Research Article ISSN 2639-944X

Journal of Medical - Clinical Research & Reviews

The Earth's Role in Circadian Regulation: Grounding to Set Daily Cortisol Pattern

Laura Koniver MD*

Intuition Physician, LLC 885 Gold Hill Road, Office 227, Fort Mill, USA.

***Correspondence:**
Laura Koniver MD, Intuition Physician, LLC 885 Gold Hill Road, Office 227, Fort Mill, USA.

Received: 04 Jul 2025; **Accepted:** 17 Aug 2025; **Published:** 26 Aug 2025

Citation: Laura Koniver. The Earth's Role in Circadian Regulation: Grounding to Set Daily Cortisol Pattern. J Med - Clin Res & Rev. 2025; 9(8): 1-4.

ABSTRACT

Emerging evidence supports the hypothesis that Earth's electromagnetic grid output—including its direct current (DC) potential, the Carnegie Curve and Schumann Resonance frequencies—plays a central role in maintaining and regulating circadian rhythms. While it is well-established that exposure to sunlight entrains melatonin production, this article proposes that grounding to the Earth may be equally vital in setting the cortisol rhythm. Historical research involving sensory-isolated bunker experiments revealed that removing the Earth's natural electromagnetic fields can lead to desynchronization of the human circadian rhythm, independent of the influence of light exposure. Modern clinical studies show that sleeping while grounded significantly alters the cortisol profile, with measurable improvements in circadian regularity, sleep quality, stress response, and autonomic nervous system function. By reviewing historical and contemporary medical studies, this article proposes that the human body's exposure to the Earth's surface potential and resonant frequencies supports cortisol rhythm integrity and may, in some contexts, be more foundational than sunlight in regulating the day/night cycle. The Earth appears to act as a hormonal "clock setter," particularly for the cortisol awakening response and overnight cortisol suppression, creating a tandem effect alongside melatonin to maintain a stable 24-hour biological rhythm.

Keywords

Grounding, Earthing, Circadian rhythm, Cortisol, Melatonin, Schumann Resonance, Sleep, Autonomic Nervous System, Electromagnetic Fields, Hormonal entrainment.

Introduction

Circadian rhythms orchestrate virtually every physiological process in the human body, regulating sleep-wake cycles, hormonal secretion, immune function, metabolic processes, and mental performance. These rhythms are typically thought to be synchronized primarily through photic input from the retina to the suprachiasmatic nucleus (SCN) in the hypothalamus, which governs the pineal gland's release of melatonin in response to diminishing light [1].

However, melatonin is only one half of the picture. Cortisol, a glucocorticoid secreted by the adrenal glands under direction of the hypothalamic–pituitary–adrenal (HPA) axis, rises in the early morning in anticipation of waking and activity, then declines throughout the day, and affects both mental and physical health [2]. These two hormones—melatonin and cortisol—act in an elegant opposition, forming a balanced endocrine cycle that supports robust circadian regulation.

Despite the established focus on light-mediated melatonin entrainment, the role of non-photic environmental cues, especially those derived from the Earth itself, is increasingly being appreciated. Multiple lines of evidence now point to the importance of electromagnetic and geophysical cues from the Earth in regulating circadian biology. For example, it has been shown that human circadian systems can remain entrained to a 24-hour cycle in total darkness, but only when natural geophysical cues remain present [3]. Experimental isolation of subjects in underground environments shielded from the Earth's electromagnetic activity leads to circadian drift and desynchronization—effects that are not observed in similar conditions when geomagnetic input is preserved [4]. Additionally, fluctuations in Earth's geomagnetic field—such as diurnal geomagnetic variation and low-frequency

electromagnetic resonances—have been observed to influence the secretion of melatonin and cortisol, as well as fluctuations in heart rate variability and vagal tone [5,6].

Recent studies suggest that the SCN may receive and integrate geomagnetic signals via magneto receptive structures in the retina or through cryptochrome proteins, which are sensitive not only to light but also to weak electromagnetic fields [7]. In fact, cryptochromes—essential to circadian timing—have been shown in animal models to be responsive to static and oscillating magnetic fields at frequencies overlapping the Earth's natural resonances [8]. This supports the hypothesis that our circadian pacemakers are not exclusively photic-dependent but may also be co-regulated by Earth's electromagnetic architecture.

Direct contact with the Earth, a practice known as grounding or earthing, may influence cortisol rhythms in a significant and clinically relevant way. This article explores historical and contemporary evidence that grounding supports the biological clock via entrainment of cortisol rhythms and restoration of autonomic balance.

Historical Evidence: Bunker Experiments and Circadian Disruption

Some of the earliest and most compelling evidence for the Earth's influence on human circadian rhythms emerged in the 1960s and 1970s from a series of experiments conducted in underground bunkers. In these studies, participants lived in total isolation from external time cues, including light, temperature fluctuations, and electromagnetic fields. German chronobiologist Jürgen Aschoff and later Rütger Wever demonstrated that while most subjects maintained a free-running rhythm close to 24 hours, a subset of participants exhibited profound circadian desynchronization when the bunker was shielded from the Earth's natural electromagnetic fields [3].

When a frequency mimicking the earth's Schumann Resonance output was reintroduced to the bunker that was shielding from the earth's EMF field, 24-hour synchrony was restored [9]. This suggests that connection to the Earth's native EMFs—not just light—plays a critical role in sustaining internal biological timing. The Schumann Resonance, a series of low-frequency electromagnetic waves generated between the Earth's surface and ionosphere, appears to serve as a natural circadian pacemaker, aligning the human system with the environmental day/night cycle even in the absence of light [10].

Schumann Resonance and Neurological Entrainment

The Schumann Resonance oscillates primarily at 7.83 Hz, with secondary harmonics at 14.1 Hz and higher [6]. These frequencies correspond strikingly with human brainwave activity, particularly the alpha and low-beta bands. EEG studies have shown coherence between human brain activity and the Schumann Resonance, indicating that the human brain may be biologically attuned to Earth's natural EM rhythm [11].

This synchronicity may help stabilize mental states, cognitive function, and circadian rhythm integrity, with far reaching effects on the central nervous system, including influencing neurotransmitter levels and brain signaling [12]. In other words, the Earth's resonance may serve not only as an environmental "clock" but also as a global neural modulator, subtly influencing autonomic tone, brain wave states, and hormonal secretion patterns—particularly cortisol, which peaks shortly after waking and is highly sensitive to environmental entrainment [10].

Grounding and Cortisol Regulation

The modern concept of grounding has brought these electromagnetic interactions into a therapeutic context. When the human body is in direct conductive contact with the Earth—such as through walking barefoot, touching conductive elements of the earth's crust with hands or feet, or using grounding tools—electrons flow into the body, instantly reducing surface potential and allowing the body to equalize with the Earth's DC field [13].

One of the earliest studies to measure the physiological impact of grounding on circadian hormones was conducted by Ghaly and Teplitz in 2004. In this pilot study, participants slept on grounded mattress pads for eight weeks, and their salivary cortisol levels were tracked at four-hour intervals over a 24-hour period. After grounding, cortisol secretion patterns normalized significantly, with a distinct reduction in nighttime cortisol, improved early-morning peaks, and a re-establishment of a healthy diurnal rhythm [14]. Participants also reported subjective improvements in sleep quality, stress levels, and energy.

Subsequent studies and reviews have confirmed these findings, showing that grounding influences the HPA axis, reduces the physiological markers of stress, and enhances autonomic regulation [15]. One proposed mechanism is the shift in sympathetic–parasympathetic balance, as measured by increased heart rate variability (HRV), which suggests greater vagal tone and better parasympathetic dominance [16]. This is particularly relevant during sleep, when the parasympathetic nervous system should be active, and cortisol levels should reach their nadir.

Sleep Quality and Circadian Stability

Multiple studies have shown that grounded sleep improves not only hormonal profiles but also sleep quality itself [17,18]. Participants sleeping on grounded beds or mats report fewer awakenings, reduced pain, decreased leg twitching or cramping, and a quicker onset of restorative sleep phases. EEG studies have begun to show shifts in alpha and theta wave activity during grounded sleep, supporting the idea that grounding encourages brain states associated with deep, restorative rest.

Sleep improvement, in turn, helps stabilize both cortisol and melatonin, further supporting the hormonal architecture of circadian rhythm. The autonomic nervous system is central to this effect. Grounding increases heart rate variability, enhances parasympathetic activity, and decreases sympathetic overdrive, which is common in individuals with insomnia, anxiety, and

circadian rhythm disorders [19]. These shifts, observed consistently in both daytime and nighttime grounding interventions, indicate that grounding is a whole-body regulatory intervention capable of enhancing homeostatic balance.

Grounding as a Hormonal Clock Setter

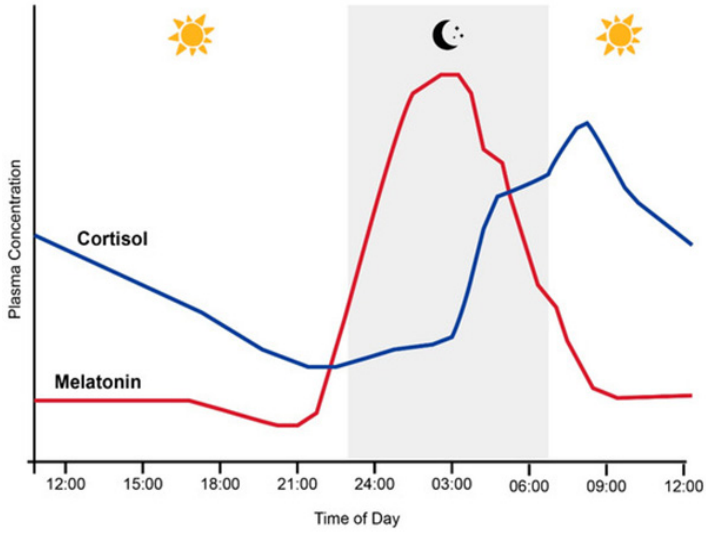

Figure 1: Plasma melatonin and cortisol levels and sleep (grey shading) in humans. From Robertson-Dixon et al. [19].

Table 1: Hormonal Phases and Grounding Effects.

Hormone	Peak Phase	Primary Function	Grounding Effects
Cortisol	Early Morning	Promotes wakefulness, metabolic activation, stress readiness	Normalizes cortisol awakening response, lowers night cortisol
Melatonin	Evening	Promotes sleep onset, circadian synchronization, antioxidant protection	Significantly improves sleep quality

Cortisol's morning peak, known as the cortisol awakening response (CAR), is essential for metabolic readiness, immune regulation, and mental alertness [20]. Disruption of this pattern—whether through stress, shift work, artificial light exposure, or isolation from environmental cues—has been linked to mood disorders, fatigue, impaired cognition, and metabolic syndrome.

Grounding appears to play a unique role in reinforcing this pattern. While light exposure drives melatonin suppression and wakefulness, the Earth's energy field may prime the cortisol rhythm, ensuring a robust CAR and appropriate suppression during sleep. Together, these dual entrainment systems—light for melatonin, Earth for cortisol—form a full-spectrum circadian support framework. To ignore Earth-based cues is to overlook half of the equation.

Clinical and Practical Implications

Beyond basic physiology, the implications of grounding extend to practical health interventions. Jet lag, for example, is characterized by temporary circadian misalignment due to rapid travel across time zones. Grounding upon arrival—such as walking barefoot, touching trees, or swimming in natural bodies of water—has been anecdotally and clinically reported to accelerate recovery from jet lag by rapidly re-entraining cortisol and melatonin cycles [21]. Studies on jet lag and cortisol changes during time zone travel reveal that cortisol significantly impacts jet lag symptoms [22] so cortisol regulation may be the main mechanism of action by which grounding treats jet lag so effectively.

Astronauts in space, separated entirely from Earth's surface potential, suffer from profound circadian disruption, immune dysregulation, and sleep disturbances—conditions which could potentially be mitigated by exposure to Earth-like electromagnetic fields or simulated grounding [23]. Grounding may also benefit individuals with chronic insomnia, stress-related cortisol dysregulation, adrenal fatigue, PTSD, and other conditions where cortisol cycling is impaired. Incorporating daily grounding practices, especially in the morning and evening, may offer a simple, side-effect–free approach to enhancing circadian health and systemic resiliency.

Conclusion

Grounding reconnects the human body with the Earth's electrical potential and natural resonance frequencies, providing biologically meaningful cues that help stabilize and entrain the circadian rhythm—particularly the cortisol cycle. Just as sunlight entrains melatonin, the Earth may act as the primary cue for cortisol regulation. These two hormones operate in a complementary rhythm, together maintaining a robust and responsive internal clock.

Modern lifestyles—characterized by rubber-soled shoes, non-grounded sleeping platforms, artificial EMF saturation, and reduced outdoor time—have disconnected us from this primal source of circadian support. Reintroducing regular grounding practices may represent one of the most fundamental, accessible, and effective ways to restore circadian integrity, improve sleep, support hormonal balance, and enhance overall physiological function, including cognitive function [24].

References

1. Cleare AJ. The HPA axis and the genesis of chronic fatigue syndrome. Trends Endocrinol Metab. 2004; 15: 55-59.
2. Adam EK, Quinn ME, Tavernier R, et al. Diurnal cortisol slopes and mental and physical health outcomes A systematic review and meta-analysis. Psychoneuro-endocrinology. 2017; 83: 25-41.
3. Persinger MA. On the possible representation of the electromagnetic properties of the earth's atmosphere as a source of lunar biological rhythm entrainment. Int J Biometeorol. 1987; 31: 1-10.

4. Aschoff J, Wever R. Human circadian rhythms a multidisciplinary approach. Naturwissenschaften. 1962; 49: 337-342.
5. Burch JB, Reif JS, Yost MG. Geomagnetic disturbances are associated with reduced nocturnal excretion of a melatonin metabolite in humans. Neurosci Lett. 2008; 438: 76-79.
6. Mulligan BP, Persinger MA. Experimental simulation of the effects of sudden geomagnetic impulses on melatonin levels in rodents. Neurosci Lett. 2012; 519: 135-139.
7. Solov'yov IA, Chandler DE, Schulten K. Magnetic field effects in Arabidopsis thaliana cryptochrome-1. Biophys J. 2007; 92: 2711-2726.
8. Fedele G, Green EW, Rosato E, et al. An electromagnetic field disrupts negative geotaxis in Drosophila via a CRY-dependent pathway. Nat Commun. 2014; 5: 4391.
9. Wever R. The Circadian System of Man Results of Experiments Under Temporal Isolation. Springer. 1979.
10. Kuroda T. Circadian rhythm synchronization using natural geomagnetic fields. Chronobiol Int. 2007; 24: 553-568.
11. Schumann W. On the free oscillations of a conducting sphere. Z Naturforsch A. 1954; 7: 149-154.
12. Pobachenko S. Synchronization of human EEG with Schumann resonances. Bioelectromagnetics. 2006; 27: 479-486.
13. Koniver L. Neurological pathways supported by grounding. Open J Neurol Neurosci. 2023; 7.
14. Oschman JL. Can electrons act as antioxidants A review and commentary. J Altern Complement Med. 2007; 13: 955-967.
15. Ghaly M, Teplitz D. The biologic effects of grounding the human body during sleep as measured by cortisol levels and subjective reporting of sleep pain and stress. J Altern Complement Med. 2004; 10: 767-776.
16. Sokal K, Sokal P. Earthing the human body influences physiologic processes. J Altern Complement Med. 2011; 17: 301-308.
17. Chevalier G, Mori K. Grounding the human body improves HRV. Complement Ther Clin Pract. 2015; 21: 112-118.
18. Lin CH, Tseng ST, Chuang YC, et al. Grounding the Body Improves Sleep Quality in Patients with Mild Alzheimer's Disease: A Pilot Study published correction appears in Healthcare. Basel. 2022; 10: 988.
19. Elder GJ, Mark A. Wetherell, Nicola L. Barclay, et al. Cortisol awakening response implications for sleep medicine. Sleep Med Rev. 2014; 18: 215-229.
20. Paragliola RM, Corsello A, Troiani E, et al. Cortisol circadian rhythm and jet-lag syndrome evaluation of salivary cortisol rhythm in a group of eastward travelers. Endocrine. 2021; 73: 424-430.
21. Chevalier G. Pilot study on grounding to reduce jet lag. J Environ Public Health. 2012; 2012: 291541.
22. Mallis MM, DeRoshia CW. Circadian rhythms sleep and performance in space. Aviat Space Environ Med. 2005; 76: B94-B107.
23. Koniver L. Current Research in Complementary & Alternative Medicine. 2024; 8: 252.
24. Robertson-Dixon I, Murphy MJ, Crewther SG, et al. The Influence of Light Wavelength on Human HPA Axis Rhythms A Systematic Review. Life. 2023; 13: 1968.