

EMF 101

**A COMPLETE GUIDE TO
ELECTROMAGNETIC FIELDS**

PREPARED BY

**OPTIMAL
DWELLING SPACES**

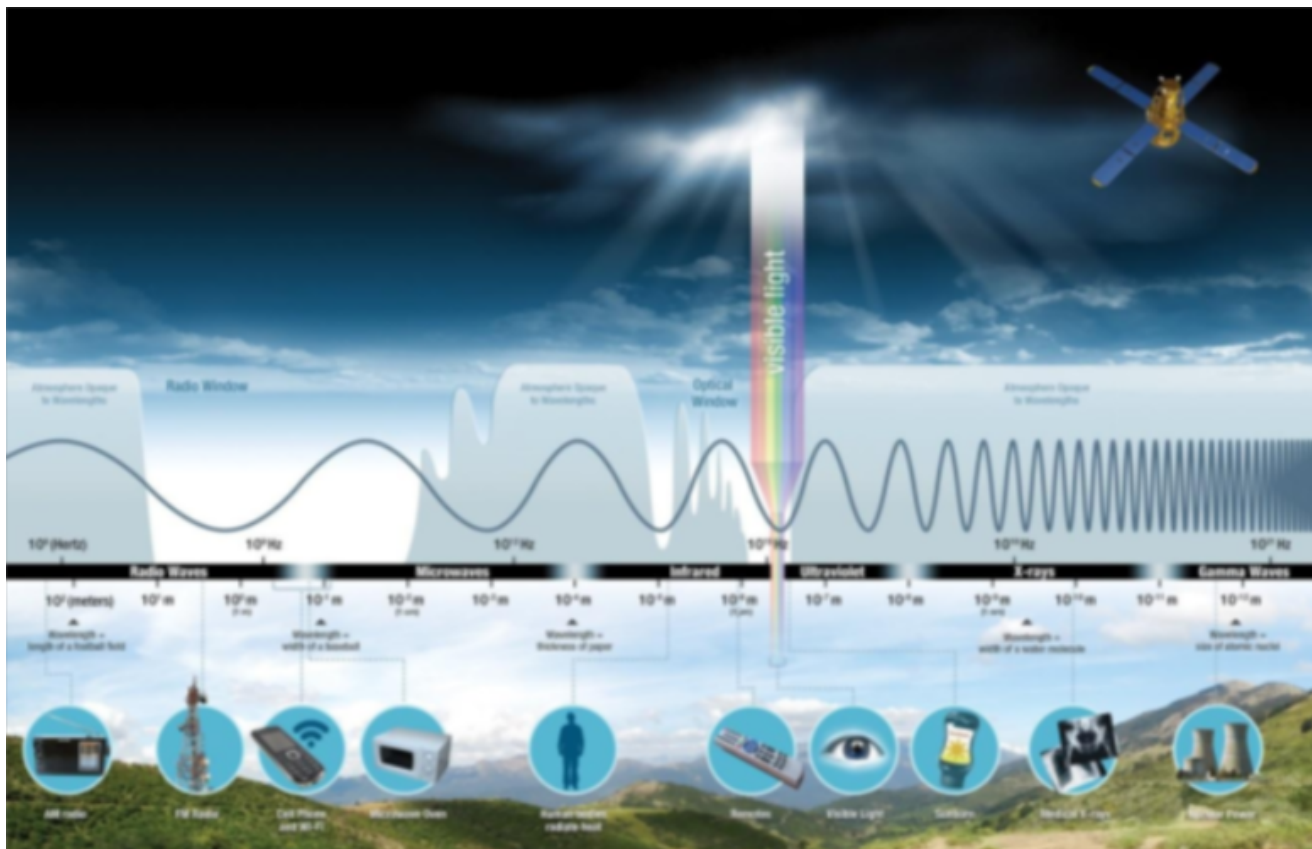
Lake Oswego, OR
(971) 204-8956

www.optimaldwellingspaces.com
optimaldwellingspaces@gmail.com

EMF 101

An electromagnetic field (EMF) is a physical field produced by electrically charged objects. It affects the behavior of charged objects in the vicinity of the field. It is one of the four fundamental forces of nature (the others are gravitation, weak interaction, and strong interaction).

You can think of EMFs in terms of native and non-native. On Earth, examples of native EMFs are sunlight and the Schumann resonance. All life has developed under their influence.¹ For the most part, they are healthy to be in and around. A key difference to note is that native EMF are not polarized, while non-native are.²



On the other hand, non-native EMFs (nnEMF) have only been around since the invention of the light bulb in 1874, and Chicago world fair in 1893, where Tesla unveiled his alternating current motor, leading to widespread electrification of the world. Over the next 100+ years, the inventions of radio, radar, microwave ovens, cordless telephones, cellular telephones, WiFi, smart meters, Bluetooth devices, LED lighting (and on and on...) have all come onto the scene, adding noise and frequencies that life has not had time to adapt to.

¹https://www.mdpi.com/1660-4601/14/7/770?utm_source=TrendMD&utm_medium=cpc&utm_campaign=Int_J_Environ_Res_Public_Health_TrendMD_0

²<https://jackkruse.com/time-10-can-you-supplement-sunlight/>

EMF 101

In such a short window of time, humanity has flooded the environment with nnEMFs, and even begun to control and change the natural cycle of day and night, as well as the seasons.

For example, these days it is very common for our species to experience an alien sun (manmade lighting) around the clock, and to eliminate any seasonality in our indoor environment (HVAC).

At a cellular level, our bodies are confused by these foreign signals and haven't done well in keeping up with the rapid pace of technological development and "creature comforts". We are truly the only organisms on the planet that have the ability, and think it is wise, to break Mother Nature's laws.

In fact, many forms of nnEMFs have been studied going back before the middle of the last century to the present day and a multitude of disruptive effects on cellular life have been found.³

Our bodies have an intrinsic electrical system and our own EMF which is easily disrupted by the "soup" of nnEMF pollution that is ubiquitous in today's world. See *The Body Electric* by Dr. Robert Becker for more information.

Doctors commonly use diagnostics like EKGs and EEGs on the heart and brain, which measure our internal electrical signaling, and point to the fact that we are electrical beings.

Major Types of nnEMF Pollution in Modern Environments AKA "The Buckets"

Toxic Lighting	Radiofrequency	AC Electric	AC Magnetic
			

³See www.bioinitiative.org for hundreds of studies on just the radiofrequency (RF) part of the spectrum alone

TOXIC LIGHTING

Examples: LED, fluorescent, and compact fluorescent bulbs; any tech device screen, headlights, streetlights.

- Remember, light is part of the EMF spectrum as well. As you can see in the diagram above, manmade lighting does not match natural sunlight. When we spend time indoors under manmade lighting, this creates a stress for our mitochondria, which are our environmental antennae and responsible for our energy production. When mitochondria are stressed, they activate mutations in our nuclear genome/DNA⁴.
- Blue light frequencies are always balanced by red light frequencies in sunlight. They are never apart. Blue light is a strong message to our bodies and by itself has been shown to destroy dopamine and melatonin. Red light by itself has been shown to signal our bodies to run regenerative programs. In fact, sunlight is 42% infrared from sunup to sundown. It does not change, unlike the other frequencies present. This is a clue for us as to its importance in biology⁵.
- Although nothing replaces sunlight, incandescent and halogen bulbs are the “best of the worst” due to low levels of violet/blue, and high levels of red light frequencies. The heat from these bulbs represents the invisible near/far infrared frequencies, which are also regenerative for our bodies. Incandescents also have a low flicker rate in comparison to more modern types.
- LED and fluorescent (CFL) create dirty electricity, additional non-native frequencies.
- LED and CFL also have visually imperceptible flicker⁶ rates up to 20,000x per second that our cells are aware of, and confused by. The flicker effect was discovered to have been responsible for many helicopter crashes during the Vietnam War due to temporary muscle paralysis when pilots looked up through their rotors on a sunny day. It’s known as the Bucha effect⁷.

⁴<https://jackkruse.com/reality-14-warburgs-proof/>

⁵https://file.scirp.org/Html/89418_89418.htm

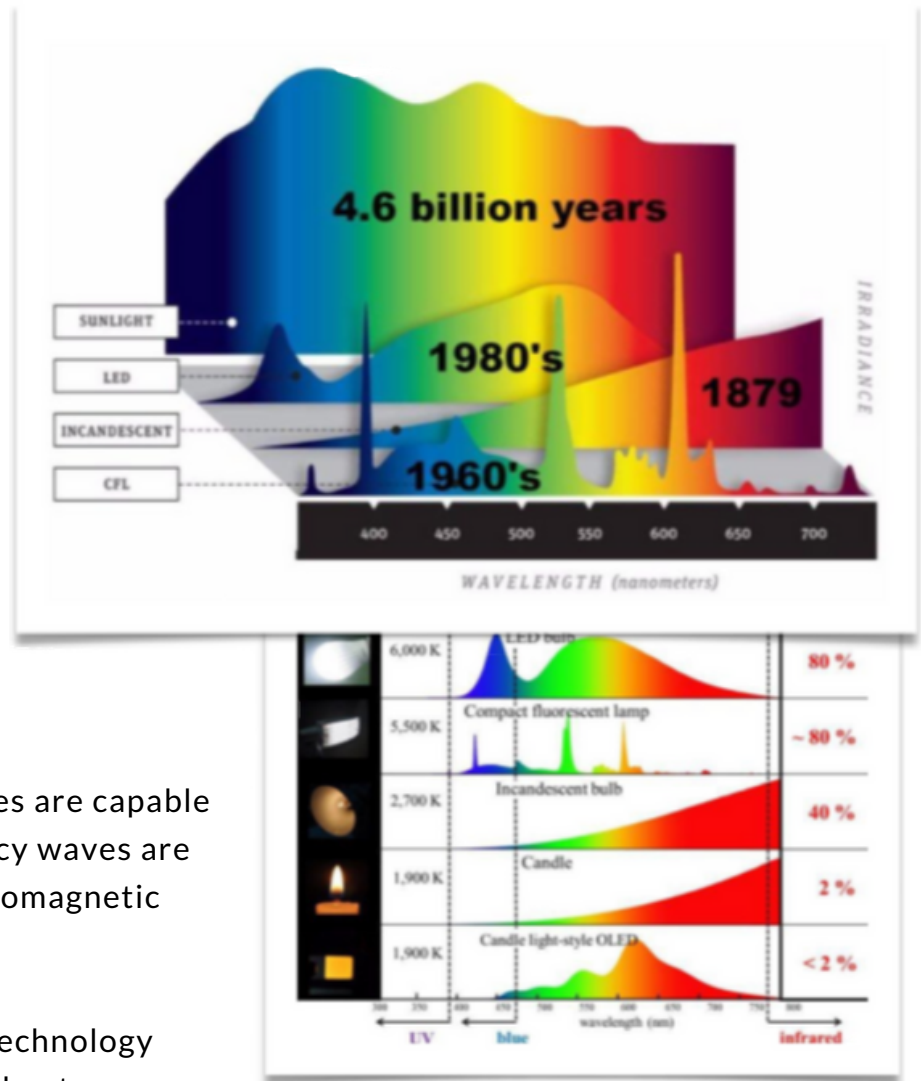
⁶<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4038456/>

⁷https://en.wikipedia.org/wiki/Flicker_vertigo

RADIOFREQUENCY (RF) RADIATION

Examples: cellular towers and phones, Bluetooth devices, cordless phones, baby monitors, smart meters, smart appliances, printers, laptops.

- Consists of waves of electric and magnetic energy moving together (radiating) through space at the speed of light. RF waves are used to convey information from one place to another through the air.
- They are used in mobile communication, radio and television broadcasts, radar, satellite navigation and homeland security. They are a core component of our wireless communication infrastructure.
- These high energy, airborne waves are capable of traveling miles. Radio frequency waves are considered high frequency electromagnetic radiation (27 MHz -6 GHz).
- The fifth generation in wireless technology '5G', which is already being rolled out domestically and in Europe will see the use and deployment of much higher frequencies, by some estimates up to 100 GHz. This is up to 100,000,000,000 oscillations per second!



AC MAGNETIC FIELDS

Examples: Home wiring and wiring errors, power lines, electric baseboards, hot water heaters, cooking range, laptop transformer, electric motors.

- Produced by electrical current flow. Any device or appliance that consumes electricity will produce an AC Magnetic Field. The intensity or strength of the magnetic field is directly related to the power consumption of the device. A more powerful device will produce a higher magnetic field.
- These fields usually remain close to their source (2-3 feet), but can travel several hundred feet in the case of high voltage power lines. AC Magnetic Fields are considered low frequency electromagnetic radiation (5 Hz – 400,000 Hz).



AC ELECTRIC FIELDS

Examples: Home wiring and wiring errors, power lines, AC/DC converter, lamps, extension cords, most plug-in appliances.

- Produced by the presence of electricity, and a voltage difference between two points. Their strength is determined by voltage; the higher the voltage or number of sources, the stronger the field. AC Electric Fields are generated by live electrical wires and generally travel 6-8 feet from the source, but in some cases further.
- An electric field will exist even when a device is not in use (turned off). In other words, these sources produce a continual emission. AC Electric Fields have a natural attraction to ground and are considered low frequency electromagnetic radiation (5 Hz – 400,000 Hz)

DIRTY ELECTRICITY (DE) FIELDS

Examples: LED and fluorescent light bulbs, solar panel transistors, certain appliances.

- Dirty electricity refers to spikes and surges of electrical energy that travel along the wiring in buildings where only standard (60 Hz) electricity should be.
- This type of electropollution is created by many modern electronics, appliances, and lighting solutions as they manipulate standard electrical current in one way or another in order to operate.
- Dirty electricity circulates throughout buildings, and even between buildings via wiring and power lines. It radiates electromagnetic fields (EMF) into rooms as it travels. Think of it as noise or excess, additional frequencies adding to the EMF soup of a modern environment.

What Are the Health Consequences from nnEMF Exposure?

RADIOFREQUENCY RADIATION

a) Electromagnetic Fields, Pulsed Radiofrequency Radiation, and Epigenetics: How Wireless Technologies May Affect Childhood Development.

- Symptoms of retarded memory, learning, cognition, attention, and behavioral problems have been reported in numerous studies and are similarly manifested in autism and attention deficit hyperactivity disorders, as a result of EMF and RFR exposure.

RADIOFREQUENCY RADIATION (CONTINUED)

b) National Toxicology Program (NTP) Study on Cell Phone Radiation.

- “Published in 2018, the \$30 million NTP studies took more than 10 years to complete and are the most comprehensive assessment, to date, of health effects in animals exposed to RFR with modulations used in 2G and 3G cell phones. 2G and 3G networks were standard when the studies were designed and are still used for phone calls and texting.”
- Radiation levels from cell phones are even higher today with 4G, LTE, 5G, and an ever increasing number of cell towers in the environment.
- “The NTP concluded there is clear evidence that male rats exposed to high levels of radio frequency radiation (RFR) like that used in 2G and 3G cell phones developed cancerous heart tumors...There was also some evidence of tumors in the brain and adrenal gland[s]...”

c) Cell Phones and the Risk of Brain Cancer Mortality: A Twenty-Five Year Cross-Country Analysis

- “We find that mobile phone subscription rates are positively and statistically significantly associated with death rates from brain cancer 15-20 years later.”

d) Association of excessive mobile phone use during pregnancy with birth weight.

- “Our results showed that pregnant women tend to excessively use mobile phones in Japan. The mean infant birth weight was lower in the excessive use group than in the ordinary use group, and the frequency of infant emergency transport was significantly higher in the excessive use group than in the ordinary use group.”
- “Low birth weight has been shown to be closely associated with neonatal mortality and morbidity, inhibited growth, poor cognitive development, and chronic diseases later in life.”

b) <https://www.niehs.nih.gov/news/newsroom/releases/2018/november1/index.cfm>

c) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2674296

d) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5664573/>

TOXIC LIGHTING

a) Exposure to Room Light before Bedtime Suppresses Melatonin Onset and Shortens Melatonin Duration in Humans.

- Manmade light (blue/violet) destroys melatonin. Melatonin signaling is a strong driver for internal housekeeping processes that occur during the night.

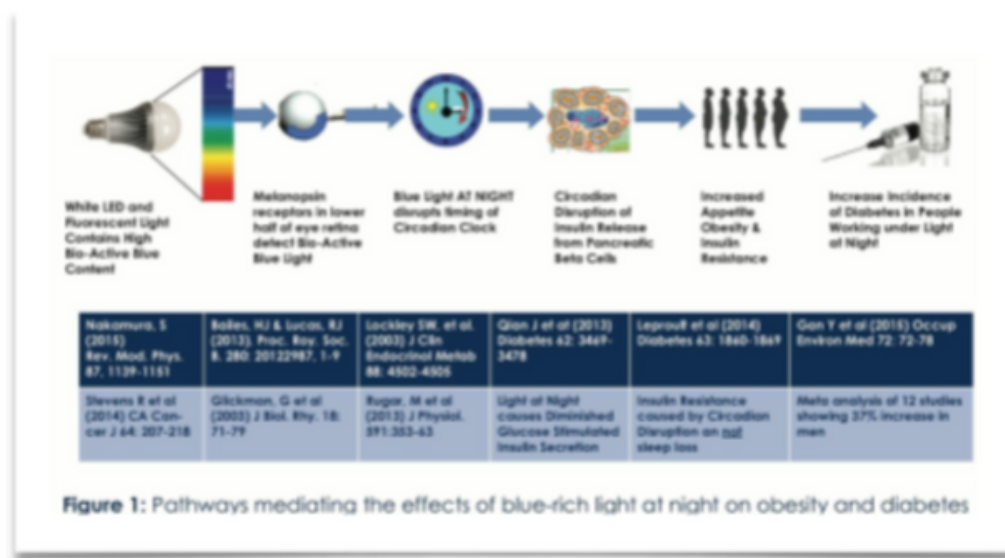
b) Light Exposure at Night Disrupts Host/Cancer Circadian Regulatory Dynamics: Impact on ... Tumor Growth Prevention

- "The central circadian clock within the suprachiasmatic nucleus (SCN) [located in between our eyes and brain] plays an important role in temporally [time-based] organizing and coordinating many of the processes governing cancer cell proliferation and tumor growth in synchrony with the daily light/dark cycle."

c) Cancer metastasis & Melatonin

- "Mounting evidence indicates that melatonin, employing multiple and interrelated mechanisms, exhibits a variety of oncostatic properties in a myriad of tumors during different stages of their progression."

d) Link Between Artificial Light at Night (ALAN) and Obesity and Diabetes



a) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3047226/>

b) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4123875/>

c) <http://onlinelibrary.wiley.com/doi/10.1111/jpi.12370/full>

TOXIC LIGHTING (CONTINUED)

e) Fluorescent Light Incites a Conserved Immune and Inflammatory Genetic Response within Vertebrate Organs

- “The study showed genome-wide changes of gene expression patterns in skin, brain and liver for two commonly utilized experimental models (zebrafish and mice), following exposure to 4,100 K ‘cool-white’ fluorescent light,” Walter said. “In spite of the extreme divergence of these animals (i.e., estimated divergence of mice and fish about 450 million years), and drastically different lifestyles (i.e., diurnal fish and nocturnal mice), the same highly conserved primary genetic response that involves activation of inflammation and immune pathways as part of an overall acute phase response was observed in the skin, brain and liver of all three animals.”

f) Potential Biological and Ecological Effects of Flickering Artificial Light

- Our results clearly demonstrate how a significant proportion of animals, particularly fast moving diurnal birds and insects have the potential to perceive the flicker of electric lamps, which has been demonstrated to have detrimental effects on both human and non-human species. When we also consider that in the case of humans, flicker can produce symptoms when it cannot be perceived (but can invoke measurable physiological changes [16], [17], [18]) we suggest that, in addition, any species with a CFF of 60 Hz (as in humans) or higher, including many other mammals, and some crustaceans, reptiles and fish, have the potential to be affected by flicker.

e) <https://neurosciencenews-com.cdn.ampproject.org/c/s/neurosciencenews.com/inflammation-immune-system-fluorescent-lights-12009/amp/>

f) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4038456/>

EXTREME LOW FREQUENCY EMFS

a) Effects of extremely low frequency electromagnetic field (ELF-EMF) on cytokines of innate and adaptive immunity.

- According to the studies, it is supposed that short-term (2-24 h/d up to a week) exposure of ELF-EMF with strong density may increase innate immune response due to an increase of innate immunity cytokines. Furthermore, long-term (2-24 h/d up to 8 years) exposure to low-density ELF-EMF may cause a decrease in adaptive immune response, especially in Th1 subset.

AC MAGNETIC FIELDS

a) Environmental magnetic fields inhibit the antiproliferative action of tamoxifen and melatonin in a human breast cancer cell line.

- “...environmental-level magnetic fields can act to modify the action of a drug or hormone on regulation of cell proliferation.”
- **Translation:** an AC magnetic field of 1.2 nanotesla (quite low for a modern home environment) can disrupt drugs and hormones that regulate cell growth. Uncontrolled cell growth is synonymous with cancer.

b) Brain cancer and occupational exposure to magnetic fields among men.

- “Our findings support the hypothesis that occupational magnetic field exposure increases the risk of glioblastoma multiforme.”

c) ELF magnetic fields, breast cancer, and melatonin: 60 Hz fields block melatonin's oncostatic action on ER+ breast cancer cell proliferation.

- “These results provide the first evidence that ELF frequency magnetic fields can act at the cellular level to enhance breast cancer cell proliferation [rapid increase] by blocking melatonin's natural oncostatic [cancer inhibiting] action.”

a1) <https://www.ncbi.nlm.nih.gov/pubmed/30518268>

a2) [https://onlinelibrary.wiley.com/doi/abs/10.1002/\(SICI\)1521-186X\(1997\)18:8%3C555::AID-BEM4%3E3.0.CO;2-1?casa_token=CFR6dpRWMiUAAAAA%3AicrNekLR_TEd6XMGtiSO6CxILq6C8z2WDNIqjTQ9NyTq61ODWhL-WMvN9FWsoOjXogdUjrjwJJQ9Hg&](https://onlinelibrary.wiley.com/doi/abs/10.1002/(SICI)1521-186X(1997)18:8%3C555::AID-BEM4%3E3.0.CO;2-1?casa_token=CFR6dpRWMiUAAAAA%3AicrNekLR_TEd6XMGtiSO6CxILq6C8z2WDNIqjTQ9NyTq61ODWhL-WMvN9FWsoOjXogdUjrjwJJQ9Hg&)

b) <https://academic.oup.com/ije/article/31/1/210/655960>

c) <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1600-079X.1993.tb00491.x>

THE EXTENSIVE RESEARCH OF DR. MARTIN PALL

Dr. Pall has compiled over 26 research papers identifying one of the key mechanisms by which EMF pollution disrupts our cells. He believes these papers show “EMFs work by activating what are called voltage-gated calcium channels (VGCCs). These are channels in the outer membrane of the cell, the plasma membrane that



surrounds all our cells. When they're activated, they open up and allow calcium to flow into the cell. It's the excess calcium in the cell which is responsible for most if not all of the [biological effects]."

Translation: Disruption of calcium timing is akin to deliveries and shipments happening at the exact same warehouse doors at the exact same time. Chaos would ensue.

In the body, chaos is known as inflammation. Chronic inflammation leads to disease processes like cancer, neurodegeneration, diabetes, and others.

WHAT IS ELECTROHYPERSENSITIVITY SYNDROME (EHS)?

The rapid expansion of technology in the last 30 years has led many to become highly sensitized to nEMF frequencies in their environments. This phenomenon has been dubbed, "Electro-hypersensitivity Syndrome" or EHS.

Magda Havas, PhD, estimates that 3% of the population have severe symptoms, with an additional 35% having mild to moderate⁸. That extrapolates to millions of lives effected worldwide.

I have worked with many clients over the last few years who are experiencing varying levels of EHS. It can be quite debilitating. Many experience rapid onset of symptoms, like a biological tipping point. One resource describes it as:

"EHS is a physiological condition. It is characterized by neurological and immunological symptoms that noticeably flare or intensify upon, or following expose to:

- *electric and magnetic fields (EMF)*
- *one or more of the types of electromagnetic radiation (EMR) found in the modern environment*

Having electrohypersensitivity means experiencing recurring stress or illness when near active EMF sources or emitters of EMR [electromagnetic radiation]. Symptoms normally diminish with distance from these sources but typically require considerable time to vanish after exposure."

(Continued on next page)

⁸<https://magdahavas.com/austrian-medical-association-guidelines-to-diagnosing-and-treating-patients-with-electrohypersensitivity/>

WHAT IS ELECTROHYPERSENSITIVITY SYNDROME (EHS)?

"The World Health Organization identifies this collection of symptoms and triggers as electrohypersensitivity, often referred to as electrosensitivity. It is not recognized as a medical diagnosis.

However, it is accepted as a functional impairment in Sweden and the Canadian Human Rights Commission recognizes it as an environmental sensitivity and classifies it as a disability.

*EHS is frequently seen in people with multiple chemical sensitivities (MCS), resulting from overexposure or intolerance to certain chemicals."*⁹

COMMON SYMPTOMS OF EHS

- Concentration problems
AKA "brain fog"
- Memory lapses
- Aches or pressure in head, throat and chest
- Unsteady balance, dizziness
- Altered heart rate
- Ringing in the ears
- Excessive fatigue
- Numbness or pain in affected areas
- Sleep disturbances
- Eye irritation
- Red skin blotches, eczema

⁹ <http://www.weepinitiative.org/areyou.html>

WHAT CAN WE LEARN FROM THE INDUSTRY?

Based on what they are saying (or not saying) can reveal interesting insights about risks from using products created by companies that propagate technology use.

- **Global Insurers Withdraw from RF Exposure Coverage**

In 2013, AM Best, the leading insurance rating agency, estimated that 250,000 workers are overexposed to radiation annually at wireless antenna sites. Since then, global insurers have chosen to exclude RF coverage from their policies. The last global insurer to exit the RF exposure market was Lloyd's of London in 2015.

The ramifications of insurance firms excluding RF coverage are considerable. A single uninsured RF injury claim can wipe out years of lease revenue and expose the property owner to expensive litigation costs.

- **Funding is well known to bias study results.**

Dr Henry Lai at the University of Washington compared 326 studies on the health effects of radiofrequency radiation from private and industry-funded sources.

“The industry-funded studies found an effect in 28% of the studies and the independently funded studies found an effect 67% of the time.”

-Prof Henry Lai via Lloyd Morgan

WHAT CAN WE LEARN FROM THE INDUSTRY?

- **Tech Elites Limit Children's Use of Technology**

These insights and anecdotes should give us pause before blindly incorporating technology into our lives:

This is a concept known as the **precautionary principle**, defined as *"a strategy to cope with possible risks where scientific understanding is yet incomplete, When human activities may lead to morally unacceptable harm that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm."*

Morally unacceptable harm refers to harm to humans or the environment that is threatening to human life or health, or serious and effectively irreversible, or inequitable to present or future generations, or imposed without adequate consideration of the human rights of those affected.

The judgement of plausibility should be grounded in scientific analysis. Analysis should be ongoing so that chosen actions are subject to review. Uncertainty may apply to, but need not be limited to, causality or the bounds of the possible harm.

Actions are interventions that are undertaken before harm occurs that seek to avoid or diminish the harm. *Actions should be chosen that are proportional to the seriousness of the potential harm, with consideration of their positive and negative consequences, and with an assessment of the moral implications of both action and inaction. The choice of action should be the result of a participatory process."*¹⁰

This concept places the burden of proving safety upon the industry prior to rampant roll-out and expansion of new products. Unfortunately, in modern day America, we have gotten this backwards and seem to be blinded by our consumerist desires and comforts, allowing Industry to grease the skids and influence our lawmakers and regulating bodies.

• <https://www.businessinsider.com/screen-time-limits-bill-gates-steve-jobs-red-flag-2017-10#despite-the-fact-he-created-the-ipad-steve-jobs-wouldnt-let-his-kids-use-it-2>

¹⁰<http://www.precautionaryprinciple.eu>

WHAT TO EXPECT DURING AND AFTER AN ODS INSPECTION

The assessment will start with a brief discussion surrounding EMFs and information gathering on specific issues and health phenomena experienced by the client. This can be completed in person or remotely.

From there the ODS technician will assess areas of the space, both inside and out, as needed, for the major types of nnEMF pollution mentioned above.

ODS makes use of state-of-the-art measurement devices and techniques to identify EMF pollution. Throughout the inspection, devices will be turned on and off, as well as various circuit breakers providing power to specific areas in the space.

This reveals problem areas and devices. We will periodically show clients areas of note, and summarize our general findings verbally when done. The assessment phase generally lasts 2-4 hours. Within 5 business days we will provide a formal report of our findings as well as mitigation recommendations. Our services include a complimentary 30 minute follow-up call to review the report and answer any lingering questions.

Our goal in assessing your home is not to reduce you and your loved ones to a prehistoric, technology free, Luddite existence, but rather to show ways to use technology and its benefits in a healthy, hygienic way that promotes optimal health and recovery. Please read our blog¹¹ for greater detail on the home inspection process.



¹¹ <https://www.optimaldwellingspaces.com/single-post/2019/12/03/What-to-Expect-During-a-Home-EMF-Assessment>

THANK YOU

Thank you for taking the time to learn about the EMFs surrounding us all in our daily lives. You're one step closer to living an EMF-free life.

You can follow us on Instagram for real-world examples of EMF hygiene, as well as our website blog for the latest news and practical prevention tips surrounding the EMF issue.

To book a free consultation call with me, visit optimaldwellingspaces.com/contact.

All My Best,
Shane Reilly
Optimal Dwelling Spaces

