



Electromagnetic fields (EMFs)

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General overview

- Electromagnetic fields (EMFs) are a form of energy that in their *natural state* have been around for as long as The Universe and helped create and continues to help regulate The Earth and all its inhabitants.
 - The Sun, cosmic rays, electrical storm activity and our atmosphere are examples of *natural* sources of EMFs.
- *Manmade or artificial* EMFs are a form of energy that are of varying frequencies and/or wavelengths along a spectrum of amount and are used to produce power for things.
 - This includes anything from the appliances in our homes, to the cell phones that we use, to power stations that source our energy needs.
- Some EMFs are used in various medical tests and procedures which are tightly regulated and can provide wonderful treatments and can be lifesaving, but there is an overabundance of other ones that are on a multitude of different wavelengths and frequencies which effects things in much different ways.
 - *All artificial EMFs are essentially “foreign” to living organisms.*
- There is *a lot of debate* about the potential negative influence of these artificial EMFs on living organisms, including flora and fauna.
- The author has done *a tremendous amount of reading* on this topic—books and briefings, research from industry and independent scientists, governmental regulations and legislation, national and international policies, various supervising committee’s reports, etc.—which has formed the basis of this white paper and its “opinions”.
 - An extensive reference and resource list—although by no means fully comprehensive—is available for further reading.
- The evidence is abundantly clear that *EMFs do influence living organisms.*
 - In different ways, in varying amounts and with different potential results.
 - The effects are quite evident on the micro- and macrolevel from altering the cellular electrical charge which effects things such as the nervous system, the flow of various fluids of the body, the body’s DNA, the chemical nature of cellular activity, healing response, oxidization of tissue (oxidative stress), hormonal functions, reproductive system, etc.
- The author has also found through *clinical observation and objective measuring* (aka “table tests”) that often when a client is in the presence of EMFs (i.e., wearing a smart watch vs not, phone on and near them vs not) that among other things there is:
 - A consistently positive correlation of poorer measures with assessments of resting nervous system function when in the presence of artificial EMFs.
 - Increased tone (i.e., tightness to palpation, restrictions, etc.) of resting soft tissue and bony structures.
 - Unfavorable range of motion changes.
 - Respiratory changes (i.e., more labored, limited, compensatory, etc.).

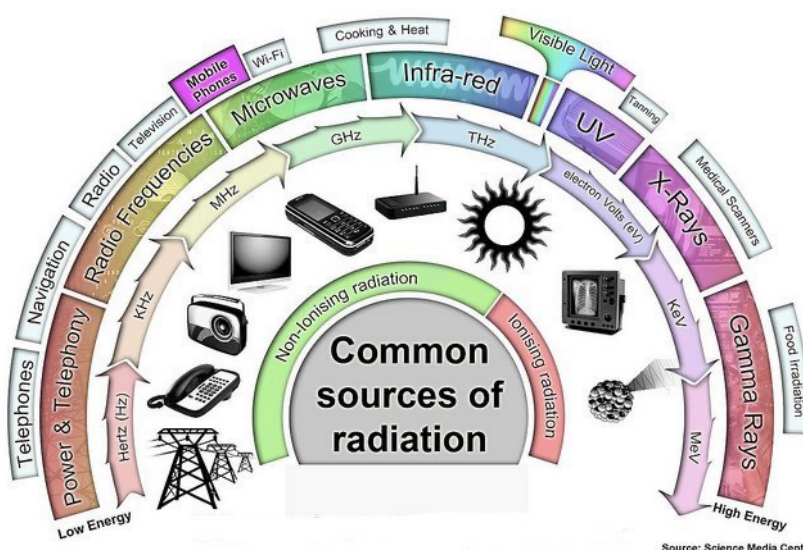
- The author has also found that when mitigation strategies are employed (aka a reduction of exposure to the various types of artificial EMFs) that people often *respond quite favorably with subjective changes* such as:
 - Improved movement capability and motor control
 - Decreased unexplained pain and/or stiffness
 - Improved quality and quantity of sleep
 - Decreased sensations of breathing challenges
 - Improved general sense of well-being and mental clarity (i.e., “brain fog”)
 - Decreased unexplained digestive issues
 - Improved sleep (i.e. ability, quality, quantity)
 - Decreased unexplained nerve symptoms

**** The author feels strongly that employing mitigation strategies is another very important aspect of overall personal and societal human physical and mental health.**

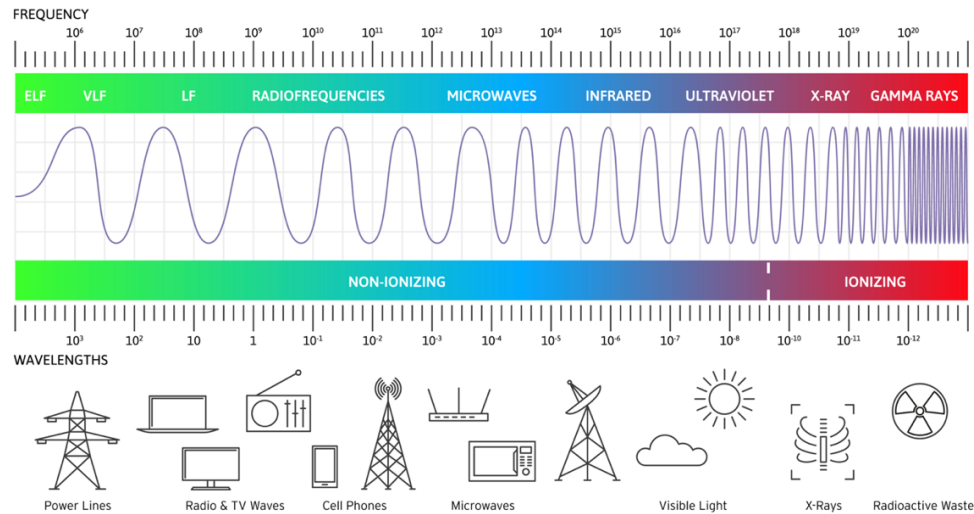
Some definitions and general information:

- *What is energy?*
 - Energy is the capacity for doing work—it is emitted from a source and can interact with something else. It may exist in many different forms such as thermal, electrical, chemical, nuclear, etc.
 - It vibrates at different wavelengths and frequencies.
 - Energy is kind of like music—It can exist in varying, amounts, wavelengths, frequencies, etc.
 - The vibration of the air that is produced by the stimulation of strings, keys, horns, voice, etc. as the music (energy) is produced.
 - There are many sources with the capacity for producing energy and doing work.
 - The sun, for example, is a *natural source* of energy and a power plant or cell phone tower is an *artificial source* of energy.
 - In many ways, energy looks for something to *absorb it or interact with it*.
 - The Earth absorbs the sun’s energy, households absorb the power plant’s energy, cell phones absorb a cellular signal, listeners absorb music’s energy.
 - Energy is “busiest” at the source *where it is produced*, and *where it interacts* with something else.
 - The energy from the sun is “busiest” at the sun and at the things that are absorbing its rays (i.e. The Earth and its inhabitants, The Moon, planets).
 - The energy from a power plant or cell phone tower is “busiest” at the source and where the energy is being absorbed and used (i.e., a household, an antennae)
 - The energy of the music is “busiest” where it is being performed, and where it interacts with the listener (absorbs this energy).
 - The listener could be considered an antenna of the energy being produced by the musician.
- *What is radiation?*
 - Radiation is the transmission of energy through space in the form of waves or particles.
 - These are also referred to as “fields” of energy and they “radiate” outwards.
 - It is generated by the vibration of electrons or other electrically charged particles.
 - Radiation from manmade sources is directed towards—or searches for—a target to exert its influence upon.

- The easier the target, such as an antenna, appliance, etc., the easier it is to have the energy transmitted onto it.
 - Much like the example above, music is transmitted through airwaves and radiates outwards in fields or waves of sound which allows a target (i.e., someone listening and engaging with the music) to be influenced by it.
 - The more specific the wavelengths and frequencies of the energy being produced, the more targeted the radiation can accomplish its desired outcome.
 - Since energy radiates outward, if it is not carefully controlled it can impact other things which absorb its energy. It can also bounce off objects and be redirected.
 - It can bounce off walls, metal objects, the Sun's rays bounce off bright colors, etc.
 - An auditorium is designed to maximize music bouncing off its walls and ceilings towards the audience.
- *What are electromagnetic fields (EMFs)?*
 - An electromagnetic field is a form of energy wherein the waves of electric and magnetic energy move together through space from a source and these waves or particles of energy yield "extra" amounts as it travels along its path.
 - Anything that produces energy emits some form of EMF and all electromagnetic fields (EMFs) produce electromagnetic radiation (EMRs), therefore the terms are synonymous with each other.
 - EMF as an umbrella term which includes a host of other elements (see below).
 - *Natural EMFs* are the sun, the stars, cosmic rays, and the activity that takes place in the atmosphere/ionosphere (i.e., electrical storms).
 - *Artificial or manmade EMFs* are all electronic equipment and devices, as well as other power sources (cords, outlets, power lines and stations, towers, etc.).
 - They are organized on a spectrum based on their wavelength and frequency.
 - A very small amount of these waves are within the visible spectrum—between infrared and ultraviolet—with sunlight falling squarely within that realm.
 - There are also broken down further into other subsections:
 - Ionizing and non-ionizing radiation (as seen in the graphs below).
 - Thermal (heating) or nonthermal.
 - Extremely low frequency (ELFs) which includes all things electrical (i.e., power lines and power stations, lighting and appliances in the home, cordless phones, etc.).



Frequency of EMF in Hertz (Cycles Per Second)



(Image source: San Diego Gas & Electric website, "Electric & Magnetic Fields")

- Common sources of artificial EMFs:
 - Appliances and building wiring
 - Mobile phone towers
 - Wi-Fi routers
 - Wireless, smart, and cordless phones
 - Bluetooth devices
 - Digital clocks
 - Electric cars
 - All lighting (especially dimmer switches)
 - Baby monitors (especially video monitors)
 - Wireless technology
 - Smart meters/meter box
 - Circuit breaker panels
 - High voltage transmission & power lines
 - Inverters from solar panels
 - X-rays
 - Radioactivity
- What are the different types of EMFs?
 - There are four main types of artificial EMFs which should be clarified,
 - Radio frequency
 - AM/FM, TV, Wireless, Satellite
 - Cordless phones, smart meters, smart phone (3G, 4G, 5G, LTE), Wi-fi, microwave oven, Bluetooth devices (listed from lowest to highest emitters of RF radiation).
 - AC Magnetic fields
 - Charger for electronics, high voltage power line, electrical panel, house with faulty/suboptimal wiring
 - AC Electric fields
 - Household wiring, power strips, ungrounded electronics, cords & chargers, lamps, and other lighting
 - Electromagnetic interference (EMI), "Dirty power", Dirty electricity"
 - CFL or fluorescent light bulbs, chargers for electronics, solar panel inverters, dimmer switches, smart televisions, poor household wiring

- Each of these four types of EMFs have been linked to specific health effects—both positively and negatively. They are emitted by specific sources and can be reduced or avoided by introducing certain mitigation strategies.
- *What is the difference between analog signals and digital?*
 - Analog, from days of old, were EMFs that were produced in what looks like waves. It was a smooth signal which allowed for products and receivers to pick up this signal, but because of its waveform also made it slower, less reliable, and competition for this signal challenged its ability to be captured consistently.
 - Digital, on the other hand, is what we are currently using in many more things, especially things produced in the last 30 years or so.
 - A nice analogy that is described in the book Radiation Nation. Imagine a 25# rod being placed on a cement road—the surface would not be affected or break. That is analog. Now imagine that same 25# weight being placed on that same road surface with same amount of force and then lifted and lowered repeatedly at the same location. Eventually it will break down the surface. That is digital.
 - The frequency or speed with which it is lifted and lowered increases the intensity with which the surface will break down. If the goal is to try and break down the surface quickly, then the speed and intensity should increase to accomplish this.
 - How quickly one receives a signal for use on a receptacle, or how hard the signal is working to try and get to receptacle, increases the amount of energy that is produced near the receptacle.
- *How might artificial EMFs affect the human organism?*
 - It is important to appreciate that there is a difference between *causation and secondary outcomes*.
 - *Causation* suggests something caused something to happen.
 - A person who spends a lot of time unprotected in the sun and develops skin cancer is an example of this. The electromagnetic fields from the sun produced electromagnetic radiation which most likely caused or was a major contributor to one's skin cancer.
 - *Secondary outcomes* are about when exposure to something makes the system vulnerable to something occurring.
 - Exposure to chronic stress weakens the immune system and makes it more generally inflamed and/or chronically ill, effects one's sleeping leading to apnea, develops chronic pain, etc.
 - It may have happened anyway, but by reducing one's natural defenses it made it susceptible to happening, it occurred more quickly, its symptoms are much more intense, etc.
 - One might use the example of climate change as an analogy—the debate about whether manmade influences are the *cause* of climate change is different than do these synthetic elements *contribute* in some way to naturally occurring processes, which can then exacerbate, accelerate and/or produce undesirable changes in the environment.
 - Another analogy would be how eating poorly over time makes the body susceptible to chronic conditions but may not have caused the issue specifically but affected the overall health of the person.

- There is evidence to suggest and/or support—some of it strongly—that EMFs are linked to:
 - ADD/ADHD
 - Allergies (i.e., food, environmental, seasonal)
 - Autism
 - Autoimmune disorders
 - Brain tumors
 - Cancers
 - Endocrine disorders (i.e., diabetes)
 - Infertility (male and female)
 - Miscarriages
 - Neurodegenerative diseases (early Alzheimer’s, dementia)
 - Multiple sclerosis
 - Obesity
 - Premature aging
 - Sleep issues
 - And more....

Why is the information so conflicting about the effects of EMFs on human health?

- There are several reasons why it has proven so difficult to get “clear and concise” findings to try to determine the impact EMFs can have on human health. Among other things:
 - The ability to control all variables due to the pervasiveness of them.
 - Difficult to create real-world scenarios which living things (human, animal, flora, and fauna, etc.) are exposed to.
 - The variability of the strengths in the environment.
 - The strengths, intensities and amount vary throughout the day and night since they are “fields” or “waves” and that they are coming from a multitude of different sources and from varying distances.
 - The ethics of exposing humans to varying amounts of something that is being studied for potential ill-effects.
 - Which allows the argument that a multitude of studies were done on animal models so there can be question about the effects on humans to perpetuate.

What are some actionable steps that can be taken to reduce one’s exposure to them?

- Refer to the handouts:
 - “Reducing EMF Exposure for Today’s Technological World” and “Reducing EMF Exposure—Bulleted List”

Disclaimer and further explanations

The author would like it to be recognized that they have done a significant amount of exploration into this topic. This has come in the form of reading information, thorough discussion with other professionals, as well as other avenues of self-education such as:

- research from industry and independent scientists and organizations
- state, federal and international governmental agencies, and committee meeting minutes
- research from experts in non-health related fields (i.e., technology sector, physics, etc.)
- individuals who have done exhaustive studies on EMFs, some with direct involvement in both the technology industry as well as independent study

- nonprofit organizations dedicated to educating others on this topic
- books, testimonials and heavily referenced papers from people who have been affected by chronic exposure to EMFs
- professional clinical observations, objective measurements, and intervention strategies
- multitude of personal experiences

The author has also performed clinical assessments with several different clients when in the presence of their smart device and then without. In many instances these were performed while going back and forth to demonstrate the ease with which table measures reflective of nervous system hyperactivity or “stress” can be changed very quickly. The following pictures demonstrate some of these changes in objective table measures by merely removing a smart watch from the wrist or moving phone away from next to the body to outside the room. (The author has over 30 years of experience performing these tests and measures so the intertester reliability is very high.)



(Demonstration of improved straight leg raise assessment of neural tension.)



(First pic: Demonstration of improved motion of upper quarter which reflects improved resting position of the nervous system.)

(Second pic: Demonstration of *decreased* range of motion of lower quarter to more normalized range, from too much to the appropriate amount.)



(Demonstration of improved active motion capability with decreased pain and tension.)



Demonstration of improved upper quarter resting position of joints, reflective of improved resting state of the body.)

Based on all this information, the author feels strongly that *artificial EMFs do have an influence on the health and well-being of living organisms (not just humans)*, with some of these effects being quite considerable. The significance of the degree continues to be studied, yet the prevailing evidence strongly suggests that, among other things, there are changes that occur on the cellular, neurological, developmental, and other disease processes level which can be impacted by overexposure to EMFs.

- This is along a spectrum of the degree of influence based on the variabilities of human responses to any artificial stimulus.
 - i.e., why some people can smoke cigarettes their whole life and live to their 90's.
- That one might perceive vs does not perceive any symptoms associated to exposure to EMFs and/or any recognized physical effects.
 - Some people, and the research suggests an increasing number of people, can sense, and feel these effects quite strongly and can affect their daily life on different and varying levels.

- Respecting that there are inconsistencies in the research, reproducibility, and the evidence produced in the results.
 - As with many topics in which there are a significant number of variables, its very complexity lends itself to make it challenging to control all variables to come up with confirmed outcomes and thus concrete findings.
- The challenge with deciding what is considered “harmful” to the human body.
 - The common discussion is about what disease processes specifically it can cause (*causation*) vs low-level exposures affecting the homeostasis of the human body and thus its ability to ward off other diseases or health influences (*secondary outcomes*) as discussed previously.
- Appreciating that being able to effectively control all variables and recreate real-world scenarios to study its effects on humans is *impossible*.
- History has demonstrated on numerous occasions that humans can get things terribly wrong at times, even when the prevailing thought might seem otherwise.
 - Consider things such as bloodletting, physicians and surgeon’s washing hands between autopsies and cases, asbestos, lead paint, mercury, smoking, talcum powder, certain pharmaceuticals, etc.

These statements are not about whether the author’s opinion might be deemed as “correct” or “incorrect”, as the complexity of this topic does not lend itself to being able to come to a definitive conclusion one way or the other. However, if one has done considerable investigation into a topic, it does allow for one to form such an opinion and then put measures into place to address it. That is the goal of this white paper—to educate others, provide information with which people can understand the topic a little better, and then provide some actionable steps that can be taken to help reduce one’s exposure to synthetic EMFs. No hidden agenda, no financial gains, no attempt at misrepresentation of information, just an attempt to help others who are trying to better understand things which may affect how the human organism works and variables which may influence its resilience.