

Top 19 Tips to Reduce Your EMF Exposure

Written by [Dr. Joseph Mercola Fact Checked](#)

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Story at-a-glance

- Persistent exposures to microwave frequencies like those from cellphones can cause mitochondrial dysfunction and nuclear DNA damage from free radicals reacted to peroxy nitrite
- Excessive exposures to cellphones and Wi-Fi networks have been linked to chronic diseases such as cardiac arrhythmias, anxiety, depression, autism, Alzheimer's and infertility
- Devices that continuously emit EMF radiation at levels that damage your mitochondria include your cellphone, cellphone towers, Wi-Fi routers and modems, baby monitors and "smart" devices of all kinds, including smart meters and smart appliances
- EMF exposure has increased about 1 quintillion times over the past 100 years. Most people experience biological impacts but have no appreciation of the damage it's causing until it's too late. Even then, it's extremely difficult to link the exposure to the symptoms or the disease
- 5G relies primarily on the bandwidth of the millimeter wave, known to penetrate 1 to 2 millimeters of human tissue and has been linked to numerous health problems, including eye and heart problems, pain and suppressed immune function

30 Tips in 30 Days Designed to Help You Take Control of Your Health

This article is included in Dr. Mercola's All-Time Top 30 Health Tips series. Every day during the month of January, a new tip will be added that will help you take control of your health. Want to see the full list? [Click here.](#)

The potential ramifications of unchecked exposure to electromagnetic field (EMF) radiation are immense. As explained in the featured interview with Martin Pall, Ph.D., Professor Emeritus of biochemistry and basic medical sciences at Washington State University, the primary danger of EMFs — and what drives the processes of chronic disease — is the mitochondrial damage triggered by peroxy nitrites, one of the most damaging types of reactive nitrogen species.

Devices that continuously emit EMF radiation at levels that damage your mitochondria include your cellphone, cellphone towers, Wi-Fi routers and modems, baby monitors and "smart" devices of all kinds, including smart meters and smart appliances.

Types of Damaging EMFs

EMFs can be broadly divided into three categories:

1. **Electric fields:** AC electric fields at 60 Hz (50 Hz in Europe) from house wiring and corded appliances (especially ungrounded ones: cords that have only two prongs rather than three). Electric fields are the most challenging to measure accurately and significantly contributes to the confusion about EMFs
2. **Magnetic fields:** AC magnetic fields at 60/50Hz Hz from power lines, wiring errors on house wiring, current on grounding paths, and from motors and transformers
3. **Radio frequencies (RF)** from cellphones, smart meters, Wi-Fi, Bluetooth and other wireless devices

In addition to these three categories, you also have [dirty electricity](#), or EMI (electromagnetic interference) caused by transient voltage spikes. If we go back in time to the end of World War I, around 1918 or so, and use that timeframe as a baseline of EMF exposure among the general public, you come to the astonishing conclusion that EMF exposure has increased about 1 quintillion times over the past 100 years.

You'd have to be irrational to assume that this radical increase — an increase of 1 billion times — couldn't have some adverse effects. The reality is that most people are experiencing biological impacts as a result of EMF exposure, but have no appreciation of the damage it's causing until it's too late. Even then, it's extremely difficult to link the exposure to the symptoms or the disease.

Unrelenting EMF Exposure Can Wreck Your Health

Pall has published research^{1,2,3,4} showing low-frequency microwave radiation activates voltage-gated calcium channels (VGCCs) — channels in the outer membrane of your cells. Once activated, the VGCCs open, allowing an abnormal influx of calcium ions into the cell, which activates nitric oxide (NO).

NO is the only molecule in your body produced at high enough concentrations to outcompete other molecules for superoxide and is a precursor for peroxynitrite.⁵ These potent oxidant stressors are associated with an increased level of systemic inflammation and mitochondrial dysfunction, and are thought to be a root cause for many of today's chronic diseases.

For an in-depth understanding of peroxynitrites and the harm they inflict, see "Nitric Oxide and Peroxynitrite in Health and Disease"⁶ — a 140-page paper with 1,500 references by Dr. Pal Pacher, Joseph Beckman and Dr. Lucas Liaudet. It's an epic paper and one of the best reviews I've ever read and best of all [it is free to download](#).

One of its most significant downsides of peroxynitrite is that it damages DNA. Your body has the capacity to repair that damage through a family of 17 different enzymes collectively called poly ADP ribose polymerases (PARP). However, while PARP work well, they require NAD+ for fuel and when they run out of NAD+ they stop repairing your DNA, which can lead to premature cell death.

Heart, Brain and Male Reproductive Organs Are at Greatest Risk

According to Pall's theory, the physical locations where VGCCs are the densest are indicative of the diseases you might expect from chronic excessive exposure to EMFs. As it turns out, the highest density of VGCCs are found in your nervous system, your brain, the pacemaker in your heart and in male testes.

As a result, EMFs are likely to contribute to neurological and neuropsychiatric problems, heart and reproductive problems, including but not limited to cardiac arrhythmias, [anxiety](#), [depression](#), [autism](#), [Alzheimer's](#) and [infertility](#). Excessive calcium signaling produced by EMF exposures also has important roles in producing pathophysiological effects of EMFs, including each of the effects listed above.

For the past 25 years, the industry has claimed that nonionizing radiation is harmless and that the only radiation worth worrying about is ionizing radiation. Pall's research unequivocally proves that this assumption is false.

Thanks to Pall's work, we now know that VGCCs are 7.2 million times more sensitive to microwave radiation than the charged particles inside and outside our cells. This means the safety standards for this exposure are off by a factor of 7.2 million. In terms of oxidative damage, research shows 3G creates the same level of cellular stress and oxidative damage as about 1,600 chest X-rays.

Disinformation by Industry Threatens Public Health

Unfortunately, negative health effects from EMFs are usually not immediately noticeable, as the damage accrues over time, similar to that from smoking. It's important to note that researchers are in general agreement that there's a latency period of about 10 years or more before the damage shows up, which places children at greatest risk, since their exposures are earlier in life and longer.

There's no doubt in my mind that cellphones are one of the greatest public health threats of the 21st century. But, like the tobacco industry before it, the telecommunication industry has manipulated federal regulatory agencies, public health authorities and professionals through powerful and sophisticated lobbying efforts, leaving consumers confused about the health risks.

In an investigative report for The Nation, Mark Hertsgaard and Mark Dowie reveals "the disinformation campaign — and massive radiation increase — behind the 5G rollout."⁷

By early 1999, findings from more than 50 studies were already raising "'serious questions' about cellphone safety," and this evidence was shared with the CTIA⁸ (the trade association for the wireless industry) board of directors. They ignored it, and have consistently fought to prevent public discussion and knowledge about the possible effects.

5G Rollout Will Significantly Magnify Health Risks

The industry touts 5G, the "5th Generation" wireless network, as a way to create faster internet and streaming services, and better cellphone coverage. The problem is that 5G relies primarily on the bandwidth of the millimeter wave (MMW), which is known to penetrate 1 to 2 millimeters of human skin tissue⁹ and has been linked to numerous health problems, including:¹⁰

- Eye problems such as lens opacity in rats, which is linked to the production of cataracts
- Impacted heart rate variability, an indicator of stress, in rats and heart rate changes (arrhythmias) in frogs
- Pain
- Suppressed immune function

MMW is actually what's used in crowd control weapons (Active Denial Systems) by the U.S. Department of Defense, as it has the ability to cause a severe burning sensation.¹¹ Unlike the "4th Generation" (4G) technology currently in use, which relies on 90-foot cell towers with about a dozen antenna ports on each, the 5G system uses "small cell" facilities or bases, each with about 100 antenna ports.¹²

Once it's installed in your neighborhood, you won't have a choice to opt out of continuous 5G exposure, and research¹³ compiled by EMF coach and author Lloyd Burrell shows the proliferation of 5G for the sake of faster internet could be a public health disaster.

While MMWs have not been widely used before, it's already been suggested that sweat ducts in human skin act as antennae when they come in contact with MMWs.¹⁴ In 2017, more than 180 doctors and scientists from 35 countries signed a petition¹⁵ to enact a moratorium on the rollout of 5G due to the potential risks to wildlife and human health, which include an increased risk for:

- Cancer
- Cellular stress and increase in harmful free radicals
- Genetic damage
- Reproductive problems^{16,17,18}
- Neurological disorders

Two years earlier, in 2015, more than 230 scientists engaged in the study of biological and health effects of nonionizing EMFs in 41 nations signed an international appeal to the United Nations, calling for protection from nonionizing EMF exposure due to evidence of health effects even at low levels.¹⁹

20 Facts About 5G's Impact on Human Health

In this video, Paul Ben Ishai, Ph.D., a senior lecturer with the department of physics at Ariel University in Israel, reviews the potential risks to human health from sub-MM communication systems. The Environmental Health Trust has also published a list²⁰ of 20 facts you need to know about 5G wireless. These include:

5G coverage requires "small cell" antennas to be placed in neighborhoods everywhere.

Millions of small cells must be built into people's front yards.

The radiation from 5G small cells is not minor, and will increase [EMF radiation](#) near homes, causing aesthetic deterioration of the environment in addition to health risks.

5G will not replace current wireless technology but add to it, increasing exposure exponentially.

Community authority is being overruled at every level of government in the name of boosting cellphone coverage and internet speeds.

Cellphone companies have confirmed that 5G small cells will work at a distance of 3,000 feet and do not need to be placed every 100 feet, necessitating them being placed near homes.

Scientists worldwide are calling for a halt to the rollout of 5G.

Cumulative daily radiation exposure is associated with serious health effects, including cancer,^{21,22} altered brain development in children and reproductive damage in men.

Indeed, thousands of studies showing biological effects from low-intensity EMF were summarized in the BioInitiative Report²³ (2007 and 2012), demonstrating immune system effects, neurological effects, cognitive effects and much more. Another important study,²⁴ funded by the U.S. government, was published in the Journal of the American Medical Association in 2011.

Using a positron emission tomography or PET scan capable of detecting alterations in glucose, the researchers determined that cellphone radiation triggers your brain cells to metabolize glucose at an increased rate.

Glucose metabolism equates to cell activation, so the findings indicate that radiation from your cellphone has a well-defined measurable influence on your brain. Essentially, each time you put a cellphone up to your ear, you're artificially activating your brain cells.

Multiple papers have concluded wireless radiation is a human carcinogen; the International Agency for Research on Cancer classified cellphones as a Group 2B "possible carcinogen" in 2011,²⁵ and two recent studies (one by the U.S. National Toxicology Program (NTP)²⁶ and one by the Ramazzini Institute in Italy²⁷) confirm its carcinogenic potential.

The NTP study found heart tumors (malignant schwannomas) in male rats, "similar to acoustic neuromas, a benign tumor in people involving the nerve that connects the ear to the brain, which some studies have linked to cellphone use."

According to experts, 5G small cell wireless streaming bills do not make financial sense.

Antennas near homes also decrease property values.

Microwave antennas in front yards pose several worker and public safety hazards.

Wireless companies warn investors of risks, but do not inform people living near cellphone towers.

Antennas near homes will cause a deterioration of sleep for the occupants, resulting in decreased performance and health.

Cellphone radiation has been shown to have an adverse impact on birds, bees, trees and plants.

Many U.S. cities and entire countries are voting to halt 5G.

The Federal Communications Commission does not monitor radiation exposures from cell installations and many cell towers already violate radiation limits.

The International Association of Firefighters officially oppose cell towers on fire stations, and have done so since 2004, after research showed firefighters with antennas on their stations suffered neurological damage, including memory problems, intermittent confusion and feelings of weakness.²⁸

The American Academy of Pediatrics and many other medical organizations are calling for federal action to protect children from EMF exposures, citing research showing that living near mobile phone

base stations is associated with an increased risk for headaches, memory problems, dizziness, depression and sleep disturbances.

Research²⁹ by Pall published in 2016 detail how, when VGCCs are activated in the brain, they release neurotransmitters and neuroendocrine hormones. Hence, consequences of chronic EMF exposure to the brain also include anxiety, depression, autism and Alzheimer's.

Preliminary results from the largest long-term study^{30,31,32} of brain development and youth health in the U.S., the Adolescent Brain Cognitive Development (ABCD) Study,³³ also reveals the brains of the most prolific users of [electronic devices](#) look different compared to those who use smartphones, tablets and video games less frequently.

Children who use electronic devices for seven hours or more each day have premature thinning of the brain cortex, the outer brain layer that processes information from the five physical senses (taste, touch, sight, smell and sound). As little as two hours of screen time per day may impact cognition, resulting in lower scores on thinking and language tests.

Fiber optic connections is the solution and the safe alternative to boost internet speed and reliability.

Learn More About the Health Risks of 5G

You can download a 2-page fact sheet³⁴ on 5G from the Environmental Health Trust. On their website, you can also access a long list of published scientific studies showing cause for concern.³⁵ In "5G Wireless Telecommunications Expansion: Public Health and Environmental Implications," published in Environmental Research in August 2018, Dr. Cindy Russell, executive director of Physicians for Safe Technology,³⁶ writes:³⁷

"Like other common toxic exposures, the effects of radiofrequency electromagnetic radiation (RF EMR) will be problematic if not impossible to sort out epidemiologically as there no longer remains an unexposed control group. This is especially important considering these effects are likely magnified by synergistic toxic exposures and other common health risk behaviors. Effects can also be nonlinear.

Because this is the first generation to have cradle-to-grave life span exposure to this level of man-made microwave (RF EMR) radiofrequencies, it will be years or decades before the true health consequences are known. Precaution in the roll out of this new technology is strongly indicated."

Protect Yourself and Your Family From Excessive EMF

There's no doubt in my mind that RF-EMF exposure is a significant health hazard that needs to be addressed if you're concerned about your health. The rollout of 5G would certainly make remedial action all the more difficult, which is why we all need to get involved and do what we can to prevent it.

Apart from that, here are several suggestions that will help reduce your [EMF exposure](#) and help mitigate damage from unavoidable exposures. For even more do's and don'ts, see the infographics by the Environmental Health Trust below.

1. Identify major sources of EMF, such as your cellphone, [cordless phones](#), Wi-Fi routers, Bluetooth headsets and other Bluetooth-equipped items, wireless mice, keyboards, smart thermostats, baby monitors, [smart meters](#) and the microwave in your kitchen. Ideally, address each source and determine how you can best limit their use.

Barring a life-threatening emergency, children should not use a cellphone or a wireless device of any type. Children are far more vulnerable to cellphone radiation than adults due to having thinner skull bones, and developing immune systems and brains.

Research³⁸ also demonstrates that infants under the age of 1 do not effectively learn language from videos, and do not transfer what they learn from the iPad to the real world, so it's a mistake to think electronic devices provide valuable education.

2. Connect your desktop computer to the internet via a wired Ethernet connection and be sure to put your desktop in airplane mode. Also avoid wireless keyboards, trackballs, mice, game systems, printers and portable house phones. Opt for the wired versions.

3. If you must use Wi-Fi, shut it off when not in use, especially at night when you are sleeping. Ideally, work toward hardwiring your house so you can eliminate Wi-Fi altogether. If you have a notebook without any Ethernet ports, a USB Ethernet adapter will allow you to connect to the internet with a wired connection.

4. Avoid using [wireless chargers](#) for your cellphone, as they too will increase EMFs throughout your home. Wireless charging is also far less energy efficient than using a dongle attached to a power plug, as it draws continuous power (and emits EMF) whether you're using it or not.

According to Venkat Srinivasan, director of Argonne Collaborative Center for Energy Storage Science, keeping your cellphone or tablet fully charged at all times will also reduce the life of the battery, which will necessitate the purchase of a brand-new phone.³⁹

As a lithium ion battery charges and discharges, ions pass between a positive electrode and a negative electrode. The higher the battery is charged the faster the ions degrade, so it's better to cycle between 45 percent and 55 percent.

5. Shut off the electricity to your bedroom at night. This typically works to reduce electrical fields from the wires in your wall unless there is an adjoining room next to your bedroom. If that is the case you will need to use a meter to determine if you also need to turn off power in the adjacent room.

6. Use a battery-powered alarm clock, ideally one without any light. I use a talking clock for the visually impaired.⁴⁰

7. If you still use a microwave oven, consider replacing it with a steam convection oven, which will heat your food as quickly and far more safely.

8. Avoid using "smart" appliances and thermostats that depend on wireless signaling. This would include all new "smart" TVs. They are called smart because they emit a Wi-Fi signal and, unlike your computer, you cannot shut the Wi-Fi signal off. Consider using a large computer monitor as your TV instead, as they don't emit Wi-Fi.

9. Refuse a smart meter on your home as long as you can, or add a shield to an existing smart meter, some of which have been shown to reduce radiation by 98 to 99 percent.⁴¹

10. Consider moving your baby's bed into your room instead of using a wireless baby monitor. Alternatively, use a hard-wired monitor.

11. Replace CFL bulbs with incandescent bulbs. Ideally remove all fluorescent lights from your house. Not only do they emit unhealthy light, but more importantly, they will actually transfer current to your body just being close to the bulbs.

12. Avoid carrying your cellphone on your body unless in airplane mode and never sleep with it in your bedroom unless it is in airplane mode. Even in airplane mode it can emit signals, which is why I put my phone in a Faraday bag.⁴²

13. When using your cellphone, use the speaker phone and hold the phone at least 3 feet away from you. Seek to radically decrease your time on the cellphone. Instead, use VoIP software phones that you can use while connected to the internet via a wired connection.

14. Avoid using your cellphone and other electronic devices at least an hour (preferably several) before bed, as the blue light from the screen and EMFs both inhibit melatonin production.^{43,44}

Research clearly shows that heavy computer and cellphone users are more prone to [insomnia](#).⁴⁵ For example, one 2008 study⁴⁶ revealed that people exposed to radiation from their mobile phones for three hours before bedtime had more trouble falling asleep and staying in a deep sleep.

15. Since we now know the effects of EMFs are reduced by calcium-channel blockers, make sure you're getting enough magnesium. Most people are deficient in magnesium, which will worsen the impact of EMFs. As noted by Pall in the featured interview:

"It is clear that when you're deficient in magnesium, you get excessive activity of the VGCCs. You also get excessive calcium influx through the N-methyl-D-aspartate receptor, caused by magnesium deficiency, which is also problematic, so it's important to allay that deficiency."

16. Pall has also published a paper⁴⁷ suggesting that raising your level of Nrf2 may help ameliorate EMF damage. One simple way to activate Nrf2 is to consume Nrf2-boosting food compounds.

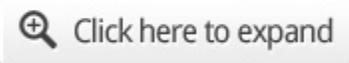
Examples include sulforaphane-containing cruciferous vegetables, foods high in phenolic antioxidants, the long-chained omega-3 fats DHA and EPA, carotenoids (especially lycopene), sulfur compounds from allium vegetables, isothiocyanates from the cabbage group, and terpenoid-rich foods.

Exercise, calorie restriction (such as intermittent fasting) and activating the nitric oxide signaling pathway (one way of doing that is the Nitric Oxide Dump exercise) will also raise Nrf2.

17. Incorporate the Nitric Oxide Dump into your daily fitness routine. According to Pall, the nitric oxide signaling pathway and the peroxynitrite pathways inhibit each other, meaning that as nitric oxide signaling increases, peroxynitrites decrease. As the Nitric Oxide Dump boosts nitric oxide, it may help provide some protection against EMF damage.

18. Molecular hydrogen has been shown to target free radicals produced in response to radiation, such as peroxynitrites. Studies have shown molecular hydrogen can mitigate about 80 percent of this damage.^{48,49,50,51,52}

19. Certain spices may help prevent or repair damage from peroxynitrites. Spices rich in phenolics, specifically cinnamon, cloves, ginger root, rosemary and turmeric, have exhibited some protective effects against peroxynitrite-induced damage.

Do's and Don'ts for Safe Technology			ENVIRONMENTAL HEALTH TRUST
Technology	Do's	Don'ts	
Cell Phones	<ul style="list-style-type: none"> Use a speakerphone or earbuds headset. Turn the power off if you need to put a phone in your pocket. Choose a wired phone when you can, especially for long calls. Set Airplane mode ON with Wi-Fi OFF more often. Power off Cell Phones in a car, a bus, train, airplane, elevator. 	<ul style="list-style-type: none"> When using the phone, never touch your head or body with the phone. Don't use a cell phone when the network signal is weak, because then the radiation from the phone is higher. Don't carry a cell phone in your bra. Don't carry a cell phone in any clothing pocket. Don't sleep with a cell phone or tablet or any wireless electronics near your head. 	
Home Phones			<ul style="list-style-type: none"> Use home phones. The DECT cordless phone emits microwave radiation. These bases, directly beside their significant source of microwave field from sleep areas.
Printers	<ul style="list-style-type: none"> Use cords to connect to them. If must use a Wi-Fi printer, set the Wi-Fi function to its lowest setting. Purchase a non-Wi-Fi printer. 	<ul style="list-style-type: none"> Don't place a wireless printer in your office near your workspace. Wireless printers constantly emit microwave radiation and should not be located near our bodies per the manufacturer's instructions. 	
Tablets and Laptops	<ul style="list-style-type: none"> Use Tablets and Laptops with ethernet connections. Set the Wi-Fi to OFF and the Airplane/Flight mode to ON. Download applications so that both can use the Tablet with the Wi-Fi off. 	<ul style="list-style-type: none"> Don't use wireless enabled laptops if ethernet is available. Don't use laptops on your lap. Don't forget to turn the wifi connection off when you are not using it. 	
		<ul style="list-style-type: none"> Don't leave your Wi-Fi Router on all the time. 	