

**Earthing and EarthFx Products:  
A Summary of Research and Development**



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## About the investigators

**William C. Amalu, DC, DABCT, DIACT, FIACT** is a Board Certified Clinical Thermologist and is President of the International Academy of Clinical Thermology.

**Roger Applewhite, PE** is Director of Engineering and co-owner of SPI Westek, formerly known as Static Prevention Inc., of Anaheim, California. He is a member of the IEEE and was trained in electrical engineering at MIT.

**Gaétan Chevalier, Ph.D.** formerly, Director of Research at the California Institute for Human Science, and now a Visiting Scientist at the University of California, Irvine. He is a biophysicist with a Ph.D. in Engineering Physics from the University of Montréal.

**Maurice Ghaly, MD** is a physician and medical researcher with a specialty in anesthesiology.

**Jonathan Head, PhD.**

**William Hobbins, MD, FABS, FACS, FABCT** of Thermal Image Analysis, Inc in Madison, Wisconsin, is a renowned specialist in thermal imaging.

**David Kolinsky, MD.**

**David L. Minkoff, MD** is Board Certified in Pediatrics in Clearwater, Florida, and is a leading authority in biological medicine.

**Kazuhito Mori, Ph.D.** was a Ph.D. student of Dr. Chevalier and conducted research on the physiological changes taking place during earthing. Currently he is teaching medical physiology and psychiatry in Japan.

**A. Clinton Ober** was CEO of several major corporations involved in cable television, and is the inventor of the Earthing technologies described here.

**James L. Oschman, Ph.D.** is a biophysicist and cell biologist (University of Pittsburgh) and award-winning author of Energy Medicine: the scientific basis and Energy Medicine in Therapeutics and Human Performance.

**Jim Philips, MS** Electrical Engineering

**Jeff Spencer, MA, DC, CCSP** is a leading expert on athletic recovery and acute injury treatment for elite athletes. He has been the principal therapist for Lance Armstrong and the United States Professional Cycling Team in their 7 Tour de France victories. In 2004 he was named International Sports Chiropractor of the Year by the International Chiropractic Association.

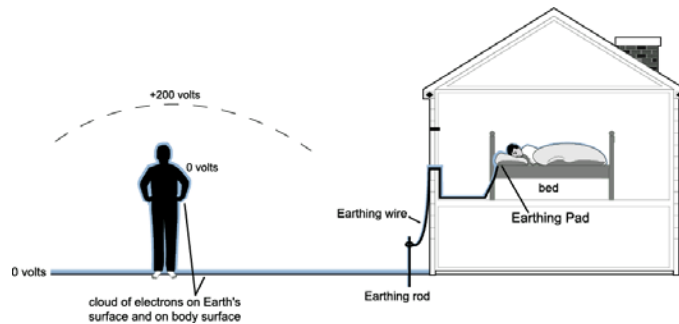
**Bob Sternowski, MS** is an electrical engineer at the Department of Physics and Astronomy at the University of Iowa.

**Dale Teplitz, MA** assisted Maurice Ghaly in the Cortisol study.

**Roger Titone, BS** is a mechanical engineer and is founder and president of Titronics Research and Development a producer of paraspinal infrared thermographic scanners.

**John T. Zimmerman, Ph.D.** is Laboratory Director of Mountain Medical Sleep Disorders Center, Carson City, Nevada, and Adjunct Professor of Psychology at the University of Nevada, Reno. He is a Diplomat of the American Board of Sleep Medicine.

**Earthing: A New Health Paradigm** A revolutionary health technology called Earthing is poised to change the world. Earthing is a disruptive technology, meaning that it will have vast repercussions comparable to those produced by the introduction of the light bulb and the computer. Earthing will change the way we think about health, recovery and performance. Remarkably, the technology has always been available, and is well known to those who appreciate how well they feel when walking barefoot on the earth or on the beach. Research on the patented Earthing systems is showing that connecting the body directly to the surface of the earth has immediate, systemic and lasting health effects.



Earthing is defined as the process by which the Earth's subtle and restorative microcurrents, composed of electrons and natural frequencies, are transferred to the body by means of a variety of patented technologies. One method involves sleeping on a conductive mattress pad that is connected via a wire to a rod that is placed into the Earth. Electrons and microcurrents from the Earth instantaneously flow up the rod and wire and onto the mattress pad. The restorative influences of the earth are then transferred to the body, which is a good electrical conductor.

People who sleep "Earthed" generally report better rest, more energy, waking more refreshed, less pain, stiffness, soreness, irritation, agitation, fatigue, faster healing, the disappearance of chronic health problems, and more physical capacity and vitality.

Clinical application of Earthing involves connecting injured or painful areas of the body to the earth via conductive patches or bands placed on the skin. Research in several laboratories is showing rapid and permanent resolution of inflammation and attendant pain, swelling, redness, and stiffness. The method works for both acute injuries and chronic problems, even in cases that have persisted for decades.



**Use of earthing patch system at the 2005 Tour de France**

Earthing technology is emerging at a time of increased public awareness of the significance of both sleep deprivation and inflammation, and how much this is affecting health, recovery and performance. “I Can’t Sleep” was the title of a recent *BusinessWeek* cover story. And *Newsweek’s* “In Search of Sleep” reported that there are over 70 million problem sleepers in the US. Around the world, people are constantly seeking ways to improve their sleep. In spite of many claims, few if any products produce measurable improvements in sleep quality. Moreover, abundant scientific evidence links sleep deprivation, inflammation, and free radicals. A recent *Time Magazine* cover story, “The Secret Killer”, links inflammation to heart attacks, strokes, cancer, arthritis, osteoporosis, Alzheimer’s and other common health disorders associated with aging. A recent *Allure* magazine describes sleep deprivation as a major contributor to the aging process.



Because of the widespread use of plastics and polymers in shoes, carpets and furniture, most people spend their lives ungrounded: their skin virtually never comes in direct contact with the surface of the earth. When polymers began to be used to make shoes, carpets and furniture, it seemed like progress: a logical and valuable application of modern technology. Plastics are extremely versatile, economic and robust materials. Everyone was delighted to have inexpensive footwear and carpeting with improved durability and traction. However, research on Earthing is showing that replacing leather-soled shoes with plastics and other insulating materials has had unanticipated long-term effects on human physiology.

The EarthFx sleep products enable people to re-connect with the earth during the one third of their lives they spend sleeping. This enables them to recover from the stresses of daily life. The beauty of the Earthing concept is its simplicity. All a person needs to do is do what they normally do, lie down and go to sleep. There’s nothing to mix, no buttons to push, no appointments to keep or refills to buy. Virtually everyone can benefit from Earthing. It is stand-alone concept. Moreover, significant clinical applications are emerging in the areas of athletic recovery, pain management and injury repair. The clinical research is documenting how quickly Earthing benefits physiology, performance and recovery processes.

## **Origins of the Earthing concept and products**

Many people assume that Earthing involves grounding a person to cause electrical charges to drain off the body. Research shows that Earthing actually involves electrons and the earth's electrical field moving from the earth to the body. Hence we refer to Earthing to distinguish it from the grounding of electrical equipment and cables.

The Earthing story began when Clint Ober connected one terminal of a voltmeter to a long wire attached to a steel rod driven into the ground. By touching the other meter terminal with his finger, he could measure the voltages induced on his body by ambient electric fields as he moved about his home. Clint discovered that his bedroom and his bed were the most electrically active regions of his house. The bed is close to electrical wires hidden behind the wall covering. Perhaps connecting the bed to the earth would "shield" him from electrical fields, much like the shielding used in electronics.

To test this idea, Clint placed a crude conducting system on his mattress and connected it to a wire that went out his bedroom window to a rod he had pushed into the earth. When he lay down on his conducting mattress, his body voltage dropped from about 5 volts to nearly zero. He quickly fell asleep and woke up the next morning with the voltmeter still on his chest where he had left it the night before. He had slept soundly for the first time in years. Lying on the conducting system on his mattress was equivalent, electrically, to lying directly on the earth, but certainly a lot more comfortable.

This was the beginning of a remarkable journey that is bringing the benefits of Earthing to everyone. Ober designed and patented a sophisticated Earthing system for use on mattresses, chairs and sofas to enable people to be connected to the earth as much as possible. He also developed an Earthing patch system that could be placed on an injured or sore place on the body.

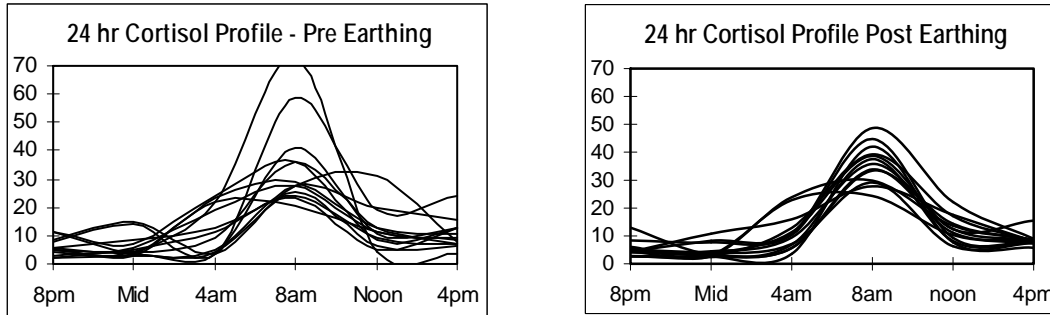
## **Earthing, insomnia and health: first pilot study**

Insomnia is not considered a disease, even though it afflicts nearly half the population to some degree and profoundly compromises their health and vitality. A pilot study of 60 people<sup>1</sup> showed that:

- 85% went to sleep quicker
- 93% reported sleeping better throughout the night
- 100% reported feeling more rested when they woke up
- 82% experienced a significant reduction in muscle stiffness
- 74% experienced the elimination of or a reduction of chronic back or joint pain
- 78% reported improved general health

## The cortisol study of Ghaly & Teplitz

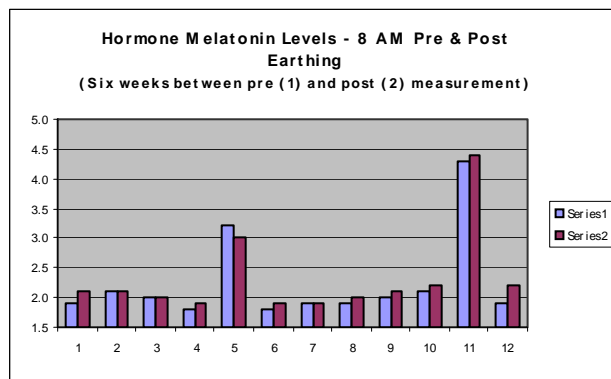
Cortisol is the so-called “stress hormone” and is accepted as a biochemical marker for stress and inflammation. In an unstressed person, the adrenal cortex secretes cortisol on a



predictable day-night pattern. Disruption of this pattern has been correlated with sleep disturbances and a wide variety of chronic disorders. Normally, the levels are high in the daytime, when a person is active, and low during the night, during rest and recovery.

In a study of 12 subjects, Ghaly & Teplitz<sup>2</sup> demonstrated that Earthing over an 8 week period normalizes the day/night cortisol rhythm. They measured cortisol levels every 4 hours using a standard saliva test. The results are shown above. Notice the chaotic daily rhythms in cortisol levels in the left graph, before using the Earthing sleep system, and the normalization afterwards, in the right graph. Earthing allows the body to “tune in” to the subtle but important rhythm in the Earth’s electric field that sets the diurnal cortisol rhythm in the body.

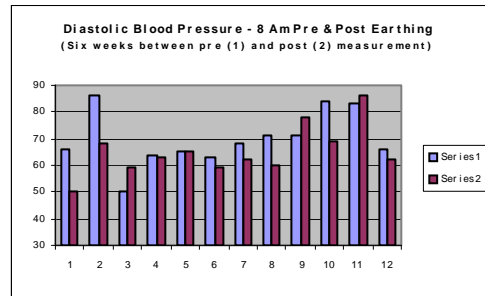
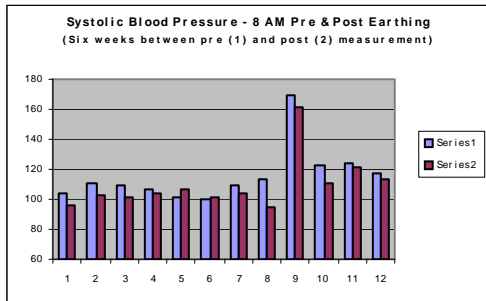
Ghaly & Teplitz also found that the important hormone, melatonin, increased in 8 of the 12 subjects. Increases ranged between 2 and 16%. Melatonin decreased by 6% in only 1 of the subjects. The other 3 remained the same.



This finding is important because Melatonin is a central neuroendocrine modulator of annual and circadian biorhythms in the body, and has a far-reaching influence over most autonomic, hormonal, and behavioral functions. Melatonin rhythms also reflect aging<sup>3</sup> processes, and are disrupted in many degenerative illnesses. Melatonin is also an potent antioxidant. Taken together, the increase in the antioxidant melatonin, and the normalization of the secretion of the inflammatory marker, cortisol, point towards a beneficial systemic effect of Earthing on inflammatory processes throughout the body.

## Blood pressure

Finally, Ghaly & Teplitz also recorded blood pressures on the subjects before and after 8 weeks of earthing. As can be seen at the top of the next page, systolic pressures decreased in 10 of the 12 subjects, and diastolic pressures were lower in 8 of the 12 subjects.



## Earthing and inflammation

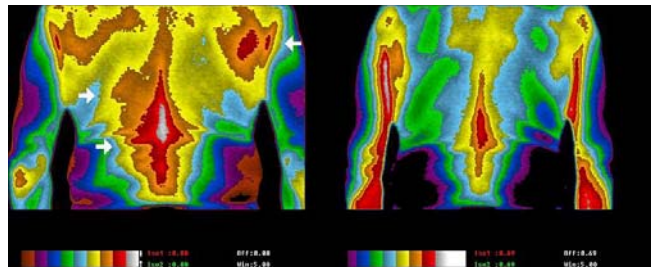
The most common report, from thousands using the EarthFx sleep system, is reduction of chronic pain. Perhaps improved sleep, and the many other benefits people have observed, are actually a consequences of decreased inflammation.

Clint Ober discussed this with Dr. Steven Sinatra, a well-known and highly respected cardiologist. Dr. Sinatra suggested investigating inflammation. The hallmark of inflammation is the presence of free radicals that normally destroy bacteria, viruses and cellular debris by tearing apart their electronic structure. Chronic inflammation arises when free radicals are not completely neutralized and begin to destroy normal tissues. This sets up a vicious cycle. The most logical explanation is that Earthing provides a virtually unlimited supply of free electrons, which are actually the most natural anti-inflammatory or antioxidant.

Cortisol and melatonin are markers of inflammation, so the Ghaly and Teplitz study supports the hypothesis.

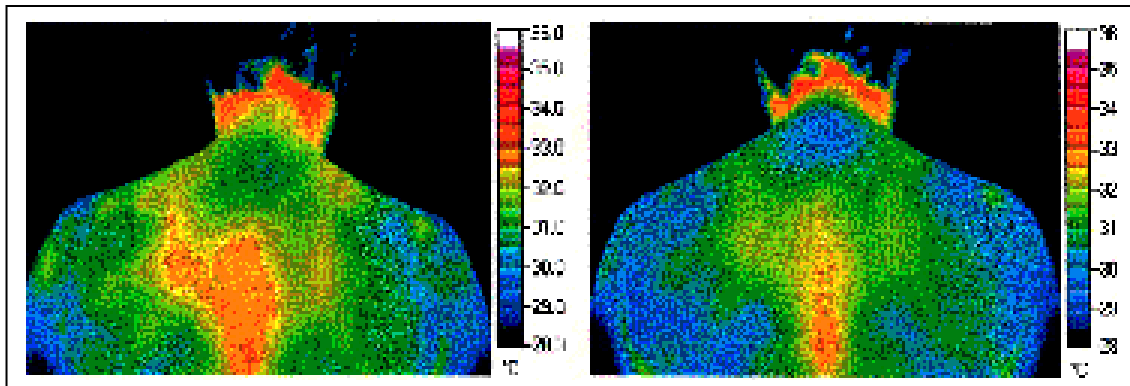
Another measure of inflammation is infrared thermography. Thermography readily detects the temperature gradient between inflamed and normal tissues.

The image on the left is of the low back and shoulders taken as a baseline (prior to ETT use). The arrows denote the most significant areas of inflammation, which also correspond precisely with the subject's areas of complaint. The image on the right was taken after 2 nights of sleeping on the ETT sleep system. Note the **complete resolution in inflammation** with a return of normal thermal symmetry.



## Clinical applications: athletic recovery

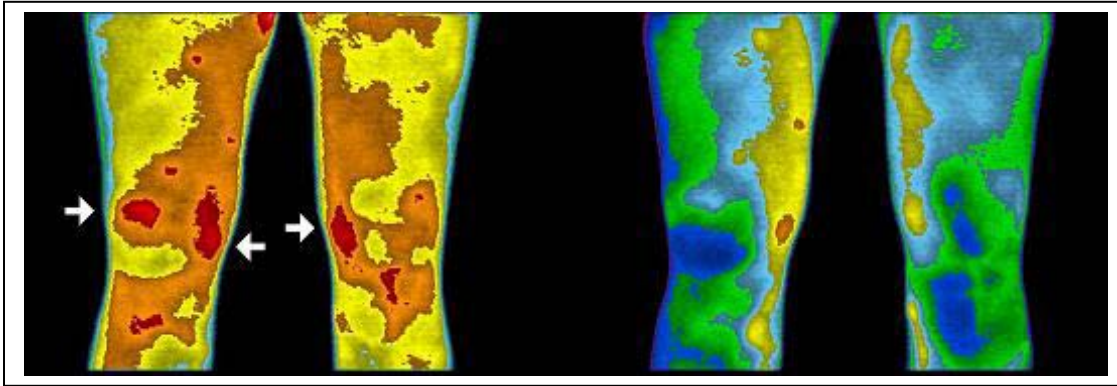
The effects of Earthing on inflammation have been documented in research by Dr. Jeff Spencer. Jeff has used Earthing on elite professional athletes and on individuals suffering from a variety of inflammatory conditions. Jeff's clientele includes golfer Tiger Woods, *Tour de France* winner Lance Armstrong, World Series MVP Troy Glaus, Chicago Bulls star Kendall Gill, Indy racer Al Unser, Supercross World Champion Chad Reed, various NFL players, and others. In addition to the Earthing sleep technology, Jeff uses the Earthing pain patch system developed by Clint Ober. These devices are shown on page 3.



Dr. Spencer used infrared thermography to document the reduction in inflammation with Earthing in the example is shown above. A female patient had undergone left shoulder rotator cuff surgery. She had post-operative inflammation and muscle tension. The top thermogram, taken from the back, shows asymmetric surface temperatures consistent with inflammation in the left shoulder. The second thermogram, taken after about 30 minutes of Earthing, shows the cooling of the same regions and symmetrical surface temperatures. At the same time the patient experienced decreased pain and greater range of motion.

## Clinical applications

Spencer's preliminary studies have been confirmed by a leading clinician and expert on thermography, Dr. William C. Amalu. In a series of over 30 case studies, Dr. Amalu has documented rapid and significant improvements in pain, overall health, and lifestyle. Dr. Amalu believes that Earthing is one of the most significance advances in the treatment of both chronic and acute inflammatory conditions. He refers to this clinical application of Earthing as Electron Transfer Therapy or ETT. Below is a thermogram from one of the case studies. The patient reported 6 years of chronic bilateral knee pain. She arrived at the office using a walker, knee wraps, and a pronounced limp. She had a history of 2 knee surgeries, and years of physical therapy and acupuncture treatments with little improvement. After two weeks of ETT treatment she no longer needed a walker and within one month she was able to go dancing. The thermograms below were taken before and after the first 30 minutes of treatment with ETT. There is significant reduction in heat over both knees. The right knee shows more heat than the left, correlating with the patient's account of greater pain on this side.

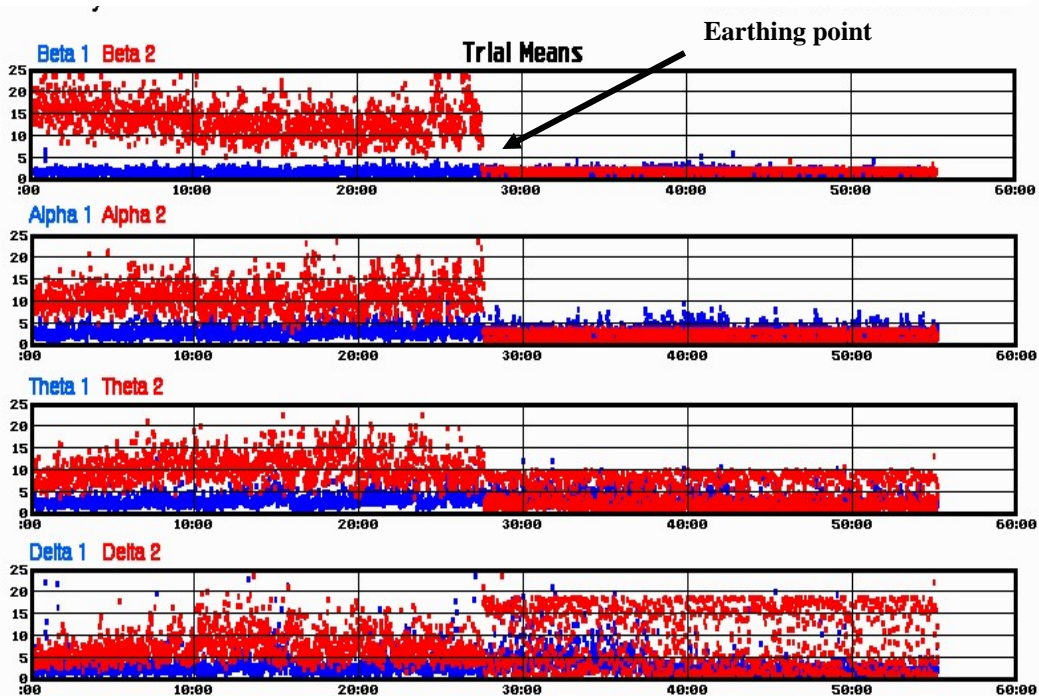


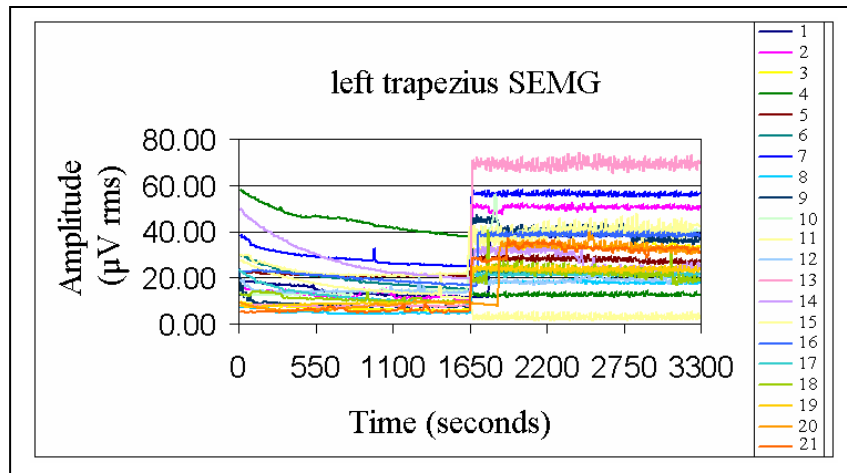
The images are of the knees taken before and after 30 minutes exposure to clinical Earthing. The arrows denote the most significant areas of inflammation. Note the considerable reduction in inflammation in the right image taken after 30 minutes of exposure to clinical ETT.

### Physiology and electrophysiology

<sup>5</sup>  
Chevalier et al have researched the effect of Earthing on human physiology. Fifty-eight healthy adult subjects (30 controls) participated in a double blind pilot study. Earthing was accomplished with conductive adhesive patches placed on the sole of each foot. As shown to the right, upon earthing (at 28 minutes, arrow), about half the experimental subjects had an abrupt, almost instantaneous change in electroencephalograms (EEG) from the left hemisphere (red), but not the right hemisphere (blue).

### Brain wave activity measurements before and during earthing





All subjects also showed an abrupt change in values of surface electromyograms (SEMGs) from right and left upper trapezius muscles (left shown above). For some subjects these values decreased on Earthing, for the majority there was an increase. SEMG measurements of the trapezius muscles are known to correlate with overall stress or “tone” of the musculature.<sup>6,7</sup> The results are typical of a situation in which some subjects have muscle tension that is below “normal” and others who are more tense. As with the cortisol levels, the results are best described as a “normalization” of physiology.

#### Summary of observations on BVP

	Controls	%	Earthed	%
<b>Down:</b>	8	32.0%	19	86.4%
<b>Up:</b>	16	64.0%	3	13.6%
<b>Stable:</b>	1	4.0%	0	0.0%
<b>Total:</b>	25	100.0%	22	100.0%
<b>Expected down:</b>	12	50.0%	11	50.0%
<b>Expected up:</b>	12	50.0%	11	50.0%
<b>Chi Square p =</b>	0.1025	n.s.	<b>0.0006</b>	

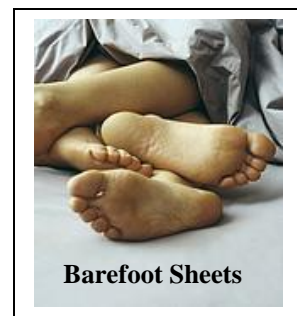
Finally, Earthing decreased blood volume pulse (BVP) in 19 of 22 experimental subjects ( $p < 0.001$ ). This finding is in accord with the decreases in systolic and diastolic blood pressures noted in the Ghaly & Teplitz study.

#### Interpreting the electrophysiology and physiology results

It is known that the left hemisphere predominantly influences parasympathetic activities,<sup>8,9</sup> while the right hemisphere regulates sympathetic activities. Hence the significant changes in absolute values of the EEG recordings for the left hemisphere (and not the right hemisphere) suggest that Earthing influences rational and parasympathetic aspects of brain functioning. The BVP results also support a shift in the direction of parasympathetic activation.

## Earth Fx product development

At the present time all of the Company's sleep product R&D is being done at Flexus Comfort Technologies (Frank & Sons) in Ontario, CA. Flexus has been instrumental in helping to develop a variety of mattresses and mattress pads that incorporate earthing technologies. Flexus has been providing products and services to the mattress industry since 1973 and has worked with almost every major brand name mattress company in North America including firms such as Serta, Spring Air, Ortho and King Koil. Flexus recently designed and set up a new 40,000 square foot manufacturing facility that can produce approximately 10,000 Barefoot bed Pads and up to 300 Barefoot Beds per day.



## **Grounding the human body to earth is the most important health discovery ever!**

*A recent Time Magazine cover story, "The Secret Killer", links inflammation to heart attacks, strokes, cancer, arthritis, osteoporosis, Alzheimer's and other common health disorders. A recent Newsweek article reported that inflammation is emerging as the "Alpha and Omega" of disease and that reducing inflammation is the most important thing a person can do to improve their health and prevent disease."*

In the 1960's the world changed. Materials made of plastic were introduced into our environment. From shoes to carpets, plastics have become commonplace. Little did anyone know what insulating the body from earth would have on health.

Today, diseases that were once uncommon have become almost epidemic. Chronic pain, asthma, allergies, heart disease, Alzheimer's, arthritis, cancer, and a host of other conditions have steadily increased in incidence from year to year. Everybody knows someone with a chronic health problem. The introduction of plastics removed from our environment the single most important connection to our body - our natural electrical connection with the earth -. Synthetic shoes, carpets, and modern building materials now insulate the human body from the free-electrons that reside on the surface of the earth. Loss of access to this natural source of free electrons has caused a cataclysmic change in how the body functions. Research is showing that loss of these free-electrons that normally flow from the earth to the body, excess free radicals produced by a normal immune response promotes inflammation or autoimmune disease.

Normally, the inflammation process is necessary to destroy pathogens and repair damaged tissues. But ongoing medical research is demonstrating that conditions ranging from chronic pain to cancer, and perhaps all diseases, may be linked to one common cause – chronic inflammation. Simply put, chronic inflammation is due to an unregulated overproduction of scavengers called free-radicals. Free-radicals are positively charged molecules in search of negatively charged electrons. As such, these free-radicals can only exist for a nano-second as they are strongly attracted to sources of electrons. In a normal controlled inflammatory reaction, free-radicals obtain the electrons they need by stripping them away from bacteria or damaged tissue. This in turn kills the bacteria or breaks down the damaged tissue cells for removal from the body.

In autoimmune disease, there is a lack of free electrons to turn off the production of free-radicals. With a shortage of free electrons, excess free-radicals attack and strip electrons from normal tissue cells. These newly damaged cells signal the immune system for more help to fight off what it thinks is an ongoing attack from pathogens. This in turn triggers the immune system to release more free-radicals; thus, creating a vicious cycle and the destructive process called chronic inflammation. When the body is supplied with its normal supply of free electrons, excess free-radicals are instantly neutralized and damage to healthy cells stops. And since there are no further signals coming from damaged cells, the immune system ceases production of free radicals. This ultimately results in resolving pain and possibly preventing or reversing the many conditions that

are classified as autoimmune or chronic inflammatory diseases. It is only now that we are discovering the full effect of isolating ourselves from earth's free electrons.

Now we can we regain this lost connection with the earth. A new state-of-the-art method of reconnecting the body to the earth has been developed to restore this normal process. The method, called Earthing, consists of supplying the body with an abundance of free-electrons by way of a conductive sleep system. There is nothing to take, eat, do, or remember. You simply lie down and go to sleep. The sleep system is connected to the earth, which conducts earth's free electrons to the body when in bed. Then, during sleep, the body can restore its natural supply of free electrons.

## **Conclusions**

The Earthing phenomenon and the EarthFx products represent a profound discovery. Research is revealing the health significance and the mechanisms involved. Each aspect of the research has been validated in different laboratories. Both immediate and long-term effects of Earthing have been documented.

People have always been searching for the secrets of health and healing. It is extraordinary that a major answer has always been right under our feet. What we are learning from Earthing is that there have been serious long-term health consequences from disassociating ourselves with the electric field of our planet. These consequences are becoming more and more significant as people take on more and more stressful lifestyles. Disconnection from the earth has actually compromised the physiological systems that deal with stress and that permit recovery. The widespread incidence of both insomnia and chronic disease documents that our society in general is suffering serious consequences from the cycle of stress and lack of recovery.

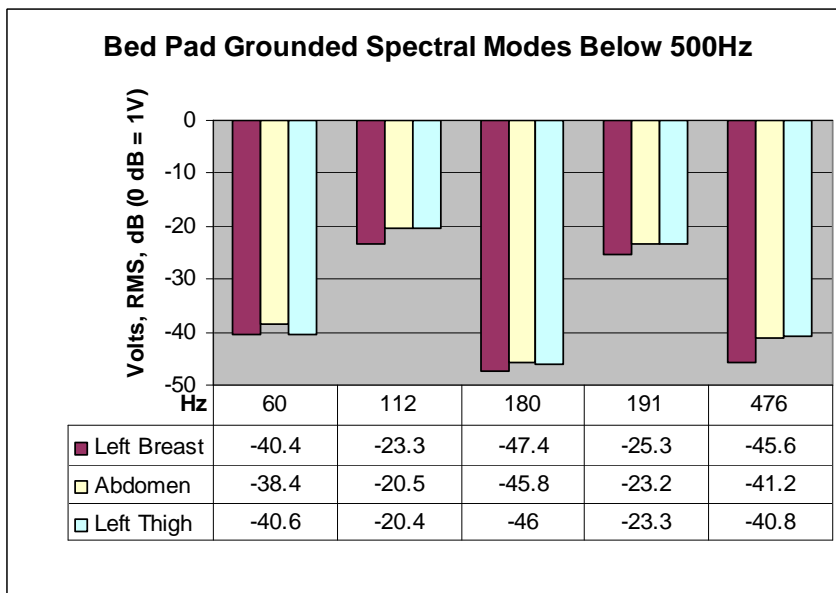
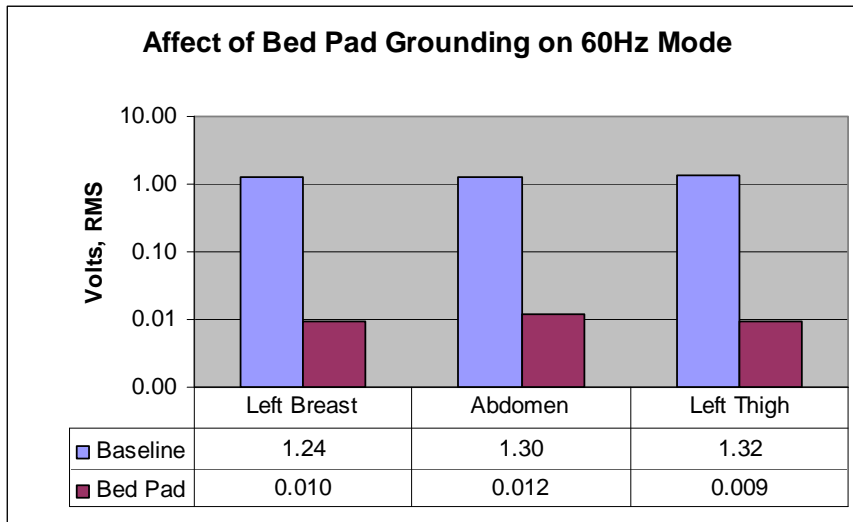
The clinical findings are that Earthing rapidly neutralizes inflammation on a system-wide basis. We know this because an Earthing patch on the bottom of a foot or on a hand can produce rapid and permanent reduction of inflammation in parts of the body distant from the site of application. Large changes take place in 30 minutes, and a few repetitions of 30-minute sessions produce progressively improved function (Spencer and Amalu). Measuring and quantifying the transfer of earth's free electrons and natural frequencies from the earth to the body is now being measured and quantified by investigators<sup>11</sup> associated with the University of Iowa.

Earthing the human body in the clinical setting or during sleep provides an environment in which inflammation from many different causes can resolve quickly, with a wide range of benefits. The dramatic clinical results are supported by the physiological studies showing virtually instantaneous shifts in the electroencephalograms and the electromyograms upon Earthing.

The many benefits of improved sleep, reduced inflammation, and reduced stress have been thoroughly documented in literally thousands of published research studies. We do

not have to repeat all of this careful science. Our research has confirmed that Earthing does, indeed, improve sleep, reduce inflammation and reduce stress. It is therefore not surprising that those who use Earthing sleep systems have reported all of the benefits one would expect from such changes.

Finally, there is widespread concern about possible biological effects of environmental fields. Living systems and healing processes are extremely sensitive to environmental electric, magnetic, and electromagnetic fields.<sup>12</sup> The Environmental Protection Agency recommends that consumers adopt “prudent avoidance” of extended exposure to 60 Hz and other electrical fields until science has determined if such fields are harmful. Earthing causes an easily measurable decrease in the induced electrical field on the body, and, at the same time, has many positive health benefits. An electrical engineer, Roger Applewhite (2004) has documented that Earthing with the EarthFx sleep system reduces<sup>13</sup> the 60Hz electric field induced on the body by a factor of 110.



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