Forschende Komplementärmedizin und Klassische Naturheilkunde

Original Article · Originalarbeit

Forsch Komplementärmed Klass Naturheilkd 2005;12:000–000 Published online: November 8, 2005
DOI: 10.1159/000088624

Biomedical Evidence of Influence of Geopathic Zones on the Human Body: Scientifically Traceable Effects and Ways of Harmonization

Gerhard W. Hacker[a] Elisabeth Pawlak[a, c] Gernot Pauser[b] Gottfried Tichy[d] Hermann Jell[e] Gabriele Posch[c] Günther Kraibacher[c] Alfred Aigner[f] Jörg Hutter[g]

[a] Institute for Frontier Questions of Medicine and Biotechnology, St. Johanns-Hospital, Salzburger Landeskliniken (SALK);
[b] Dept. of Anesthesiology, Perioperative Medicine and Critical Care, St. Johanns-Hospital, SALK and Paracelsus Medical University (PMU), Salzburg;
[c] Geowave Research, Salzburg;
[d] Department of Geography, Geology and Mineralogy, University of Salzburg;
[e] Division of Environmental Technology Safety, Department of Town Planning and Building Authority, Salzburg;
[f] Institute of Sportsmedicine, SALK and Institute of Preventive and Rehabilitative Sportsmedicine, PMU, Salzburg;
[g] Dept. of Surgery, St. Johanns-Hospital, SALK and PMU, Salzburg, Austria

Key Words
Geopathic Zones · Geopathic stress · Water veins · Gas discharge visualization · GDV · Compensation · Harmonization

Summary
Background: Empiric knowledge of the existence of geopathic zones ('water veins' etc) is probably as old as humankind. It has often been tried to experimentally detect direct influences on the body. However, so far, there have been no publications in accepted biomedical journals. The target of this study was to verify influences of 2 different zones above ground on the human body and to test a device for which pilot studies have indicated a potential harmonizing effect in this context. **Materials and Methods:** Using a randomized, non-clinical, double-blinded trial design, 52 persons were tested with a gas discharge visualization (GDV) system whilst staying on 2 zones with or without the Geowave® device (Geowave-Research, Salzburg, Austria). The 2 zones investigated had been dowsed by experienced professional dowsers and labeled with black dots in a non-persuasive manner, thereby blindly representing areas of geopathy or more neutral zones. The main analytical parameter was the GDV glow image area (area of glow). Complementary calculated parameters were spatial fractality, corona projections and corona diagrams. **Results:** In the geopathic zone, the detected areas of glow were statistically significantly smaller than in the more neutral zone. With the Geowave blindly mounted in an adjacent room of the above story, a marked increase of the glow image area was found in both zones. The corona projections showed well-recognizable points of body energy deficits in the geopathic zone, mostly associated with the lymphatic system, the cardiovascular system and the pineal gland, which were – to a distinctly lesser degree – also present in the more neutral zone. The device tested yielded compensation or harmonization in both zones in most of the test persons. **Conclusion:** The significant differences in the physical area of glow parameter, which were also noticed for the complementary parameters analyzed, lead to the conclusion that the 2 different zones within the same room (geopathic vs. more neutral zone) exerted different influences on the human body, which may have caused a geopathic stress phenomenon. As a result, individually different retardation of the immune system and other organs may occur. The device tested in both zones showed harmonizing effects, which may help to compensate some influences of geopathy and possibility also superimposed stressors derived from certain other sources, such as technical electromagnetic fields.

Schlüsselwörter
Geopathische Störzonen · Geopathischer Stress · Wasseradern · Gasentladungs-Visualisierung · GDV · Ausgleichsmassnahmen · Harmonisierung

Zusammenfassung
Hintergrund: Empirisches Wissen um die Existenz geopathischer Störzonen (unter anderem «Wasseradern») ist vermutlich so alt wie die Menschheit. Die Publikation eines Nachweises möglicher Wirkungen in anerkannten medizinischen Zeitschriften steht bisher aus. Ziele der vorliegenden Arbeit waren der Versuch, standortabhängige Einflüsse auf den Menschen zu belegen und eine Vorrichtung zu testen, der man ausgleichende Wirkung nachsagt. **Material und Methoden:** In einer randomisierten, nichtklinischen Doppelblindstudie wurden 52 Testpersonen unter Verwendung der Gasentladungs-Visualisierung (GDV) an je zwei Standorten mit und ohne Geowave®-Vorrichtung (Geowave-Research, Salzburg, Österreich) untersucht. Die beiden Messstandorte waren zuvor von erfahrenen Radiästheten «gemutet» und die gefundenen geopathischen Störzonen bzw. neutraleren Zonen auf dem Boden nichtpersuasiv mit schwarzen Punkten markiert worden. Als Hauptanalyseparameter diente die Gasentladungsfläche (glow image area). Ergänzend wurden auch die spatiale Fraktalität, Corona-Projektionen und Corona-Diagramme einbezogen. **Ergebnisse:** Auf der geopathischen Zone fanden sich statistisch hochsignifikant kleinere Werte der Gasentladungsfläche als auf der neutraleren Zone. War die Geowave-Vorrichtung im Nebenraum montiert, fand sich auf beiden Zonen eine hochsignifikante Vergrösserung der Gasentladungsfläche. Bei den Corona-Projektionen und -Diagrammen fanden sich auf der Störzone gut erkennbare Einbrüche, zumeist in den Bereichen, die mit dem lymphatischen System, dem Herz-Kreislauf-System und dem Pinealorgan assoziiert werden. Auf der neutraleren Zone waren diese als Energiedefizite gewerteten Glow-Verminderungen weniger stark ausgeprägt. Die Verwendung der Geowave-Vorrichtung führte bei den meisten Probanden zu einem deutlich erkennbaren Ausgleich auf beiden Zonen. **Schlussfolgerung:** Die dargestellten Unterschiede bezüglich der Gasentladungsfläche, welche sich analog auch bei den anderen Parametern deutlich zeigten, lassen den Schluss zu, dass an beiden unterschiedlichen Aufenthaltsorten im gleichen Raum (geopathische Störzone vs. neutralere Zone) tatsächlich unterschiedliche Einflüsse auf den Menschen vorhanden waren, die besonders im Fall der Störzone ein geopathisches Stressphänomen bewirkt haben. Damit einhergehend wurden individuell unterschiedliche Belastungen des Immunsystems und einiger anderer Organsysteme angezeigt. Die untersuchte Vorrichtung zeigte auf beiden Standorten messbar harmonisierende Effekte, mit denen bestimmte Aspekte äusserer geopathischer Einflüsse sowie anderer überlagernder (z.B. elektromagnetischer) Belastungen ausgeglichen werden dürften.

KARGER

Fax +49 761 4 52 07 14
E-mail Information@Karger.de
www.karger.com

Accessible online at:
www.karger.com/fkm

Univ.-Prof. Dr. Gerhard W. Hacker
Forschungsinstitut für Grund- und Grenzfragen
der Medizin und Biotechnologie, St. Johanns-Spital, SALK
Muellner Hauptstr. 48, 5020 Salzburg, Österreich
Tel. +43 662 4482-3180, Fax -865
E-mail g.hacker@salk.at; www.med-grenzfragen.at

Introduction

The influence of geopathic zones on the human body has not yet been proven by scientifically accepted techniques. The existence of the phenomenon has been known for a few thousand years, maybe even since the early roots of humankind. Publications presenting scientific evidence of directly measurable effects of presumed geopathic zones on the human body are very rare, but numerous harmful and sometimes beneficial effects have been reported in 'public' literature [1–6]. Dowsing, a valuable and low-cost way of detecting potential wells and circumventing effects of possible geopathy, e.g. in bedrooms, is being used all over the world. However, only few studies exist dealing with the abilities of dowsers in a scientific way. The 'Munich Barn Experiments' and extensive field studies on the dowsing phenomenon conducted by an interdisciplinary research team during the 1980's and 1990's still is considered the current state of the art as regards the usability of dowsing for finding water access [7–11]. Possible influences attributed to geopathy phenomena have been widely reported by the mass media, albeit without scientific proof. Apparently, geopathy does not only influence humans but all kinds of animals, plants, fungi and bacteria. Geopathic stress is thought to be related to different kinds of natural radiation, at least in part rising up from the ground. Some of the effects appear to be associated with naturally occurring streams of underground water and with bands of interference fields on the surface. Most likely, there also are other, so far unknown causes. It is beyond the scope of this article to explain, measure and prove their origin. Even amongst geologists and biophysicists, views differ on this extremely complex subject [8].

Here, we present an experimental study involving the gas discharge visualization (GDV) technique known from the fields of biophysics and complementary medicine [12–16]. The results are being discussed in context to existing literature on geopathy-related phenomena. Using the latest generation of scientifically designed GDV equipment and software, we investigated whether certain zones above ground – suggested by professional dowsers to represent either a geopathic zone or a more neutral zone – would exert an influence on the human body. In the same setup, a device known as Geowave® (Geowave-Research, Salzburg, Austria) was to be tested for possible harmonizing effects on geopathy-related stress. The present study combines measurement and analysis of the evoked image glow area with complementary conclusions drawn from whole body corona diagrams and projections. The image glow area parameter is gaining more and more acceptance in the scientific community and is to be regarded as the main factor in our study. All other (calculated) parameters (such as fractality, corona diagrams and projections) presented in this manuscript are complementary data. Although their value has not yet been verified, these data are also presented here, as they generally go in line with published data on stress.

Material and Methods

Test Persons and Experimental Setup

The test design used was that of a randomized, double-blinded, non-clinical trial [17–19]. Only non-invasive techniques were used, and the ethical guidelines of the expanded Helsinki Declaration, including special attention to data security, were fully adhered to [18]. All test persons gave their written consent. 52 volunteers (28 women, 24 men) aged 17–68 years (mean: 44.2; median: 46) were included, all of them having been informed about the purpose of the study and the methods about to be applied. All test persons knew that they would participate in a study investigating the influence of water veins (ley lines), but not what the different areas in the laboratory room corresponded to. They were also informed about the GDV system and related safety issues and that they may feel a slight sensation of 'crawling' in their fingers. In order to obtain a sample comparable to real life, smokers and persons with slight health variations were also included. Exclusion criteria were pacemakers, epilepsy and other severe psychoses, skin problems and severe cardiovacular problems. Each test person was asked to complete a medical history form which was labeled by a code number instead of the name of the person. The participants had been asked not to drink coffee or consume any other stimulating beverages or foods the evening before and the morning of the tests.

For the selection of optimum zones above ground for the detection of influences of geopathic stress, 6 professional dowsers used different types of dowsing rods (one- and two-hand rods as well as a Lecher rod [8]) in a specially adapted laboratory at the Federal Hospital of Salzburg (Salzburger Landeskliniken, SALK). The dowsers were selected on the basis of reputation and dowsing success rates. They were to search independently for representative areas of potential geopathic stress and more neutral zones and label the respective zones in a map. None of the dowsers was informed which zones their colleagues had picked. Finally, the principal investigator compared the 6 individual hand-drawn maps, with the result of 2 definite specific zones being defined for that room. The areas were labeled on the floor, using identical black dots and insulation tape in a non-persuasive manner. One area was designated a geopathic stress zone, the other a more neutral zone. All 6 dowsers had classified the geopathic zone as a medium-strength stress zone. The operator performing the GDV measurements was not informed which of the labeled areas corresponded to the stress zone or the more neutral zone.

In addition to testing possible influences of geopathy on the human organism, we also attempted to test the Geowave device that, in a number of pilot studies, had shown promising effects regarding harmonization. This tool was mounted or demounted in an adjacent room one floor above, at an angle of about 60° and about either 8 or 11 m away from the test person. Mounting or demounting of the device was performed at random, as suggested by a computer program. This was carried out by a second person who was informed by telephone about the sequence and timing to be used for each test person. 'Mounting' referred to the device hanging horizontally at the ceiling of the adjacent room located transversally one floor above. 'Demounting' referred to the device in a collapsed position, hanging vertically/non-horizontally. To ensure the vertically demounted device was not affecting the results of the measurements, numerous pre-study tests had been performed in which the vertically demounted device was compared with a situation where no device at all was present (i.e. the device had been completely demounted and taken to a car which was at least 100 m away from the laboratory). The results showed no influence of the vertically demounted device on the outcome.

In principle, the Geowave device represents as a corrugated oval sheet made of special metal alloy, shaped in a sigmoid manner (www.geowave-research.com). In our tests, we used the Geowave-D measuring about 80 by 50 cm. Mounted, the device hangs horizontally on an appliance made of insulation material.

Each test person underwent 4 test periods, with the sequence of these test periods varying in a randomized way as determined by computer: The 4

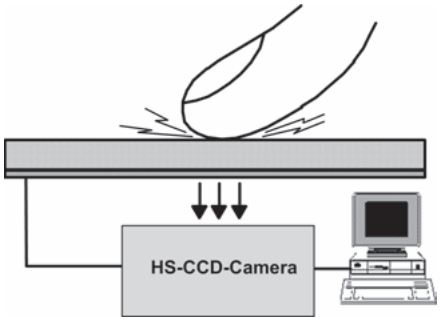

Fig. 1. Schematic representation of the process used to obtain GDV images. Shielded from daylight, the fingertip is being placed onto a glass plate which on its opposite side is coated with a translucent electrically conductive metal layer, thus behaving like a transparent electrode. The obtained glow is recorded by a CCD camera and the image then processed by computer. The system is based on the registration of bioelectrographic signals by computer, followed by an estimation of the energy status and stress levels by means of non-linear mathematics and data mining methods.

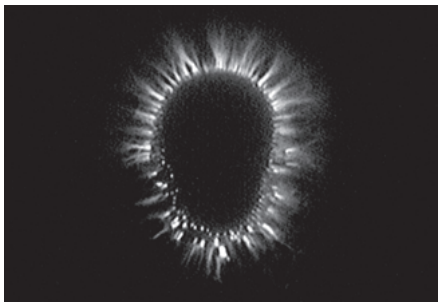

Fig. 2. Example of a GDV image obtained from a single finger. In this case, the gas discharge picture from the little finger of the left hand of a male test person is shown.

measurement setups included the person sitting at A. the neutral zone, B. the stress zone, C. the neutral zone with the mounted Geowave device and D. the stress zone with the mounted device. For chronobiological optimization, tests were performed only between 8–10 a.m. or 10–12 a.m. Every day, a maximum of 2 persons were tested. Before measurement, each test person was asked to quietly sit for 15 min on a chair placed in one of the 2 zones labeled in the test room.

GDV Test System

The GDV technique used to obtain electrophotonic Kirlian emission data, as well as safety and reproducibility issues have been described extensively in the literature [12–16, 20–23]. In principle, the GDV camera applies a very stable high-intensity electric field (10 kV, 1,024 Hz, square pulses) to a fingertip set on the electrified glass plate. The applied field, in practice, is pulsed on and off every 10 ms, for a duration of 0.5 s. The electric field produces a visible gas discharge glow around the fingertip (Kirlian image). These corona discharges of each of the 10 fingertips of the test person are captured via sensitive digital imaging and analyzed with specific hardware and software.

Throughout our study, we used a sophisticated up-to-date GDV system, the GDV Camera Pro (Konstantin Korotkov, St. Petersburg, Russia). This model has been specifically designed for high stability and reproducibility as required for scientific measurements. The GDV camera was connected to a computer, and the recorded glow images were digitally transferred using GDV Capture software (version 1.9.9., 2004). For further calculations and analyses, GDV Meridian Analysis and GDV Diagram software (both version 1.9.9.) and the GDV Scientific Laboratory software (version 1.1.5.) were applied. All GDV software is by Konstantin Korotkov, St. Petersburg, Russia.

Figure 1 shows a simplified schematic drawing of the setup used. As the main parameter investigated in this study, the GDV system provides the mean glow image area (also known as the mean area of glow) of the Kirlian image recorded on a high-sensitivity CCD camera and then processed and analyzed by computer. Steps for analyzing finger GDV-grams are described in detail elsewhere, as are the different parameters obtained by measuring and other means of evaluation calculated by the software [12, 16]. During the experiments, the GDV system was used mounted on a trolley, and measuring took place directly at the 2 different location zones investigated. For each person and test period, 50 single static measurements of the GDV glow area were performed (each finger measured 5 times for 0.5 s). In addition, dynamic GDV measurements for both ring fingers were performed and repeated 3 times each (thus, measuring $3 \times 2 \times 100$ single images, i.e. 600 images per test sub-period). An example of a sole image obtained from a single fingertip is shown in figure 2.

After recording the fingertip glow images, the software applied calculates different types of output: The mean GDV image area is derived from the single areas of glow (the number of pixels with non-zero intensity in each single electrophotonic finger image) and is calculated as the mean obtained from the sum of all single finger images captured during one specific measurement circle, divided by their number [24–26]. In the specific setup for the static GDV images used in our study, the overall GDV image area values are therefore to be understood as mean values of 50 single finger GDV images in total. In the case of the dynamic overall GDV image areas, the values we used for further analysis represent mean values of 600 single images obtained from both ring fingers. In addition to the mean, a number of standard values of descriptive statistics are being calculated internally, such as the standard error of the mean (SEM).

In addition to the mean image area of glow – a parameter which has gained increasing acceptance in the biomedical research community – GDV also delivers what we refer to as complementary data [12, 21, 22, 27–32]. One of these types of output calculated is the spatial fractality which is defined as the fractal dimension of isoline of the image [12]. Fractality, in its scientific validity, appears to be less reliable than the mean area of glow, also as it can only be calculated with a certain error. In the present study, we therefore present the fractality data in addition and in short form only.

Additional types of output are related to the energy meridian system derived from Traditional Chinese Medicine (TCM) which are therefore also not to be regarded as pure physical data. For example, images and diagrams of the whole body aura are constructed from the single images of the representative fingers. The terminology, however, appears to be very misleading, which is why we prefer to use the terms corona projections and corona diagrams instead. The Korotkov GDV system uses a combination of the applications described in Mandel's Energy Emission Analysis and the Su-Jok system of acupuncture [12, 33–35] to construct these corona projections and diagrams (fig. 3). For example, the left side of the middle finger relates to the cardiovascular system, the top of the thumb relates to the head and the bottom part of the little finger represents the respiratory system. This reconstruction based on sectors of the finger image also forms the basis for diagnostic implications in the form of the corona diagrams (also known as beograms). Excess or deficiency of the image in various sectors is considered to be indicative of imbalance in the corresponding body systems [12, 14, 21, 29]. In this manuscript, we present these diagrams and projections supplementary to GDV image areas and fractality. Although these corona diagrams seem very promising, little is known about their real value [12, 29, 31, 35, 36].

Reproducibility and Safety Issues

In order to gain reliable data, we paid careful attention to a number of issues influencing stability, reproducibility and safety [16, 33, 38]. We used the same GDV system throughout the study. Before each testing period, the GDV camera (which at all times was kept inside the laboratory at constant room temperature) was switched on at least 30 min prior to measuring. Careful calibration was performed before each test sub-period and before each person was measured. Each test person was asked to carefully wash their hands using a pH neutral laboratory soap, followed by wip-

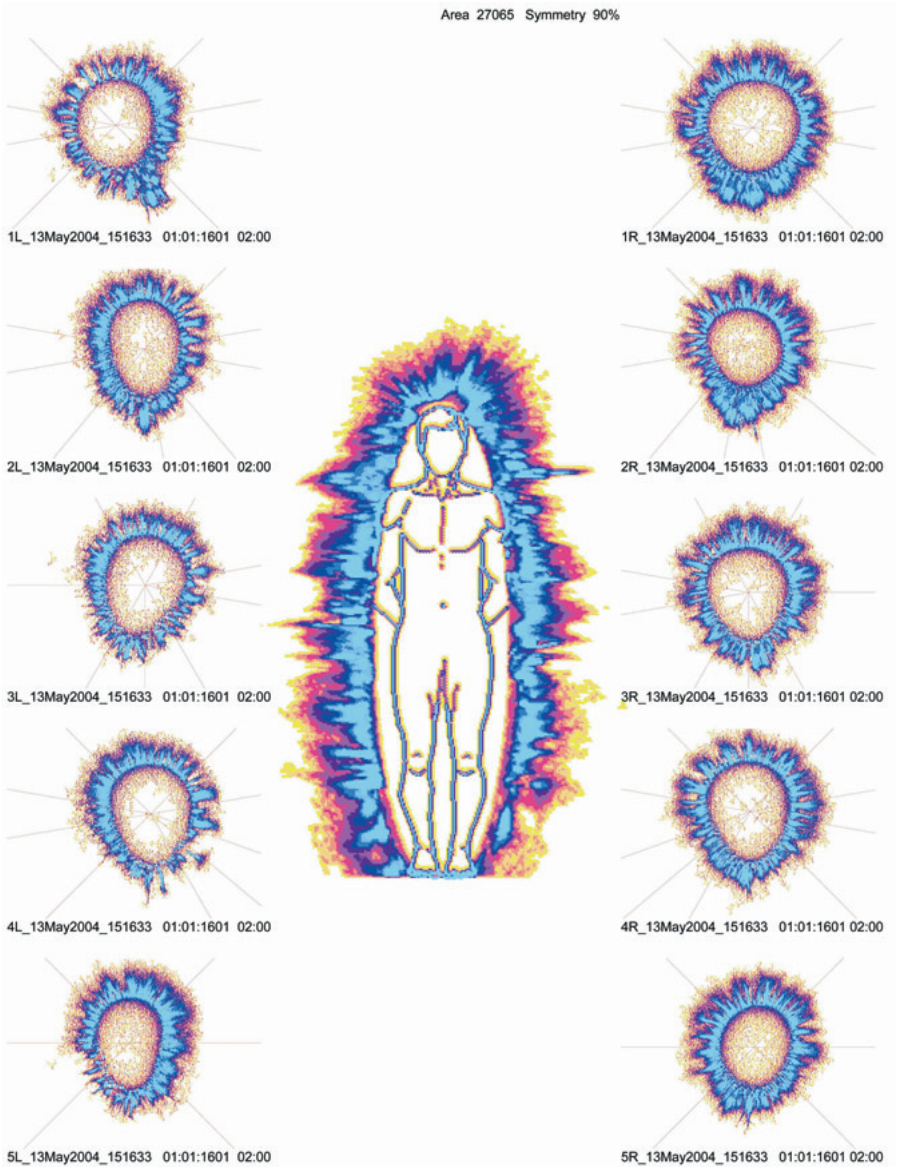

Fig. 3. Example of GDV glow images of all 10 fingertips with the corresponding processing into a whole body corona projection.

ing the fingertips with alcohol. This was done at least 20 min before the first measurement. The use of hand cream or lotion was not allowed. The glass plate surface of the GDV camera was cleaned using alcohol before each measurement sub-period. It was assured that none of the test persons had wet hands. During measuring, the test persons were asked to keep their fingers still and relaxed, without applying undue pressure, at an approximately 30-degree angle to the instrument axis. Deliberate pressure could potentially influence the result by changing the peripheral circulation [39].

Statistical Analysis

For analyzing the raw data from GDV image glow area and fractality, the software programs Sigma-Plot 2002 (SPSS) and Excel 2003 (Microsoft) were used. In addition to calculating descriptive data such as mean M, median Md, standard deviation SD or range, normality tests were carried out. Histograms of the glow image area and fractality raw data showed almost normally distributed, near Gaussian bell-shaped curves in each of the configuration samples and patients included in the study. Therefore, the paired two-sample t-test for dependent variables was used to determine whether there are significant differences in the mean GDV glow image areas and the fractality of the 4 test sub-period results. Two-sided p-values were classified statistically significant if they were < 0.01. Glow image data from each of the 4 above setups were compared as follows: 1. neutral zone with stress zone (both without the Geowave device), 2. neutral zone with or without the device, 3. stress zone with or without the device and 4. neutral zone with stress zone (both with mounted device). In addition, overall mean values obtained from all 52 test persons were calculated and presented as histograms and as grouped bar charts (fig. 4–7). Corona diagrams and whole-body corona projections were evaluated descriptively.

Additional Precautions

Being aware that overlaying technical electromagnetic fields would be present, we used sophisticated equipment from the City Division of Environmental Technology, Dept. of Town Planning and Building Authorities, Salzburg, Austria (Anritsu Spectrum Analyzer type MS 2711B, frequency range 100 kHz – 3 GHz; ARC Seibersdorf antenna type PCD 8250, frequency range 80 MHz – 2.5 GHz; Schwarzbeck USLP 9142 broad band log-per antenna; Fauser Elektrotechnik Universal Measurement System type UMS4, frequency range 5 Hz – 400 kHz). In the laboratory used for this study, the level of technical electromagnetic fields in all frequency bands scanned was consistently > 1,000 times below the limit valid in Aus-

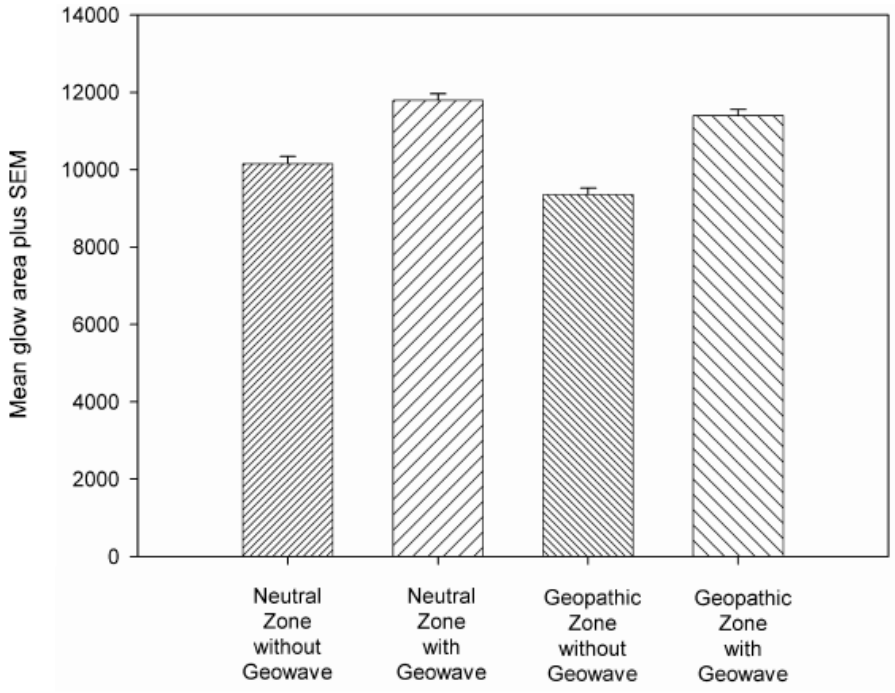

Fig. 4. Histogram comparing the overall mean glow image areas obtained from 52 test persons in 4 different test variations. Areas are expressed in pixels with the corresponding SEMs superimposed. Compared to the intermediate-sized GDV glow area values obtained in the more neutral zone, the areas in the geopathic stress area were decreased. In both zones the areas were markedly increased when the Geowave device was mounted in a double-blind manner.

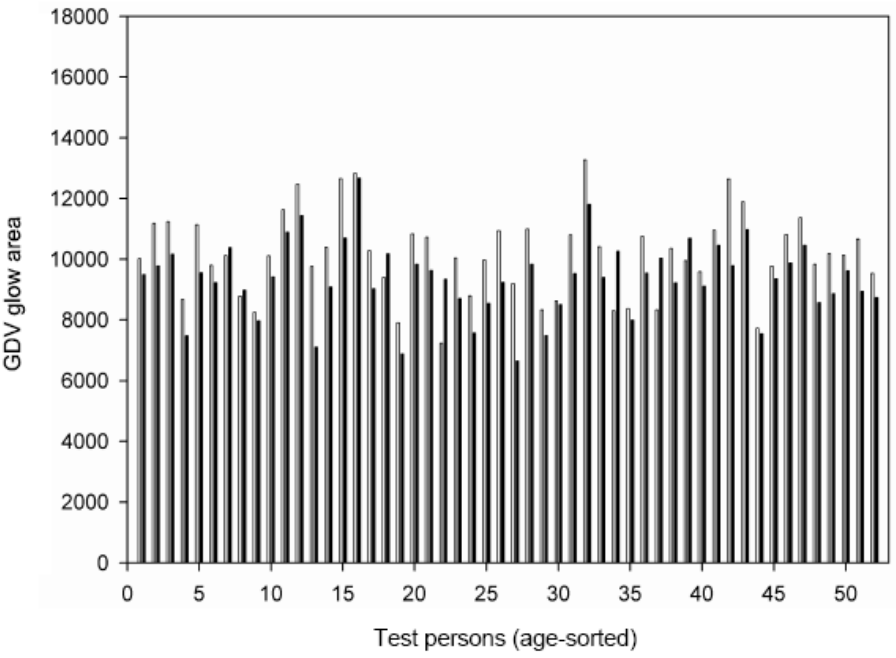

Fig. 5. Grouped bar chart diagram illustrating the direct individual comparison of GDV glow areas obtained in the more neutral zone (white bars) and the geopathic stress zone (black bars). On the x-axis, the 52 test persons are sorted according to age. The y-axis shows the GDV glow area of all test persons as numbers of pixels. Marked area reductions in the geopathic zone are seen in the vast majority of test persons. A few test persons expressed an increase in glow area compared to the more neutral zone.

tria. The accomplished acoustic measurements too showed no likely impairment of the test persons when measuring exposure to vibrations or sound using a RION Sound Analyzer (type NA-27, measuring range 24–141 dB(A), Rion, Tokyo, Japan) and a Larson-Davis LD-2900 acoustic spectrum and vibration analyzer (0.5 Hz – 20 kHz, Larson Davis, Provo, Utah, USA).

Results

Appearance of Glow Area Images

As a qualitative description it can be stated that, at the geopathic stress zone, the Kirlian (GDV) image patterns in most cases showed relatively uneven distributions of glow, often with missing proportions of glow at varying locations around the finger tip, and the overall glow area appeared to be relatively small. In the more neutral zone, images tended towards an intermediate size of area, and in a number of persons more regular patterns were seen. With the Geowave device mounted, an overall increase in the GDV glow image areas sometimes readily visible to the naked eye, was observed, as well as a form of stable and harmonized activation of the image. The images obtained with the Geowave from single fingertips consistently showed more evenly distributed glow distributions.

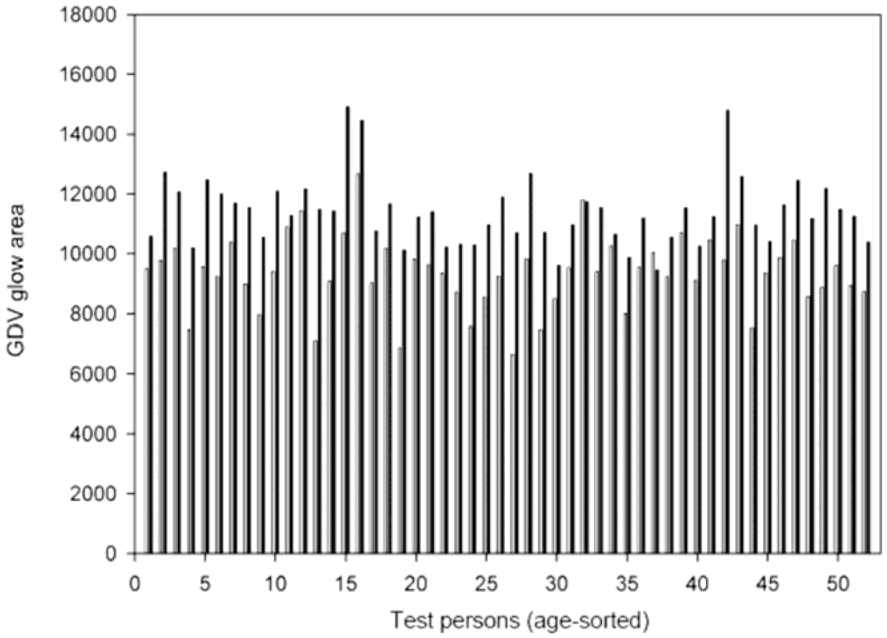

Fig. 6. Grouped bar chart diagram illustrating direct individual comparisons of GDV glow areas obtained in the geopathic stress zone with (black bars) or without (white bars) the Geowave device mounted. A marked increase of glow area was seen in the great majority of test persons when the device was present. Only very few persons showed little or paradoxical effects (bars 32 and 37).

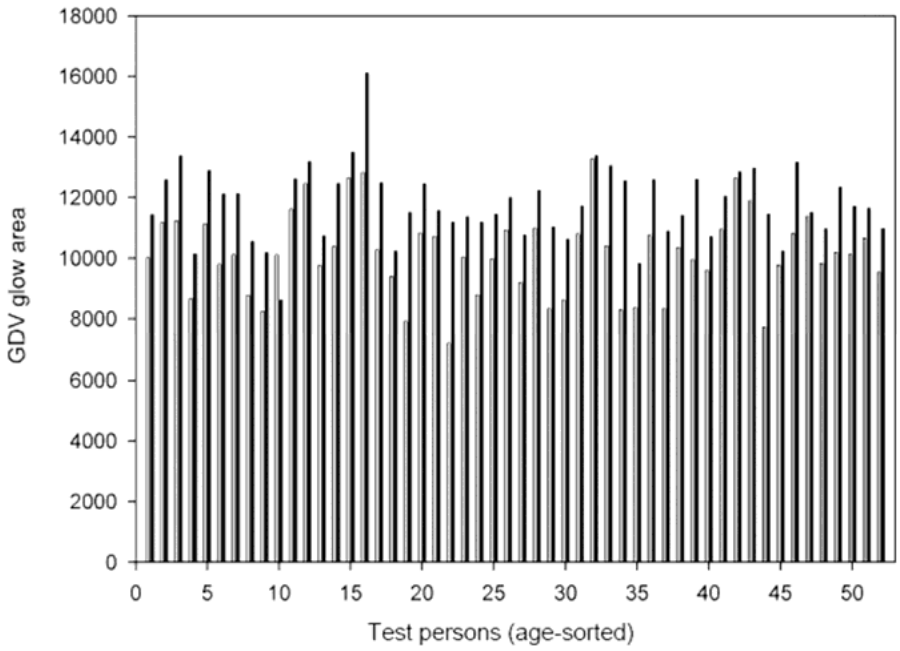

Fig. 7. Grouped bar chart diagram illustrating direct individual comparisons of GDV glow areas obtained in the more neutral zone with (black bars) or without (white bars) the Geowave device mounted. A marked increase of glow area is seen in the majority of test persons when the device was present. Only very few persons showed little change (bars 32 and 42) and only 1 person showed paradoxical effects (bar 10).

Static GDV Image Area

Quantitatively comparing the images examined in the GDV software system, the mean static GDV glow areas obtained in the more neutral zone (M: 10,152 pixels, SEM: 190) were statistically significantly larger than those obtained in the geopathic zone (M: 9,354 pixels, SEM: 170, $p < 0.0001$). With the Geowave device mounted, the static GDV glow image areas were significantly larger in both locations (M in more neutral zone with mounted device: 11,792 pixels, SEM: 169, $p < 0.0001$; M in geopathic stress zone with mounted device: 11,393 pixels, SEM: 160, $p < 0.0001$). For a better overview, the histogram in figure 4 shows a direct comparison of the overall static GDV image mean values of 52 test persons in the more neutral zone without device and in the geopathic stress zone with or without the device tested. Figure 5 presents a case-by-case comparison of the influence of the geopathic zone in comparison to the neutral zone for each of the test persons. The grouped bar chart shows that, at the geopathic zone, the static GDV mean image glow area was influenced towards area reduction in 45 of the 52 persons tested. For the

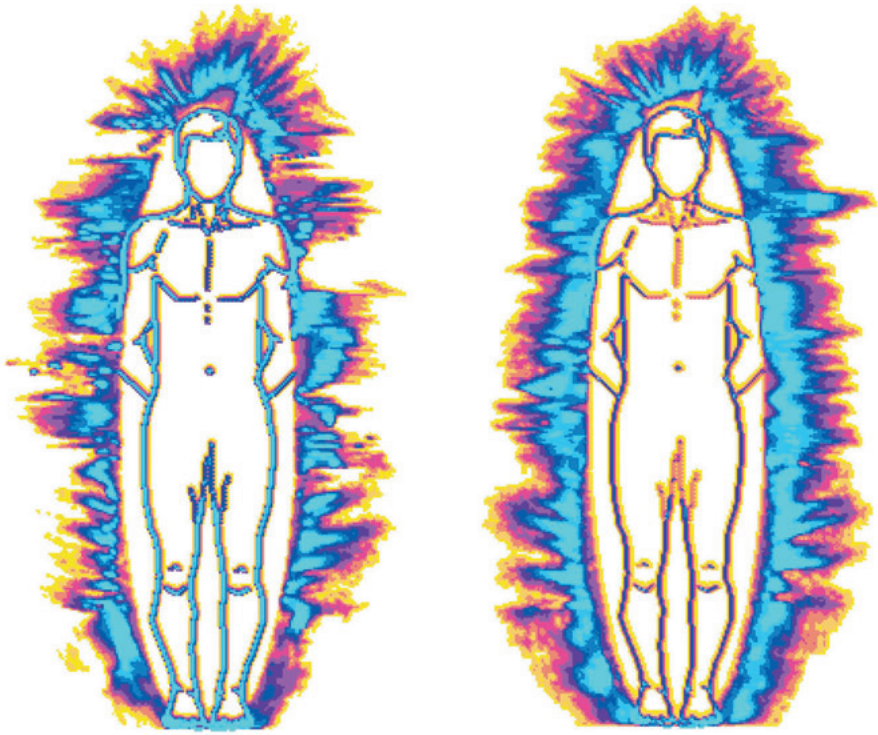

Fig. 8. Example of a whole body corona projection obtained for the same person within the same test at the more neutral zone with or without (left) the mounted Geowave device. Whereas without the device, there was a number of irregularities/energy deficits, the device produced a smoothing, harmonizing effect and compensated most of the energy deficits.

remaining 7 persons no effects, or slight to pronounced paradoxical effects can be noted towards an increase of image glow area. Figure 6 and 7 demonstrate the individual effects of the Geowave device. Figure 6 compares individual mean image area values obtained in the geopathic zone and shows that in 50 out of 52 test persons the GDV glow image area markedly increased when the device was present. One person showed very little change (test person no. 51, a 51-year old man, represented as no. 32 in the age-sorted diagram), while another person showed a slightly paradoxical effect, i.e. the device produced a slightly decreased GDV area size (test person no. 52, a 48-year old man, represented in the diagram as no. 37). When comparing the results of these 2 persons with the glow areas shown in fig. 5, it can be noted that they belonged to the group of 7 already mentioned above, in which the suspected geopathic zone had shown slight or pronounced paradoxical effects. Figure 7 compares individual mean glow image areas in the more neutral zone with or without the tested device. Here, a comparable situation to that in figure 6 can be found: at the more neutral zone, the device increased the glow area size in 51 out of 52 test persons. The effect was pronounced in 49 persons and slight in 2. The 1 remaining person showed a paradoxical effect (test person no. 25, a 25-year old woman, represented in the age-sorted diagram as no. 10).

Dynamic GDV Image Area

Results of the dynamic GDV glow area measurements were analogous to those obtained with the static images. The mean dynamic GDV glow areas were smaller in the geopathic stress zone than in the more neutral zone, and with the Geowave mounted, a significant area increase was observed in both zones. It must be taken into account that these images were obtained from the ring fingers of each hand only, whereas the static area measurement reflected the images obtained on all 5 fingers of each hand. The neutral zone mean dynamic GDV area was 9,635 pixels (SEM: 133), the mean at the geopathic stress zone was 8,780 pixels (SEM: 113). With the device in the more neutral zone, the mean dynamic GDV area was 10,722 pixels (SEM: 118). With the device in the geopathic stress zone, it was 10,461 pixels (SEM: 113). The differences between all tested setups were highly significant (each: $p < 0.0001$).

GDV Image Fractality

The mean fractality values were 1,897 (SEM: 0.0036) in the more neutral zone and 1,903 (SEM: 0.0030) in the geopathic zone. With the device mounted, the mean fractality at the more neutral zone was 1,896, whereas in the geopathic zone, a mean of 1,895 (SEM: 0.0036) was obtained. The fractality mean was significantly higher in the geopathic stress zone without the device compared to the fractality with the mounted device ($p < 0.012$). Comparison of neutral and geopathic zone was just below statistical significance ($p < 0.056$), and the fractality values at the neutral area with and without Geowave device were not significantly different.

Corona Diagrams and Meridian Projections

In figure 3, an example of glow area images after computer processing of each finger tip is seen, as well as the correspond-

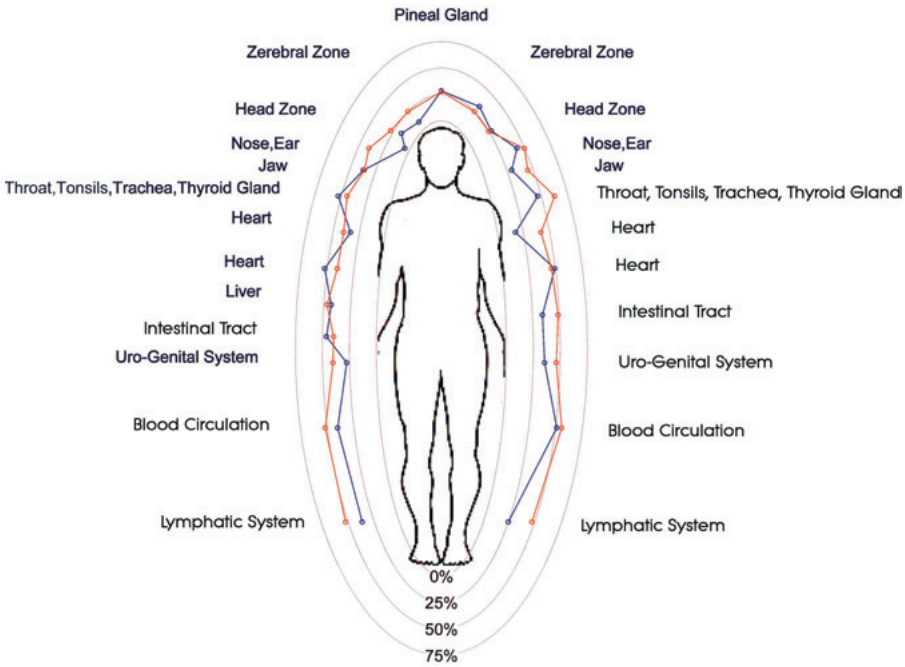

Fig. 9. Example of a corona diagram illustrating the smoothening, harmonizing effect of the Geowave device (red) in comparison to the situation without the device (blue), in which 'Alpine valley' shapes were present to a much higher degree.

ing whole body corona projection obtained following meridian analysis according Korotkov's modification of the Mandel and Su-Kok systems [12, 33, 40]. Figure 8 presents a whole-body corona image calculated by the GDV software. The glow area patterns obtained qualitatively appeared more evenly distributed with the Geowave mounted, whereas without the device, a more inconsistent appearance was found in most cases. Figure 9 shows the corona diagram obtained from the same measurement and test persons as figure 8, with or without the device. On a large proportion of the corona diagrams calculated, we observed that test persons placed in the more neutral zone and even more so in the geopathic zone showed body energy deficits and that the appearance of the diagrams was more 'edgy' when no device was present. It is evident that a rounding or irruption-compensating effect is obtained by using the device.

We counted how many percent of the test persons expressed conspicuous harmonizing changes in the corona diagrams when the Geowave was mounted. The results are summarized in table 1. Retardation of a number of body organ system projection energy levels has been observed, particularly in connection with the lymphatic system, when no Geowave was present. However, when the device was mounted, nearly all of the corona diagrams showed that it had an energy-increasing effect where weak points (Alpine valley skylines) had been present before, in both, the geopathic and the more neutral zone. The effect was more marked, however, in the geopathic stress areas. When the device was demounted, striking energy retardation valleys in the geopathic zone and (to a lesser degree) the more neutral zone were observed, especially in the heart region, the lymphatic system and the pineal system – the two latter indicating a weakening effect on the immune system.

Discussion

One of the targets of the present study was to demonstrate whether there is a detectable influence of different zones above ground on the human organism. Using a GDV system, we obtained statistically significant data supporting the hypothesis of a location dependency. We are well aware of the fact that GDV is relatively new and still controversially discussed. However, we feel its use to be justified for the specific purpose of this study, as the system employed was a stable up-to-date setup specifically designed for scientific purposes. We did not use any of the commercial and paramedical (borderline) software also sold for GDV, but only the image capture program, calculation of the glow area pixel output and the scientific laboratory software. Additional data only included fractality, corona diagrams and corona projections. GDV represents a valuable tool that, in the case of the glow image area parameter, provides a measure often suggested in the literature for the detection of stress-related bodily reactions with high sensitivity [12–14, 21]. We have taken special care to continuously check stability of the machinery and ensure the measured results are reproducible.

We found that the GDV glow image area was of intermediate size in a location defined here as the more neutral zone and was considerably decreased in size in a location defined as the geopathic zone. GDV glow image areas were much larger on both zones when the Geowave device was present and mount-

Table 1. Percentages of test persons (n = 52) showing notable changes in the whole body corona diagrams obtained with the Geowave device

Organ projection	Geopathic zone			Neutral zone		
	No change, %	Energy increase, %	Energy reduction, %	No change, %	Energy increase, %	Energy reduction, %
Pineal organ	34	57	9	33	59	8
Zerebral zone	34	57	9	37	59	4
Head zone	34	57	9	33	67	0
Nose & ears	21	70	9	23	69	8
Jaw	19	70	11	25	69	6
Throat / tonsils	21	67	12	14	74	12
Right heart	15	77	8	12	88	0
Left heart	23	72	5	18	69	13
Liver	21	68	11	22	73	5
Gastrointestinal tract	23	73	4	23	77	0
Urogenital tract	13	80	7	10	84	6
Cardiovascular system	13	81	6	20	67	13
Lymphatic system	17	72	11	23	74	3

ed in a hidden manner. Assuming that the GDV area of glow represents a form of stress level-related overall energy state of the human body, it may be concluded that firstly, the geopathic zone may be regarded as stress-inducing area, caused relatively large energy-detracting effects which secondly, the more neutral zone was not really a pure neutral zone – most likely due to overlapping of different factors rather than geological causes, and thirdly, the Geowave device had harmonizing, energizing effects in both zones.

Stress and Geopathy

The idea of stress as a factor of ill health is now widely accepted, and numerous effects of stress on the body are well documented [41–44]. Geopathic stress as a causal link to disease is usually ignored, as many people are unaware of its presence. Most texts available, being popular descriptions in books, journals or the Internet or the relatively rare literature addressing the matter scientifically, discuss geopathic stress as a complex phenomenon composed of weak electromagnetic fields of different wavelengths (ranging from very low frequencies of <1 Hz to the upper GHz-region), manifold waveforms and amplitudes expressing dynamic changes. Timely composition of electromagnetic field variations may play a major role. Other types of radiation are likely to contribute, and it seems possible that some of them have not yet been discovered. Part of the technical problem of measuring geopathic zones with scientific instrumentation is that the high level of background interference from other sources appears to mask and prevent an electronic detection of the very weak interference signals associated with geopathic stress. Interference and resonance effects with the human body could be critical triggers of health problems. A review addressing some of these assumptions has recently been published [6]. The various biophysically accepted possibilities contributing to location dependency and dowsing phenomena have been discussed extensively by the Munich group [8].

Lack of awareness of the impact of certain energetic fields on health and well-being may prove dangerous. Electromagnetic fields – no matter what their source is – under certain circumstances may be hazardous to health, possibly affecting a number of important bodily systems, such as the nervous system, the cardiovascular system and the immune system, thereby also elevating the risk of developing cancer [6, 44, 45]. A recent Austrian study showed that the variability of the electrosensibility among the general population appears to be much larger than has been estimated, but much smaller than claimed by self-aid groups [46]. König and Betz have also critically reviewed a number of earlier studies dealing with location-related effects on organisms [8].

In addition to geopathic stress stimuli arising from the ground, electromagnetic fields created by modern technology (technical fields) are always present today, at any place in the world, and may also contribute to the stress by interferences or resonance effects. Technical fields usually originate from telecommunication, radio and television antennas, radar, electricity wires and pylons as well as transformers. When we talk about geopathic stress, it is crucial to be aware that technical fields, and also factors from space or the irregularities of the Earth's magnetic field, are present, too. This also implies that such zones may vary dynamically, also depending on ongoing changes in the overlaying artificial electromagnetic fields [47]. This is one of the reasons why a pure neutral zone cannot exist.

Many minor but serious illnesses and psychological disorders have been attributed to geopathic stress. Assuming that a smaller GDV glow area represents a decreased overall energy state of the measured person, the strikingly smaller GDV glow area we observed in the geopathic zone compared to the more neutral zone may be a sign of increased stress induction, indicating an increased risk of a weakening of the immune system's capabilities for defense and repair. Dowsers reported that some people, when in geopathic zones, relatively quickly

sense a reduction in well-being [1, 48, 49]. Some people become nervous, and various symptoms may arise. Retardation of the immune system has several consequences. Firstly, if the stress-inducing situation lasts for a long time, the incidence of minor infections, such as colds, increases. Secondly, it is likely that undesirable psychological effects are developed. Thirdly, long-lasting exposure to geopathy may also prove to make the organism more likely to acquire cancer.

A number of publications present data which underline the potential risk of development of malignancies, such as leukemia, triggered by some types of electromagnetic radiation. Some authors speak of slightly elevated levels of relative risk [50], others about highly significant increases in the incidence of malignancies, cardiovascular deficiencies, immune deficiency disorders, restless sleep, chronic pain, migraine/headaches, sudden signs of physical aging, irritability and chronic fatigue. Stress of various causes, including geopathy and technical fields, has also been suggested to be a common factor in cases of infertility and miscarriages, learning difficulties, behavioral problems and neurological disabilities in children [2–6, 50–62].

The experimental design used in our study allowed to examine short-term effects only. Concluding a general validity for long-term effects appears to be problematic. However, relevant implications can be expected: Although acute stress may sometimes have stimulating effects on the immune system, certain stress-inducing conditions may have negative effects, even if present for only a short time. Long-term exposure to stress-inducing factors usually causes more pronounced negative effects. It is widely known that in such cases of chronic stress the immune system may be down-regulated. Whole cascades of messenger factors are released, directly influencing the immune system, the cardiovascular system, the nervous system and the psychological status. In severe cases, cancer, cardiopathy, autoimmune diseases and major psychopathies may develop [41, 42, 44, 62, 71–73]. There is, however, considerable individual variability in the immune response to stress. To a large extent, this seems to be determined by the subject's way of dealing with stress [72]. Meditation and life style improvements may help to cope with stress to a certain degree. Prolonged exposure to stressors may, however, sooner or later outweigh the person's coping resources [72, 74]. Long-term exposure to geopathy, e.g. sleeping in a geopathic area, may prove particularly stressful. In such conditions, the organism would not receive the full rest required for repair and regeneration. In our study, a harmonizing/compensatory effect of the Geowave device was detectable in almost all test persons, with only very few exceptions. Provided that the short-term effect detected in our study also applies to more long-term situations, our observation may be very valuable: For instance in places where people have diminished resistance and health, such as hospitals, the device may prove to be beneficial for healing.

Geopathic/electromagnetic stress zones may influence the release of messenger substances (hormones, regulatory peptides, cytokines) needed to maintain a balanced function of the immune system. In this context, special attention has been paid in the literature to melatonin which can be suppressed by static and certain electromagnetic/magnetic fields. This effect is well documented, and increased incidences of cancer may, in part, be attributed to it. The full complexity of the problem is, however, far from being understood, and there is discordant literature [55, 60, 63–70]. One study related the melatonin decrease to geomagnetic disturbances in conjunction with artificial magnetic field exposure. Increased geomagnetic activity was shown to cause significant reduction of nocturnal melatonin excretion [63]. The additional data from the corona projection diagrams (beograms) obtained in our study (table 1) showed that in many of the test persons the areas representative for the pineal organ and the lymphatic system exerted below-average energy levels (indicating higher stress levels for these particular systems). This may be understood as an indirect complementary finding supporting the melatonin-suppressing and immune-system retarding effects described by others for stress situations.

It has been speculated that not only the central nervous system (CNS) and the lymphatic system are likely to be affected by geopathic stress. It is known that electromagnetic radiation from various sources can also interfere with the peripheral nervous system (PNS) and the diffuse neuroendocrine system (DNES), thereby influencing glandular functions, the cardiovascular system, the gastrointestinal tract and the urogenital system [42, 43, 75]. The GDV corona diagrams obtained in our study indirectly support for this hypothesis: In more than 70% of the test persons, weakened energy levels of the cardiovascular system were observed, and weak points were also found in other organ projections, such as the urogenital system or the gastrointestinal tract.

Dowsing

The experimental study presented here is based on the assumption that the areas at which the GDV measurements took place corresponded to a geopathic zone and a more neutral zone. Due to the lack of reliable geophysical equipment that could prove these assumptions, we had decided to use dowsing performed by highly reputed dowsers. It is undeniable that dowsing is being successfully used throughout the world for numerous applications, e.g. by governmental departments, engineering companies, geologists, water companies, armed forces, mining companies, building contractors, breweries etc., as an efficient low-cost alternative to all other methods known today for the detection of water supplies or geopathic stress zones. From the studies of the Munich group, it is known that only a small proportion of dowsers is accurately able to detect water reservoirs, faults, fissures and fractures [8–11]. In our study, the 6 independent professional dowsers presented their 'muting' results in drawn form, and those 6 maps showed sufficient agreement with each other on the location of such zones in the laboratory. The results of the

GDV measurements finally showed that using dowsers for selecting the test locations was an acceptable compromise.

GDV

The question may arise of whether GDV is an acceptable system to provide scientifically exploitable data. Already in 1939, the Russian scientist Semyon Kirlian discovered by accident that by subjecting different types of objects to strong impulsive electromagnetic fields, gas discharge image formation around these objects is created (Kirlian effect). As it turned out, gas discharge pictures around biological objects can provide substantial information about the internal state of an object. First-generation GDV equipment and also older setups relying on the Kirlian effect, such as Mandel's energetic terminal point diagnosis (ETD) turned out not to be reliable enough to justify their use in medical research [35]. Later-generation GDV instruments are believed to be much more consistent and effective systems to evaluate responses to physiological or psychical stressors [12, 15, 16, 22, 29]. It should also be mentioned that not all authors support the claims made by Korotkov regarding GDV [21, 76]. However, the mean GDV image area of glow parameter appears to gain increasing scientific acceptance as being useful in examining the overall level of energy, detecting influences of a certain stressor on test persons with high sensitivity [12, 14, 21].

Furthermore, there is convincing evidence that standardization and precise precautions and control during experimentation are of crucial importance [12, 13, 37, 77]. Only today, instruments for GDV are available which are stable enough to deliver reproducible and therefore scientifically acceptable data. One of the points that need to be verified is whether it would be valid to add up the single glow image area data of all fingers to yield an overall mean. This question arises, because it is known that the images from single fingers give different outputs related to the different individual projections from the organ systems connected by meridians [12, 14, 21, 29]. In the SciLab GDV software used in our study, internal non-parametric controls check the validity of the raw data and their summing up (e.g. by using the Kolmogorov-Smirnov test). In addition, before and during this study, we calculated mean values obtained from single finger measurements and compared them separately. As we did not see substantial differences in the outcome when comparing mean values obtained from single fingers with those derived from area data of all fingers together, we regard our assumption that overall mean values can be used in this kind of study to be confirmed. A third internal control was to also use dynamic measurements obtained from ring fingers only, which essentially yielded comparable statistical results of high significance.

The Geowave Device: Function?

It is not yet known why the tested device showed a harmonizing effects. Taking the human body as a physical object, we suspect that the device, instead of the body, goes into resonance with the geologically and possibly also with some technically originating fields, as a kind of a predominant resonator antenna. We do not know whether this is a valid explanation, but various academic physicists we have discussed this matter with could not give an alternative explanation. The overall size of the device, the distance between the corrugations, the shape and size of the sigmoid bending, the composition of the alloy used and a number of other factors may influence the effect.

Short Critical Appraisal

Short-term stress may also have beneficial effects, e.g. stimulation of a person's maximum performance (eustress, in contrast to distress [78]). Long-term exposure to stressors, however, has negative effects on the majority of people. With the methods used in our study, we could find a small number of persons (out of the 52 test persons) whose GDV glow image areas did not change or even increased after exposure to geopathic stress. This does not appear to be the rule, but seems to be possible in certain people as a short-term effect. With the exception of a few test persons, the Geowave device showed a harmonizing effect on almost all test persons. It might therefore be necessary to check individual effects of the device before mounting it. Again, it should be emphasized that only short-term effects have been measured here, long-term studies are to follow.

The study presented here is based on a number of assumptions: 1. We assume that the dowsed zones were representative for geopathic zones and more neutral zones. 2. We assume that the used GDV system provided valid measurements allowing highly sensitive and reproducible detection of stress-related reactions of the body. As we have thoroughly ensured stability of the apparatus and standardization of the test procedures and implemented randomized variation of the sequence of the experimental sub-phases, we regard our results to be justified. We are aware that we are only at the beginning and are already in the process of performing a number of additional experiments which will enable us to address the phenomena attributed to location dependency or geopathy by different scientific approaches. The new studies will also involve direct measurement of various factors of neuroendocrine/hormonal and immunological regulation as well as efficacy testing in work areas and reaction time testing.

In conclusion, we have obtained reproducible, statistically significant data indicating that the human body reacts differently in different areas. The zones investigated were muted by professional dowsers. We showed that the device tested provided a statistically significant harmonizing effect. Also, a number of the findings obtained in this study support the idea of earlier work that the main effect of geopathic zones might be due to effects on the immune system and the pineal system. These results await confirmation by direct measurements of the parameters involved.

Acknowledgements

We would like to acknowledge the extensive support and expert assistance by the following persons and institutions: Land Salzburg: G. Burgstaller (Governor), A. Grüner (Department of Health), W. Fries, G. Brandstetter (Presidial Department); SALK, St. Johanns-Hospital, Salzburg: M. Piberger (Hospital Technology Department), M. Weinberger (Public Relations), M. Hader (Director of Nursing), G. Biber (Economy Director), I. Jekel and S. Roth (Research Institute for Frontier Questions of Medicine and Biotechnology); Stadt Salzburg: H. Schaden (Mayor), J. Riedl (Municipal Authorities of Salzburg City); H. Koutny and A. Karlbauer (Trauma Center of the Austrian Social Insurance for Occupational Risks); J. Aumayr and B. Klausbruckner (Wiener Krankenanstaltenverbund). We also thank Mr. A. Wiebecke, Salzburg, for allowing us to examine the Geowave device in our study and congratulate him on this most promising development.

Dedication

This study is dedicated to one of the European fathers of geopathic stress research, the late Prof. Otto Bergsmann. We thank him for stimulating our work and for his enthusiastic and professional approach towards clarifying geopathic phenomena. His profound work has provided an invaluable basis for the multitude of knowledge in this field today.

References

1 Angerer J, Hartmann E, König HL, Purner J, Schmitz-Petri W, Ott T: Mensch, Wünschelrute, Krankheit. Umwelt-Strahlungen. Wie sie auf uns wirken. St. Gallen, Astroterra, 1985.
2 Bergsmann O: Risikofaktor Standort. Wien, Facultas Universitätsverlag, 1990.
3 Bergsmann O: Bioelektrische Phänomene und Regulation in der Komplementärmedizin. Wien, Facultas Universitätsverlag, 1994.
4 Freshwater D: Geopathic stress. Complement Ther Nurs Midwifery 1997;3:160–162.
5 Bergsmann O, Bergsmann R; Chronische Belastungen. Wien, Facultas Universitätsverlag, 1998.
6 Saunders T: Health hazards and electromagnetic fields. Complement Ther Nurs Midwifery 2003;9: 191–197.
7 König HL: Wetterfühligkeit, Feldkräfte, Wünschelruteneffekt. Der Mensch im Einfluß elektromagnetischer Energieformen. München, Moos, 1987.
8 König HL, Betz H-D: Erdstrahlen? Der Wünschelrutenreport. Wissenschaftlicher Untersuchungsbericht. München, Eigenverlag, 1989.
9 Betz H-D: Das Rutengänger-Phänomen – Neue Kontroversen und Erkenntnisse. Z Parapsychol Grenzgeb Psychol 1995;37:178–188.
10 Betz H-D: Unconventional water detection: field test of the dowsing technique in dry zones: part 1. J Sci Explorat 1995;9:1–43.
11 Betz H-D: Unconventional water detection: field test of the dowsing technique in dry zones: part 2. J Sci Explorat 1995;9:159–189.
12 Korotkov K: Human Energy Field Study with GDV Bioelectrography. Petersburg, Backbone, 2002.
13 Korotkov K: GDV in medicine 2002: application of the GDV bioelectrography technique in medicine; in Francomano CA, Jonas WB, Chez RA (eds): Proceedings: Measuring the Human Energy Field State of the Science. Corona del Mar, CA, Samueli Institute, 2002, pp 9–22.
14 Korotkov K, Williams B, Wisneski LA: Assessing biophysical energy transfer mechanisms in living systems: the basis of life processes. J Altern Complement Med 2004;10:49–57.
15 Rizzo-Roberts N: Gaseous discharge visualization (GDV) bioelectrography: an overview; in Francomano CA, Jonas WB, Chez RA (eds): Proceedings: Measuring the Human Energy Field: State of the Science. Corona del Mar, CA, Samueli Institute, 2002, pp 23–30.
16 Rizzo-Roberts N: GDV description and discussion of safety issues; in Korotkov K (ed): Measuring Energy Fields State of the Science. Fair Lawn, NJ, Backbone, 2004, pp 23–28.
17 Altman DG, Schulz KF, Moher D, Egger M, Davidoff F, Elbourne D, Gotzsche PC, Lang T: The revised CONSORT statement for reporting randomized trials: explanation and elaboration. Ann Intern Med 2001;134:663–694.
18 World Medical Association declaration of Helsinki. Recommendations guiding physicians in biomedical research involving human subjects. Jama 1997; 277:925–926.
19 Moher D, Schulz KF, Altman D: The CONSORT statement: revised recommendations for improving the quality of reports of parallel-group randomized trials. Jama 2001;285:1987–1991.
20 Bundzen PV, Korotkov KG, Unestahl LE: Altered states of consciousness: review of experimental data obtained with a multiple techniques approach. J Altern Complement Med 2002;8:153–165.
21 Dobson P, O'Keefe E: Research into the efficacy of the gas discharge visualisation technique as a measure of physical and mental health. http://wwwkirlianorg/gdvresearch/experiments/paulelena/refhtml 2004.
22 Owens J, Van De Castle R: Gas discharge visualization (GDV) technique; in Korotkov K (ed): Measuring Energy Fields State of the Science. Fair Lawn, NJ, Backbone, 2004, pp 11–22.
23 Rubik B: Scientific analysis of the human aura. in Korotkov K (ed): Measuring Energy Fields State of the Science. Fair Lawn, NJ, Backbone, 2004, pp 157–170.
24 Korotkov K: Stability and reproducibility of GDV parameters. Aura and consciousness. New stage of scientific understanding. St. Petersburg Division of Russian Ministry of Culture, State Editing and Publishing Unit, 'Kultura', 1999, pp 84–108.
25 Cioka G, Korotkov K, Giacomoni PU, Rein G, Korotkova A: Effects of exposure to electromagnetic fields from computer monitors on the corona discharge from skin; in Korotkov K (ed): Measuring Energy Fields State of the Science. Fair Lawn, NJ, Backbone, 2004, pp 183–192.
26 Gibson SS: Effect of listening to music and focused meditation on the human energy field as measured by the GDV and the profile of mood states (POMS); in Korotkov K (ed): Measuring Energy Fields: State of the Science. Fair Lawn, NJ, Backbone, 2004, pp 209–222.
27 Boyers DG, Tiller WA: Corona Discharge Photography. J Appl Biophys 1973;44:3102–3112.
28 Howell CJ: The therapeutic effect of tai chi in the healing progress of HIV. Int J Altern Complem Med 1999;Nov:16–20.
29 Dobson P, O'Keefe E: Investigations into stress and its management using the gas discharge visualization technique. J Altern Complement Med 2000; 12–17.
30 Russo M, Choudhri AF, Whitworth G, Weinberg AD, Bickel W, Oz MC: Quantitative analysis of reproducible changes in high-voltage electrophotography. J Altern Complement Med 2001;7:617–631.
31 Francomano CA, Jonas WB, Chez RA: Measuring the Human Energy Field. State of the Science, Corona del Mar, CA, Samueli Institute, 2002.
32 Korotkov KG, Popechitelev EP: Method for gas-discharge visualization and automation of the system of realizing it in clinical practice. Med Tekh 2002:21–25.
33 Mandel P: Energy emission analysis. New application of Kirlian photography for holistic medicine. Essen, Synthesis, 1986.
34 Medvedev SN, Mal'tseva AS, Popkova AM, Serov VV, Igonina NP, Tkacheva OI, Kozin AN: Possibilities of the use of Korean acupuncture Su Jok in the clinical practice. Klin Med (Mosk) 1996;74:64.
35 Treugut H, Gorner C, Ludtke R, Schmid P, Fuss R: Reliabilitat der Energetischen Terminalpunktdiagnose (ETD) nach Mandel bei Kranken. Forsch Komplementärmed 1998;5:224–229.
36 Treugut H, Koppen M, Nickolay B, Fuss R, Schmid P: Kirlian Fotografie: Zufälliges oder personenspezifisches Entladungsmuster? Forsch Komplementärmed Klass Naturheilkd 2000;7:12–16.
37 Bascom R, Buyantseva L, Zhegmin Q, Dolina M, Korotkov K: Gas discharge visualization (GDV)-bioelectrography. Description of GDV performance under workshop conditions and principles for consideration of GDV as a possible health status measure; in Francomano CA, Jonas WB, Chez RA (eds): Proceedings: Measuring the Human Energy Field. State of the Science. Corona del Mar, CA, Samueli Institute, 2002, pp 55–66.
38 Korotkov K, Donlina MY, Bascom R: Appendix: translation of Russian documents related to GDV; in Francomano CA, Jonas WB (eds): Proceedings: Measuring the Human Energy Field. State of the science. Corona del Mar, CA, Samueli Institute, 2002, pp 90–156.
39 Korotkov K: Main steps of the diagnostic process with the gas discharge visualization (GDV) technique; in Taylor R (ed): Aura and Consciousness: New Stage of Scientific Understanding, ed 2. St. Petersburg Division of the Russian Ministry of Culture, State Editing and Publishing Unit 'Kultura', Petersburg, 1999, pp 58–83.

40 Medvedev SN, Mal'tseva AS, Popkova AM, Serov VV, Igonima NP, Tkacheva OI, Kozin AN: Possibilities of the use of Korean acupuncture Su Jok in the clinical practice. Klin Med (Mosk) 1996;74:64.
41 Ader R, Cohen N: Psychoneuroimmunology: conditioning and stress. Ann Rev Psychol 1993;44: 53–85.
42 Torpy DJ, Chrousos GP: The three-way interactions between the hypothalamic-pituitary-adrenal and gonadal axes and the immune system. Baillieres Clin Rheumatol 1996;10:181–198.
43 Miller DB, O'Callaghan JP: Neuroendocrine aspects of the response to stress. Metabolism 2002; 51:5–10.
44 Reiche EM, Nunes SO, Morimoto HK: Stress, depression, the immune system, and cancer. Lancet Oncol 2004;5:617–625.
45 Skyberg K, Vistnes AI: Low frequency electromagnetic fields in the working environment – exposure and health effects. Elevated risk of cancer, reproductive hazards or other unwanted health effects? Tidsskr Nor Laegeforen 1994;114:1077–1081.
46 Leitgeb N, Schröttner J: Electrosensibility and electromagnetic hypersensitivity. Bioelectromagnetics 2003;24:387–394.
47 Müller U, Stieglitz R: Can the Earth's magnetic field be stimulated in the laboratory? Naturwissenschaften 2000;87:381–390.
48 Hansen GP: Dowsing: a review of experimental research. J Soc Psych Res 1982;51:343–367.
49 Mayer H, Winklbaur G: Wünschelrutenpraxis. Wien, Orac, Kremayr and Scheriau, 1991.
50 Gurvich EB, Novokhatskaia EA: The potential hazard for the development of leukemia from exposure to electromagnetic radiation (a review of the literature). Gig Tr Prof Zabol 1989:37–38.
51 Bergsmann O: Bioelektrische Funktionsdiagnostik. Physiologische und Pathophysiologische Grundlagen. Heidelberg, Haug, 1979.
52 Salvatore JR, Weitberg AB: Non-ionizing electromagnetic radiation and cancer – is there a relationship? R I Med J 1989;72:15–21.
53 Green PH, O'Toole KM, Slonim D: Geopathology of early gastric cancer. Gastroenterology 1990;99: 1540–1541.
54 Kato M, Honma K, Shigemitsu T, Shiga Y: Circularly polarized 50-Hz magnetic field exposure reduces pineal gland and blood melatonin concentrations of Long-Evans rats. Neurosci Lett 1994;166: 59–62.
55 Reiter RJ: Melatonin suppression by static and extremely low frequency electromagnetic fields: relationship to the reported increased incidence of cancer. Rev Environ Health 1994;10:171–186.
56 Salvatore JR, Blackinton D, Polk C, Mehta S: Nonionizing electromagnetic radiation: a study of carcinogenic and cancer treatment potential. Rev Environ Health 1994;10:197–207.
57 Salvatore JR, Weitberg AB, Mehta S: Nonionizing electromagnetic fields and cancer: a review. Oncology (Huntingt) 1996;10:563–578.
58 Stevens RG, Davis S: The melatonin hypothesis: electric power and breast cancer. Environ Health Perspect 1996;104(suppl 1):135–140.
59 Brendel H, Niehaus M, Lerchl A: Direct suppressive effects of weak magnetic fields (50 Hz and 16 2/3 Hz) on melatonin synthesis in the pineal gland of Djungarian hamsters (Phodopus sungorus). J Pineal Res 2000;29:228–233.
60 Caplan LS, Schoenfeld ER, O'Leary ES, Leske MC: Breast cancer and electromagnetic fields – a review. Ann Epidemiol 2000;10:31–44.
61 Brocklehurst B: Magnetic fields and radical reactions: recent developments and their role in nature. Chem Soc Rev 2002;31:301–311.
62 Costa G: Cardiopathy and stress-inducing factors. Med Lav 2004;95:133–139.
63 Burch JB, Reif JS, Yost MG: Geomagnetic disturbances are associated with reduced nocturnal excretion of a melatonin metabolite in humans. Neurosci Lett 1999;266:209–212.
64 Burch JB, Reif JS, Yost MG, Keefe TJ, Pitrat CA: Reduced excretion of a melatonin metabolite in workers exposed to 60 Hz magnetic fields. Am J Epidemiol 1999;150:27–36.
65 Reiter RJ: Reported biological consequences related to the suppression of melatonin by electric and magnetic field exposure. Integr Physiol Behav Sci 1995;30:314–330.
66 Graham C, Cook MR, Sastre A, Riffle DW, Gerkovich MM: Multi-night exposure to 60 Hz magnetic fields: effects on melatonin and its enzymatic metabolite. J Pineal Res 2000;28:1–8.
67 Jajte J, Zmyslony M: The role of melatonin in the molecular mechanism of weak, static and extremely low frequency (50 Hz) magnetic fields (ELF). Med Pr 2000;51:51–57.
68 Juutilainen J, Stevens RG, Anderson LE, Hansen NH, Kilpelainen M, Kumlin T, Laitinen JT, Sobel E, Wilson BW: Nocturnal 6-hydroxymelatonin sulfate excretion in female workers exposed to magnetic fields. J Pineal Res 2000;28:97–104.
69 Weaver JC: Understanding conditions for which biological effects of nonionizing electromagnetic fields can be expected. Bioelectrochemistry 2002; 56:207–9.
70 Warman GR, Tripp HM, Warman VL, Arendt J: Circadian neuroendocrine physiology and electromagnetic field studies: precautions and complexities. Radiat Prot Dosimetry 2003;106:369–373.
71 Baltrusch HJ, Stangel W, Titze I: Stress, cancer and immunity. New developments in biopsychosocial and psychoneuroimmunologic research. Acta Neurol (Napoli) 1991;13:315–327.
72 Olff M: Stress, depression and immunity: the role of defense and coping styles. Psychiatry Res 1999; 85:7–15.
73 Plytycz B, Seljelid R: Stress and immunity: minireview. Folia Biol (Krakow) 2002;50:181–189.
74 Bower JE, Segerstrom SC: Stress management, finding benefit, and immune function: positive mechanisms for intervention effects on physiology. J Psychosom Res 2004;56:9–11.
75 Nuzhdina MA: Effect of natural factors on the occurrence of cardiovascular diseases. Biofizika 1998; 43:640–646.
76 Duerden T: An aura of confusion Part 2: the aided eye – 'imaging the aura?' Complement Ther Nurs Midwifery 2004;10:116–123.
77 Francomano CA, Owens JE: Concept sheet for a proposed GDV protocol; in Francomano CA, Jonas WB, Chez RA (eds): Proceedings: Measuring the Human Energy Field State of the Science. Corona del Mar, CA, Samueli Institute, 2002, pp 82–157.
78 Esch T: Stress, adaptation, and self-organization: balancing processes facilitate health and survival. Forsch Komplementärmed Klass Naturheilkd 2003; 10:330–341.