



## Short Communication

# Could Grounding Improve Cognition?

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### Abstract

There is a significant positive correlation between exposure to nature and improved cognitive function [1]. Even just the sight of nature can boost brain function, for example researchers found that productivity increased when subjects had potted plants near them while working [2], another study found significantly improved performance when executing tasks near potted plants [3] and yet another study found that working daily with plants decreased dementia risk by an incredible 36% [4], possibly because gardening has been found to increase levels of growth factors like Brain-Derived Neurotrophic Factor (BDNF) and Vascular Endothelial Growth Factor (VEGF) [5] as well as boost levels of the brain neurotransmitters tryptophan and serotonin [6]. So, this begs the question, if just seeing nature has an impact on brain function, might connecting directly to the earth outside — a healing practice known as grounding — have additional benefits? New research suggests yes. Connecting our electrically based central nervous system to the electrical output of the earth makes an immediate impact on how the human brain functions, and grounding research over the past several decades has added new insight on how our brains may work in cohesion to the earth's electrical activity. This article serves as a review of what we know so far on how grounding impacts the function of the brain.

**Keywords:** Grounding; Earthing; Nature; Conductivity; Brain; Central nervous system; Electrical fields; Earth; Coherence; Cognition

### Grounding and Brain Function

The human brain shows a direct coherence with the earth's electrical fields, with the Schumann Resonance acting as a globally available synchronization system [9]. Using electroencephalogram (EEG) monitoring during geomagnetic stimulation, researchers have found that human brains collect and process directional input from the earth [10]. Further research in this field has given us even additional exciting evidence that the earth may directly support intellectual function as well [11]. By monitoring the brain's electrical activity through an EEG while simultaneously measuring Schumann Resonance frequencies in real time, scientists found that electrical activity from the earth makes a measurable synchronization in our cerebral cortex that allows for real-time coupling between the Schumann resonance and cerebral activity. The researchers found that this activity is the exact amount of time,

length of time, amplitude of signaling, and frequency of time that would be required for a “ping” from the planet to our human brains to occur, without interfering with or disrupting cognitive thought [12].

Researchers looking at the earth's impact on brain wave function in double blinded studies have found an immediate shift in brain wave patterns on study participants who were grounded to the earth [7] while another study found that the brain wave shifts happen near instantaneously, within milliseconds, as recorded on an EEG when the human body is grounded [8]. Alpha wave patterns increase when the brain is grounded, putting the brain into a healing, receptive state -- similar to the healing state the human brain goes into during prolonged meditation -- alert, calm, and centered.

Newer research suggests this shift this may have cognitive benefit. Researchers followed three groups of participants for 12 weeks to determine if walking barefoot outside for 40 minutes in the morning, four times a week, had any impact on their cognition

compared to controls. Using an EEG to record brain wave patterns before and immediately following the 12 weeks, participants were asked a series of questions and performed tasks to examine spatial perception, memory, cognitive speed, concentration, and levels of brain stress. Researchers found that only the barefoot group showed significantly boosted alpha waves and significantly decreased beta waves, and they found that this translated cognitively into a significant increase in cognitive speed and concentration along with a significant decrease in brain stress. The control group that did the same walking activity but wore sneakers the entire time, had no significant change in any of the mental performance tasks [13]. The researchers conclude that barefoot walking activated cognitive ability, particularly in information processing and complex reasoning, while simultaneously reducing mental stress and brain fatigue.

Preliminary animal tests suggest a possible mechanism of action on why the barefoot group had decreased levels of brain stress. One study on mice found that grounding significantly decreased levels of corticotropin-releasing factor (CRF) in the brain, a hormone associated with stress and anxiety which then stimulates the release of cortisol in the adrenal glands. A decrease in this signaling should reflect a decrease in cortisol output and a lowered subjective feeling of stress [14]. Additional studies on grounding in humans reveal this to be the case, one study showed complete normalization of cortisol in humans who slept grounded for two months [15]. Not only were their cortisol levels significantly decreased while grounding but they also reported significantly decreased levels of stress and pain.

Even brains that already have degenerative brain changes occurring may be supported by grounding, as patients with Alzheimers Disease were able to significantly improve sleep quality (an average improvement of 62% on PSQI, Pittsburgh Sleep Quality Index) after 12 weeks of sleeping grounded [16]. And because inflammation is now being linked with cognitive disorders such as mild cognitive impairment and dementia (including Alzheimers,) the long-term effects of grounding to protect cognition may come from it's ability to decrease inflammation and potentially decrease neuroinflammation over time [17].

Grounding may even positively affect mood due it's ability to decrease inflammation. Research into the connection between inflammation and depression found that increased inflammation in the body worsens symptoms of clinical depression [18] and significantly higher levels of inflammation was directly correlated with a variety of depressive symptoms, including sleep difficulty, decreased energy levels, decreased motivation and increased or decreased appetite. In another study, inflammation was also found to contribute to cognitive changes such as loss of pleasure in activities previously found pleasurable (anhedonia), depressed

mood, lowered feelings of self worth, decreased ability to concentrate, and even suicidal thoughts [19]. The reverse is true as well, by decreasing inflammation you can improve depression. Researchers reviewed 14 randomized, placebo-controlled studies looking at over 6,300 patients and found that adding anti-inflammatory medications to a treatment plan helped to lessen depressive symptoms and resolve depressive episodes better than placebo alone and better than anti-depressants alone [20, 21]. These results have been demonstrated in studies on the ability of grounding to impact mood, likely because of grounding's anti-inflammatory effect. In a double blinded study on grounding and mood, researchers found that participants who were grounded had measurable improvements in mood that were significantly higher than the sham-grounded participants after just 40 minutes of grounding [22]. Grounded subjects also have statistically significant decreases in blood markers of total body inflammation as compared to non-grounded controls [23].

Researchers have even found a direct correlation between inflammation and neurotransmitter levels, specifically that inflammation lowers dopamine levels in the brain. They also found that as the dopamine levels drops, so does the individual's motivation [24]. In fact, grounding specifically decreases the same inflammatory cytokines that have that direct impact on our dopamine levels. In one study, researchers found that cytokines such as such as IP-10, MIP-1 $\beta$ , and sP-Selectin were all decreased in grounded test subjects, compared to non-grounded controls. The average drop induced by grounding a patient was a 10 —20% drop in inflammatory cytokine concentration [25]. By decreasing inflammatory cytokines, it's likely that grounding gives a natural dopamine boost to the brain. This powerful, natural anti-inflammatory effect is likely the mechanism of action behind the earth's ability to elevate mood, boost cognitive function, and decrease brain stress.

We know that grounding immediately impact brain function, but might it have long term benefits as well? Because grounding decreases inflammation, it's possible that one of the long-term benefits of grounding is decreased neuro inflammation as well, thereby protecting the cognitive function of the brain and extending it's health span. There are many anti-aging benefits of grounding, that include protecting musculoskeletal health, reducing stress levels, improving circadian rhythm and deepening sleep, even protecting skin health and boosting wound repair [26], so hopefully there will be longer term studies to evaluate grounding's ability to protect brain health over a lifetime and increase it's functional longevity.

## Conclusion

All in all, it makes sense that the human brain just may work with better when it is grounded. After all, the near seven million

years that the human brain has been evolving and increasing in intellectual capacity have all been with the brain being bathed in the electrical field that the earth produces. This cohesive evolution of the central nervous system to the natural electrical field of the earth may be why the brain has evolved to sit in an electrolytic solution of cerebrospinal fluid (CSF) that is highly conductive — and therefore easily grounded. Could the instantaneous brain effects of grounding come in part from the instant grounding of the CSF? Hopefully research into grounding and brain function will elucidate the exact pathway that grounding our central nervous system works and the impact that grounded CSF may have on the health and function of the entire central nervous system, including the spinal cord as well.

You have likely experienced this cohesion for yourself, if you have you ever been mulling over a big life decision, feeling overwhelmed or confused, and then spent time in nature and found a solution, a deeper insight, or a sudden idea that provided clarity. By connecting with the earth, we can shift the brain from high strung beta waves to calming alpha wave patterns, decrease inflammation, decrease mental stress, improve mood, and even potentially boost cognition, all naturally. And the effects of grounding the human brain start right away, with measurable changes in brain wave activity in less than one second. So, the next time you need a little boost in brain function, try heading outside to get grounded. And hopefully longer-term studies into the healing benefits of being grounding will shed even more insight into how the earth may help preserve cognitive function as well as the ideal amount of time needed to provide these benefits.

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