Experimental Paper

BIOENERGY DIFFERENCES AMONG RACES

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ABSTRACT

The Single Square Voltage Pulse method was applied on specific acupuncture points of several thousand relatively healthy subjects from two continents. Two thousand subjects were measured in Japan and as many as thirty Hispanics, fifty Asians and fifty Caucasians, from a pool of more than two thousand five hundred subjects measured in California, were also included. No consideration was given to gender differences between males and females. From the current response curve, only the BP (Before Polarization; the pre-polarization resistance of the skin) parameter was used in this study. The data from the yearly random selection of subjects shows that Japanese, Asians and Hispanics share commonalties suggesting that they belong to one racial group while the Caucasians form another group. Japanese, Asians and Hispanics have an active functioning of the digestive organs while Caucasians are more active in the circulatory system. The Winter averages show results similar to the yearly random selection of subjects. The analysis of the Summer averaged also showed significant differences among the races.

KEYWORDS: Single Square Voltage Pulse method, pre-polarization resistance, bioenergy, racial differences, electrodermal current, biophysical measurements.

The Single Square Voltage Pulse method is gaining recognition as a diagnostic tool when applied to specific acupuncture points.[1] The pulsed voltage induced a current response, which contains meaningful biophysical information as shown by Motoyama.[1-3] In this paper we refer to bioenergy as a form of biophysical energy leading to the production of electrical potentials and currents in the body. The Single Square Voltage Pulse method is proving to be useful in many different applications. For example, the method has been used to discriminate between different levels of liver diseases,[4(pp.10-26)] to show lateral differences in cases of thoracoplasty,[4(pp.27-30)] to diagnose dental occlusions[5,6] and as a diagnostic method for rheumatoid arthritis.[2(pp62-64)] It has shown utility in diagnosing mental diseases such as neurosis.[4(pp.113-118)] The method was also used to monitor biophysical changes due to various internal and external stimuli such as image recollection, meditation, Zen and others.[7,8] It was even used to monitor relaxation during biofeedback sessions.[9] A good discussion comparing the single square voltage pulse method to other slower response mechanisms of the skin is provided by Tiller.[10]

This paper is a first step toward building a universal standard against which to determine the health condition of people. This first step involves monitoring thousands of relatively healthy individuals. We are attempting in this paper to determine if there is a difference among people of different racial origins at different periods of the year.

PURPOSE AND METHODOLOGY

PURPOSE

To investigate whether there is a difference in the bioenergy flowing through meridians (as defined by Traditional Chinese Medicine or TCM) and in the function of meridians among Asians[11] (Japanese, Chinese, etc.), Hispanics and Caucasians.[12]

DATA COLLECTION

California residents (Asians, Hispanics and Caucasians) were measured over a period of 5 years at the California Institute for Human Science (CIHS), a

private graduate school and research center in Southern California. In Japan, the Acupuncture and Moxibustion Clinic of the Motoyama Institute for Life Physics in Tokyo measured more than 2,000 Japanese subjects.

Measurement Method

The three parameters explained in the next section were measured using the Single Square Voltage Pulse (SSVP) method,[1,2,7] which in this case was a 3 Volt, 0.25 millisecond pulse. The measuring device was the AMI, which is described in detail in Motoyama.[2] A summary of the AMI and its functioning is presented in the appendix. The measuring procedure was as follows: First, the active electrodes were attached to the Jing-Well points of the twelve standard meridians and two extra meridians (stomach branch and diaphragm) and the indifferent electrodes were attached to the extensor surface of the forearms 5 cm above both wrists. The SSVP was then applied at each point successively. Finally, the AMI collected the raw data, digitized it, and the parameters were calculated.

The Meaning of the Parameters

The BP (Before Polarization) current is the initial electric current that is flowing mainly in the dermis, and has been shown to be the parameter of meridian function.[2] This meridian function relates to Chi-energy in TCM (Ki-energy in Japanese) and the term Ki-energy and bioenergy will be used interchangeably in this paper. The AP (After Polarization) current is identical to Galvanic Skin Response (GSR), and is a parameter of the autonomic nervous system (ANS). The IQ (Integral electrical charge) is the total electric charge accumulated at the basal membrane due to its function as a capacitor, and has been shown to be the parameter of the body's self defense mechanism, including the immune system.[2] It has been verified that there is a close functional relationship between a meridian and the internal organ/tissue for which that meridian is named, through the interaction between the meridian system, the viscero-cutaneous reflex system and the autonomic nervous system.[4] The analyses presented in this paper are related to the BP parameter only.

RESULTS AND DISCUSSION

No Seasonal Differentiation: Analyses and Related Considerations

The data utilized in this section were obtained from 2,000 Japanese, 30 Hispanics, 50 Asians and 50 Caucasians. The latter three groups were among the 2,500 subjects measured at the California Institute for Human Science while the data from the 2,000 Japanese subjects were measured in Japan. The average BP values of each meridian were calculated to obtain the average values for each racial group without consideration for the gender differences or the season in which the data were collected (yearly random selection).

Test for the average BP values of the 14 meridians among races. The t-test values shown in Table I indicate there are no significant differences in the average BP values of the 14 meridians for the Japanese/Hispanic, Japanese/Asian and Hispanic/Asian subjects. However, the value for Japanese/Caucasians (2.049) is very close to a value of 5% significance (2.056). The values for Hispanics/Caucasians and Asians/Caucasians show a significant difference at less than the 1% level.

This suggests that there is no significant difference in the yearly BP averages of the 14 meridians (amount of bioenergy) among Japanese, Asians and Hispanics. On the contrary, the yearly BP average of the Caucasian subjects is significantly lower than the respective averages of Japanese, Asians and Hispanics. It can be said that Japanese, Hispanics and Asians belong to the same group in the aspect of bioenergy, in comparison with Caucasians. Japanese and Asians belong to the Mongoloid race, and are considered similar in their DNA sequencing, meridian functioning and constitution. Hispanics emerged as a result of intermixing between the Spanish and Native Americans, who are Mongoloids. It seems that Hispanics predominantly inherited the meridian functioning and constitution of Native American and belong to the same group as Mongoloids concerning the amount of bioenergy.

Test for the difference of BP value variances among Asians, Hispanics and Caucasians. Table II shows that $F(2,39) = 7.25$, $p < .01$, a significant difference among the three groups of subjects (Asians, Hispanics and Caucasians).

Table I

t-test Analysis for Random Yearly Selection
Japanese/Hispanic/Asian/Caucasian

	Japanese		Hispanic-30		Asian-50		Caucasians-50	
	LU	1952	LU	1986	LU	2083	LU	1843
	LV	1903	SP	1753	SP	1795	HT	1615
	SP	1894	LV	1712	LV	1768	DI	1606
	KI	1755	HT	1705	LI	1713	SP	1561
	GB	1675	DI	1681	HT	1694	LV	1541
	SB	1659	LI	1675	DI	1678	TH	1538
	ST	1653	SI	1643	SI	1656	LI	1533
	HT	1626	HC	1640	KI	1653	SI	1528
	LI	1533	TH	1639	TH	1645	HC	1504
	SI	1527	KI	1602	HC	1639	KI	1449
	DI	1520	GB	1587	GB	1618	SB	1421
	TH	1481	SB	1563	UB	1593	GB	1411
	HC	1474	ST	1513	SB	1584	ST	1405
	UB	1338	UB	1497	ST	15672	UB	1366
Sum		22990		23195		23681		21321
Mean		1642		1657		1692		1523

t-test	Jap/His	Jap/Asian	Jap/Cauc.	His/Asian	His/Cauc.	Asian/Cauc.
Obtained t =	-0.252	-0.826	2.049	-0.732	2.950	3.557

Criterion: $t = 2.056$ ($p < .05$); $t = 2.779$ ($p < .01$); $t = 3.707$ ($p < .001$)

This indicates that a difference exists in the function of the 14 meridians and in Ki-energy among the races. This also implies that there is a difference in the functioning of the individual meridians and the level of activity of their corresponding internal organs. Table I shows that the three most active meridians (having the highest BP values or Ki-energy) starting from the highest are the Lung, Spleen and Liver in Asians and Hispanics, and the Lung, Liver

Table II

F-test Analysis for Random Yearly Selection
Hispanic—Asian—Caucasian

	df	SS	MS	Obtained F(2,39) =	Criterion F(2,38) =
Between Group	2	221849.33	110924.67	7.25	5.21
Within Group	39	596428.79	15293.05	($p < .01$)	($p = .01$)
Total	41	818278.12			

SS: Sum of the squares
MS: Mean squares = SS/df

and Spleen in Japanese. The three most active meridians are the same for Asians, Hispanics and Japanese.

In contrast, the three meridians with the highest BP values for Caucasians are the Lung, Heart and Diaphragm. Showing a similarity to the Mongoloid group, the Lung meridian is the most active, but the second and the third highest meridians are the Heart and the Diaphragm.

As explained in the meaning of parameters, the above indicates that Caucasians have more activity in the lungs, heart and diaphragm (related to cardiac functioning), and that Asians and others in the Mongoloid group have high activity in the lungs, spleen (which includes the pancreas and is internally-externally related to the stomach in TCM) and the liver. This data is thus congruent with the fact that heart disease is prevalent among countries where the majority of the population are Caucasians,[13] and Asians are prone to suffer from digestive organs diseases.[14] A reason for the Lung meridian to have the highest BP value for all races could be air pollution, which affects lung functioning. This hypothesis is based on previous research done by Motoyama, which has shown that Ki-energy accumulates in an affected meridian or internal organ, and that the BP values of the Lung meridian of individuals who come to Motoyama's acupuncture clinic from less air-polluted rural areas are lower and are not always the highest.

Archaeological and Anthropological Considerations. Here we would like to discuss some reasons why Caucasian people are highly active in the Heart and Diaphragm meridians (heart), while Asian, Hispanic and Japanese people are highly active in the Liver meridian (liver) and the Spleen meridian (pancreas and stomach), based on archaeological and anthropological considerations.

In Europe there were long glacial periods over 100,000 years in the past.[15] Agriculture, therefore, started later there than in Asia. Five thousand years ago, hunting and livestock farming were the basis of European life. In comparison, agriculture was an essential part of life in Asia 10,000 years ago. This was due to warm weather and abundant water supplies.[15] In a hunting society, people needed to run after animals, catch them, or shoot arrows or throw spears in order to capture them. During these activities, the heart must work hard to supply blood to the muscles of the hands, arms, legs and feet. It would be quite natural for the descendants of hunting tribes to have developed, genetically, a physical characteristic such as a highly active heart. At the same time, this could cause a higher rate of heart disease later in life. Asians generally settled down in a permanent place, farmed, and ate a diet mainly composed of grains.[16] Their nutritional intake was not sufficient, especially in proteins, unless a great deal of grain such as rice and wheat was ingested. This could be one reason for their highly active digestive system.

The negative side of a heavy reliance on grains for sustenance is that these grains are accumulated into the digestive organs and this could promote the occurrence of cancers of the stomach and of other digestive organs. Stomach cancer is ranked as the first cancer mortality cause among Japanese people at present.[14] On average Asians' large intestine is 20 ~ 50 cm longer than that of Caucasians.[17,18] This is probably due to the accumulation of large amounts of grain in the large intestine after digestion. It seems to be part of the genetic constitution of the farming tribes of Asia to be susceptible to diseases of the digestive organs.[14]

Chi Square tests on the frequency distributions of the three highest BP values and the three lowest BP values between Asians and Caucasians. Analyses and considerations related to Tables I and II have revealed that Caucasians have active heart functioning and tend to suffer from heart disease, while Asians have active digestive functioning and tend to develop digestive

problems. In order to certify these points, a Chi Square test was performed to examine whether there is a significant difference between Caucasians and Asians on the three highest BP values. This is shown in Table III.

Table III shows that the Lung meridian (lungs) has the highest frequency for being the most active in both the Caucasian and Asian subjects. The other high frequencies for Caucasians are found in the Heart meridian (heart), the Spleen meridian (pancreas and stomach) and the Diaphragm meridian (related to the heart). Asians have high frequencies for the Spleen meridian (pancreas and stomach) and the Liver meridian (liver). There is a significant difference at less than the 2% level between Caucasians and Asians for the frequencies of the three most active meridians (three highest BP values). This is the same tendency as was shown in Table I. In this Chi Square test, Caucasians (who live in California) also show a high frequency for high activity in the Spleen meridian (pancreas and stomach). It seems this could be due to overeating.

Table IV shows the result of the Chi Square test examining whether there is a significant difference between Caucasians and Asians using the three lowest BP values. This table shows that there is no significant difference between the two. A low BP value for a meridian means a low supply of Ki-energy by the meridian and hypo-function of the corresponding organ.

In Asians the lowest BP value is most commonly in the Stomach meridian. This is an indication of weakness in the stomach function. The next most common meridians showing low values in this racial group are the Stomach Branch meridian (also related to the stomach function), the Urinary Bladder meridian (urogenital organs), the Heart Constrictor meridian (related to the whole body and the function of heart) and the Triple Heater meridian (concerned with energy delivery to the entire body), all commonly showing high indications of weakness or hypo-functioning.

Caucasian subjects have greater indications of low energy in the Urinary Bladder meridian (urogenital organs). Next in order are the Stomach meridian (stomach), the Gall Bladder meridian (gall bladder) and the Stomach Branch meridian (stomach).

Both Asians and Caucasians possess most common indications of low energy in the Stomach Meridian (stomach), the Stomach Branch meridian (stomach)

Table III
Chi Square Analysis for 50 Asians/Caucasian

High 3 Highest	LU	LI	HC	DI	TH	HT	SI	SP	LV	ST	SB	GB	KI	UB	
Asian-Hi	46	15	4	7	0	9	5	25	21	0	0	2	10	6	150
Caucasian-Hi	48	8	2	18	3	24	2	21	16	0	1	1	5	1	150
Total	94	23	6	25	3	33	7	46	37	0	1	3	15	7	300
E															
Asian-Hi	47	11.5	3	12.5	1.5	16.5	3.5	23	18.5	0	0.5	1	7.5	3.5	150
Caucasian-Hi	47	11.5	3	12.5	1.5	16.5	32.5	23	18.5	0	0.5	1.5	7.5	3.5	150
Total	94	23	6	25	3	33	7	46	37	0	1	3	15	7	300
X^2															
Asian-Hi	0.02	1.07	0.33	2.42	1.5	3.41	0.64	0.17	0.34	0	0.5	0.17	0.83	1.79	*
Caucasian-Hi	0.02	1.07	0.33	2.42	1.5	3.41	0.64	0.17	0.34	0	0.5	0.17	0.83	1.79	**
Total	0.04	2.13	0.67	4.84	3	6.82	1.29	0.35	0.68	0	1	0.33	1.67	3.57	***

	* Obtained ** X^2	Criterion X^2	
	** 26.4	24.7	
df = 13		(p <.025)	(p = .025)

Table IV
Chi Square Analysis for 50 Asians/Caucasians

Low 3 Lowest	LU	LI	HC	DI	TH	HT	SI	SP	LV	ST	SB	GB	KI	UB	
Asian-Low	0	6	16	10	15	9	10	2	4	24	17	13	9	15	150
Caucasian-Low	0	7	13	4	7	2	5	5	6	23	18	21	13	26	150
Total	0	13	29	14	22	11	15	7	10	47	35	34	22	41	300
E															
Asian-Low	0	6.5	14.5	7	11	5.5	7.5	3.5	5	23.5	17.5	17	11	20.5	150
Caucasian-Low	0	6.5	14.5	7	11	5.5	7.5	3.5	5	23.5	17.5	17	11	20.5	150
Total	0	13	29	14	22	11	15	7	10	47	35	34	22	41	300
X^2															
Asian-Low	0	0.04	0.16	1.29	1.45	2.23	0.83	0.64	0.20	0.01	0.01	0.94	0.36	1.48	*
Caucasian-Low	0	0.04	0.16	1.29	1.45	2.23	0.83	0.64	0.20	0.01	0.01	0.94	0.36	1.48	**
Total	0	0.08	0.31	2.57	2.91	4.45	1.67	1.29	0.40	0..02	0.03	1.88	0.73	2.95	***

	* Obtained ** X^2	Criterion X^2
**	19.3	22.4
df = 13	N.S.	(p = .05)

and the Urinary Bladder meridian (urogenital organs), marking a tendency for hypo-function or susceptibility to sickness in the corresponding organs. This seems a common characteristic of the races living in the United States. In the future, an important research theme will be determination of the cause of the functional deterioration, which appears common to people living in the United States, despite racial differences. This may be the result of commonalties in the natural environment, food habits and life styles.

Summer (July, August and September) and Winter (January, February and March): Analyses and Related Considerations

The examination for Summer (July, August and September) was performed on the data from 160 Japanese, 22 Hispanics, 22 Asians and 22 Caucasians. The examination for Winter (January, February and March) was done on the data from 194 Japanese, 42 Hispanics, 42 Asians and 42 Caucasians. The Hispanic, Asian and Caucasian data were randomly extracted from 2500 AMI readings accumulated at the California Institute for Human Science, because the number of Hispanics were limited at 22 for Summer and 42 for Winter.

Summer t-test results. Table V shows the Summer averages of BP values for Asian, Hispanic, Caucasian and Japanese subjects. In the yearly averages of BP values calculated without considering the seasonal difference, there were no significant differences between Asians, Japanese and Hispanics, but there were significant differences between Caucasians and each group of the Mongoloids (Asians, Japanese and Hispanics). Differing from the yearly BP value evaluation, the Summer averages of BP values showed significant differences at the high levels (5% ~ 0.1%) among racial groups. The average BP values of all meridians are: Japanese 1892μA, Hispanics 1756μA, Asians 1623μA and Caucasians 1470μA. So the Japanese have the highest average BP value while Caucasians have the lowest average BP value.

This result could be due to the high humidity and high temperature in July, August and September in Japan. The high humidity and temperature levels result in sweating, and expansion of capillaries and increases in blood and

Table V

t-test for Summer (Jul.—Aug.—Sept.)
of Hispanic/Asian/Caucasian/Japanese

Hispanic		Asian		Caucasian		Japanese	
LU	2134	LU	1922	LU	1713	LU	2222
SP	1932	SP	1786	SP	1586	SP	213
LV	1865	LV	1748	LV	1523	LV	2118
LI	1770	KI	1653	GB	1481	KI	1977
HT	1753	HT	1616	DI	1475	GB	1916
SI	1724	LI	1598	UB	1460	SB	1892
DI	1722	DI	1589	HT	1459	HT	1855
KI	1714	GB	1582	SI	1455	ST	1853
TH	1703	ST	1570	TH	1435	LI	1810
HC	1699	TH	1563	LI	1423	SI	1763
GB	1690	SB	1563	HC	1403	UB	1750
UB	1669	SI	1554	SB	1401	DI	1741
SB	1609	HC	1525	KI	1396	HC	1735
ST	1603	UB	1456	ST	1375	TH	1713
Sum	24587		22725		20585		26481
Mean	1756		1623		1470		1892

t-test	His/Asian	His/Cauc	His/Japanese	Asia/Cauc	Asian/Japanese	Cauc/Japanese
Obtained t =	2.701	6.464	-2.346	3.820	-4.922	-8.418

Criterion: $t = 2.056$ ($p < .05$); $t = 2.779$ ($p < .01$); $t = 3.707$ ($p < .001$)

body fluid flow in the dermis, which are due to the predominant function of the parasympathetic nervous system.

During the same period, California is much less humid. Because the air is dry, so is the skin, and hence the conductivity of the epidermis and dermis is less than that in Japan. It can be surmised that the BP values of Caucasians,

Hispanics and Asians living in California are consequently lower than that of Japanese people living in Japan.

Winter *t*-tests results. Table VI shows the Winter averages of BP values with the *t*-test results. There were significant differences at the 5% ~ 1% levels for Hispanics/Caucasians, Hispanics/Japanese, Asians/Caucasians and Caucasians/Japanese. There were no significant differences for Hispanics/Asians and Asians/Japanese. Except for the 5% significance between Hispanics and Japanese, this test result is almost the same as the results of the yearly BP average examination.

This result also seems to indicate that Asians, Hispanics and Japanese (the same Mongoloid race, different racial group from Caucasians) have a similar constitution and meridian functioning. However, it is interesting to note that, in Winter, the average BP value of all the meridians is highest for the Caucasians at 1601μA and that of the Japanese is lowest at 1360μA, while in Summer the situation is reversed with the Japanese having the highest BP average value at 1892mA and Caucasians having the lowest at 1470μA. Also in Winter, the Hispanic average BP value at 1487μA and the Asian value at 1419μA are lower than that of Caucasians while in Summer their average values of 1756μA and 1623μA are both higher than that for Caucasians.

How do we interpret these results? BP is the electric current flowing through the dermis, and depends on the amount of blood and body fluid flow, the amount of electric charge of positive and negative ions, the amount of negative charge of mucopolysaccharides (hyaluronic acid, chondroitin sulfate, among others).[2] Consequently, an increase in the BP value is due to an increase of the above mentioned factors, and conversely, a decrease in the above factors will result in a decrease in the BP value. For Japanese, Asians and Hispanics, it can be considered that (a) in Summer, these factors increased in the dermis due to the predominant functioning of the parasympathetic nervous system, resulting in the increase of the BP values, and that (b) in Winter, the capillaries contracted and blood and body fluid flows decreased in the dermis due to the predominant functioning of the sympathetic nervous system, resulting in the decrease of BP value.

Table VI

***t*-test Analysis for Winter (Jan,—Feb.—Mar.) of Hispanic/Asian/Caucasian/Japanese**

Hispanic		Asian		Caucasian		Japanese	
LU	1851	LU	1812	LU	2024	LU	1616
HT	1613	SP	1494	HT	1670	LC	1585
DI	1556	LV	1475	DI	1660	SP	1558
TH	1537	HT	1463	LI	1658	KI	1442
SI	1517	SI	1435	SP	1635	ST	1377
SP	1514	DI	1427	LV	1625	HT	1374
LI	1508	LI	1424	TH	1614	GB	1356
HC	1504	TH	1380	SI	1604	SB	1342
LV	1493	HC	1376	HC	1583	DI	1264
GB	1377	KI	1359	KI	1529	SI	1251
KI	1373	GB	1316	ST	1466	UB	1237
SB	1365	SB	1309	SB	1462	LI	1231
ST	1349	UB	1305	GB	1455	TH	1211
UB	1267	ST	1286	UB	1435	HC	1192
Sum	20822		19861		22419		19036
Mean	1487		1419		1601		1360

t-test	His/Asian	His/Cauc	His/Japanese	Asia/Cauc	Asian/Japanese	Cauc/Japanese
Obtained t =	1.321	-2.073	2.360	-3.450	1.133	4.392

Criterion: $t = 2.056$ ($p < .05$); $t = 2.779$ ($p < .01$); $t = 3.707$ ($p < .001$)

On the contrary, the BP average of Caucasians is 1601μA in Winter, which is higher than their Summer BP average (1470μA). In general, Caucasians have a thicker epidermis, thicker subcutaneous fatty tissues and more body hair than Asians and Japanese.[19-21] Therefore, the effect of heat and cold is not as easily transmitted to the dermis as it is for the Asians and Hispanics who live in California and the Japanese who live in Japan. Furthermore, the heart of

Table VII

F-test Analysis for Summer (Jul.—Aug.—Sept.) of Hispanic/Asian/Caucasian

Hispanic—Asian—Caucasian				Obtained	Criterion
	df	SS	MS	F(2,39)=	F(2,40)=
Between	2	572920.19	286460.10	20.53	8.25
Within	39	544247.93	13955.08	(p < .001)	(p = .001)
Total	41	1117168.12			

His/Asian				Obtained	Criterion
	df	SS	MS	F(1,26)=	F(1,26)=
Between	1	123823.00	123823.00	7.30	5.66
Within	26	441158.71	16967.64	(p < .025)	(p = .025)
Total	27	564981.71			

His/Caucasian				Obtained	Criterion
	df	SS	MS	F(1,26)=	F(1,26)=
Between	1	572000.14	572000.14	41.78	13.7
Within	26	355979.57	13691.52	(p < .001)	(p = .001)
Total	27	927979.71			

Asian/Caucasian				Obtained	Criterion
	df	SS	MS	F(1,26)=	F(1,26)=
Between	1	163557.14	163557.14	14.60	13.7
Within	26	291357.57	11206.06	(p < .001)	(p = .001)
Total	27	454914.71			

Caucasians has been shown here to be more active than in Mongoloids, with a resulting higher blood flow even in Winter. The above could be the reason that Caucasian people show Winter BP > Summer BP, which is reverse to Winter BP < Summer BP for the Mongoloid races. This hypothesis needs further research for substantiation, and other explanations should also be sought.

Summer data variance analyses. Table VII presents the F-test results for the data presented in Table V between Hispanic, Asian and Caucasian subjects.

These results show that there exist statistically significant differences ranging from 2.5% to 0.1% among these three races for variance of BP values of the 14 meridians. This indicates that each race of subjects is not of the same group based upon variance of BP values.

Referring back to Table V, the three meridians with the highest BP values for Hispanics, Asians and Caucasians are, in order from the highest to the third highest, Lung, Spleen and Liver. The lowest three meridians are, in order from the lowest to the third lowest, Stomach, Stomach Branch and Urinary Bladder for Hispanics, Urinary Bladder, Heart Constrictor and Small Intestine for Asians, Stomach, Kidney and Stomach Branch for Caucasians. These differences in the lowest meridians show a definite difference among the races. Caucasians show a deterioration of the function of the Stomach and Kidney meridians; Hispanics show a similar tendency for the Stomach and for the Urinary Bladder; Asians show hypo-function of the Urinary Bladder, Heart Constrictor and Small Intestine meridians, which is a different tendency from Caucasians and Hispanics.

Winter Data Variance Analyses. Table VIII was constructed using the data from Table VI, to examine whether there is a significant difference among races in variance of BP values for the 14 meridians. There is a significant difference of variance at less than the 1% level between Hispanics, Asians and Caucasians compared as a group. There is no significant difference even at the 5% level between Hispanics and Asians. There is a significant difference at less than the 5% level between Hispanics and Caucasians, and there is a significant difference between Asians and Caucasians at less than the 1% level. As mentioned earlier, the non-significant difference between Hispanics and Asians can be explained in the basis that they both belong to the Mongoloid race. So this data indicates that Hispanics and Asians belong to a different group from Caucasians in variance of BP values for the 14 meridians.

Referring back to Table VI, however, one can see that the meridians with the three highest BP values are the Lung, Heart and Diaphragm for Hispanics; the Lung, Spleen and Liver for Asians; the Lung, Heart and Diaphragm for Caucasians; and the Lung, Liver and Spleen for Japanese. Here Asians and Japanese show a similar tendency while Hispanics and Caucasians have a similar tendency. This data indicates that Asians and Japanese belong to one group, while Hispanics and Caucasians belong to another.

Table VIII

F-test Analysis for Summer (Jan.—Feb.—Mar.) of Hispanic/Asian/Caucasian

Hispanic—Asian—Caucasian				Obtained	Criterion
	df	SS	MS	F(2,39)=	F(2,40)=
Between	2	238466.0	119233.0	5.99	5.18
Within	39	776357.3	19906.6	($p < .01$)	($p = .01$)
Total	41	1014823.2			

His/Asian				Obtained	Criterion
	df	SS	MS	F(1,26)=	F(1,26)=
Between	1	33017.2	33017.2	1.75	4.23
Within	26	491646.3	18909.5	N.S.	($p = .05$)
Total	27	524663.5			

His/Caucasian				Obtained	Criterion
	df	SS	MS	F(1,26)=	F(1,26)=
Between	1	91014.1	91014.1	4.30	4.23
Within	26	550626.5	21177.9	($p < .05$)	($p = .05$)
Total	27	641640.6			

Asian/Caucasian				Obtained	Criterion
	df	SS	MS	F(1,26)=	F(1,26)=
Between	1	233667.6	233667.6	11.90	7.72
Within	26	510441.8	19632.4	($p < .01$)	($p = .01$)
Total	27	744109.4			

Still looking at Table VI, the meridians with the three lowest BP values (from the lowest up) are the Urinary Bladder, Stomach and Stomach Branch for Hispanics; the Stomach, Urinary Bladder and Stomach Branch for Asians; the Urinary Bladder, Gall Bladder and Stomach Branch for Caucasians; and the Heart Constrictor, Triple Heater and Large Intestine for Japanese. While it is apparent that Hispanics, Asians and Caucasians living in California show similar tendencies, that is deterioration of the urogenital system as well as the digestive

system, the Japanese measured in Japan show a different inclination indicating deterioration of the Heart Constructor and Triple Heater, which are in charge of Ki energy distribution throughout the body.

These results coincide with the data presented in Table IV for yearly random selection of subjects. This suggests that the functions of bioenergy, meridians and internal organs become homogenized among different races when the natural environment, climactic conditions, food habits and life styles become similar. However, the variance analyses for BP values of the 14 meridians show significant differences among races, indicating that there still remains a basic difference.

Chi-square analysis for the meridians with the three highest and three lowest BP values in Summer. According to Table IX, there is no significant difference for the frequency distribution of the three highest BP values between Asians and Caucasians. For both groups, the Lung, Spleen and Liver are the meridians with the highest, second highest and third highest BP values respectively.

There is no significant difference either for the meridians with the three lowest BP values between Asians and Caucasians. The meridian which showed the highest frequency for the lowest meridian is the Urinary Bladder for Asians and the Heart Constrictor for Caucasians, but this difference in the lowest meridian is insufficient to insure an overall significant difference.

Chi-square analysis for the meridians with the three highest and three lowest BP values in Winter. No significance is observed in Table X for the frequency distribution of the three highest meridians between Asians and Caucasians. Both Asians and Caucasians have high frequencies in the Lung and Spleen meridians. One difference seen between Asians and Caucasians is that Asians often show a high BP value in the Liver meridian, as do Caucasians in the Diaphragm meridian.

There is no significant difference in frequency distribution of the lowest BP values between Asians and Caucasians. Low readings are often found in the Urinary Bladder, Stomach, Gall Bladder and Stomach Branch meridians, indicating that the organs corresponding to these meridians are hypo-functioning in both races.

Table IX

Chi Square Analysis for 22 Asians/WCaucasians—Summer (Jul.—Aug.—Sept.)

High 3 Highest	LU	LI	HC	DI	TH	HT	SI	SP	LV	ST	SB	GB	KI	UB		
Asian	20	2	0	1	0	6	0	15	12	2	2	2	4	0	66	
Caucasian	18	3	1	2	0	3	0	13	9	2	2	3	6	4	66	
Total	38	5	1	3	0	9	0	28	21	4	4	5	10	4	132	
E																
Asian	19	2.5	0.5	1.5	0	4.5	0	14	10.5	2	2	2.5	5	2	66	
Caucasian	19	2.5	0.5	1.5	0	4.5	0	14	10.5	2	2	2.5	5	2	66	
Total	38	5	1	3	0	9	0	28	21	4	4	5	10	4	132	
X^2																
Asian	0.05	0.10	0.50	0.17	0.00	0.50	0.00	0.07	0.21	0.00	0.00	0.10	0.20	2.00	Obtained	Criterion
Caucasian	0.05	0.10	0.50	0.17	0.00	0.50	0.00	0.07	0.21	0.00	0.00	0.10	0.20	2.00	X^2	X^2
Total	0.11	0.20	1.00	0.33	0.00	1.00	0.00	0.14	0.43	0.00	0.00	0.20	0.40	4.00	7.8	22.4
df = 13															N.S.	(p = .05)

Low 3 Lowest	LU	LI	HC	DI	TH	HT	SI	SP	LV	ST	SB	GB	KI	UB		
Asian	0	3	5	3	3	4	7	1	2	7	9	6	3	13	66	
Caucasian	1	7	11	4	5	3	3	1	3	8	4	2	9	5	66	
Total	1	10	16	7	8	7	10	2	5	15	13	8	12	18	132	
E																
Asian	0.5	5	8	3.5	4	3.5	5	1	2.5	7.5	6.5	4	6	9	66	
Caucasian	0.5	5	8	3.5	4	3.5	5	1	2.5	7.5	6.5	4	6	9	66	
Total	1	10	16	7	8	7	10	2	5	15	13	8	12	18	132	
X^2																
Asian	0.50	0.80	1.13	0.07	0.25	0.07	0.80	0.00	0.10	0.03	0.96	1.00	1.50	1.78	Obtained	Criterion
Caucasian	1.50	0.80	1.13	0.07	0.25	0.07	0.80	0.00	0.10	0.03	0.96	1.00	1.50	1.78	X^2	X^2
Total	1.00	1.60	2.25	0.14	0.50	0.14	1.60	0.00	0.20	0.07	1.92	2.00	3.00	3.56	17.98	22.36
df = 13															N.S.	(p = .05)

Table X
Chi Square Analysis for 22 Asians/Caucasians—Winter (Jan.—Feb.—Mar.)

High 3 Highest	LU	LI	HC	DI	TH	HT	SI	SP	LV	ST	SB	GB	KI	UB		
Asian	39	11	3	6	3	13	5	18	15	0	0	2	8	3	126	
Caucasian	41	17	1	16	1	14	4	15	9	1	1	0	3	3	126	
Total	80	28	4	22	4	27	9	33	24	1	1	2	11	6	252	
E																
Asian	40	14	2	11	2	13.5	4.5	16.5	12	0.5	0.5	1	5.5	3	126	
Caucasian	40	14	2	11	2	13.5	4.5	16.5	12	0.5	0.5	0	5.5	3	126	
Total	80	28	4	22	4	27	9	33	24	1	1	2	11	6	252	
X^2																
Asian	0.03	0.64	0.50	2.27	0.50	0.02	0.06	0.14	0.75	0.50	0.50	1.00	1.14	0	Obtained	Criterion
Caucasian	0.03	0.64	0.50	2.27	0.50	0.02	0.06	0.14	0.75	0.50	0.50	1.00	1.14	0	X^2	X^2
Total	0.05	1.29	1.00	4.55	1.00	0.04	0.11	0.27	1.50	1.00	1.00	2.00	2.27	0	7.8	22.4
df = 13															N.S.	(p = .05)

Low 3 Lowest	LU	LI	HC	DI	TH	HT	SI	SP	LV	ST	SB	GB	KI	UB		
Asian	0	9	11	4	12	1	6	2	1	19	16	15	13	17	126	
Caucasian	0	5	9	4	3	1	2	4	1	20	20	26	6	25	126	
Total	0	14	20	8	15	2	8	6	2	39	36	41	19	42	252	
E																
Asian	0	7	10	4	7.5	1	4	3	1	19.5	18	20.5	9.5	21	126	
Caucasian	0	7	10	4	7.5	1	4	3	1	19.5	18	20.5	9.5	21	126	
Total	0	14	20	8	15	2	8	6	2	39	36	41	19	42	252	
X^2																
Asian	0	0.57	0.1	0	2.7	0	1	0.33	0	0.01	0.22	1.48	1.29	0.76	Obtained	Criterion
Caucasian	0	0.57	0.1	0	2.7	0	1	0.33	0	0.01	0.22	1.48	1.29	0.76	X^2	X^2
Total	0	1.14	0.2	0	5.4	0	2	0.67	0	0.03	0.44	2.95	2.58	1.52	16.93	22.36
df = 13															N.S.	(p = .05)

CONCLUSION

Conclusions Based on Analyses and Consideration of the Data from the Yearly Random Selection of Subjects

(1) From analysis and consideration of Table I, it can be said that Japanese living in Japan and Asians & Hispanics living in the United States (mainly California) belong to the same racial group, but that Caucasians are a different race, with regard to BP averages (bioenergy).

(2) From analyses and consideration of Tables I & II, there is a significant variance in the BP values of the 14 individual meridians in relation to their distributions in Caucasians/Asians and in Caucasians/Hispanics. Asians, Hispanics and Japanese have active functioning in the meridians related with the digestive system, as do Caucasians in the meridians related with cardiac functioning. All Japanese, Asians, Hispanics and Caucasians have a high Ki-energy level of the Lung Meridian (highly active function of the lung). This could be due to air pollution.

(3) The analysis of Table III confirms the results obtained from Table I and Table II, and indicates that Caucasians also have a highly active Spleen meridian (stomach and pancreatic function).

(4) From the analysis of Table IV, there is no significant difference between Caucasians and Asians in relation to the frequency of the three lowest BP values. Both races show a similar tendency, that is, hypo-activity of the Stomach and Urinary Bladder Meridians (susceptibility to stomach and urogenital diseases). This result may indicate that when people live under a similar natural environment, food habits and life styles, the functioning of their meridians and corresponding internal organs/tissues develop similarities that transcend racial differences. To understand the cause and the mechanism of these tendencies is one of our future research themes.

Conclusions Based on the Analysis and Considerations of the Data From Summer and Winter

(1) Summer averages of BP values of the 14 meridians in Table V show significant differences among races.

Winter averages of the BP values in Table VI show the same results with the time-of-year differences among races except for significant difference between Hispanics and Japanese. Significant differences exist for Caucasians/Hispanics, Caucasian/Asians and Caucasians/Japanese, Hispanics/Japanese, but no significant differences are seen in comparisons for Hispanics/Asians and Asians/Japanese. This suggests that Asians, Japanese and Hispanics belong to the same grouping, which is different from the group of Caucasians. However, in Summer, Asians, Hispanics and Japanese have higher average BP values than Caucasians while in Winter the situation is reversed with Caucasians showing more bioenergy. This indicates bioenergy-related racial difference with seasons between Caucasians and the Mongoloid group. The reasons have been already discussed (see page 11).

(2) From Tables VII and VIII, the variances of BP values of the 14 meridians in both Summer and Winter show that there are significant differences between races, except between Hispanics and Asians in Winter. To this extent one can consider that each of the four groups is a different race with different functioning of each meridian and of each organ.

It is clear, from the analysis of the Summer data in Table V, that all races have in common the highest BP values in the Lung (highest), Spleen (second highest) and Liver (third highest) meridians. Regarding the three lowest BP values, the lowest, second lowest and third lowest values are seen in the Stomach, Kidney and Stomach Branch meridians for Caucasians, in the Stomach, Stomach Branch and Urinary Bladder meridians for Hispanics, in the Urinary Bladder, Heart Constrictor and Small Intestine meridians for Asians, and Triple Heater, Heart Constrictor and Diaphragm meridians for Japanese. Therefore, in Summer there is a similar tendency among Caucasians and Hispanics, but Asians show a different tendency. Japanese who live in Japan show a different tendency from Caucasians, Asians and Hispanics who live in California.

In Winter, Hispanics and Caucasians show a similar tendency with the highest BP values in the Lung and Heart meridians. Asians and Japanese show a similar tendencies with the highest BP values in the Lung, Liver and Spleen meridians. In this regard, Caucasians and Hispanics belong to a different group from the group of Asians and Japanese. Considering

the lowest BP values, Asians, Caucasians and Hispanics living in California have deteriorated functions of the Urinary Bladder, Stomach and Stomach Branch meridians, while Japanese living in Japan shows deficient function of the overall body energies represented by the Heart Constrictor and Triple Heater meridians.

These results may indicate that some kind of assimilation phenomena is taking place between races when they live under a similar natural environment, climactic conditions and life styles, and that this assimilation takes place more easily in Winter when people feel cold. However, we should remember that the variance of BP values indicated that activity of the 14 meridians is different between the races even in Winter.

(3) The Chi-square tests were performed on the frequency distributions of the three highest an the three lowest BP values in Summer and Winter only between Asians and Caucasians, because of the low number of Hispanic subjects available to this study. This result shows that there are no differences in the frequency distribution of the highest and the lowest BP values. This would mean that Asians and Caucasians living in California have similar functioning of the meridians and their corresponding organs.

An important question raised by this pilot study concerns the assimilation phenomena that seems to be represented in our data. Do these results imply that there is an assimilation phenomenon taking place spontaneously when races, with different genetic backgrounds, live in a similar natural environment, climactic conditions, food habits and life styles (social environment)? We believe that exploring possible answers to these questions is important in helping sociologists to understand the dynamics of race relationships.

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APPENDIX A

INTRODUCTION TO THE AMI

PURPOSE OF THE AMI—RAPID DIAGNOSIS. The AMI is a high-speed diagnostic instrument developed by Hiroshi Motoyama, Ph.D., Director of the Institute for Religious Psychology (Japan) and President of the California Institute for Human Science (U.S.). Unlike conventional medical checkups, an AMI diagnosis takes less than 10 minutes from hooking-up the patient to printing out the diagnostic evaluation. The AMI measures the electrical conductivity, capacitance, and polarization of skin tissue and fluids; it uses these to evaluate the tissue condition and the functioning of the acupuncture meridians and their corresponding internal organs.

The 10-minute AMI evaluation tells you:

- The condition of the meridians and the functioning of their corresponding internal organs—lung, large intestine, heart, small intestine, spleen, liver, stomach, urinary bladder, kidney, and gall bladder;
- Pre-disease states: vulnerability to disease striking the heart, urinary, throat, skin, and other organs;
- Suggested treatment points: maximally effective acupoints for the treatment of identified diseases or pre-disease states:
- Whether Ki energy is excessive or deficient,
- An objective analysis of the autonomic nervous system:
- The effects of acupuncture, meditation, and exercise throtiqh continuous monitorinq of the autonomic nervous system and Ki energy;
- Sensitive skin measurements useful for biofeedback.

OPERATING THE AMI. The complete AMI apparatus (Figure A1) consists of

- *electrodes* to measure currents in the skin (28 electrodes placed atop acupoints, 2 ground electrodes),
- an *electrode pen* to apply voltage to the 28 electrodes and record response current from the body;
- an *electrode box* which inputs and outputs signals to and from the electrodes;

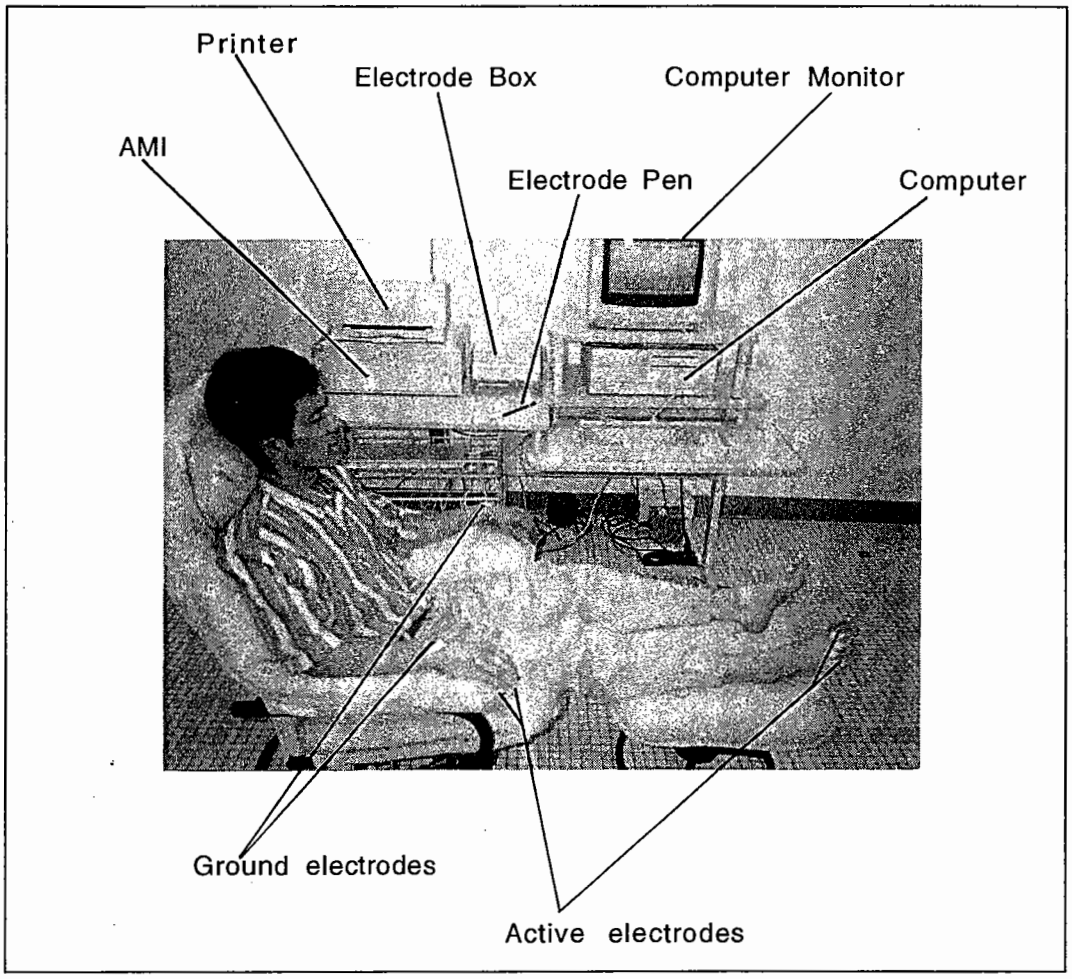

Figure A1. *The AMI apparatus.*

- the *AMI* itself which analyzes the signals from the electrodes:
- a *computer* to control the entire measuring process and run diagnostic software on the information from the AMI;
- a *monitor* to display command options and real-time graphs of the measured skin currents;
- a *printer* to output the diagnostic charts.

We begin the diagnosis by asking the subject to remove his or her socks and shoes and relax in a chair. We place active electrodes (electrodes where we will apply a voltage) to 28 points around the nailbeds of the fingers and toes called Sei or Well Points (Figure A2 identifies these points by giving their associated meridians). We also place a pair of ground electrodes, one electrode atop each wrist, to complete an electrical circuit.

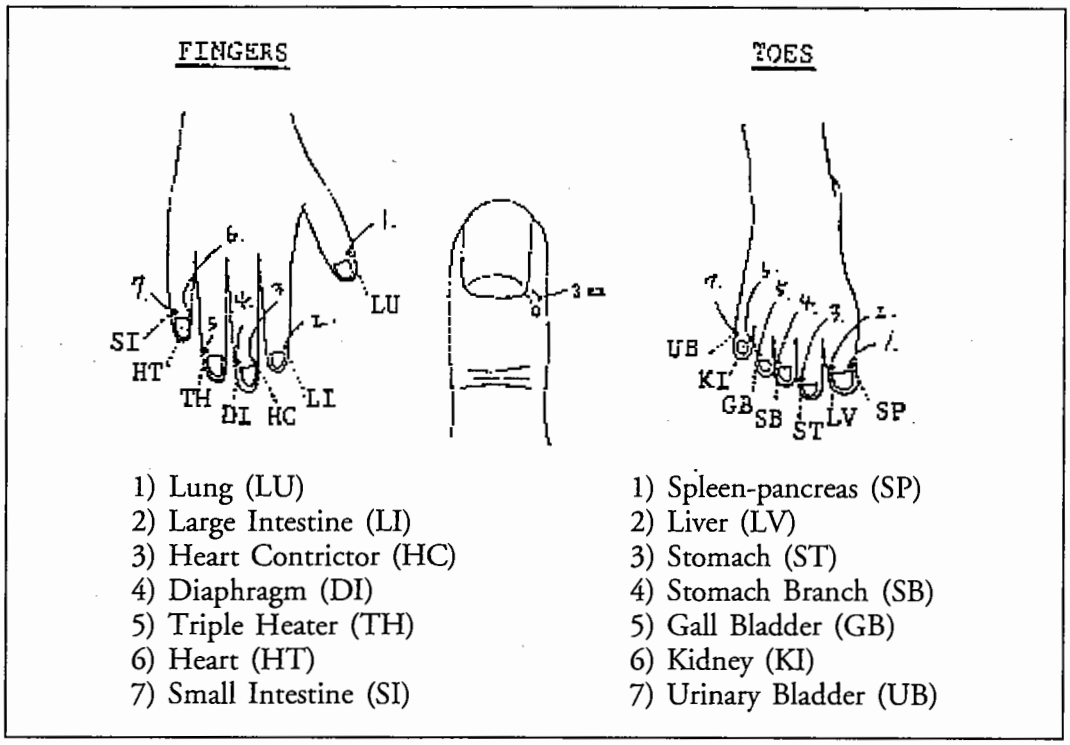

Figure A2. *Sei ponts and corresponding meridians.*

We give each Sei point a short, 3-volt pulse by touching the active electrode placed over the Sei point with an electrode pen (see Figure A3). The resulting electrical current within the skin is measured and parametrized by quantities BP, AP, IC. These parameters are then analyzed to generate a printed diagnosis. From start to finish, the AMI evaluation takes less than 10 minutes.

Background: Meridians and Sei Points. According to the teachings of traditional Chinese medicine, Sei points are points on the fingers and toes where meridians begin or end. Meridians are channels within the human body which direct the flow of ki energy, a life energy distinct from the usual physical energies. An example of a meridian is the Lung Meridian (see Figure A4) which courses through the lungs and runs down the arm before terminating at its Sei point located near the nailbed of the thumb.

For 4000 years, Oriental medicine has known the existence of these meridians. However, Western medicine has failed in surgically detecting them.

Dr. Motoyama at the Institute tor Religious Psychology has shown that meridians exist not as easily detectable ducts or tubes (like blood vessels), but as dynamically changing and shifting channels, like channels of water beneath the earth. Indeed, meridians are

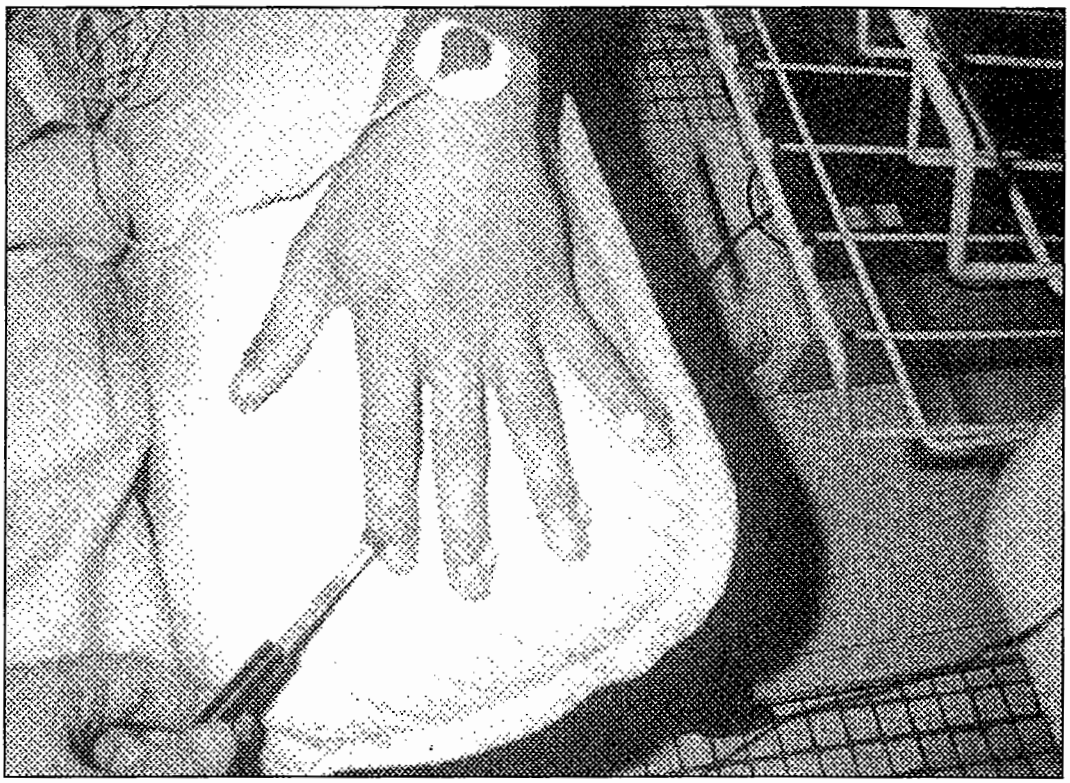

Figure A3. *Applying electrode pen to electrode.*

water channels that run beneath the skin. A more specific, biophysiological conception defines meridians as the water-rich phase of connective tissue.

The flow of the biochemical constituents (sodium, potassium calcium chloride, etc.) in this water-rich phase corresponds to the flow of Ki energy. If these biochemical constituents stagnate, so too does Ki flow and vice versa.

Basic Physics of the AMI Measurement—The Measured Current. The behavior of these biochemical constituents can be measured electrically because they exist as ions (atoms which carry charge, having lost or gained some electrons)—their flow through the meridians creates an electrical current. By measuring this electrical current, we can detect the flow of these ions and thereby deduce the flow of Ki energy.

The electrodes placed on the Sei points and the ground electrodes placed on the wrists complete an electrical circuit which connects to the AMI measuring apparatus (Figure A5). When we touch a Sei point electrode with the electrode pen, the circuit receives a pulse (a square wave) of 3 volts and 1/1000 second duration. Figure A6 shows the general form of this applied voltage.

The electrode pen picks up the current in the skin which results from the applied voltage. Figure A6 shows this resulting current versus time. The current initially shoots straight up, reaching a peak typically around 2000 to 3000μA. But as the ions within the skin flow and polarize their charge distribution, they begin to screen out the effect of the applied voltage. Thus, the current dwindles down, eventually flattening out at a steady DC value typically 100 times smaller than the initial peak (Figure A6 does not show this difference nor the decay time constant to scale).

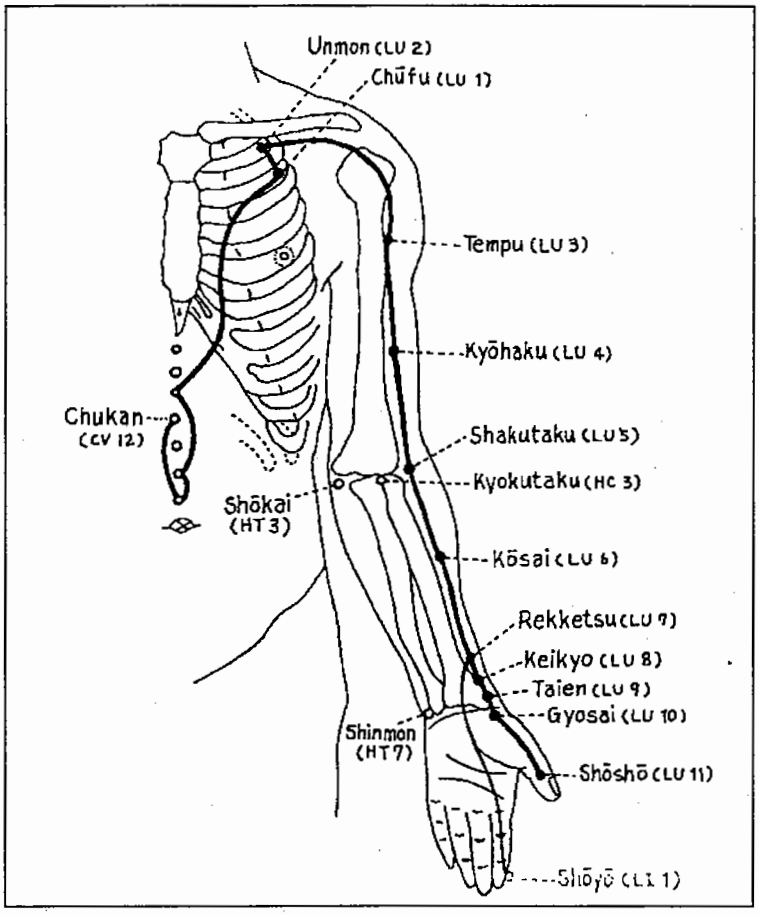

Figure A4. *Lung Meridian.*

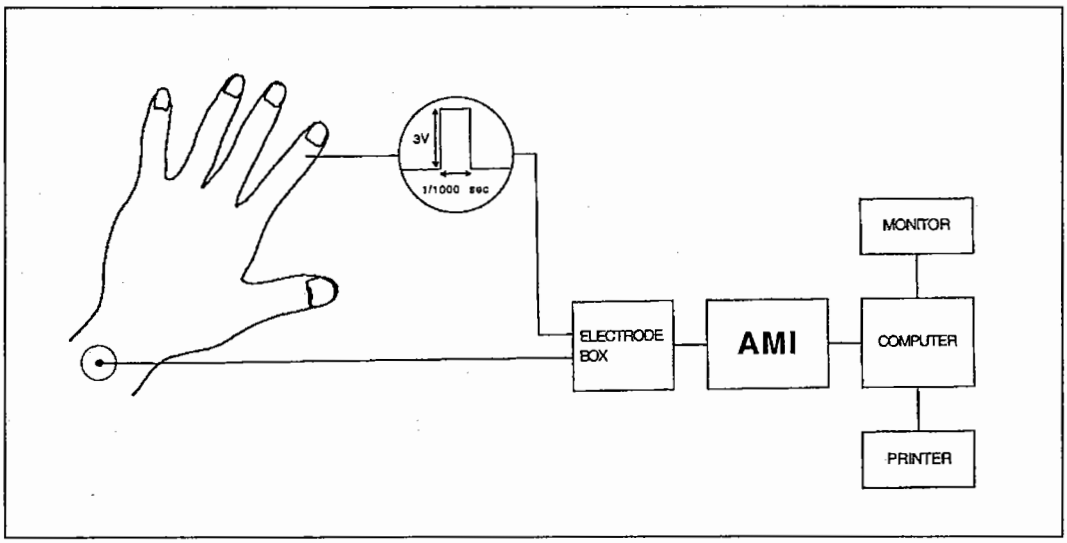

Figure A5. *Block diagram of circuit.*

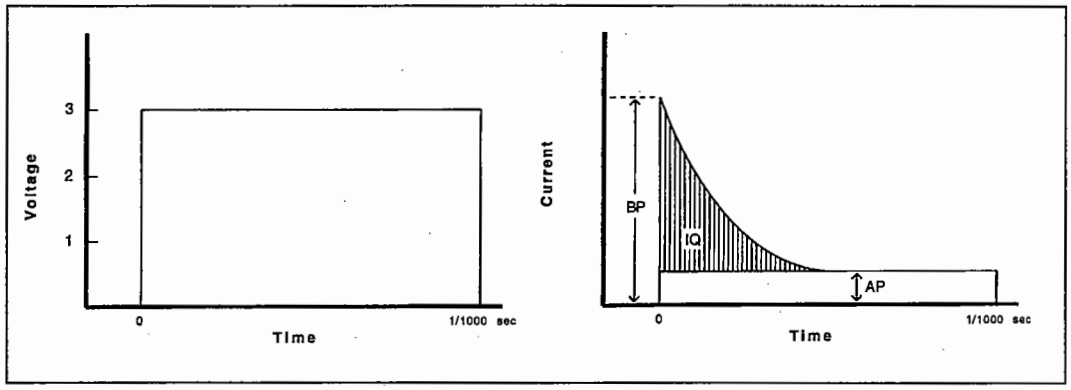

Figure A6. *Applied voltage and resulting current.*

The shape of current flow is parametrized by three parameters: BP, AP, IQ. BP (Before Polarization) is the value of the peak current. AP (After Polarization) is the value of the residual DC current—the plateau in the diagram at 10 to 30 μA.. IQ is the total electrical charge accumulated in the polarization. Schematically, IQ is the area of the shaded region.

Skin Structure. The stratified layers of the skin consist of two basic parts: the epidermis and the dermis. These two layers are separated by a barrier membrane (the basal membran), an electrical insulating layer (Figure A7). When voltage is applied the electrodes put an electrical potential across this membrane. The electrical potential

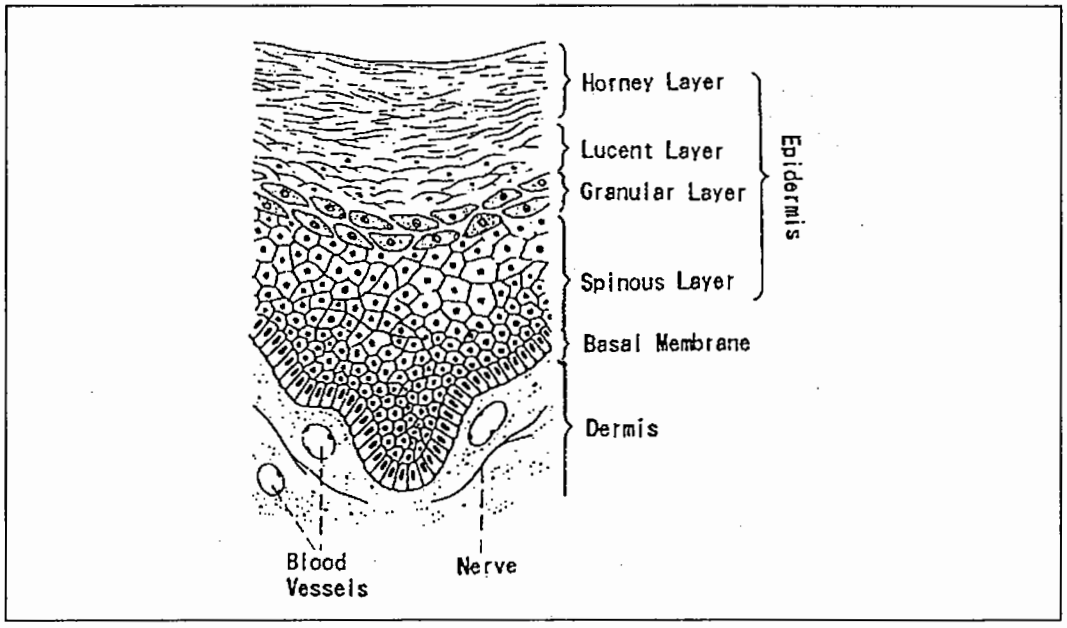

Figure A7. *Layers of the skin.*

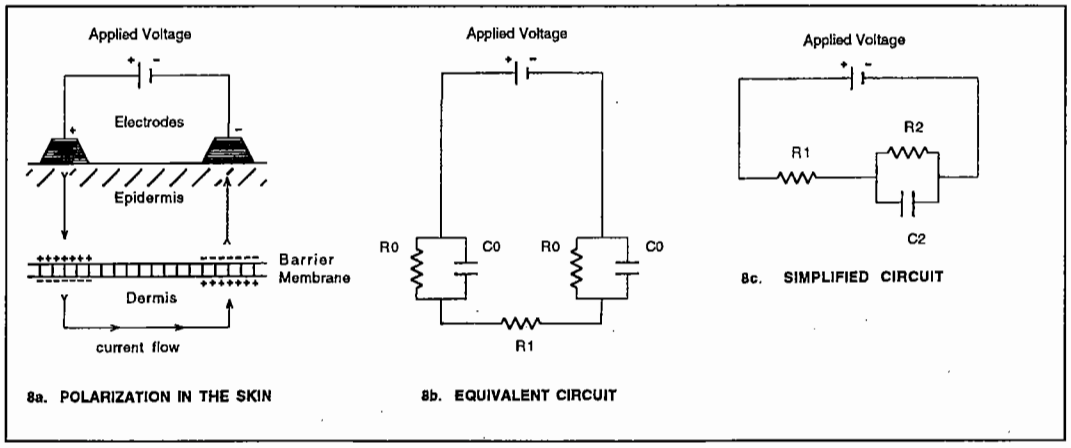

Figure A8. *Modeling the skin with a simple circuit..*

causes the ions to assumulate both above and below the insulating membrane, a redistribution which eventually negates to large extent the influence of the applied voltage. This phenomenon is called polarization.

When we apply a voltage, polarization does not occur instantaneously—there is initially a flow of electrical current proportional to the voltage applied. We label this current the BP or Before-Polarization current. The BP current flows mainly within the dermis where electrical resistance is low relative to other layers of the skin.

When polarization is complete, the insulating layer has largely negated the voltage across it. It has effectively shut down further flow of current However, a residual current does manage to get through. We call this the AP or After-Polarization current.

IQ corresponds to the total charge separately accumulated both above and below the electrically-insulated layer; it is determined by the characteristics of this layer.

THE EQUIVALENT CIRCUIT. We can model the electrical response of the skin with a simple circuit. Figure A8b shows a model circuit possessing features parallel to that of the skin (Figure A8a). This circuit can be further simplified to an equivalent R-RC circuit shown in AFigure 8c.

When a voltage V is first applied, the circuit behaves essentially as an RC circuit. The initial current—which corresponds in the skin to the BP current—is V/R_1. Thus, **BP = V/R** where R_1 is the resistance of the dermis. In other words, BP is proportional to the conductivity of the dermis.

At late times when charging (i.e. polarization) of the capacitor is essentially complete, the circuit behaves as one with a single resistor, R2. (Strictly speaking, the resistance = R1 + R2 but since R2 >> R1, R1+R2 = R2). This residual current—which corresponds in the skin to the AP current—is V/R_2. Thus, $\mathbf{AP = V/R_2}$ where R_2 is the resistance of the insulating layer (or, AP is proportional to the conductivity of the insulating layer).

The total charge accumulated is VC, where C is the capacitance. Thus, **IQ = VC** where C is the capacitance of the barrier membrane.

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