

A Statistical Comparison of Repeatability in Three Commonly Used Bioelectronic Devices: Kirlian Photography, the Segmental Electrogram, and the AMI of Motoyama

Julian Jessel-Kenyon, Lucia Pfeiffer and Martin Brenton

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Summary

This paper describes the results of measurements made on 30 patients, tested at the same time of day on consecutive days, with each of three commonly used bioelectronic diagnostic devices. The repeatability of these measurements was compared statistically, using a method known as the coefficient of variation. The most repeatable technique was the AMI of Motoyama. Kirlian photography and the segmental electrogram showed widely varying results, which casts doubt upon their validity as bioelectronic investigational devices.

Key words

AMI of Motoyama, Bioelectronic devices, Kirlian photography, Repeatability, Segmental electrogram.

Introduction

Bioelectronic instruments have long been a part of medical practice. Of the myriad devices developed, many have become outmoded or fallen into disrepute, while others have become indispensable. With further advances in electronic and computer technology, and with the increasing influence of complementary medical approaches, the number of available devices continues to grow. Three of the most promising are examined here. The segmental electrogram (SEG), the plasma print (a form of Kirlian photography), and the AMI (the Apparatus to diagnose the function of the Meridians and the corresponding Internal organs) of Motoyama, all purport to give readings on functional parameters in the body (1-4). If such devices are to be clinically useful, they must provide repeatable data. In this study, two sets of data from each device were compared to assess repeatability. This allows comparison of the three techniques.

Materials

Segmental electrogram

The segmental electrogram measures skin impedance in eight body segments, before and after stimulation with a small current given at an *unphysiological* frequency. A frequency of 13 cycles per second is used, this is a sufficiently low intensity

not to be felt by the patient. The body is divided into head, left and right; chest, left and right; abdomen, left and right; and the lower limbs, left and right. There is no significance of this division of segments other than dividing the body up into eight different segments. The various factors recorded from the measurements made are shown in *Table 1*, the exact meaning of each factor is beyond the scope of this paper, only their repeatability is what has been looked at. The SEG is promoted as being able to detect functional disturbance in the body (1-3,5). In its computerised form it provides data printouts from each body segment, as well as from the body as a whole. In clinical practice the SEG is useful in detecting the presence of abnormal focal processes, such as chronic appendicitis, dental abscess, or other localised pathology. A focus is the presence of a non-absorbable irritating substance in the body which may be metallic, e.g. shrapnel from a gunshot wound, or infective, such as a bacterial focus or a localised collection of toxins. The segmental electrogram shows a particular irregular reading over the segment in which a focus is present. It can also indicate whether *geopathic stress* is present. Geopathic stress is the presence of abnormal earth currents generated by piezo-electric effects due to large masses of rock sliding on each other, and/or energetic effects produced by underground water. Underground water is essentially a conductor moving through a magnetic field, i.e. the earth's magnetic field, which in itself can cause abnormal earth currents to which some people are particularly sensitive. There is no good evidence available in terms of reference papers that the segmental electrogram is a reliable piece of equipment, and much of the information here is derived from the manufacturer's accompanying literature. All of the studies using the segmental electrogram have been informal and unpublished.

Kirlian photography

Kirlian photography has been the subject of extensive research (6-12). It claims to show patterns indicative of toxicity, inflammation, and degenerative processes, all located in specific organs, in any particular patient studied. This would

suggest the possibility of using it as a diagnostic tool in clinical medicine. The plasma print is a commercially available Kirlian photography device, developed by Dieter Knapp, for taking high voltage, high frequency photographs. It is designed primarily for taking pictures of the hands. There is an air gap between the charging electrode and the dielectric plate; exposure time and other settings are fixed, and specific photographic paper is supplied by the manufacturer. The colour range of the photographs is from yellow, through brown, to black. Diagnosis of somatic dysfunction is based on the interpretation of the significance of these colours. Laboratory studies on Kirlian photography and acupuncture by Omura (8,9) have shown Kirlian photography to be reliable under certain circumstances, but very susceptible to artefacts. Numerous factors must be controlled, such as skin temperature, pressure on the hand and on the photographic plate, and environmental conditions such as humidity. By studying the day to day consistency of this technique, under clinical conditions, its repeatability and practicality were assessed. Kirlian photography on a somatotopic basis will show the presence of problems in various parts of the body. For example, each particular finger is divided into segments and each segment corresponds to a particular organ, and therefore there is a relationship to micro-meridian based hand acupuncture. There are no studies showing what conditions Kirlian photography can diagnose and with what accuracy, but there is much anecdotal evidence that it can diagnose problems that are initially inaccessible to conventional diagnosis.

AMI of Motoyama

The AMI was developed by Hiroshi Motoyama in Tokyo, Japan more than 20 years ago. It is based on the principles of Chinese medicine, and was designed to diagnose organ excess or deficiency. This apparatus measures the body's response to the application of a 3 volt electrical stimulus for 10 milliseconds. This produces a response of a sharp increase of milliamp readings made in this first 10 milliseconds before polarisation of the tissues occurs. Polarisation is the body applying an equal and opposite voltage to that applied by the instrument. The stimulus is not perceptible as the voltage is so low. It does not present the user with a plot of the current response, but rather samples the response at a very high frequency and in so doing basically provides a very detailed plot of milliamps against milliseconds because the sampling rate is so high, then processes the data and calculates four parameters from which the diagnosis is made. These four parameters represent the functions of:

- i. The autonomic nervous system (AP)
- ii. The flow of Qi (BP)
- iii. The immune system (IQ)
- iv. The organism's response (TC).

Measurements are made at the *Ting* point of each meridian, and the derived information relates to that

meridian's organ. Seasonal values have been calculated for large numbers of normal Japanese individuals, and this information is in the software. The results on the AMI vary according to seasons on the basis of traditional Chinese theory, in that certain meridians are higher in energy at certain months than others, and the findings made on the AMI very much correspond to traditional Chinese medical theory in this area. The instrument compares the measurements from the patient to the normal values, and determines whether the organ is in excess or deficiency for that time of year. In some instances the organ dysfunction can be related to a Western diagnosis, but this is not always the case, and there are no papers at the moment exploring this aspect.

Method

Thirty patients, male and female, ranging in age from 18 to 85 years, took part in the study. Each patient was tested with each apparatus on two consecutive days, at the same time of day. An attempt was made to standardise the pressure on the photographic plate for the plasma print by having each patient first apply 500g pressure to a small scale, then repeat that amount of pressure on the photographic plate; each patient needed on average only 5 minutes practice in order to be able to produce a repeatable 500g pressure.

Results

The two sets of data from each of the instruments were evaluated statistically by calculating the coefficient of correlation as described by Bland and Altman (13). A coefficient of correlation of 0.85 is generally regarded as being indicative of repeatability. Values above 0.85 show increasingly reliable repeatability, those below 0.85 show the opposite, *i.e.* 0 = no correlation; 1 = perfect correlation.

For the evaluation of the SEG, the original programme devised by Schimmel was used (1). For evaluating the plasma prints, the presence or absence of a corona in each of three finger segments was noted. For the AMI, the AP, BP, IQ, and TC values were compared (Tables 1-3).

Table 1

REPEATABILITY DATA FOR THE SEGMENTAL ELECTROGRAM

Segment	Correlation coefficient
Combined factor abdomen right	0.747
Combined factor head left	0.752
Global combined factor	0.721
Stress factor abdomen right	0.782
Stress factor abdomen left	0.725
Global stress factor	0.727
Average field of disturbance factor	0.535
Field of disturbance factor	-0.06

Values above 0.85 show increasingly reliable repeatability those below 0.85 show the opposite.

Table 2

REPEATABILITY DATA FOR THE PLASMA PRINT

Site	Correlation coefficient
1	0.39
2	0.41
3	0.12

Values above 0.85 show increasingly reliable repeatability those below 0.85 show the opposite.

Discussion

The segmental electrogram is not as useful clinically as the manufacturers suggest. The only useful result relates to problems of focal disturbance, such as dental problems, tonsillar foci, gall bladder, prostate, or appendix focuses. It also indicates the presence of geopathic stress. The results vary to some extent from appointment to appointment when seeing patients, and they can be difficult to explain. The results of this study seem to be consistent with this clinical finding.

The plasma print (Kirlian photography) shows very variable results in clinical practice and reliably shows the presence of toxicity. The location of organ disturbance is never consistent, as the plasma print is so variable. The results of this study again support this clinical impression.

By contrast the AMI is a useful clinical tool, consistently giving results which tie up with the patient's clinical picture, and in practice leads to targeted therapy, with quicker results observed clinically in patients treated using the AMI as a diagnostic tool, in comparison to those patients in whom such an investigation is not carried out. The results of the study support this impression.

Conclusion

The segmental electrogram and the plasma print are both unreliable diagnostic instruments. The AMI is, by contrast, a highly repeatable diagnostic test.

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Note

One of the authors (JJ-K) has previously had a commercial interest in the Segmental Electrogram, however this had been terminated prior to this investigation.

Julian Jessel-Kenyon MD
Lucia Pfeiffer MD
Martin Brenton

Address for correspondence
Dr Julian Jessel-Kenyon
The Centre for the Study of
Complementary Medicine
51 Bedford Place,
Southampton SO15 2DT (UK)

Table 3

REPEATABILITY DATA FOR THE AMI

Factor	Correlation coefficient
AP	0.940
BP	0.938
IQ	0.923
TC	0.947

Values above 0.85 show increasingly reliable repeatability those below 0.85 show the opposite.

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