

Frequencies as Levers: Observations from 30 Years at the Intersection of Building Systems and Human Physiology

Public comment on the HHS Request for Information concerning electromagnetic fields, radiofrequency radiation, and wireless technologies | October 2026

My background is not the kind that typically appears in submissions like this one, and that's precisely why I'm writing it.

I hold a five-year degree in architectural engineering from a program jointly administered by the engineering and architecture departments, graduating at the top of my class. The ARGE program was new at the time — architectural offices weren't yet familiar with working with its graduates, which meant entering a professional environment still organized around separate specialties while being trained to see building systems as a single integrated whole. That training covered the engineering calculations for all of it: structural systems, electrical systems, lighting, HVAC, thermal comfort, etc. I subsequently worked in architecture for five years, involved in the early development of integrated design approaches and playing a leadership role in the sustainable design community.

I mention this not as a credential in the conventional sense but because the perspective it established is the foundation for everything that follows. When I look at a building, I don't see separate systems. I see electrical fields generated by wiring, magnetic fields produced by current flow, lighting conditions affecting circadian signaling, thermal environments affecting metabolic function, and the person inside all of it responding to the whole. That's the same lens I bring to the question of electromagnetic exposure and human health.

I was learning about EMFs and building biology — known as Baubiologie — as early as 1997, with contacts already practicing in EMF mitigation. My own chronic illness affected my cognition significantly from 2004 onward, which made accessing that knowledge difficult at precisely the time it would have helped me most. That is itself a data point worth sitting with.

By 2018, I recognized the full extent of my own electromagnetic sensitivity — an investigation that began with identifying that the magnetic fields generated by the car's own systems as well as the RF exposure from cell towers enroute were affecting me enough that I stopped driving for safety reasons. It's important to recognize that these are different problems requiring different responses.

I now work as an ART practitioner and health coach, working with a small number of clients dealing with chronic illness and environmental exposures. ART — Autonomic Response Testing — is the testing

methodology developed and refined by Dr. Dietrich Klinghardt over 45 years of clinical practice. I chose it for two reasons: because Klinghardt has developed it specifically for the complexity of chronic illness, and because I can conduct the investigation within an environment I've already optimized for my own functioning. The testing environment is not a neutral variable — the buildings as well as electrical instruments used in conventional diagnostic environments were themselves introducing additional exposures that would affect results. I'd note that even ART testing requires an electrically clean environment to get accurate results. Background electrical interference adds noise that compromises the accuracy and/or specificity of the findings.

For many years, since I have more rigorous training on the subtopics within the field of EMFs than what similar educators have produced, I have been asked by many followers and clients if I would create a course on how they can mitigate their own EMF exposures. This project has recently begun.

The Core Issue

Technology exists to improve our lives. How are we accounting for its effects when the technology itself interferes with people's ability to live those lives?

What My Body Evolved to Respond To Is Not What It's Currently Being Asked to Process

The question I keep returning to, and that I'd like to bring into this conversation, is one that precedes any specific discussion of exposure levels, frequencies, or research methodology.

Our cells evolved within a specific electromagnetic environment — the natural frequencies of the earth, the geomagnetic field, the Schumann resonances, and the solar frequencies that have been present throughout human biological history. These frequencies appear to function as levers: the body has developed responses to them, uses them as signals, integrates them into regulatory processes. This isn't speculation; it's the basis of circadian biology, magnetoreception research, and the documented health effects of removing people from natural light environments.

Man-made electromagnetic frequencies, especially from Alternating Current and Radio Frequency, are a different category. The body receives much of these as signals it didn't evolve to utilize, causing them to become noise it has to filter — and that filtering is a demand on the nervous system, specifically the autonomic nervous system, which is already managing every other regulatory function simultaneously.

This is where the toxic burden framework becomes relevant. Each person has a capacity for stress — chemical, biological, electromagnetic, psychological. When cumulative burden remains below that threshold, the system compensates. When burden surpasses capacity, symptoms appear and illness

begins. The electromagnetic environment isn't an isolated variable; it's one input into a system that's either managing or not managing a total load.

In my work with ART over the past several years, I have not encountered a single person — client or colleague — who tested as being in parasympathetic mode as their baseline state. Everyone I've tested shows as sympathetically dominant. The fields we live and work within, combined with the lifestyles and social interactions that are part of modern life, appear to keep the autonomic nervous system in a state of defended readiness that never fully resolves.

This matters for research design in a way that doesn't often get discussed: if you're studying physiological responses to electromagnetic exposure in a population that is already chronically sympathetically dominant, you're studying the response of a system that is already braced. Adding another stressor to a body in that state produces a different result than the same stressor would in a body with full regulatory capacity. The baseline state is not neutral, and it's not constant across individuals or time.

What I Detect — and What I'd Be Curious to See Measured by Other Methods

Using ART, I'm identifying two distinct variables in autonomic function that I want to be precise about because they're frequently conflated: autonomic state — whether someone is testing as sympathetically or parasympathetically active — and autonomic regulatory capacity — whether their regulation is open and responsive or blocked.

Someone can be sympathetically dominant without having impaired regulatory capacity. Conversely, identifying the prevailing autonomic state doesn't tell you whether the person can transition appropriately between states. My testing distinguishes these conditions rather than treating them as the same variable.

In clients dealing with chronic illness and EMF sensitivity, my ART testing is suggesting an increase in reactive oxygen species (ROS), reactive carbonyl species (RCS), and reactive nitrogen species (RNS) that worsen with EMF exposure and resolves when the exposure is removed or reduced. I'm curious to see what more precise measurement would reveal.

These are preliminary observations. I'm not offering them as conclusions; I'm offering them as the kind of specific, testable hypotheses that warrant investigation with instrumentation capable of measuring what I'm detecting through autonomic response.

The investigative sequence I use is worth describing, because it's different from how research is typically structured, and because it has practical implications for where more precise measurement would be most valuable.

When I test a client for a suspected EMF stressor — a device screen, for example — I first verify they're testing strong, not switched, and that their autonomic regulation is open. Then I introduce the variable: the person looks at a device screen from across the room. The autonomic response is immediate — either blocked regulation, switching and/or a shift toward a stress response/sympathetic dominance, or not. If they react, I can then cross-check to specific areas of interest: brain regions (prefrontal cortex, limbic system, dopamine pathways), digestive function, immune markers, or whatever the clinical picture suggests. That additional testing isn't always necessary for the immediate purpose of helping someone reduce an exposure. For research purposes, however, those additional findings could help identify which measurements might reveal the underlying mechanisms, and that's where bringing in EEG equipment, HRV measurement, or other physiological tools would add the most information. My testing tells me there is an effect. Further testing — by ART or by other methods — can hone in on what that effect is.

The device screen example also illustrates something important about exposure measurement. If the ART test doesn't show a reaction, I wouldn't expect much clinical benefit from reducing that particular exposure for that person. If they do react, I'd expect changes from reduction — some immediate, some developing over time as their system recalibrates. And I can later test whether they've regained any tolerance for that exposure, which tells me something about how their system is adapting or recovering.

The Body Doesn't Experience EMFs the Way a Meter Does

One point about measurement that I want to define more clearly: the body may be responding to aspects of the electromagnetic environment that current consumer and research instruments don't capture.

First and foremost, biological systems don't respond linearly to stressors — there are threshold effects, hormetic curves, and compensatory responses that collapse suddenly rather than gradually. For myself, my RF exposure limit is 7 mW/m² on my EMF-390 meter, significantly lower than the federal limit of 10,000 mW/m². I would test my clients using ART to identify what their personal limit is.

An instrument measures what it's designed to measure, within the frequency range and sensitivity it was built for. A measurement showing no detectable exposure doesn't establish the absence of every possible electromagnetic component — it establishes that nothing was detected within that instrument's capabilities under those conditions. That's a meaningful distinction when the body is a broadband, exquisitely sensitive biological sensor that has been responding to electromagnetic signals for its entire evolutionary history.

The body may also be responding to transitions and rate of change rather than — or in addition to — steady-state field levels. Two environments with similar average magnetic field readings can have very

different temporal characteristics: one stable, one constantly shifting as electrical loads switch, equipment cycles, or current takes different paths through the building's wiring. The autonomic nervous system may respond differently to those two environments even when a meter reports similar numbers.

Additionally, the testing environment in research studies is not electromagnetically neutral. The building wiring creates electric fields whenever energized and magnetic fields when carrying current. Standard electrical codes require outlets every several feet along walls. Devices with RF antennas — even when turned off — can resonate when exposed to ambient fields. An experiment carefully controlling one RF transmitter while treating everything else in the room (or exposures enroute to that room, even) as negligible background may be missing significant portions of the actual exposure.

Supporting Recovery

One point that Dr Dietrich Klinghardt has emphasized from his work with chronic illness patients is that it will be impossible for their body to recover while in a high EMF environment, so, it becomes essential to identify the aspects of their environment that are beyond their individual threshold and mitigate accordingly. Removal of EMF stressors is not usually enough on its own, but reducing their overall body burden alongside EMF mitigation can produce effective results. I want to also note that I have experienced direct reductions in my own EMF reactions after addressing toxic metals and mold/mycotoxins.

The Accessibility Issue Is a Legal and Lawful One

I have not felt safe going into town or traveling in a car since 2019. The final situation that made this clear was a scheduled hair appointment — arranged early, before the salon officially opened, specifically to accommodate my sensitivity. I already knew the location of the salon had a very low RF level on my meter, so I expected I would be safe. The stylist arrived with her first regular client, who was insistent on keeping her cell phone active. My meter was reading 25 mW/m² at the distance I would be sitting from her for the next hour. I knew from experience that at that time my cognitive function was the first thing to decline at exposures above approximately 7 mW/m² (significantly lower than the federal limit of 10,000 mW/m²), typically within minutes. I asked if she could turn the phone off for the duration of the appointment. She emphatically refused. I left and haven't gone into town for appointments, shopping, or entertainment since.

I've missed two very dear friends' funerals. Visiting friends and relatives, some who are aging, has not been possible. I cannot access a medical facility if I needed to. These aren't preferences; they're the consequences of an environment that has become intolerable for my physiology.

I want to be clear about what this means, because it's important for policy discussions: I am not always physically incapable of entering these environments. I'm making a calculation about whether the

consequences of the exposure — immediate effects that may or may not be debilitating, but the real consequence is weeks of reduced functioning and increased symptoms of pain, inflammation, immune dysregulation, slowed cognition, and so on — are worth the benefit of the activity. The ability to occasionally endure an exposure is not the same as being able to participate in it without significant consequences. That distinction matters when assessing functional impairment.

Legally, this is an ADA issue, if the relevant bodies are willing to consider it. ADA protections are based on functional impairment, not on whether a specific condition has been formally diagnosed or medically recognized. A physical impairment that substantially limits major life activities — accessing healthcare, attending family events, participating in commerce and community life — may qualify regardless of whether the mechanism is fully characterized in existing medical literature.

The broader question the RFI has an opportunity to address is this: at what point does one person's technology cross over into restricting another person's lawful ability to exercise the life, liberty, and pursuit of happiness that the Declaration of Independence establishes as a foundational right? EMFs are an unseen category that can cause demonstrable harm to people at distances well beyond the user's own space. Medicine that incorporates biophysics is necessary to fully grasp the implications of that.

What I'm Curious to See Investigated

I want to be clear about the posture of this submission. I'm not asking HHS to validate what I've been finding. I hold my observations with confidence because they've been consistent, they've guided effective interventions, and they continue to be refined. What I'm curious about is what their measurement capabilities could reveal in the areas where I'm detecting effects but don't yet have precise quantification.

Specifically worth investigating:

- The autonomic nervous system as the intermediary between electromagnetic exposure and downstream symptoms. Rather than attempting to establish a direct causal pathway from EMFs to each individual symptom, investigating whether specific exposures produce measurable autonomic changes — captured by HRV, sympathetic/parasympathetic markers, heart rate patterns — and then how those autonomic changes propagate into function across physiological systems. The 2019 systematic review of HRV and cognitive function across 19,431 participants suggests HRV as a promising biomarker; it would be worth examining how EMF exposures affect those same metrics.
- The interaction between EMF exposure and ROS, RCS, RNS generation

- Baseline autonomic state as a critical variable in exposure research. The sympathetic dominance I observe universally in my client population suggests that most people being studied are already in a stressed baseline. Measuring autonomic state before exposure begins — and distinguishing between autonomic state and autonomic regulatory capacity — would add significant interpretive value to what studies are finding.
- The interaction between EMF exposure and toxic burden. The people most severely affected by electromagnetic exposure are almost always those already dealing with high body burden of heavy metals, mycotoxins, or other chronic stressors. The EMF exposure isn't the only variable; it's the variable that pushes a system already near its threshold over the edge. Studies that don't account for total burden may be systematically underdetecting effects in the most affected populations.
- The mold-EMF interaction specifically. Research exists indicating that mold organisms produce increased mycotoxin and enzyme activity when exposed to RF fields. This intersection deserves dedicated study, both for understanding indoor air quality in buildings with wireless infrastructure and for understanding why people with mold exposure histories are disproportionately represented in electromagnetically sensitive populations.

The Most Important Question

What standard of health are we aiming for? Are we asking whether EMF exposure causes acute toxicity in healthy people, or are we asking whether it contributes to conditions that prevent people from functioning at their biological potential — cognitively sharp, neurologically regulated, able to heal, able to participate fully in their own lives? Those are different research questions and they lead to different investigations. I'd advocate for the second, because that's the question that will yield the most useful answers for the people who need them most.

Submitted by Samantha Vilppu, ARCE, ART-Based Health Coach

Index to RFI Questions Addressed

Q2 — Perspective represented: Healthcare professional/ART-based health coach; individual with direct adverse health effects

Q3 — Individual experience with adverse health effects: see The Accessibility Issue Is a Legal and Lawful One; opening biographical section (RF and magnetic field sensitivity, driving cessation, salon incident, isolation from community and family)

Q3f — Steps taken to reduce exposure and observed changes: Supporting Recovery; biographical section (detox of metals and mycotoxins reducing EMF reactivity)

Q4 — Clinical observations from practice: What I Detect — and What I'd Be Curious to See Measured by Other Methods (ART findings across client population: RDS/RCS/RNS, blocked autonomic regulation, sympathetic dominance)

Q5o — Research gaps and knowledge needs: What I'm Curious to See Investigated (ANS as intermediary, baseline autonomic state, toxic burden interaction, mold-EMF interaction)

Q5p — Exposure characteristics beyond simple intensity: The Body Doesn't Experience EMFs the Way a Meter Does (nonlinear response, rate of change, temporal characteristics, instrument limitations, background environment in research settings)

Q7 & Q8 — Exposure assessment methodologies and improvements needed: The Body Doesn't Experience EMFs the Way a Meter Does; What I Detect (ART as a biological readout complementing instrument measurement; testing environment as a variable)

Q11g — Sensitive populations: What My Body Evolved to Respond To; toxic burden framework (individuals with chronic illness and high body burden as a distinct population experiencing disproportionate effects)

Q12 — Effects below current federal exposure limits: The Core Issue; The Accessibility Issue (cognitive decline at 7 mW/m², well below current limits)

Q16 — Highest priority research gaps: What I'm Curious to See Investigated (all five areas)

Q18 — Additional scientific evidence and recommendations: The Most Important Question (standard of health being aimed for); Supporting Recovery (toxic burden framework as essential context for EMF research)