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ELECTROMAGNETIC FIELDS

EMFs (electromagnetic fields) are a growing discussion because of all the new technology being invented and produced. According to the documentary film *Generation Zapped*, the number of cell phones currently is 4.77 billion, that's more than half the world's population, including children. Let's take your cell phone for example. According to the readings I have done, your cell phone constantly emits around 20MHz, now multiply that by 4.77 billion. But it doesn't stop there; that's only cell phones. As stated by Pineault, there are many other things that emit all different kinds of EMFs (8), like lighting, some pipes, and any electronic devices. To provide all those phones with the "necessary" connection you need cell towers, right? According to a magazine called *Forbes,* there are roughly 220 thousand cell towers in the United States. How many EMFs are these producing? *Generation Zapped* points out that compared with just 10 years ago, there are one quintillion times, that's a 1 with 18 zeros (1,000,000,000,000,000,000) more EMFs being emitted. As Pineault puts it, "We're all bathing in a huge, invisible EMF soup" (16). We have mostly been talking about 4G networks, but there is a brand new network being introduced, as Alice Whittenburg informs us in her article on the subject, and that's 5G, or 5th generation wireless. *Generation Zapped* tells us that 5th generation wireless will make everything operated wirelessly, as described in the name, making things easily accessible and convenient. It seems great, right? That's why it's becoming a popular idea. People see the convenience and think it's a good idea to incorporate 5th generation wireless into everything, but people aren't considering the consequences. The Electromagnetic Safety Alliance states "5th generation wireless uses high-frequency millimeter wave radiation (MMW), an

untested technology." Later in the article, they go on to say, "planet Earth will become part of this massive experiment to find out how our bodies react to (MMW)." People need to give 5G time to be tested, and, if needed, adjusted to be safer for our bodies.

Have you ever sat in front of a computer, laptop, or some kind of wireless device for a long time and felt that your brain was fuzzy? Well, EMFs have a part to play in that. According to The Encyclopaedia Britannica, EMFs are waves of electric and magnetic energy radiating through space, produced by electric charges from wires and electric devices. These next four paragraphs will be about the four main types of EMFs: RF, MF, EF, and DE. These EMFs each come from different things, and as a result, vibrate at different frequencies. Frequency is the rate at which a vibration happens, and is measured by hertz (Hz), the cycle per second (Encyclopaedia Britannica). "EMFs are organized on a spectrum and, classified according to their wavelength and frequency." says Pineault (6).

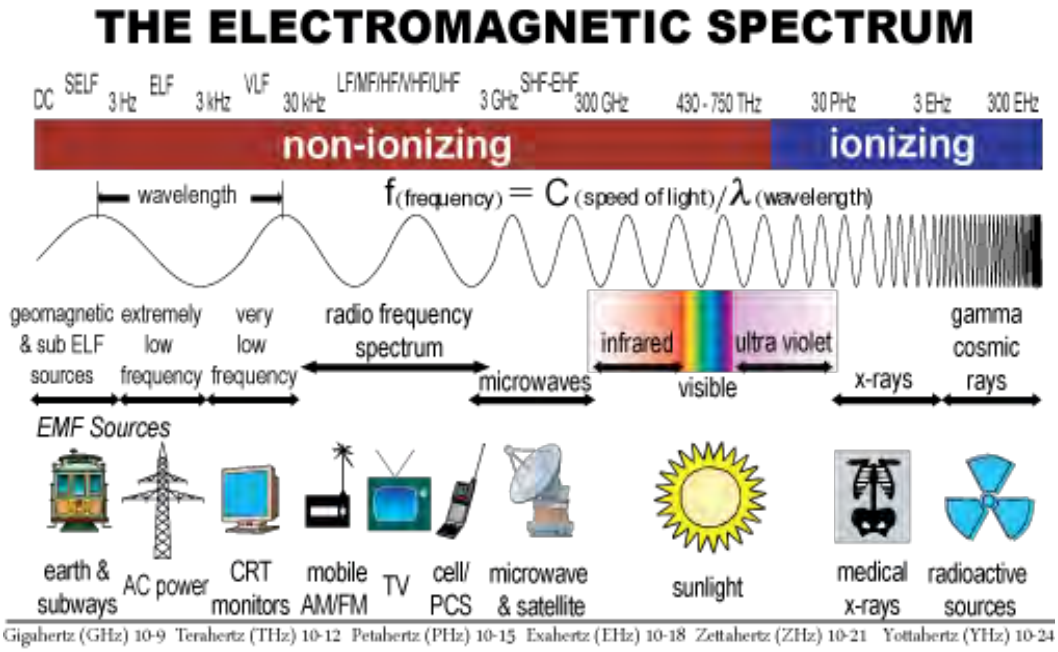

Image courtesy of https://socratic.org/questions/what-is-the-electromagnetic-spectrum-used-for

Radio frequency (RF) is a high-frequency EMF that mostly comes from wireless electronics. RF is what I am mainly going to be talking about throughout this essay because, as stated in Pineault's book, RF comes from things that are becoming more and more common as technology grows -- things like cordless phones (900 MHz), smart meters (900 MHz to 2.4 GHz), smartphones (710 MHz to 2.7 GHz), Wi-Fi (2.4 GHz to 5.8 GHz), microwave oven (2.45 GHz), bluetooth devices (2.4 to 2.485 GHz), and 5G (3.85 GHz to 71 GHz). As you can see, RF is a high-frequency EMF. The things I have listed are only the most common EMF exposures; the actual range of RF is 100 kHz to as high as 300 GHz. (9).

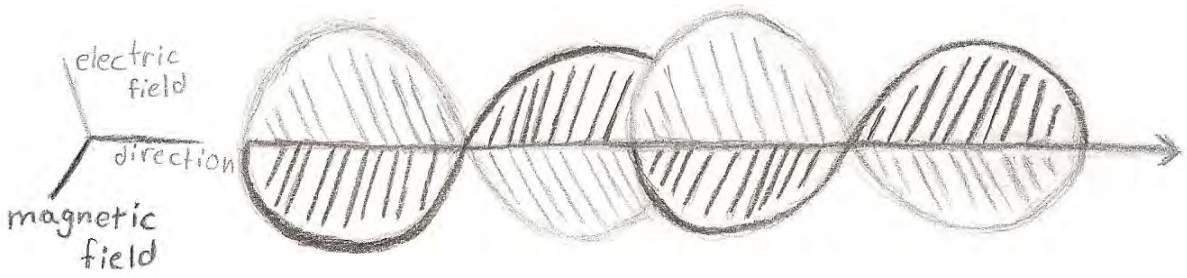

Image inspired by the non-tinfoil guide to EMFs (page 10)

Nicolas Pineault goes on to talk about how when electricity runs along a metal surface, it creates EMFs that contain both magnetic fields (MF) and electric fields (EF), hence the name "electromagnetic fields". The most common MF exposures are called "point sources", and these include Pineault's list of "transformers, electric motors, our breaker panel, and electric meters" (10). And no, a transformer is not a giant robot, but they do have a *giant* part to play in your everyday life. Transformers transform alternating current (AC) coming out of the outlet in your wall, into direct current (DC) that charges your electronics. This action creates MFs because electricity running through appliances and electronic devices create MFs. These MFs "can irradiate for up to several feet around it" says Pineault (11).

Nicolas Pineault tells you to think of a gardening hose to help understand the difference between EFs and MFs. The water coming out of the hose is the current of the electrical wire; this creates a magnetic field. The water pressure is the voltage of the electrical wire, this creates electric fields. These fields are absorbed by the natural antenna of the human body. Since you absorb these fields, you always have a low-level electric shock. Household wiring, power strips, cords/chargers, lamps, lighting, and so on, always emit EFs, even when they're "OFF" (12).

Pineault finishes chapter one by talking about dirty electricity (DE). A big problem with modern electrical equipment is that they are made to break the circuit, causing the current to be constantly interrupted which then emits EMFs with frequencies from 300 Hz to 10 MHz. Anything that is supposed to dim lights or save energy does this. Healthwise, any electricity that is dirty can harm your body (13-14).

Pineault talks about how not only humans, but all animals are affected by EMFs. He goes on to give a few examples of bizarre insect behaviors like ants walking in a circle around a phone being called."Colony collapse disorder" (50% of bees disappearing in many countries) may be partly caused by all the new cell towers being built. Some organizations paid to have a law passed to prohibit the people from having a say in where these cell towers go. Most animals have a certain natural material called magnetite that makes them sensitive to 60 Hz magnetic fields that are 200 times weaker than FCC safety standards. Birds have shown signs of being disoriented by magnetic fields 2,000 times weaker than FCC safety standards (44-45). Cells can "sense" your electromagnetic environment. "For example," says Pineault, "very low-level magnetic fields have been found to activate a pathway called "NADPH oxidase" which is considered a major cause of atherosclerosis, the hardening of the heart's arteries." (47).

Next, I'll talk about the negative effects of EMFs on the human body. *Generation Zapped* and *Full signal* mention that there is a disorder called electrohypersensitivity (EHS): a person with this is extremely sensitive to EMFs. EHS has been around for a while but is fairly common now because of all the new technologies. Some symptoms are dizziness, brain fog, and headaches, but it doesn't affect all people in the same way. Have you ever had trouble sleeping and thought "well, I'm not tired so maybe I can just scroll through my phone or laptop and try sleeping a little bit"? Assuming you have, did it work? Probably not and here's why: *Harvard Health's* article, "Blue Light has a Dark Side", talks about how device screens at night and EMFs confuse your brain, making your brain think it's day time because of the blue light emitted, so it doesn't indicate to the part of your body that produces melatonin (a chemical in your body that calms you down and prepares you for sleep) to activate, resulting in trouble sleeping. So next time, just let your body prepare and don't use electronics at least one to two hours before bed. According to the documentary *Full Signal,* routers and computers emitting large amounts of EMFs in schools, and anywhere, are affecting children's brains in a negative way. Many schools have wireless laptops and other devices that are emitting EMFs constantly during the school day, resulting in large amounts of EMF absorption that stunts brain growth. It is believed that EMF exposure results in some cancers as well. As described by *Generation Zapped,* many breast cancers are from women putting cell phones in their bras. When you put your phone in your pocket, lap, etc. it damages reproductive organs. You can get brain tumors from putting your phone against your head; brain cancer is common in children from EMF exposure. *Full Signal* goes on to talk about how single-strand DNA breaks usually easily mend themselves, but double-strand DNA breaks are harder to heal and commonly don't at all. When your body is harmed by EMFs, it's often double-strand breaks as opposed to single. Some cell phone companies deny

that cell phones cause cancer, even though cell phones had no safety testing, even after the people who sold the first phones promised they would do a $25,000 test.

Now that I have talked about the risks, I will talk about what you can and should do to prevent these risks. People should start hardwiring computers (especially in schools) so there is less exposure to EMFs. *Generation Zapped* says that people under the age of 16 especially should limit screen time because of brain development. Turn your cell phone on airplane mode as much as you can (especially at night). Turn off your Wi-Fi router at night; this helps with sleep. Avoid using phones and other devices 1-2 hours before bed. *Generation Zapped* informs us to not put your phone against your head when calling someone. Just put it an inch or so away; this prevents tumors and supports the overall health of your brain. See the table below for my data gathered that demonstrates how putting distance between you and a device or object can drastically reduce the EMFs your body is exposed to). Have live plants in your home to help absorb radiation. And lastly, consider using Faraday fabric to help block EMFs (Examples: blankets, belly bands, shorts, hats, bed canopies, phone cases, laptop covers, etc.). Doing this is no guarantee that you will be 100% safe, but a few simple changes will dramatically reduce your EMF exposure and make you a healthier person.

TriField (TF2) EMF meter Readings

readings taken without touching meter with body

	1 foot away (peak)	**2 feet away (peak)**
Alexa	3.725	1.874
Router	Max*	19.999
Apple TV playing Netflix	14.2	0.488
hp laptop touchpad	4.623	0.228

Item against the device (peak)	**3 inches away (peak)**	**6 inches away (peak)**	**1 foot away (peak)**
Synced Wireless Headphones *(beats 3)*	9.57			0.38
iPhone 7+ connected to Wi-Fi *(no call no open apps)*	Max*	2.351	0.688	0.777
iPhone 7+ on cellular data *(no call no open apps)*	Max*	2.009	0.609	0.218
iPhone 7+ calling someone on Wi-Fi	18.416	9.35	2.228	0.669
iPhone 7+ being called on Wi-Fi	2.099	1.884	0.831	0.966
iPhone 7+ on an active call Wi-Fi	Max*	2.521	1.83	1.775
iPhone 7+ on an active call cellular service	Max*	2.65	1.677	0.975

**Max RF for this meter is 20MHz - 6 GHz with a range of 0.001 - 19.999 milliwats per square meter (mW/m_2)*

Wireless technology is growing more and more advanced when our bodies aren't ready to take on 5G and other high-tech inventions that create and emit EMFs. As a society, we need to work together to mitigate this problem by working to have a say in where cell towers are built and thinking about where we really need them, hardwiring schools, and turning off mobile devices in public places when you don't need them.

Works Cited

Pineault, Nicolas. *The Non-tinfoil Guide to EMFs.* CreateSpace independent publishing platform, 2017.

Dunckley, Victoria L. *Reset Your Child's Brain*. Novato, California, New World Library, 2015.

Full Signal. 2010. Total jambari film, 2010.

Gemayel, Sabine El, director. *Generation Zapped*. 2017.

McBride, Stephen. "This Stock Is America's 5G 'Landlord', And It pays A3.8% Dividend" Forbes. March 20, 2019. https://www.forbes.com/sites/stephenmcbride1/2019/03/20/this-stock-is-americas-5g-landlord-and-it-pays-a-3-8-dividend/#6a06b5af6644

"Blue light has a dark side"Harvard Health Publications. August 13, 2018, https://www.health.harvard.edu/staying-healthy/blue-light-has-a-dark-side

Dwight. "What is the electromagnetic spectrum used for? "Electromagnetic spectrum image https://socratic.org/questions/what-is-the-electromagnetic-spectrum-used-for

The Editors of Encyclopaedia Britannica. "Electromagnetic fields" Enyclopædia Britannica, inc. October 24, 2018, https://www.britannica.com/science/electromagnetic-field

The Editors of Encyclopaedia Britannica. "Frequency" Enyclopædia Britannica, Inc. March 28, 2017, https://www.britannica.com/science/frequency-physics