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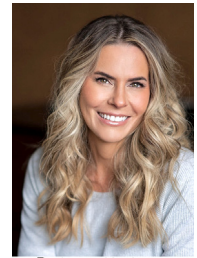
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Practical applications of grounding to support health

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ABSTRACT

An ever expanding body of research over the past several decades suggest that directly touching the earth, a practice known as grounding, puts the body into a healing state. The natural universe conducts an energy current known as a direct current (DC). This DC circuit of energy flows through everything on our planet, including plants, animals, human beings, and the surface of our entire globe, creating a global electrical circuit. DC energy is also what the living human body uses to function, as everything from the beating of our heart to the movement of our muscles to our brain's ability to think operates using DC energy. The earth's DC energy flows continuously across the earth's crust, and anything conductive that touches the earth becomes part of this natural circuit. Our human bodies, which are highly conductive, join this global electrical circuit whenever we make direct contact with the earth, a practice known as grounding. Medical studies are revealing that by becoming a part of the global electrical circuit, through grounding, the human body enters a profound healing state. As our understanding of the health benefits of grounding continue to deepen, we can begin to use grounding as an intentional healing tool in clinical medicine. Grounding may play a role in not only improving the body's natural ability to function, but may also play a role in the healing of disease and the prevention of disease development in the first place. Studies so far suggest that becoming a part of the earth's global DC circuit enhances our conductive health, which has far reaching implications to all our organ systems that utilize DC energy and conductivity to work, including but not limited to: our central and peripheral nervous system, our musculoskeletal system, and our cardiovascular system. Further research into the healing properties of grounding will help clinicians tailor suggestions for specific health issues, and will help us understand the role of our body's conductivity in the presence of our global electrical circuit.

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Introduction - The global electrical circuit

The earth, and all living things on the earth — both plants and animals — including the 8.7 million species of life [1] are part of an all natural, global electrical circuit [2]. This energy grid is comprised of DC energy, the natural energy of the entire universe, which is very different from our typical idea of energy — the manmade alternating current (AC) that powers our lightbulbs and household electrical appliances. Instead, the natural world runs off of a DC energy, a direct current (DC) that syncs all conductive elements of the earth and life on earth together into one flowing circuit of energy [3–6] [Figs. 1–4].

Because our bodies are entirely conductive — every cell, the cytoplasm of each cell, the cytoskeleton of each cell, every fluid in the body (including blood, cerebrospinal fluid, synovial fluid, plasma and more), every tissue, and every organ system — the entirety of our anatomy is conductive. When we touch the earth in any way, we become a part of this global electrical circuit through the nature of our innate conductivity. In fact, it is only recently that we have ever lived disconnected from this natural global circuit, as it is only recently that we wear plastic shoes, live and work and learn and shop and eat in insulated indoor dwellings, even riding up off the earth in rubber tired vehicles and flying up away from the surface of the earth in aircrafts. Because we no longer connect all day long to the earth's natural energy circuit, we must intentionally ground our body to it in order to become a part of this global electrical circuit, a practice known as grounding.

The concept of human health being boosted by direct electrical contact with the earth is well over a century old, being suggested first by Louise Kuhne in 1892 in his book *The New Science of Healing* [7], then echoed by Adolf Just in 1897 in his book *The Return To Nature* [8]. The 24 h rhythmic cycle of the global electrical circuit was first named the Carnegie Curve in experiments conducted by Charles Wilson in 1915 [3, 4, 5.] The Carnegie Curve is a DC cycle that rises and falls in a 24 h pattern, becoming highest at 7 pm Universal Time (UT) and lowest at 3 am UT. Not only is the Carnegie Curve cyclical daily but it falls into an elliptical pattern annually as well, becoming

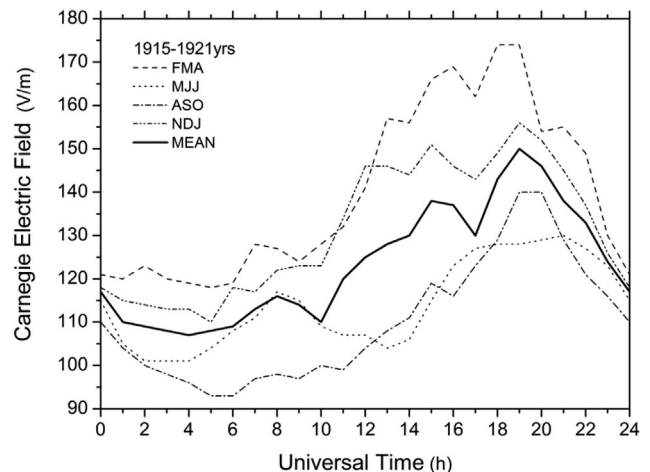


Fig. 2 24 hour carnegie curve cycle. Image credit: Edward J. Zipser.

lowest seasonally at the spring and fall equinox, and highest at the summer and winter solstice [4,6].

Practical experiments in the 1960s and 70s helped elucidate how the presence of this DC energy current produced by the

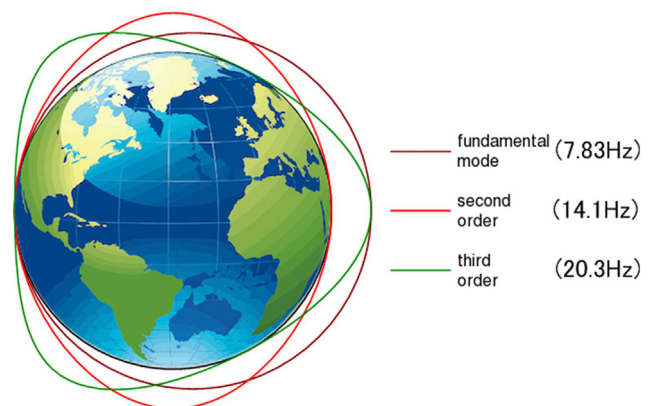


Fig. 3 Schumann resonance. Image credit: Neotesla.

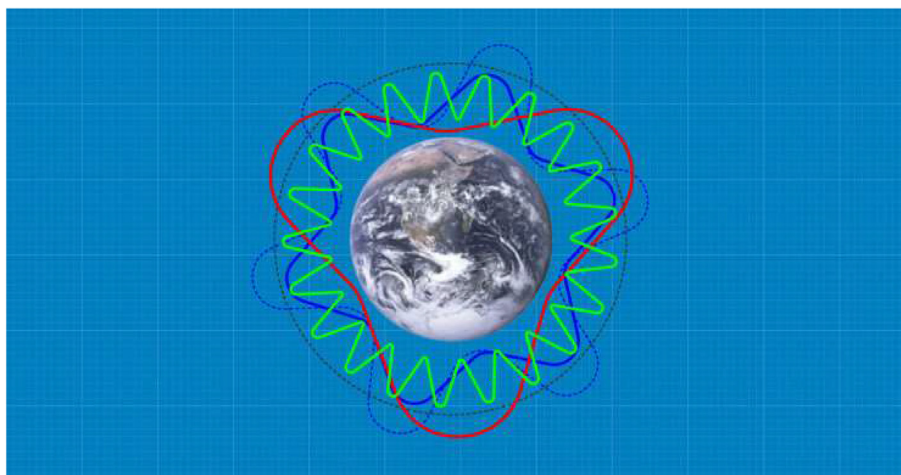


Fig. 1 The global electrical circuit. Image credit: NASA/Simones.

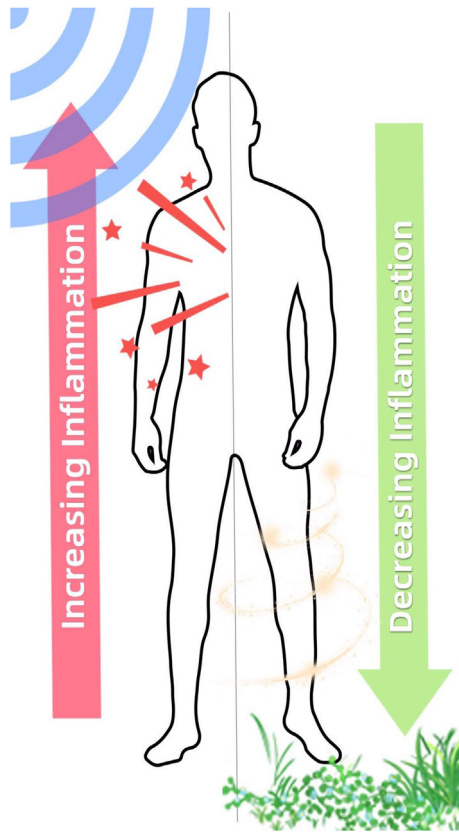


Fig. 4 The human body grounded to the global electrical circuit. Image credit: Laura Koniver MD.

earth helps human beings maintain a healthy circadian rhythm [9]. Test subjects who lived for a month in an underground bunker, completely removed from exposure to natural daylight, were able to maintain an internal synchronization to a day/night rhythm, even with the complete absence of sunlight. Test subjects who lived for a month in an underground bunker that was additionally shielded from the DC energy of the earth (effectively shielding over 99% of the earth's natural EMFs) became internally desynchronized, unable to maintain a consistent day/night rhythm. In repeated experiments of over 100 test subjects, the only test subjects that became internally desynchronized were the ones that were shielded from the earth's DC energy pulse, but never the ones that were shielded only from the sun [9].

In addition to the Carnegie Curve, another possible mechanism of influence on the body's conductive health might be the Schumann Resonance. The Schumann Resonance is often described as the earth's double heartbeat, a 7.83 Hz and 14.1 Hz frequency that bathes the entire earth and all occupants on the earth in a healing dial tone. When a 10 Hz electromagnetic field (approximating an average of the two heartbeats of the earth) was re-introduced to the earth shielded test subject's living quarters from the experiment described above, they began to re-synchronize to a healthy day/night rhythm once again [10].

Because of these experiments, we understand that it is not simply exposure to light, but also exposure to the earth's Schumann Resonance that contributes to a healthy day/night

pattern. This helps to make sense of why connecting to the global electrical grid at night — via grounding — helps to normalize sleep at night and boost daytime wakefulness, improving our circadian rhythm. Grounding studies have shown that being conductively connected to the earth deepens restorative sleep, normalizes cortisol, helps to relax muscles, and boost mood [11].

Although the term for becoming part of the global electrical circuit was newly coined “earthing” (also known as grounding) by Clint Ober in the 1990s [12], living organisms have been benefitting from contact with the earth since the beginning of life itself. It's a healing practice that you can quite literally feel for yourself. Have you noticed that activities that require you to touch the earth with your skin are more restorative than activities that don't? Swimming in the ocean, walking barefoot on the beach, running hands through the soil while planting a garden ... these are the times you plug into the earth's global electrical circuit and allow your body to benefit from grounding.

Grounding to the global electrical grid yields health benefits

25 years of medical research now backs this up. Researchers have exhaustively looked at the human body while it is connected to the earth, and found that the body goes into a deeply healing state while grounded. We benefit from grounding with a boosted heart rate variability (HRV) [13], increased blood perfusion of our tissues [14] and blood that flows more easily, with decreased viscosity [15]. Our immune system function (including immunoglobulins and white blood cells) get a boost [16], our muscles are more supported during exertion [17] and are less sore afterwards [18,19] our brain gets much needed support immediately, with electroencephalogram (EEG) studies of brain activity show that grounding instantaneously shifts our brain wave patterns and reduces ambient stress levels [20] along with supporting deeper, more restorative sleep at night [21], boosting sleep quality [22] and improving our body's autonomic function through vagal tone support [23]. Grounding even supports our metabolic function as a whole, boosting our basal metabolic rate [24]. Grounding helps to resolve the cascade of inflammation and autoimmune signaling in hormonal pathways that may ultimately lead to thyroid hormone imbalances, cortisol or sex hormone imbalances, all which can lead to issues such as adrenal fatigue, hypothyroidism, insomnia and more [25,26].

Grounding exerts full body benefits, as every single organ system gets a boost of blood flow and oxygen because grounding positively impacts our cardiovascular function, improving circulation. Over time, hormones normalize, cortisol drops, blood sugar stabilizes, sleep deepens, inflammation decreases, and the human body heals. While the body can clearly function running on its own DC energy circuit even when disconnected from the earth, these medical studies suggest that lack of grounding the body over time means optimal health (possibly as a result of accumulating inflammation). When electrical contact between the body and the earth is reestablished via grounding, organ system function begins to optimize once again. And it is not just human

bodies that benefit from grounding. When plants are grounded to our global electrical circuit, growing directly up out of the earth, they grow taller, bloom more, and the blossoms last longer than plants that are growing disconnected from the earth in ungrounded containers [27,28]. When humans are grounded, we feel more vibrant and healthy and energetic than we do when we are ungrounded. While the plant world expresses grounded support by vibrant growth, we express grounded support by vibrant health!

When you disconnect from the earth, by putting on shoes, going inside your home, or driving in your car, you disconnect from the earth's global electrical circuit. You have become unplugged from the natural flow of DC energy in this system and are operating instead as a closed loop. All in all, a closed loop system is a finite system that is destined to decline. Touch the earth. As you plug back into the global electrical circuit, you become an open flowing part of this DC energy circuit, not a closed container, and you feel yourself come back into balance. You are a conductive avenue for the expression and flow of life!

Practical applications of grounding

So, knowing this, how can we intentionally utilize grounding as a health practice? Understanding the benefits of grounding the human body can give us different ideas in approaching grounding for our own healing. Here are some examples of ways to incorporate the healing practice of grounding into a full treatment plan. Discuss your particular health concerns with your physician and include grounding as an integral part of your healing therapies.

Stress/burn out: plan a grounded vacation

Feeling psychologically stressed truly impacts your body's health over time. As part of a larger plan to boost your resiliency that includes routine exercising, sleeping well and eating lots of fresh, unprocessed foods, taking a grounding vacation can reset your body. Whether it is laying on a beach, swimming in a lake, napping poolside, yoga in a meadow or hiking in the mountains, taking a vacation (or a long weekend) centered around grounding daily might be one of the best ways to hit a reset button in your life. Almost every vacation destination has evolved to be a vacation spot because of how good it feels to be grounded, even though most people don't realize grounding is why: beaches, lakeside resorts, camp grounds, in ground pools in hotels ... it's all grounded and it all feels amazing. While you relax connected to the global electrical circuit of the earth, grounding is at work decreasing cortisol, decreasing whole body inflammation, and significantly boosting mood — all perfect to decrease stress levels and restore your naturally energetic, creative and optimistic inner child.

Digestive issues: eat meals grounded outside

As a physician, it's becoming incredibly obvious that digestive issues of all kinds, from inflammatory bowel diseases to food

sensitivities and food intolerances, are on the rise. Steeply. In addition to the food allergy testing, blood tests and bowel imaging studies that your physician may want to do as part of your work up, and in complement to the dietary changes, medications and lifestyle interventions your physician may suggest as a treatment plan, I encourage you to eat at least one meal every day grounded outside. Grounding decreases inflammation throughout your entire body, and your gut lining is no exception. Decreasing the inflammatory response of the gut by grounding while you are eating is a great way to allow your food to digest more easily and with less discomfort, and secondarily because grounding increases blood flow as well, your gut absorption will be enhanced too. In addition, vagal tone gets a boost when the body is grounded, and this in turn is a direct avenue for grounding to impact digestion, as our entire digestive tract is driven by the vagus nerve, everything from our salivary glands to our swallowing mechanism to gut peristalsis and even digestive enzyme secretion is guided by vagus nerve function. On top of all of this, walking boosts gut motility, so consider taking 10 min to walk grounded after a meal to help boost gut peristalsis naturally, which will encourage healthy bowel movements and decrease bloating, indigestion and constipation.

Insomnia: ground in first morning light

If you find you have trouble sleeping at night, one of the best things you can do is to make a daily habit out of grounding in the morning light. Grounding to the earth directly helps re-sync your circadian rhythm to the planet via the global electrical circuit. And as we know from the medical literature, this helps calm brain waves, deepen sleep, boosts sleep quality, normalize cortisol and makes the sleep you do get (even if it is not as long as you would hope) more restorative. Get up with the sunrise and go outside for 20 min of grounding during the AM hours where you live. Do this daily and you will notice your sleep naturally improving at night. The best part about grounding in the morning as an adjunctive treatment for insomnia is that it works in concert with any conventional medical treatment your physician might suggest, and can complement everything from a sleep study work up, to correcting sleep apnea with a continuous positive airway pressure (CPAP) machine, to sleep-inducing supplements and medications.

Anxiety: ground during panic attacks

Because grounding goes immediately to work directly stabilizing your autonomic nervous system by boosting your vagal tone, it has the power to regulate your racing heart and deepen your breathing. So, it's literally the perfect adjunctive support during panic attacks and heightened anxiety states. Along with conventional evaluation and treatment that might include therapy, medication, exercise and mind-body work, grounding is an instantly accessible healing tool that can provide immediate support during increased periods of anxiety no matter where you are or what you are doing. If you feel a panic attack approaching, stop everything and touch the earth. Pull over if you are driving, go outside if you are home or

at work or in a crowded shop or restaurant and let the stability of the earth ease your panic and calm your anxiety with its power.

Depression: daily grounding is crucial

Grounding is a wonderfully uplifting way to balance mood, support the central nervous system, and release chronic inflammation that puts wear and tear on the body and mind. Ongoing research is revealing the full extent that inflammation plays in depression, as higher levels of blood markers of inflammation have been found to be directly correlated with a variety of depressive symptoms, including sleep difficulty, decreased energy levels, decreased motivation and increased or decreased appetite [29,30]. Another study found that anti-inflammatory drugs helped to lessen depressive symptoms and resolve depressive episodes better than anti-depressants alone when added to anti-depressant therapy [31]. Grounding is not only anti-inflammatory and stabilizing, it boosts mood and energy levels as well, and can work in conjunction with any therapy, medication or treatment for depression that your physician may suggest. The best approach to adding grounding to a treatment for depression is to get into a daily routine so that benefits are cumulative over time, instead of sporadic support. So, choose hobbies that get you outside routinely: gardening is perfect, whether it is flowers or herbs or vegetables that will get you outside daily, nurturing something growing on this earth will have you grounding daily by default. Other ideas include bird watching, nature photography, stretching or journaling outside, or simply listening to a podcast or music ... headphones on and bare feet in the grass.

Back pain: the earth is your physical therapist

Back pain is one of the most common reasons people see a doctor. And the good news is, no matter what treatment plan your physician recommends, from imaging studies to physical therapy to surgery to medications, grounding can expedite your recovery and decrease pain from injury and inflammation in your spine. Consider the earth your very own physical therapist, as you lay grounding directly on the earth outside. We know that routine grounding decreases pain and decreases whole body inflammation, and that includes inflammation and pain in your ligaments and tendons. Your entire spine is conductive, the discs and ligaments and vertebral bones that make up your spine are conductive, and all of your joints and the fluid in your joints are conductive. Grounding spinal care can be as simple as laying on the earth outside with an ice pack or a hot water bottle held to tight areas, or you can add some gentle twists, stretches and release exercises or any physical therapy and rehabilitative exercises you've been instructed to do. Make this time exponentially more powerful then stretching or doing rehab exercises indoors by adding grounding to the therapy session. Even if all you do is go stretch on the earth outside while you wait for your pain medication to take effect, you will be supporting repair to your body's skeletal system on a much deeper level than just treating pain with a pill. Grounding decreases inflammation in the body over the long term, but you don't have to wait to have back pain to begin to support your body's longevity, but if you

do already have back issues, grounding is one healing therapy you will want to add to your already established medical treatment plan.

Trauma: meditate grounded

Meditation has been medically proven repeatedly in the medical literature to reduce post-traumatic stress disorder (PTSD) symptoms as well as, or better than, traditional therapeutic approaches including talk therapy and exposure therapy [32]. Even a super quick and easy meditation technique like mantra repetition out performed talk therapy in reducing PTSD symptoms, even hard-to-treat symptoms such as insomnia [33]. So, if you struggle with prolonged meditation, simply taking a few minutes to repeat a positive word or phrase with mindfulness can reap huge benefits in trauma recovery. And to get exponential benefits, combine mantra and meditation with grounding outside. It can be as simple as sitting outside on the earth and focusing on your breath. Connecting to our global electrical circuit through grounding deepens sleep, decreases stress hormones and boosts vagal tone, all of which can provide incredible relief and boost resiliency in the face of trauma.

Rehabilitation/joint issues: ground in water

Take weight off of your area of injury to allow it to recover by removing the force of gravity from your joints, allowing healing that can be more gentle while at the same time be more effective. Water is perfectly suited to helping you heal not just because it buffers the force of gravity from your skeletal system but because almost all pools and certainly all natural bodies of water are grounded. In ground pools that are made from concrete or cement are all grounded, so most pools in hotels and gyms and neighborhoods and private back yards, as long as they are not lined with plastic or made from plastic, provide therapeutic grounding support to your body while you work on building strength, recovering mobility and increasing range of motion in the water. We know that grounding not only decreases inflammation and pain, but during exertion it decreases damage done to muscles and mitigates how much soreness you experience later. Which means you can participate more fully in your water-based recovery plan, without worrying about being as sore or in pain later. This will allow you to be more invested in your healing sessions and see results faster, all while the grounded water is allowing supported movement and decreases the gravitational load on your joints.

Heart disease: exercise grounded

The link between exercise and heart health has long been studied, so most physicians will prescribe some sort of exercise plan for their patients with cardiovascular risk factors. If you are in this group, be sure to add a grounded form of exercise to your routine, for a free way to upgrade the effectiveness of your healing plan. In addition to any therapies, interventions and/or medications your cardiologist recommends, grounding outside on the earth can work synergistically to help naturally increase circulation and blood flow,

decrease blood viscosity, increase heart rate variability, and reduce soreness after exercise. Not only will this benefit your entire cardiovascular system, all of your bodily organs will then benefit from the improved blood flow as well, in addition to your heart. Walking grounded, grounding through your hands while outdoors exercising (for example, while playing golf or hiking) or doing fun barefooted exercises outside such as tai chi, yoga, dance or even lifting weights (and if you keep your weights on a cement floor in your garage or basement, it's very likely to be grounded)! If you are on blood thinners, be sure to tell your physician you are grounding and have your physician follow your lab tests closely. As your blood naturally moves more freely with daily time spent grounded, your personal physician may need to guide a medication adjustment and monitor your results.

Osteoporosis: grounded yoga

The opposite of exercising in water to remove the wear and tear of gravity on your joints, to build bone density you actually want to have resistance or weight training to make your bones strong. Simply using gravity is a wonderful way to maintain strong bones for a lifetime and combining this with the healing power of grounding will reduce bone metabolism to help protect your bones in an additional way. Any poses that allow you to place weight on your hands such as tabletop, plank, chaturanga, reverse tabletop and downward facing dog, plus inversions such as forward fold, crow pose, head and hand and shoulder stands, all help keep your bones strong and are an invaluable daily habit to get into. Doing it grounded outside not only adds the additional element of conductive health to your bone support, but the daylight you get while outside boosts your vitamin D levels naturally, which are crucial for bone integrity. Use gravity with yoga to stimulate strong bones, protect the metabolism of your bones with grounding, and boost vitamin D levels outdoors all in one 20 min yoga session.

Cancer recovery: walk a dog grounded

There have been several incredibly positive studies showing that walking is one of the best things you can do to recover from, and prevent remission in, cancer treatment. Walking was shown in a large medical study to significantly improves sleep in cancer patients (no matter which type or stage of cancer they had) and another study showed that walking improved outcome, decreased mortality rates, and predicted positive outcome in cancer recovery [34,35]. Those results were so impressive that some physicians even started prescribing adopting and walking a dog daily as a crucial part of a cancer care plan. Walking helps reverse sleep impairment during cancer treatment, supports better sleep during recovery, and is so good at improving outcomes that it could be considered front line therapy alongside conventional medical treatment. Add grounding on to this and compound these fantastic results with decreased pain, decreased inflammation, deeper and more restorative sleep at night, and improved energy and mood as well. Walk your dog and petting him or her often (which allows you to ground through your pet) or remove your shoes and walk barefoot with your pet daily.

Take your activities outside

By now, I hope you can see how integral a grounding practice can be for your health no matter what your health care treatments are, and that's why I routinely prescribe it for my patients as a crucial part of their healing plan. So I urge you to consider taking your health care activities outside and doing them grounded whenever possible.

Whatever therapeutic and healing daily practices you have that support your health, ask yourself if you can possibly do them outside, so that you can get the double benefit of supportive relief from the activity as well as from time spent connected to our global electrical circuit. So many therapies are even more powerful when done outside. For example, if your physical therapist has a set of stretches for you to do daily at home, do them outside. If your psychologist wants you to do journal writing daily, do it outside. If your massage therapist suggests hydrating more, take your glass of water and drink it outside. If your physician wants you to get more exercise, swim or yoga or walk grounded outside. If your nutritionist wants you on a specific diet plan, eat it outside. If your spiritual director suggests you meditate daily, do it outside. If your friend wants to come over and spend time with you, hang out outside. If your partner wants time with you, go on a walk holding hands together outside. If your kids want to play with you, head outside! If your boss has catch up work for you to do on your laptop at night, take it outside.

Even though we have discussed numerous scientific studies that support the practice of grounding, the point isn't just to optimize your cardiovascular health, or boost your metabolic health, or get better sleep. The whole reason we want to optimize those things is so that you can feel vibrant and alive and enjoy your life more. And ultimately that's what grounding does. I've seen it over and over again, I've experienced it personally in my own life, and I encourage you to connect to our planet and get grounded daily so that you can experience it too. The global electrical circuit is just outside, waiting for you.

Conflicts of interest

The author declares that there is no conflicts of interest. This article is part of the special issue "The Biological Effects of Electrical Grounding (Earthing)". It is not associated with a conference. The images sources are public and credited.

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