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Review Article

Grounding – The universal anti-inflammatory remedy

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ABSTRACT

Grounding or earthing could be the anti-inflammatory antidote for modern man. It is one of the greatest kept secrets when it comes to our health and aliveness and only a small part of the scientific community really understands the concept. Once health professionals and others realize that grounding is especially important in preventing inflammatory illness, an incredible effect on public health will be realized. The breath of validation from previous published data and real-life testimonials is a testimony of the earth's dramatic impact on healing the human body.

Health information is constantly changing as a result of new research in various approaches to treating a multitude of inflammatory conditions. Sometimes, even with the most relevant published data, it is difficult to choose which advice is most conducive for healing. For example, it has been noted that perhaps one-third of the medical literature could be fraudulent.. Understanding absolute versus relative risk can also be confusing even for health professionals. And when data is reported in relative risk, only a fraction of the real science is revealed. However, one small established fact that conveys universal agreement is the simple correlation that inflammation is the root cause of almost all diseases!

Inflammation is defined as a localized response to trauma or infection that can wall off damaged tissues until the immune system removes foreign matter, damaged cells, and microbes [1,2]. A low level of chronic inflammation, often referred to as “silent inflammation”, can continue for years, damaging and

compromising the function of adjacent healthy tissues and unnecessarily weakening the immune system.

Such situations pose a challenge to the healer because a small pocket of chronic inflammation from an old injury can release toxins into the body [2]. The difficulty for the physician is

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finding the source of the problem, which can be a pocket of inflammation from a distant forgotten trauma, an unrecognized dental issue such as a cavitation or root canal or even a walled off tissue injury.

Most clinicians routinely deal with inflammation by prescribing anti-inflammatory drugs. Such drugs are important clinical agents in their ability to reduce inflammation-related pain but many have substantial side effects. Practitioners of integrative medicine treat their patients with other factors such as a non-inflammatory diet, targeted nutritional supplementations, detoxification maneuvers, mind/body techniques, and now grounding to the earth's energy (electrons and the Schumann resonances) [3].

Earthing/grounding and the Schumann resonances

Grounding or earthing the body is having direct contact with the natural electric charge of the earth (electrons). We believe this natural anti-inflammatory is the non-pharmaceutical therapy of choice. It is free, easy to implement, and improves quality of living. Our research group refers to grounding as perhaps vitamin G or electronic nutrition [4,5]. This energetic phenomenon includes the Schumann resonances, an electromagnetic "vibration" (7.83 Hz, fundamental frequency) in the atmosphere as well as a humming of the energetic surface of the earth [6]. The Schumann resonances are not uniform but vary from moment to moment in a rhythm that affects the motion of the electrons in the surface of the earth. Thus, the earth's ground is electronically active and dynamic.

The fundamental frequency of the Schumann resonances vibrates at 7.83 Hz or roughly eight times per second. This key frequency of the grounding phenomenon is maintained by a global electrical circuit. This circuit has three main generators: the solar wind entering the magnetosphere; the ionospheric wind and in thunderstorms occurring predominantly around the equator as well as the rest of the globe with lightning strikes happening thousands of times per minute. This creates a constant current of thousands of amperes transferring positive charge to the upper atmosphere (ionosphere) and negative charge to the surface of the earth [7]. The earth's surface is, therefore, inundated with enormous amounts of free electrons. Such earth electrons, when conducted to the human body, result in favorable and physiological changes. Previous research has demonstrated attenuation of the inflammatory response, decreased red blood cells RBC aggregation, improved heart rate variability (HRV) and a favorable impact on blood viscosity [8].

Increased blood viscosity, a new factor in cardiovascular events

Increased blood viscosity in the general population may be perhaps the newest risk factor in cardiovascular events because of its negative impact on blood pressure, thrombogenesis, ischemia, and arterogenesis. Any intervention that

reduces blood viscosity and RBC aggregation, are especially important in reducing complications in the now chronic viral pandemic of the 21st Century [9,10].

Covid-19

The recent onset and continual severe acute respiratory syndrome (SARS) viral pandemic have created an urgent yet chronic dilemma in which health professionals needed to explore alternative remedies to help alleviate the profound complications of Covid-19.

Two interesting publications addressed the utilization of grounding as an antidote in the treatment of Covid-19. Ober and Oschman reported in the International Journal of Clinical Endocrinology and Metabolism an anecdotal case where grounding patches placed on the chest of a woman during a Covid-19 infection. The husband of the woman with the infection gave the following feedback "A grounding patch on her chest has helped her immensely" [11]. Since inflammatory risk varies from person to person, ominous risk factors such as obesity, diabetes and even aging must be considered in the vulnerability of viral complications including death.

Mousa subsequently reported out of the University of Basrah College of Medicine in Iraq an observational study on 59 patients with confirmed Covid-19 infection. Earthing was carried out by the patients either walking barefoot on non-insulated ground or utilizing chest patches with a conductive metallic bar in the earth with conductive wire attached to an electrode (electrocardiography-type patch) over each lung. In the patients that were grounded, the complication of blood clots was not seen as opposed to the patients that were not grounded. After 1–3 days of grounding, most patients experienced improvement in fever, dyspnea, cough, weakness, headache, chest pain, body pain and even taste and smell loss. Twenty patients of the 59 had severe illness and 17 improved, two were lost in follow-up and one expired. In 28 with moderate illness, all improved; and in 11 with mild illness, all improved and no deaths were reported. Mousa concluded that grounding demonstrated significant preventative as well as curative aspects in the treatment of Covid-19 [12].

These two communications demonstrate that grounding the human body may assist in not only the prevention of significant symptoms but assistance in recovery from the illness. Both of these communications demonstrate that assimilated electrons from the earth are not only quick acting antioxidants but they also help to synchronize hormonal rhythms of the body in contact with the earth's electric field. Although further study is needed, it is interesting to speculate that this regenerated supply of free electrons acting as natural antioxidants neutralizes free radicals and minimizes both acute and chronic inflammatory events.

Thus, earthing or grounding could have a significant clinical impact in the management of patients with Covid-19. Since the main complications of hypoxemia, coagulopathy and overwhelming inflammation are literally life threatening, earthing which produces no known side effects appears to be a promising therapeutic intervention in communicable disease.

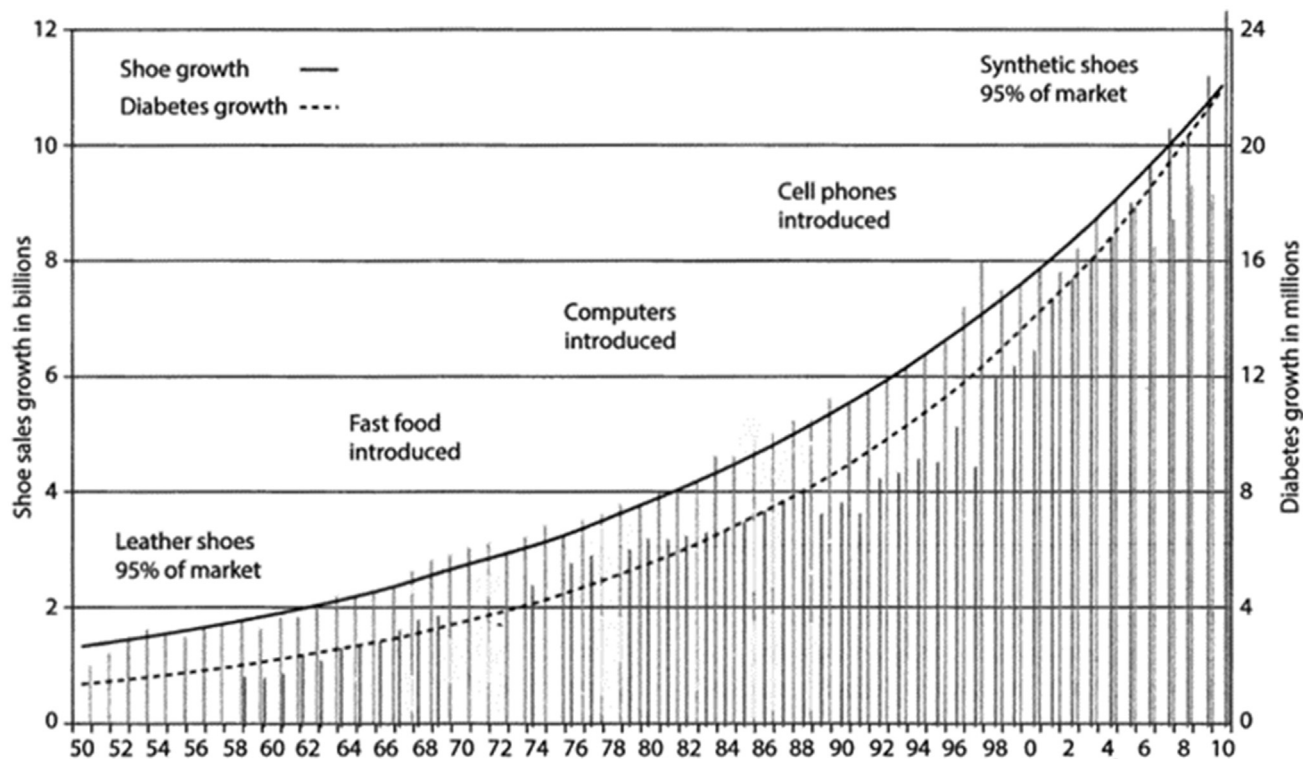


Fig 1: Diabetes growth- United States Center for Disease Control and prevention shoe industry statistics.

Fig. 1 Source: Oschman JL, Chevalier G, Ober AC. Biophysics of Earthing (Grounding) the Human Body. In: Paul J. Rosch, editor, Bioelectromagnetic and Subtle Energy Medicine Second Edition. New York: CRC Press: p430.

Age and non-communicable diseases

However, the rise in non-communicable diseases presents another major challenge to our healthcare system as cardiovascular, neurodegenerative, type 2 diabetes, chronic kidney disease and cancer continue to afflict the world's population with 41 million deaths annually [13].

Age is another factor as people are living longer. Scientists have stated that the deterioration of the immune system as human's age is often referred to as immune senescence [14]. One medical theory states that the general inexorable decline occurring during the aging process is caused by oxidative stress resulting in inflammation and injury to cells as well as DNA. Cross linking of proteins may create wrinkling in the skin and another low-grade inflammation process occurs in the brain [15]. Type 2 diabetes is also on the rise as we age. In fact, in the USA alone, it is estimated that 11.3% of the US population is diabetic, and 38.0% of adult population are pre-diabetic [16].

Modern lifestyles

Modern lifestyles, especially using footwear that does not possess a natural conductive affinity for the earth's surface, has created a disconnect with the electrons of the earth and of the Schumann resonances. Humans have been increasingly wearing insulated rubber, sneakers, or plastic-soled shoes instead of traditional leather or hides from antiquity.

Fig 1 shows a possible relationship between the disconnection of the earth's natural energy and frequencies and an inflammatory-related disease – diabetes. During the mid-1950's, leather shoes were gradually being replaced with non-conductive synthetic soles. Presently 95% of all shoes have non-conductive soles. The question arises whether this observation represents a coincidence or a correlation with the exponential rise in diabetes. Is the loss of our natural conductivity to mother earth a factor in the rise of diabetes and other inflammatory diseases? Obviously overconsumption of sugary foods, sedentary living, high fructose corn syrup sweeteners also contribute to this enormous growth in our diabetic population. However, previous research in both animal and human studies have suggested a rise in blood sugars when rats as well as humans were disconnected from the earth [17,18]. In twelve patients with non-insulin dependent diabetes mellitus being grounded to the earth's field increases glucose utilization. The researchers suggested lack of contact with the earth may have an opposite effect and perhaps may have an impact on diabetes, obesity and even high blood pressure [18].

Hypertension

In another small clinical investigation, earthing and grounding effects were studied on hypertensive individuals. There were ten participants in the study, all of whom were on one to three anti-hypertensive drugs. All ten patients reduced their blood pressure and many were able to reduce their reliance on hypertensive blood pressure medication. Systolic

blood pressure levels decreased 8.6%–22.7% with an average reduction of 14.3%. The pilot study clearly demonstrated that grounding for a minimum of ten to 12 h per day resulted in remarkable blood pressure lowering [19].

Other grounding studies

Other research over the last decade demonstrate that grounding studies have documented results including reduced inflammation and pain [20,21,22], better sleep [23], improved response to trauma and injuries with accelerated wound healing [21,24,25], improved blood flow [20,26], and reduced blood viscosity [9,10].

Grounding contributes to a de-stressing and balancing effect on the autonomic nervous system with an improvement in heart rate variability (HRV) [27]. HRV plays a vital role in determining one's risk for possible future cardiac events. Heart rate fluctuates with emotions, physical activity, medications, foods, and even with electromechanical pollution. One's heart rate is dynamic. It speeds up when you exert yourself or become emotionally overburdened and it slows down with relaxation and sleep. That is normal heart rate variability. HRV represents an accurate assessment of your ability to cope with both internal and external environmental changes. Decreased HRV or having too "fixed" a heart rate interval is now regarded as a most accurate reflector of not only personal stress but even a predictor of sudden cardiac death. In other words, disturbed HRV has been accepted as an independent risk factor for sudden cardiac death and is even more ominous than chronic hypertension, diabetes, and smoking. Individuals with low HRV are often less able to accommodate external stresses and are more prone to stress-related disorders such as cardiovascular events. In a study of 27 individuals, improvements in HRV occurred after just 20 min of grounding and continuation of an improvement in HRV occurred with even more time grounding [27].

In another meaningful and unfortunately less popularized study that had significant implications in pre-term infants was conducted at Pennsylvania State University. Pre-term babies in the neonatal intensive care unit have tremendous health challenges due to their immaturity of their organs. In this study, these pre-term babies were grounded and it was determined that the baby's autonomic nervous system was able to sense the environment and the babies were more relaxed when grounded. There was improved vagus-nerve tone among the premature babies which could potentially enhance regulatory mechanisms [28].

One of the most important investigations that Dr. Stephen Sinatra has ever conducted in his fifty years of medicine included an improved blood flow and reduced blood viscosity study [9]. Although there are traditional risk factors in cardiovascular disease, including high blood pressure, aging, higher blood sugars, higher cholesterols, and uric acid to mention a few, thick clumped blood is really the hallmark of not only diabetes but cardiovascular disease as well. In one study investigating the effects of earthing on blood viscosity, the zeta potential of blood cells was determined. Zeta potential is defined as a net negative charge on red blood cells creating force that pushes them apart resulting in a lowering of blood viscosity. Obviously the lower viscosity or the thinner

your blood is the less vulnerable it is to clotting or thrombosis. In our study, participants relaxed for 2 h while being grounded and there was an astonishing 273% reduction in blood viscosity [9]. In another subsequent study, a commercial blood viscometer was used to measure viscosity of individuals practicing yoga on a grounded yoga mat [10]. Once again, earthing significantly reduced the blood thickness.

In another study of 40 patients, blood flow regulation and circulation to the head, face, torso, and extremities, were enhanced within a 1-h session of grounding in a chair. A Laser Speckle Contrast Imaging (LSCI) camera continuously and non-invasively recorded changes in their facial blood flow. The results were surprising. Just 1 h of grounding restored facial blood flow regulation suggesting enhanced repair of skin tissue in the participants leading to improved facial appearance and other improved implications of overall health [26]. Again grounding may represent an effective preventive and therapeutic strategy in those suffering from cardiovascular disease and diabetes. Diabetes perhaps is an even ominous risk factor as a study in 2008 reported on the zeta potential of red blood cells in patients with diabetes [29].

Researchers from the University of Calcutta described a "remarkable alteration" in the electrodynamics of RBCs – a progressive deterioration of the zeta potential and hypercoagulability among patients with diabetes, which was even worse among those who also had CVD. The researchers also indicated that high blood sugar levels are associated with significant alterations in the electrodynamics of a RBC's outer membrane and may increase the potential for RBC clumping. It was concluded that zeta potential could and should be used as an indicator of cardiovascular disease in patients who have diabetes [29]. Again, grounding with its profound impact on blood viscosity, should be utilized as an adjunct therapeutic maneuver in anyone with advanced peripheral vascular disease and diabetes mellitus. Abnormal glucose levels are often related to excess cortisol release – a definite marker of emotional and psychological stress.

Chronic sustained elevation of cortisol from emotional stress can lead to a disruption of the body's circadian rhythms and contribute to sleep disorders, hypertension, and a whole host of pathological situations including cardiovascular disease. In multiple studies, grounding has been documented to have profound beneficial effects on physiological and emotional stress [27,30,31,32,33]. Grounding includes a normalizing influence on cortisol [20], a calming impact on the electrical activity of the brain [33,34], and a normalization of muscular tension [33]. In addition, there is an improved response to trauma and tissue injuries with accelerated wound healing [21,24,25]. In anyone participating in high level sports activity and especially professional endeavors, significant changes in immune function and markers have been found among grounded individuals but not among the ungrounded. In two studies on grounding and delayed onset muscle soreness, grounded participants had minor inflammation, less discomfort and a shorter recovery time [21,24]. In another investigation, grounding during cycling exercise significantly reduced the level of blood urea, a marker of less muscle and protein breakdown [35]. Such findings represent a major recovery benefit for training athletes. Among American cyclists during the Tour de France competitions, it was found that grounding

produced very rapid healing and minimal signs of inflammation despite the fact that many of the cyclists had significant superficial wounds resulting in major discomforts [36].

Grounding supports energy production

The search for evidence-based improvements in reducing human suffering without significant risk will continue in the healing profession. Grounding provides a primary source of cellular restoration and energy by supporting the mitochondria or the microscopic power plants that literally provide energy to the cell [37].

Although oxygen is essential to metabolism and life, the oxygen molecule itself is extremely toxic and the body uses a variety of antioxidant processes to keep the concentration of oxygen low in the tissues. Too much oxygen creates oxidative stress. One of the key reactions in living cells, of course, is the electron transport chain in mitochondria that produces adenosine triphosphate (ATP), the energy source for all living processes. Studies have shown that providing electrons to animals dramatically increases ATP production and protein synthesis, 2 processes that are essential for wound healing [17].

Electrons from earth serve as a potent neutralizer or quencher of electron-seeking free radicals. The term electron deficiency may be appropriate to describe the largely ungrounded status of most of humanity. As noted, the modern lifestyle, notably the wearing of shoes with synthetic soles, has severed us from our electric roots, our connection with earth and its natural supply of electrons. Earthing may perhaps be a way to transfer electrons and fortify mitochondria, thus contributing to optimum levels of ATP production in our cells.

Grounding or earthing is virtually harmless while having incredible health implications at the same time. Blood pressure lowering, supportive HRV, and blood thinning are significant contributions in reducing cardiovascular risk including sudden cardiac death. One very important caveat of grounding is to exercise extreme caution in any patient taking Coumadin-like blood thinners as the combination of pharmaceutical blood thinning and grounding can virtually make the blood too thin. Cardiologists have seen this occurrence in their patients who were grounding and simultaneously taking blood thinners as bleeding became apparent. It is thus imperative that when patients take Coumadin-like derivatives, that they discuss earthing or grounding with their doctor to avoid the possibility of any adverse bleeding complications.

Summary

Multiple clinical investigations indicate that grounding the body generates broad, beneficial, and significant physiological changes. The source of these effects is believed to be the mobile electrons omnipresent on the surface of the earth, which are responsible for the planet's negative charge. Lifestyle changes have disconnected most humans from this primordial health and healing resource, creating what may be an unrecognized electron deficiency in the body, an overlooked cause or contributor to chronic inflammation and

common chronic and degenerative diseases. High blood pressure, disturbed HRV, and hyperviscosity are potentially destructive cardiovascular situations that can be improved with grounding.

When earth connection is restored through grounding, electrons flood throughout the body, reducing inflammation and oxidative stress while also reinforcing the body's own defense mechanisms. Electron transfers are the basis of virtually all antioxidant and anti-inflammatory activity. And the earth may very well be the ultimate supplier! When the supply is restored, humans have the potential to thrive. Touching our skin to the earth, is perhaps the perfect natural anti-inflammatory supporting biochemical and physiological effects that enhance healing.

In 2022, it is still in its infancy as more research is presently being done. When physicians recommend evidence-based, harmless, and simple therapeutic natural interventions to reduce human suffering and improve quality of life, we have done our job in the interest of the patient. In our opinion, diabetes and auto-immune diseases in general, cardiovascular disease, and communicable diseases are the most invasive, inflammatory illnesses that affect our present civilization. Grounding may soon become one of the premier preventive and therapeutic antidotes!

Disclaimer Statement

SW Sinatra is the founder of [Grounded.com](https://grounded.com). G Chevalier is Director and Chairman of the Earthing Institute.

Personal Statement

This paper was predominately written by my father, Dr. Stephen T. Sinatra. He left this existence on Fathers Day of 2022, just months before we collaborated on this work. It has been an honor and blessing to have the father I had teach me the complexities of life with humor, passion and love. I am still shocked by his passing as I truly thought he had another decade in him. Yet what he has left behind on this planet is remarkable. The message of Grounding he pioneered may be his greatest legacy. One that I have committed myself to continuing as we endlessly search for the true recalibration of the body and spirit of human beings. My father saved my life not once but twice, he gave me more than any son could ask for, for all of it I am truly grateful. Step Sinatra - December, 2022.

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