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Statement on Understanding Earthing

April 2015

Gaétan Chevalier, Ph.D.*, and James L. Oschman, Ph.D.**

*University of Montréal Polytechnic School, Engineering Physics, 1988.

** University of Pittsburgh, Biological Sciences, 1965

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Part 1 Earthing and Electricity

Introduction

People feel better when they walk barefoot on the Earth and research has now started to demonstrate why. Multiple studies show that the body functions more effectively when

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effects against chronic inflammation, the underlying cause of many common health disorders.

Connection with the Earth can also be achieved through the use of conductive indoor systems developed specifically for comfort and convenience, as well as for when being barefoot outdoors is not practical. Such systems include bed sheets and pillowcases, mats placed on the floor in front of a favorite chair or beneath a computer desk, as well as body bands and patches.

As summarized in the 2014 book *Earthing: The Most Important Health Discovery Ever!*, more than fifteen years of observations and research have shown that the more time people spend in conductive contact with the Earth, either outdoors or indoors, the better they feel. 1

Such contact is known as Earthing or grounding.

The worldwide ***Society for Barefoot Living*** promotes the benefits of removing shoes and socks and walking naturally on the Earth. On the basis of the organization's experience and research in the field of biomechanics, barefoot enthusiasts attribute many foot and back problems in part to stresses created by shoes that force us to stand and move in ways the human body was not designed for. 2

A different stream of research – involving Earthing – focuses on the influence of the Earth's electrodynamic surface on our bioelectrical bodies, and namely to unique, intriguing physiological changes indicative of a more efficient physiology. This research, and years of observations and feedback, has given rise to the Earthing hypothesis: the Earth is a natural source of electrons and subtle electric fields, and fundamental for health.

Of major importance is the fact that modern biomedical research has documented correlations between chronic inflammation and all of the chronic diseases, including the diseases of aging and the aging process itself. The Earthing research indicates that chronic inflammation is a condition that can be significantly reduced or prevented by grounding our bodies to the Earth. 3

The Earthing hypothesis emphasizes that the loss of the primordial connection with the Earth – our electrical roots – through modern lifestyle is an overlooked cause of widespread and increasing physiological dysfunction and chronic disease. A prime example of this disconnect is the replacement, beginning in the 1960s, of leather soled shoes with rubber and plastics by the footwear industry. Throughout virtually all of history, humans were either barefoot or used animal hides (leather) for footwear. When leather becomes moist, as a result of perspiration from the feet, a channel of conductivity for electron flow is created between the Earth and the feet. Rubber and plastics are electrical insulators and therefore block the beneficial flow of electrons from the Earth to our bodies. Moreover, we live and work today in environments that electrically separate the body from the Earth. Our houses are elevated off the ground. Many of us live and/or work in high rises, very high off the ground.

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phenomena, but we are surrounded by an invisible sea of fluctuating stronger and weaker electromagnetic fields (EMFs) produced by the wiring in homes and businesses as well as various electronic technologies including cell phones and WiFi.

The focus of this article is about the safety of Earthing, a discussion prompted by requests for clarification about whether Earthing is harmful in an environment replete with man-made EMFs.

The short answer to this question: Earthing is not harmful. Just the opposite.

Confusion about this issue stems in part from the fact that research on grounding the human body is opening up new perspectives, and requires a fresh examination of the basics of electricity and magnetism as applied to physiology and medicine. To begin, we would like to briefly lay out some basics of conductors, insulators, and EMFs.

Conductors and Insulators

Materials such as metals are electric conductors. Example: a copper wire. Conductors contain free electrons that carry electric energy from place to place. Turning on a light switch allows electric energy to be conducted through wires to a bulb that converts the electric energy into light energy.

The human body is conductive because it contains a large number of charged ions (called electrolytes) dissolved mainly in interstitial fluids (the fluids flowing in the internal environment outside the cells) and in the blood. Because of this environment, free electrons can move easily within the body. 4

Other materials, called insulators, have very few free electrons. Such materials include plastic, wood, and rubber widely used to prevent electric currents from flowing to places where they can harm someone or damage objects or equipment. For example, common electric wires are covered with insulation to keep the conductors from touching each other, which could cause a short circuit, and from contact with your skin, which could otherwise give you a shock.

Different Forms of Electricity

- **Direct current (DC) electricity**
- **Alternating current (AC) electricity**
- **Static electricity**

All three forms of electricity are present in our environment and can possibly affect the way we feel. Here we focus on DC and AC electricity, while recognizing that static electricity can also affect us and that static charges can also be eliminated by Earthing. 5

Direct Current (DC)

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This unseen sea of electrons is subject to a wide array of rhythms and movements according to stimuli from the sun, moon, and processes going on in the atmosphere and inside the Earth itself. These electrons create a stable DC electric field that is an essential part of the global electric current (for more information on the Earth's electrodynamic surface, see Gaétan Chevalier, The Earth's Electrical Surface Potential: A Summary of Present Understanding.6

When you are grounded, your body is absorbing enough of these electrons to bring your body's electric potential to the same level as that of the Earth. Throughout history, life on the planet has attuned our biology to this natural resource.

Batteries are examples of applied DC. Consider an ordinary flashlight with two type D batteries. When the light is switched on, a current created by chemical reactions in the batteries causes electrons to flow to the bulb, which converts the electric energy into light.

Alternating Current (AC)

AC is the type of man-made electricity producing EMFs with a very wide range of frequencies (measured in Hz, meaning cycles per second) used for homes and businesses, cell phones, WiFi, and microwaves. These frequencies, ranging from about 50 Hz to 18 Gigahertz, have been the subject of research investigating their possible relationship to a variety of health-related issues. For more information on these frequencies and findings, refer to the question in Part 2 on **What are the biological effects of EMFs?**

AC electricity is produced by electric generators and distributed throughout a community via overhead or underground wires. In contrast to DC electricity, the actual flow of electrons in an AC circuit is virtually zero, as the electrons mainly vibrate back and forth (60 times per second in North America and 50 times in Europe, thus the designations 60Hz and 50Hz) without actually progressing along the wire. Therefore, for AC in a typical lamp cord, the electrons do not actually "flow." Instead they "wiggle" back and forth in the wires. Their "wiggle room" is so minuscule that you would barely see it using a microscope with a magnification factor of 10,000 (the distance traveled is around 0.00004cm or 0.00002").

More than a hundred years ago, AC was chosen over DC as the most efficient way to provide electric energy over long distances. Generators at power plants initiate the wiggling motion of the electrons, and this wiggling motion is transmitted through the line, filled with electrons, almost at the speed of light, to produce the energy that powers our appliances and electric devices. As strange as it sounds, the electrons in your household wiring are probably the same ones present when your house was built.

This point is important because of confusion created by statements such as this:

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The statement is incorrect. The power plant produces AC electricity, but no electron actually leaves, goes to your home or your neighbor's home, and then comes back to the plant. Moreover, there is absolutely no fundamental law of physics stipulating that in order to work, a power plant must send out electrons and that these electrons must return to the generator to create more electricity. Rather the opposite is true: no electron leaves the power plant in order to produce the AC electricity we use in our homes. It is the wiggling motion of electrons that carry the electric energy from AC power generators to our homes.

Wiring

The wiring in homes, buildings, and throughout power distribution systems acts as an antenna that can both transmit and receive natural and man-made EMFs. Many recent technologies add significantly to the electromagnetic environment: cell phone towers, WiFi, wireless routers, satellite TV, and cordless telephones. And a variety of devices introduce spikes or transients that distort the 60 or 50 cycle electric field in the wiring, particularly when they are switched on or off. Some examples:

- ballasts used in fluorescent lighting
- high-efficiency lighting such as CFL (Compact-Fluorescent Light) bulbs
- computer hard drives
- electric heaters
- electric hair dryers
- refrigerators and air conditioners
- vacuum cleaners
- dimmer switches on lights

To illustrate this phenomenon, we will use the example of a neighbor's refrigerator or air conditioner switching on or off. This produces a sudden electric "spike" that travels through the power lines to your household's electric system. A signal is also radiated into the atmosphere because the wiring acts as an emitting antenna (an antenna can be used to receive or emit EMFs). Taken together the various signals and distortions to the alternating current field create what some have referred to as "dirty electricity." It is simply EMF "noise" generated by the normal use and functioning of electric appliances.

Attempts have been made to link these phenomena to a variety of health effects and there has been considerable debate about the issue. Some people appear to be very sensitive to EMFs and can become sick from exposure to them, whereas most others are not sensitive.

The term "electromagnetic pollution" is also widely incriminated as a cause of "electrosensitivity." Such a term, as we understand it, refers to the general man-made electromagnetic environment

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Are these fields actually harmful to health? And does Earthing increase any harm they may cause?

The answer to the first question is being debated by researchers. These fields definitely have effects on the body and researchers have begun to propose the potential mechanisms involved.

The answer to the second is clear. Absolutely not.

What Earthing does is mitigate any potentially harmful effects. The protective effect of Earthing on the human body is similar to that of grounding electric systems:

- creating stability in those systems
- decreasing interference.

The shielding of electric cables and electronic equipment by grounding their housings to the Earth is widely used as a method to prevent internal electromagnetic interference.

Over the years, we have heard from people who describe themselves as “electro-sensitive.” Our observation is that such people frequently have a background of stress that has resulted in weakened adrenal glands. Weakened adrenals can lead to many problems and electro-sensitivity may be among them. We have heard from individuals who say that Earthing has helped lessen their sensitivity, and have reported on this in the Earthing book.

However, we regard Earthing’s protective effect against these fields as secondary to the benefits generated by absorption of the Earth’s electrons into the body. Published research on Earthing indicates that such contact yields a broad array of favorable health-related results including improved immune function, sleep, and energy, decreased inflammation and pain, a normalizing effect on the stress hormone cortisol, reduction and/or normalization of stress, improved blood flow, diminished damage to muscle tissue caused by delayed onset muscle soreness (DOMS), reduction of primary indicators of osteoporosis, and improved glucose regulation. 7, 8.

Part 2 Questions about Earthing and Safety

Q. Can the Ground Be Used as a Power Line Return and Harm People Who are in Contact with the Ground?

Some people have expressed concern that it might be dangerous to be in contact with the ground, whether barefoot outside or inside in contact with Earthing equipment. As told to us, the reason for concern is that electric power companies use the ground as the return path of the AC circuit instead of a return (neutral) wire, and by doing so save on the expense of wires needed to meet increasing demands for electricity.

The concern relates to two misconceptions about single wire earth return system (SWER).

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and under special approval, in the U.S.) and more widely in a few developing countries (such as Brazil, India, and Laos), and parts of Africa. The U.S. National Electrical Code does not permit using the Earth as the return path; it requires a metallic return line (neutral wire) from the load (appliances, interior and exterior lighting, computers, and any object that uses electricity) to the generator. The code, however, allows the use of the ground as a return path only as an exception that requires approval by local authorities. 9,10

The second misconception: if you are in the path of the return ground current you may receive a shock if walking barefoot or using grounding equipment indoors. The concern is false, unless you are immediately adjacent (within a few feet) of an "earth point" of a SWER system, an extremely unlikely possibility.

The advantage of SWER is its low cost. But there are definite disadvantages, including the following:

- Large power losses, especially when the soil has high resistance (dry soil or rocky terrain, in particular).
- SWER lines tend to have high resistance in any case because of the long distances between poles carrying the hot wires, so a voltage drop is often a problem and causes an irregular voltage supply.
- Voltage delivered to end users along the SWER lines can also be affected by the electric power demand at any given time resulting in surges and deficits.
- Most hazardous is the presence of significant current, on the order of 8 amperes, flowing through the ground immediately adjacent (within a few feet) to the earth point (where the return wire/rod is planted in the ground). A good-quality grounding method needs to be used to prevent this risk. Such places, while few in number and quite remote, should be avoided.

The U.S. National Electrical Code furthers requires that the current produced by a short circuit of any kind (called a fault) be able to trip a circuit breaker or blow a fuse to prevent injury to people or damage appliances. This can only happen with a neutral wire that connects with the local power source. The code also requires that electric systems include a ground connection to stabilize voltages in the presence of lightning, line surges, or accidental contact between regular power lines and high-voltage lines. 9

The electrical code is not a law, but insurance companies in the U.S. require compliance, and regulating agencies oversee compliance. The standards are usually followed closely because one can be sued if the guidelines are not followed.

Q. Does Grounding Affect Electric Fields Around You?

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your Earthed body is “shielded” from such fields, especially low frequency fields (less than 100,000 Hz), and so part of the electric fields that would have penetrated your body are now reflected outward, increasing the overall immediate electric field strength around you.

We offer this explanation because some people have claimed that Earthing is harmful because the 50/60 Hz electric field around a grounded individual is higher. Yes, the field around the body is increased, as measured with an electric field meter or an EMF power meter. But this effect is merely a result of the body being shielded. There is no increased 50/60 Hz field inside the body. On the contrary, the AC field inside the body decreases significantly and instantly upon grounding. It virtually vanishes. 11 It is as if you are inside a protective bubble. You have become an extension of the Earth’s natural, electric potential. This is basic electromagnetic understanding, which we refer to as an “umbrella effect.” 1

Q. Does the Grounded Body Act Like an Antenna?

Some critics of Earthing claim that when you are grounded your body acts like an antenna and pulls in EMFs from the environment, and the effect could be harmful.

First, for an antenna to work, it cannot be grounded. A grounded antenna does not work because it becomes an extension of the Earth’s potential and the electrons within it will not respond to external EMFs. The antenna is shielded and EMFs are reflected. This is, once again, “the umbrella effect.”

Since the body is a conductor, just like an antenna, it will act as an antenna (a receiving antenna, not an emitting one) when not grounded.

As far as “pulling in” of EMFs is concerned, such a phenomenon does not exist. An object, whether a conductor or a non-conductor, does not pull in EMFs. An ungrounded antenna will respond to EMFs only if these fields come in actual contact with it and not because of any “pulling” force generated by the antenna.

Q. Does Grounding Amid High Electric Fields Put You at Risk of a Shock?

Some critics of Earthing have also suggested that you shouldn’t ground yourself in an environment of unshielded or ungrounded electricity (such as from ungrounded appliances) as there is a risk that your body may provide the shortest pathway to the ground, that is, the path of least resistance, and you will get a shock. It is better, they say, to unplug or ground the electric appliances contributing to high ambient voltages and turn off unnecessary circuit breakers.

These assumptions have no basis. There is no “unshielded or ungrounded electricity” floating in the air that can produce a current and much less flow through your grounded body to ground. EMFs do not generate and/or emit electrons. EMFs are composed, as the name indicates, of electric and magnetic fields only, but not of electrons. EMFs cannot create currents where there

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themselves. EMFs may make the electrons of your body wiggle when the body is not grounded. But when grounded, they cannot make your electrons wiggle inside the body. Again, that's "the umbrella effect." And EMFs DO NOT create a new current that increases a risk of shock.

Taking this further, some have equated exposure to EMFs when grounded to the shock/electrocution danger of touching a live wire while grounded. You do not run the risks of a shock because EMFs are present in the environment, as just explained. However, in case you were to inadvertently touch a live wire while grounded, a built-in 100k ohm resistor in the Earthing cords will restrict the flow of the current and prevent you from getting a shock. The resistor acts like a kink in a water hose. Just as the kink restricts the flow of water in the hose, the resistor restricts the flow of current in the wire.

Over the years, the consistent evidence produced in all our studies is that when you ground the body to the Earth, benefits occurred regardless of the intensity of ambient EMFs in the locations where the studies were conducted.

Unplugging or grounding appliances, or turning off electricity in the house, has no effect on the efficacy of Earthing itself.

Nevertheless, if you want to reduce your exposure to these fields, a starting point could be your bedroom which often has a clutter of electrical devices and cords. Research has shown that the sleeping area in many homes has the highest electric fields, from wiring in the walls, floors, and ceilings, and from cords to lamps and appliances. Some people go to the extreme and turn off the power in their homes. That's perhaps not practical in most cases.

For more information about how body voltage is generated and how to localize the sources, see our article on *How to Measure the Effect of Earthing on Body Voltage*.

Q. What are the Biological Effects of EMFs?

The possible biological effects of ambient EMFs are controversial. Some scientists are firmly convinced that both the magnetic and the electric fields can have health effects. Others are just as firmly convinced that the evidence is not adequate to make such a statement.

Human made electromagnetic fields are prevalent in our society. They range from the extremely low electromagnetic field band (ELF, >0 up to 300 Hz) to the radio frequencies band (RF, 100 kHz up to 300 GHz). In between is the intermediate frequency band (IF).

On the low frequency side are electrical power systems (50–60 Hz) and on the higher side we have cell phones (900 MHz and 1,800 MHz) and microwave ovens (2.45 GHz). All these frequencies are termed non-ionizing radiation because they lack enough energy to remove electrons from atoms and break up chemical bonds in the body.

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bonds. They include infrared radiation, visible light, UV radiation, x-rays, and gamma-rays. There is no question that ionizing radiation can damage living tissue.

There are well recognized biophysical mechanisms that can lead to health effects as a consequence of exposure to sufficiently strong fields. For frequencies up to about 100 kHz, the mechanism is stimulation of nerve and muscle cells due to induced currents at the surface and inside the body; at higher frequencies, tissue heating (a thermal effect) is the main mechanism. The International Commission on Non-Ionizing Radiation Protection (ICNIRP; www.icnirp.org) and the World Health Organization have established guidelines relating to maximum safe exposure. These guidelines, however, have been put in question as a result of new research demonstrating effects on living tissue well below the level of thermal stimulation. 12

We are in favor of practicing "prudent avoidance," meaning to minimize exposure to EMFs as much as is feasible until the scientific evidence is more definitive. In this context of "prudent avoidance," we would like to re-emphasize the point that Earthing greatly reduces the penetration of most EMFs (such as 50-60 Hz) into the body, as evidenced by the voltmeter experiment shown in our paper on *How to Measure the Effect of Earthing on Body Voltage.*

However, reducing the influence of EMFs on the body is definitely not the most important consequence of Earthing, as we have already stated.

The protective potential of Earthing has not been tested yet on higher frequency EMFs, such as those used in cell phones and Wi-Fi. There is no research indicating that Earthing will or will not offer protection from exposure.

Based on the cases we have seen of people extremely sensitive to such EMFs it is prudent to minimize exposure to these fields and to be grounded as much as possible in the home or office. The research shows that Earthing keeps your metabolism – and your capacity for recuperation from injury – at maximum efficacy.

Q. Do Earthing Products Have a Built-in Safety Factor?

Earthing products made by Clint Ober are designed with built-in user safety. First, a circuit checker is supplied with each product to verify that an outlet is properly wired and that the outlet has a working ground. The product ground cords are designed to provide a safe soft ground utilizing a built-in (molded in) in-line current limiting 100kohm resistor. In the event that a short develops in an electric device that a person is in contact with while grounded, the built-in resistor limits the current flow to a safe level. The accepted safe current limit of 5mA is defined as "sensation of shock not painful; individuals can let go at will." The human body threshold of sensation is 1mA. The electrical calculation is current=volts/resistance (I=V/R). R = Rresistor + Rbody. Typical body resistance is 10k when wet and much higher when dry. However, to be conservative, using Rbody=0, Rres=100kohm, V=130volts; then maximum current

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Conclusions

The most important health benefit of Earthing is providing the body with an abundant source of electrons from the Earth. The scientific research and hypotheses related to Earthing point to a major impact on the inflammatory process as a result of this electron transfer.

A variety of measures of physiological stress show that the person who is grounded is less stressed and more relaxed. Earthing generates a shift from sympathetic to parasympathetic activation, reduction in muscle tension, and increased heart rate variability. Regardless of whether or not Earthing reduces effects of environmental fields on the body, these studies firmly demonstrate that Earthing does not stress the body; in fact, Earthing reduces every measure of stress we have used in our studies. 7,8

Earthing is an overlooked factor in public health. We regard it as a missing link with broad and significant implications. When Earthing is restored, many people report major improvements in a wide range of ailments. Individuals with a variety of inflammatory issues including severe autoimmune diseases, have benefited.

We do not describe Earthing as a “treatment” or a “cure” for any disease or disorder. **Instead, it can be said without any equivocation that the bioelectrical human body has been nourished throughout history by the natural “battery” of the Earth underfoot. Modern lifestyle has separated us from this primordial source of sustenance. Staying disconnected puts our health in peril.**

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5. Static electricity produces a DC field around our bodies when we are not grounded. Normally the human body and the objects around us have exactly the same number of electrons and protons and are therefore electrically neutral. Static electricity arises when electric charge builds up on the body or clothing and produces large DC fields around the body. For example, when the relative humidity is low, walking across a carpet can develop enough electric charge on your body to produce a potential difference of 35,000 volts between the body and the ground. A urethane foam-padded chair can develop 18,000 volts and a vinyl floor can produce 12,000 volts. When your body becomes electrically charged in this way, you can experience a shock when you reach for a conducting object that

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produced by static electricity can be very high, much higher than the 120 volts of our home electric power outlet, we are not harmed by them because the number of electrons discharged during a static electric shock is small, meaning the current is very small. Conductive surfaces that are grounded to the Earth cannot build up static charges. Every day millions of workers in the electronics industry are grounded to prevent the build-up of static electricity that could otherwise discharge into sensitive electronics components and damage them.

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