

Question 2.

I am an other-wise healthy, college-educated individual who is suffering adverse health effects related to EMF exposure and EMR disability. I also have a family member (cousin) who has EMR syndrome and friends who suffer from it as well.

Question 3.

I react to the entire EMF family of frequencies including radio frequencies such as cellular, WIFI, Bluetooth and radar as well as electric and magnetic fields. I react to mobile phones, smart watches and other wearable devices, cell towers, smart meters, computers and other tech that are using Bluetooth or connecting to WIFI...

Today I suffer from EMR syndrome to a degree that hampers my ability to freely enjoy normal modern, urban life. I have to limit my time in public, I have to ask everyone around me to turn the antennas off on their phones (the cellular, WIFI and Bluetooth), I have to be vigilant about where the WIFI routers are. Driving on the freeway is exhausting and gives me brain fog due to the preponderance of cell towers and antennas that line them. When I am close to cell towers or cell phones I get a pressure in my chest as if someone were pressing their fist into it. I get a pressure in my chest from high magnetic fields as well. I cannot touch electric devices without pain. I have to limit my time typing even though my keyboard and mouse are hard-wired because I am reacting to the electric and magnetic fields in them. It was even worse when I had wireless versions of the keyboard and mouse due to the radio frequencies. I had to hardwire my home and anything I own that connects to the internet needs to be hard-wired. I also had to add shielding to my home to help mitigate what comes in from outside as far as cellular, the neighbor's WIFI, their smart meters, etc.

Since pay phones basically do not exist anymore, people like me still have to use cell phones when away from home but we keep all the antennas turned off. If I have to reach someone, I compose a text and then briefly turn on the cellular antenna so that I can send the text and then I put it back on airplane mode and make sure that all the other antennas are off as well.

I think that living with EMR syndrome is similar to living with asthma in the days when everyone smoked wherever they pleased. A big difference from that is that at least you could see the smoke and know that you were the cause of it. As difficult as it is now, it was even more difficult before I knew what was happening to me and what I might do to mitigate it.

The first thing I noticed with regard to my reaction to RF was that my ear would get hot and hurt when I held the phone to my head. This would happen after a few minutes of using a cell phone or a cordless phone but the pain would last for hours afterwards. I had to start using the speakerphone in order to avoid the pain.

The next thing I noticed was that when I went for a walk, I would get a pain in my body at the spot where my cell phone was located in my pocket and specifically where the antennas on the phone were located. At this point I did not yet notice a reaction to electric and magnetic fields. I could hold things that were electric without pain but eventually the disability grew to include the entire EMF spectrum.

During this earlier period of developing EMR Syndrome, I found that I could tolerate the phone if I turned it off or turned off its antennas. It also helped if I kept it at a distance from my body. My reaction grew to where I started to feel the pain from my phone even when it was not touching me directly. Then I started to get a tapping in my chest — a heart palpitation. When this started I thought it was a thyroid reaction until I realized that I only had the heart palpitation when cellular was turned on and the phone was near me. I found that if I put the phone on

airplane mode or turned it off, the heart palpitation would stop. It was like flipping a switch. I of course started being vigilant about keeping my phone's antennas off and asking those around me to do the same, but my disability continued to grow to where I could feel people's phones from across the room. I could tell if someone had a phone on them as soon as they showed up at the door. It was as if I had become a high precision human RF meter. It was incredibly frustrating and debilitating having to feel everyone's phones everywhere that I went. Eventually I started to get that same heart palpitation whenever we were next to a cell tower.

Finally, I started to react to other frequencies within the EMF family. I started to get the heart palpitation whenever I drove our car. I thought it was due to the fact that modern cars are computers and I thought it was Radio Frequency that I was reacting to but once I had a tri-field meter that I could use to measure frequencies in the car, I discovered it had a high magnetic field from the engine. The computer I owned at the time also had a high magnetic field and caused a similar reaction. By then I had turned off the WIFI and Bluetooth on it.

It was a really scary time because the reactivity was ramping up and I didn't know if it was ever going to stop or plateau. I was very scared that I was going to have to go be a hermit in the woods away from my family and loved ones. I did end up becoming a bit of a recluse during this period as it was uncomfortable to drive my car or be around people's phones, etc.

I have a cousin who also has EMR syndrome and he did go off and become a hermit in order to feel healthy and feel like himself. I know of other people who have done this as well. It is so sad and so unfortunate that people have to go to these extremes in order to be healthy because of EMF pollution that has been proven to cause harm by a large and credible body of scientific work (links included in question 6 and others below).

I hired a building biologist to help me figure out how to shield areas of my home and make things safer. I got rid of WIFI completely and hard-wired the house. I also took measures to make sure that the wiring was sound and that we did not have high magnetic fields from wiring errors. Once I took these measures to limit my EMF exposure, I was able to tolerate a little more. I eventually was able to drive again. Now instead of getting the heart palpitation, I feel the pressure in my chest. It is still unpleasant but easier to tolerate. I still have to limit my time touching anything electric and I have to be careful about what I am exposed to. It is difficult for me to travel unless I can find a place to stay where I can turn off the WIFI and other EMF emitting devices and not be near to cell towers.

I should also mention that in addition to the symptoms that are clear and obvious, I also have symptoms that are more subtle, especially to WIFI, such as brain fog, insomnia and anxiety. Once I knew what was going on and got rid of the WIFI it felt like I had been given a brain upgrade and my sleep improved, too.

In regard to part E. of this question, it is extremely difficult to find doctors in this country who have an understanding or training regarding the dangers of EMFs and how to diagnose EMR syndrome. In Sweden it is a protected disability and people who have it are guaranteed a safe place to live and work. They also have identified biomarkers connected with the disability.

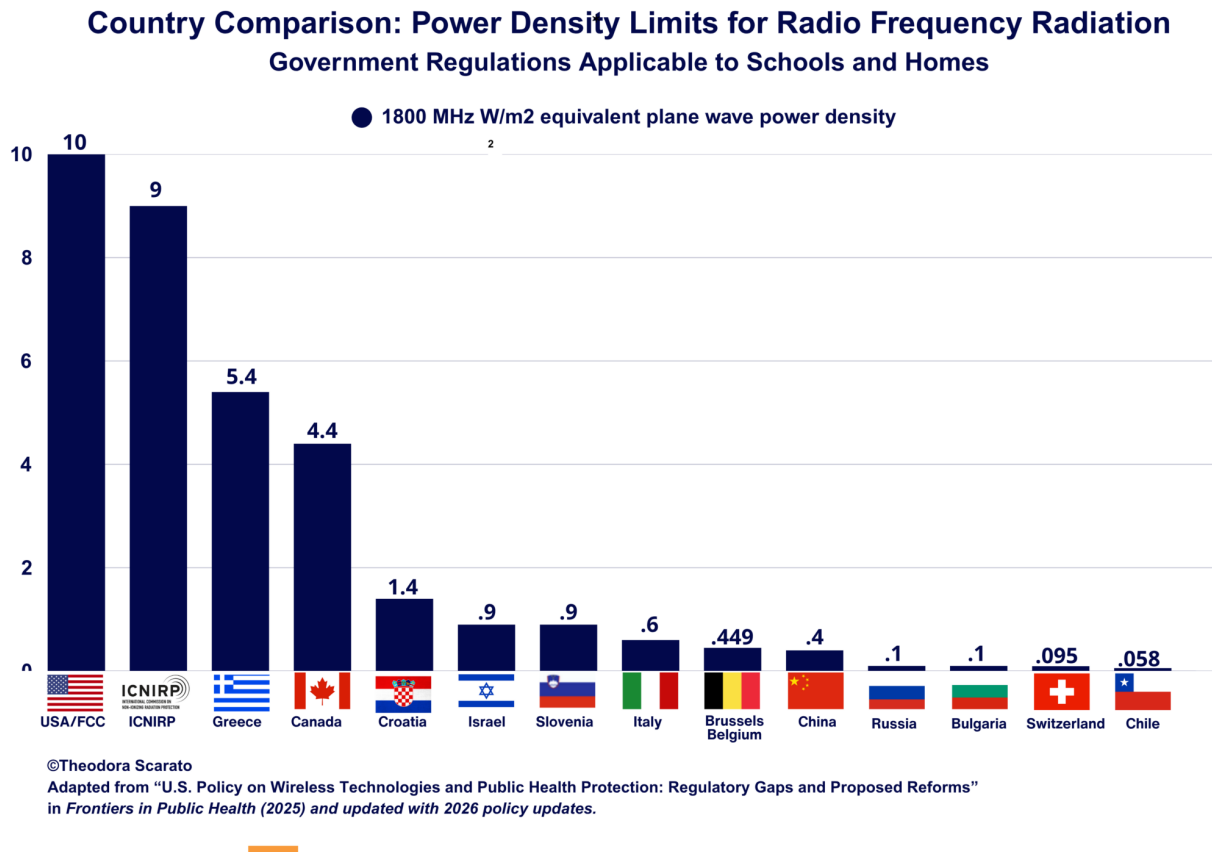
Question 5:

It appears that we are the worst country when it comes to the laxity of our exposure limits. Please refer to this excellent article from Environmental Health Sciences that shows that we might learn something from countries like Chile, Switzerland, Bulgaria, Russia and China when it comes to taking a more protective and precautionary approach:

<https://ehsciences.org/cell-tower-radiation-limits-worldwide/>

The article includes a list of International Policies to Prohibit Cell Towers Near Schools

For quick reference, here is a graph by Theodora Scarato in that article:



Our federal health agencies such as the HHS, EPA and NIEHS need to be funded for conducting studies on the health effects of EMFs without interference from the telecom industry and their lobbying dollars. The EPA was defunded for this research in the 90s and it needs to be allowed to get back to it. Our federal health agencies must make the health and safety of the public their highest priority. The FCC must defer to them since they do not have the scientific expertise themselves and it is probably an agency like EPA that should be setting regulatory limits on EMF exposures not the FCC.

The FCC's exposure limit guidelines from 1996 are three decades old and are based on scientific research from even earlier (the 1980s). The shoddy '80s research they rely on uses a small sampling of adult rats and a few adult monkeys. They do not look into the effects of the kind of long-term exposures that we are subjected to in the modern world. They also don't

address affects on children or pregnant women, nor do they look at the non-thermal affects of non-ionizing radiation.

The FCC compliance testing procedures are also woefully inadequate and do not protect us. Based on using a mannequin representing a 220 lb human, they don't take into account smaller people such as women, children and especially babies, whose skulls are not yet fully formed. In fact, most men are not accounted for either because the mannequin head is larger than that of 97% of all cell phone users according to DeBaun, D. and Debaun R. (2017), Radiation Nation: The Fallout of Modern Technology.

Children are especially vulnerable due to their developing brains, thinner skulls and the lifetime of exposure they can expect compared to previous generations. Ronald Melnick, Phd., calls the concentrated RF exposure that children are subjected to "an environmental insult on the child's brain." Research done after 1996 shows that children's brains absorb more cell-tower radiation than adult brains.

The testing is focused on limiting thermal effects so they don't take into account the non-thermal aspects of radio-frequency that have been shown by numerous scientific studies to cause multiple kinds of harm to health: memory impacts, increased cancer risk, reproductive, endocrine, brain impacts, oxidative stress, genetic harm and DNA damage

The testing is also for a very limited timeframe, which I believe is only half an hour. This is obviously laughably out of alignment with what our exposures are today given that people generally leave their phones with all antennas turned on at all times and are bathing in man-made radiation of all types 24/7 from many other sources in addition to their phones and their WIFI router. We need testing that takes into consideration the full complexity of what we are being exposed to.

The testing is allowed to be done at distances chosen by the device manufacturers rather than in the way that people actually use their devices with the device actually touching the body. Even the FCC's egregiously inadequate safety limits are usually not able to be met when phones are in contact with the body.

It seems like insanity that the FCC's EMF safety standards are three decades old. One would think it would be obvious that they need to be updated — a no brainer. But when it is revealed that the FCC leadership has had a revolving door with the telecom industry for decades, it all makes sense. They are not looking after the public's interests, they are looking after the interests of the telecom industry. This is infuriating and it should not be allowed. It also explains oddities in the 1996 Telecommunications Act such as section 704 which prohibits state or local government from regulating the placement of wireless infrastructure "on the basis of the environmental effects of radio frequency emission..." This is insanity. All government agencies are funded by tax payers and their first duty must be to our citizens and their health and well-being.

Here are some excellent policy recommendations for the US Federal Government that I would like to see implemented. These are from Environmental Health Sciences:

Research and Independent Scientific Review

- Restore independent federal research programs and coordinated interagency review of the issue. All activities and funding should be publicly reported.

- Direct federal agencies to commission the National Academies of Sciences, Engineering, and Medicine to review the health and environmental effects of non-ionizing electromagnetic fields, including RF and ELF exposures, and issue actionable policy recommendations, research priorities, monitoring, and protection of children, workers, and ecosystems.
- Direct the National Institute of Environmental Health Sciences (NIEHS) to conduct a comprehensive, transparent review of human, animal, and mechanistic evidence on the health effects of RF, ELF and other non-ionizing exposures, including chronic exposure and vulnerable populations. Prioritize evaluations of RF radiation and ELF magnetic fields for inclusion in the National Toxicology Program's Report on Carcinogens.
- Research should encompass all artificial non-ionizing frequencies, including power lines, charging systems, wireless power transfer, LED systems, satellite systems, and mmWave–THz bands associated with emerging technologies.

Risk Assessment and Exposure Limits

- The FCC has no public health, environmental, or biological expertise and cannot perform scientific analysis. Direct relevant federal agencies with public health expertise to establish legally enforceable, science-based exposure limits for RF radiation and other non-ionizing electric and magnetic fields, addressing long-term, cumulative exposures and non-thermal effects, with protections for children, pregnant people, workers, and medically vulnerable populations, and clear monitoring and enforcement requirements. RF and EMF radiation exposure limits should be based on a comprehensive review and risk analysis of scientific research. The approach should be a public health approach of risk mitigation.
- Science-based safety limits for health protection need to be developed for all artificial non-ionizing frequencies, including those from electricity and electrical charging systems, wireless power transfer, LEDs and artificial light, satellite systems, and the higher THz bands associated with emerging technologies.
- Develop wildlife-specific exposure limits and immediate policies to mitigate wildlife exposure and environmental exposures in ecologically sensitive areas.
- Require regular, publicly scheduled reviews of exposure limits and regulations based on current scientific evidence, with public participation, independent scientific review, and timely revisions to address new findings, technologies, and exposure patterns.

Safety Testing and Enforcement

- Require premarket safety testing for health effects from chronic exposure for all new wireless technologies, and for proposed electrical grid infrastructure (such as high voltage 765 kv power lines) emissions, just as is required for drugs.
- Modernize cell phone and wireless device compliance tests to reflect real-world use of people of all ages, including direct body contact and simultaneous exposure from multiple devices.
- Establish routine robust post-market RF radiation compliance testing for all cell phones, RF emitting devices, cell towers, base stations etc., with all results publicly posted and meaningful enforcement.

Exposure Monitoring and Health Surveillance

- Implement a nationwide RF and EMF exposure measuring and monitoring program prioritizing schools, workplaces, residential areas, and sensitive wildlife habitats with 24/7 monitoring.
- All measurements should be publicly posted on an easy to access website with the ability to see measurements over time.
- Analyze data with regular updates for the public.
- Create a national health and environmental surveillance system to document and investigate suspected adverse effects.

Consumer Information and Public Education

- Require clear RF radiation exposure labeling on all cell phones, Wi-Fi, Bluetooth and wireless devices, packaging, and at the point of sale, including applicable separation distances for the test system (if the FCC continues to refuse to update the tests) and practical instructions to reduce exposure.
- Require clear EMF exposure labeling for charging cords, power adapters, appliances, and other electronics, including information on electric and magnetic field emissions and practical instructions to reduce exposure.
- Launch a multimedia public health education campaign for the American public on wireless and cell phone radiation, covering cell phones, Bluetooth devices, laptops, tablets, Wi-Fi routers, and other RF-emitting devices, with clear, practical guidance on reducing exposure and using wired

alternatives. Ensure clear straightforward guidance and the importance of using wired alternatives.

- Expand public education to address electric and magnetic field exposures from charging cords, power adapters, appliances, and other electronics, with clear guidance on reducing exposure through distance, placement, and equipment use.

Risk Mitigation and Exposure Reduction

- Mitigate RF and EMF exposures in schools and childcare settings, prioritize wired connections, and establish protective siting policies to ensure schools are not near RF or EMF emitting infrastructure.
- Prohibit cell towers and high-voltage power lines on or near schools.
- Incentivise technologies and research that eliminate and/or reduce exposure, including readily available Ethernet connections and other wired options.
- Require manufacturers to provide readily usable wired connection options, including plug-and-play Ethernet and cable connections instead of wireless. Require manufacturers and network developers to demonstrate that they have researched and integrated EMF reduction strategies into devices and network deployment. Consider a federal certification program for no/low EMF technologies and spaces. Issue guidance to local governments and institutions on reducing exposures through infrastructure siting, land use planning, building networks, and device selection.

Accessible Public Spaces and Medical Facilities

- Ensure public libraries and other public accommodations provide designated areas free of intentional wireless RF emissions, with wired internet access and measures to minimize other non-ionizing EMF exposures.
- Ensure hospitals, medical offices, and other healthcare facilities provide designated areas and reasonable accommodations for people needing no/low EMF areas while maintaining access to necessary medical equipment and care.
- Establish safeguards and exposure-reduction protocols in patient rooms, waiting areas, maternity units, neonatal units, and other settings serving medically vulnerable populations.

Education and Training for Medical Professionals

- Incorporate education on RF and other non-ionizing EMF exposures into medical, nursing, and allied health curricula.
- Develop independent continuing education on the scientific evidence, research gaps, exposure assessment, and practical exposure-reduction measures.
- Train healthcare professionals to take environmental and occupational exposure histories, including exposures from wireless devices, cell towers, power lines, and workplace equipment.
- Develop clinical guidance for evaluating and supporting patients reporting symptoms associated with EMF exposure, including assessment of other possible causes and appropriate referrals.
- Train healthcare professionals on exposure-reduction counseling for children, pregnant patients, workers, and medically vulnerable populations.
- Provide training on reasonable accommodations and reducing exposures in healthcare settings.
- Establish training on documenting and reporting suspected adverse effects to the national health surveillance system.
- Develop medical education materials and training programs.

Consumer Information and Public Education

- Require all relevant federal agencies to provide clear, publicly accessible information on RF and other non-ionizing EMF exposures, acknowledging that scientific evidence exists reporting associations with adverse health effects, with links to the research and explanations of findings and uncertainties.
- Require the CDC, FDA, and other relevant federal health and environmental agencies to educate the public on practical ways to reduce RF and EMF exposures, including the use of wired alternatives. This should extend beyond cell phones.
- Require the FDA to establish and enforce clear RF and EMF radiation exposure labeling requirements for cell phones and other RF-emitting consumer devices, including information on packaging and at the point of sale, applicable testing separation distances, and practical instructions to reduce exposure.

Workplace Safeguards

- Establish a comprehensive occupational health program for EMF safety
- Characterize and monitor exposure levels in a broad range of exposed occupations, from telecom, plastic industry, utilities, healthcare, military, to retail and education.
- Establish standardized medical surveillance with mandatory recordkeeping and reporting to track worker health and exposure incidents, including overexposures.
- Initiate R&D and innovation programs that prioritize low-EMF design and emission reduction in industrial and workplace technologies, focusing on minimizing unnecessary EMF exposures through improved engineering and manufacturing practices.
- Require machinery and equipment to incorporate engineered EMF controls, shielding, and design features that minimize worker exposure, with verified performance and routine maintenance checks.
- Issue comprehensive, site-specific guidance to minimize EMF exposure and mitigate risk, with special provisions for accommodating pregnant workers, medically vulnerable individuals, and persons with implants.
- Ensure employer/worker training and education.

Restore state and local authority to consider health and environmental effects when regulating the siting of wireless infrastructure.

Recommendations for Schools

Recommendations for Schools to Protect Children, Teachers, and Staff from the [Position Statement By The International Commission On The Biological Effects Of Electromagnetic Fields](#)

- Replace all Wi-Fi networks with hardwired, shielded Ethernet internet connections.
- Purchase laptops and tablets with Ethernet capability, and with easy steps to disable wireless antennas so that computers connect to the internet with Ethernet only.
- Require that all cell phones be powered off for the entire school day and stored in a Faraday box or other shielded storage to reduce unnecessary RF exposure and minimize classroom distractions.

- Require that all devices and technology equipment used in schools have wireless transmitters (intentional radiators) disabled, ensuring that no wireless radiation sources operate within school buildings.
- Provide wired telephones for personnel in all classrooms.
- Educate students, staff, and families on the risks of wireless and EMF exposure and how to reduce exposure.
- Minimize ELF exposures by ensuring adequate grounding, use of shielded cabling, twisted wiring, and devices with low ELF emissions.
- Ensure students are at a distance from electrical equipment and charging stations.
- Prohibit cell towers/base stations and other wireless emitting antennas on or near school property as is already the policy in some countries and U.S. school districts.[i]
- Prohibit high-voltage power lines and electrical substations on or near school property.
- School boards should maintain a team that can routinely conduct transparent, independent real-time EMF measurements (including body-worn dosimeters) in classrooms, playgrounds, and sports fields to ensure the lowest possible levels are maintained.
- Continuously mitigate as required to ensure the above principles are adhered to

Recommendations for Wildlife and the Environment

from “[Flora and fauna—How nonhuman species interact with natural and man-made EMF at ecosystem levels and public policy recommendations](#)” published in Frontiers in Public Health.

Here are some of the key recommendations. [Download the paper here.](#)

- Recognize non-ionizing EMF as a biologically active pollutant in air, ground, and water, and designate airspace as habitat.
- Establish an EPA research program on RF biological and ecological impacts, including long-term exposure, cumulative risks, and interactions with other environmental stressors.
- Determine which ICRP protections for flora and fauna can apply to non-ionizing radiation.

- Ensure independent science guides federal safety standards protecting public health and the environment. Fund research to close wildlife data gaps and inform updated regulations.
- Establish wildlife exposure standards addressing chronic, low-level EMF exposure and avoiding or minimizing take of protected species. Model species-specific, whole-body and organ-specific resonance, with laboratory and field validation.
- Create a species- and frequency-specific exposure database.
- Create an environmental surveillance/reporting program to track wildlife behavior, reproduction, population trends, and effects on plants and trees in exposed areas.
- Amend migratory bird “take” protections to address known or suspected EMF impacts.
- Include wireless radiation effects in tower permitting and migratory bird rulemaking.
- Implement nationwide EMF monitoring, prioritizing parks, forests, refuges, wetlands, coastal ecosystems, migratory corridors, and wilderness areas.
- Establish NEPA-compliant procedures assessing cumulative RF and non-ionizing EMF impacts on wildlife, insects, and flora. Include emissions estimates and exposure-reduction design alternatives in environmental impact statements
- Document categorically excluded facilities and publish environmental assessments and RF compliance reports.
- Make wildlife protection and reducing EMF exposure a priority in technology and communications network design. Require independent RF spot checks before and after construction.
- Subject existing and proposed satellite systems to NEPA review.
- Fund at least one wildlife biologist position at FCC.
- Require premarket testing, including cost–benefit and cumulative effects analyses.
- Conduct robust environmental reviews that include EMF exposure before licensing and national deployment of new technologies.
- Establish accessible post-market reporting systems for ecological impacts.

- Establish formal interagency coordination, bioelectromagnetics expertise, and regular meetings.
- Establish species-specific habitat protections. Implement policies to reduce exposure. Direct antenna emissions away from foraging, nesting, and denning sites. Reduce ELF exposure through transmission corridor siting and wire configurations that reduce magnetic fields. Designate low- to no-EMF zones in critical habitats, wilderness areas, parks, forests, refuges, and other sensitive areas. Prohibit higher-frequency deployments that pose heightened risks to sensitive taxa in ecologically sensitive areas.

Use barriers, antenna pattern modifications, and power line configurations to reduce wildlife exposure.

- Prioritize non-invasive non EMF emitting wildlife tracking and assess telemetry equipment for exposures and potential effects before use. Minimize telemetry emissions, transmission times, equipment burden, and the number of tagged animals.

Regarding Part O of this question: There may be research needed to develop, test and evaluate the effectiveness of procedures and techniques for minimizing exposure to electronic product radiation, however I think a lot is known already. I think the issue is more that companies are not made to comply with meaningful safety standards. An easy example is the two-pronged plugs on Apple computers. Why do they not come with a three-prong plug so that they can connect to a grounding wire? Electrical engineers who have an understanding of the negative health impacts of EMFs should be tapped to help create product and manufacturing safety standards. The building biologist I have engaged, Brian Hoyer, is developing his own shielded, low-EMF products such as power strips and shielded electric cords, lighting, etc., as these kinds of products generally aren't available on the market.

Question 6:

What scientific evidence exists about potential adverse health effects caused by current exposure limits?

There is significant scientific research done by many well-respected scientists that show evidence of adverse health effects. Here are some of the papers below and many more can be found at <https://ehsciences.org/science-and-policy-citations-on-non-ionizing-electromagnetic-fields/#reproductive-health-impacts-and-pregnancy> :

Increased Cancer Linked to Wireless RF Radiation

Melnick, R. L., & Moskowitz, J. M., on behalf of the International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF) (2026). [Exposure limits to radiofrequency EMF do not account for cancer risk or reproductive toxicity](#)

assessed from data in experimental animals. *Environmental Health*, 25, 42. <https://doi.org/10.1186/s12940-026-01288-6>

Tahmasebi, S., Mortazavi, S. M. J., Pourghayoomi, M., Sheikhzadeh, P., Welsh, J. S., Seif, F., et al. (2025). [Radiofrequency radiation from mobile phones and the risk of breast cancer: A multicenter case-control study with an additional suspected comparison group](https://doi.org/10.4103/jrms.jrms_679_25). *Journal of Research in Medical Sciences*, 30(1), 63. https://doi.org/10.4103/jrms.jrms_679_25

Li, D.-K., Ferber, J., Hirst, A., Odouli, R., Quesenberry, C., & Levin, T. (2024). [Is cellphone carrying below the waist \(exposure to non-ionizing radiation\) contributing to the rapid rise in early-onset colorectal cancer?](https://doi.org/10.1289/isee.2024.1903) *ISEE Conference Abstracts*, 2024(1). <https://doi.org/10.1289/isee.2024.1903> [Conference abstract]

Moon, J., Kwon, J., & Mun, Y. (2024). [Relationship between radiofrequency-electromagnetic radiation from cellular phones and brain tumor: Meta-analyses using various proxies for RF-EMR exposure-outcome assessment](https://doi.org/10.1186/s12940-024-01117-8). *Environmental Health*, 23, 82. <https://doi.org/10.1186/s12940-024-01117-8>

Zhang, Y., Zhang, Y., Ye, Z., Yang, S., Liu, M., Wu, Q., Zhou, C., He, P., Gan, X., & Qin, X. (2024). [Mobile phone use and risks of overall and 25 site-specific cancers: A prospective study from the UK Biobank Study](https://doi.org/10.1158/1055-9965.EPI-23-0766). *Cancer Epidemiology, Biomarkers & Prevention*, 33(1), 88–95. <https://doi.org/10.1158/1055-9965.EPI-23-0766> Published online October 23, 2023.

Minorette, P., Lahmar, A., & Emanuele, E. (2023). [Where is your smartphone? An unusual mass within the tensor fasciae latae muscle](https://doi.org/10.1148/radiol.2023230000). *Radiology Case Reports*, 18(11), 3984–3987.

Peleg, M., Berry, E. M., Deitch, M., Nativ, O., & Richter, E. D. (2023). [On radar and radio exposure and cancer in the military setting](https://doi.org/10.1016/j.envres.2022.114610). *Environmental Research*, 216(Pt 2), 114610. <https://doi.org/10.1016/j.envres.2022.114610> Published online October 21, 2022.

Birnbaum, L. S., Taylor, H. S., Baldwin, H., Ben-Ishai, P., & Davis, D. L. (2022). [RE: Cellular telephone use and the risk of brain tumors: Update of the UK Million Women Study](https://doi.org/10.1093/jnci/djac110). *JNCI: Journal of the National Cancer Institute*, 114(11), 1551–1552. <https://doi.org/10.1093/jnci/djac110>

Ding, Z., Xiang, X., Li, J., & Wu, S. (2022). [Molecular mechanism of malignant transformation of Balb/c-3T3 cells induced by long-term exposure to 1800 MHz radiofrequency electromagnetic radiation \(RF-EMR\)](https://doi.org/10.1016/j.bioeng.2022.101610). *Bioengineering*, 9(2), 43.

Lin, J. C. (2022). [Carcinogenesis from chronic exposure to radio-frequency radiation](https://doi.org/10.3389/fpubh.2022.1042478). *Frontiers in Public Health*, 10, 1042478. <https://doi.org/10.3389/fpubh.2022.1042478>

Mevissen, M., Ducray, A., Ward, J. M., Kopp-Schneider, A., McNamee, J. P., Wood, A. W., Rivero, T. M., & Straif, K. (2025). [Effects of radiofrequency electromagnetic field exposure on cancer in laboratory animal studies, a systematic review](#). *Environment International*, 199, 109482.

Pareja-Peña, F., Burgos-Molina, A. M., Sendra-Portero, F., & Ruiz-Gómez, M. J. (2022). [Evidences of the \(400 MHz – 3 GHz\) radiofrequency electromagnetic field influence on brain tumor induction](https://doi.org/10.1080/09603123.2020.1738352). *International Journal of Environmental Health Research*, 32(1), 121–130. <https://doi.org/10.1080/09603123.2020.1738352>

Directorate-General for Parliamentary Research Services (European Parliament), & Belpoggi, F. (2021). [Health impact of 5G: Current state of knowledge of 5G related carcinogenic and reproductive/developmental hazards as they emerge from epidemiological studies and in vivo experimental studies](https://doi.org/10.2861/657478). *Publications Office of the European Union*. <https://doi.org/10.2861/657478> Full report PDF

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de Seze, R., Poutriquet, C., Gamez, C., Maillot-Maréchal, E., Robidel, F., Lecomte, A., & Fonta, C. (2020). [Repeated exposure to nanosecond high power pulsed microwaves increases cancer incidence in rat. PLOS ONE, 15\(4\), e0226858. https://doi.org/10.1371/journal.pone.0226858](https://doi.org/10.1371/journal.pone.0226858)

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Recommendations

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Question 8:

What, if any, improvements in exposure assessment methodologies are needed to better evaluate real-world exposure conditions?

- Implement a nationwide RF and EMF exposure measuring and monitoring program prioritizing schools, workplaces, residential areas, and sensitive wildlife habitats with 24/7 monitoring.
- All measurements should be publicly posted on an easy to access website with the ability to see measurements over time.
- Analyze data with regular updates for the public.
- Create a national health and environmental surveillance system to document and investigate suspected adverse effects.

Question 9:

What, if any, technical and exposure-related information should be disclosed to consumers, residents, workers, schools, healthcare providers, and local governments?

- Require clear RF radiation exposure labeling on all cell phones, Wi-Fi, Bluetooth and wireless devices, packaging, and at the point of sale, including applicable separation distances for the test system (if the FCC continues to refuse to update the tests) and practical instructions to reduce exposure.
- Require clear EMF exposure labeling for charging cords, power adapters, appliances, and other electronics, including information on electric and magnetic field emissions and practical instructions to reduce exposure.
- Launch a multimedia public health education campaign for the American public on wireless and cell phone radiation, covering cell phones, Bluetooth devices, laptops, tablets, Wi-Fi routers, and other RF-emitting devices, with clear, practical guidance on reducing exposure and using wired alternatives. Ensure clear straightforward guidance and the importance of using wired alternatives.
- Expand public education to address electric and magnetic field exposures from charging cords, power adapters, appliances, and other electronics, with clear guidance on reducing exposure through distance, placement, and equipment use.
- I believe that one reason for the public's gap in understanding about the dangers of EMFs is because the media seems to be missing in action. I found this surprising until I started noticing not just full page ads but multipage ads from the telecom industry in the New York Times and other media outlets. They don't want to jeopardize their advertising dollars. The telecom industry has done a masterful job of controlling the narrative about the safety or lack of safety regarding cell phones and other related devices. I'm not sure what the remedy is but it is important to educate the public in a way that will resonate with them. Cigarettes were once thought of as healthy, but at least in the case of cigarettes people adopted them willingly (aside from those affected by second-hand smoke). With EMF exposure, we are swimming in it whether we choose to or not. It took one hundred years to go from doctors recommending cigarettes to doctors denouncing cigarettes. We can't afford to wait that long.

Question 10:

There absolutely should be systems in place to monitor adverse health affects connected with RF exposure.

Question 11:

Yes. The most vulnerable populations that you list should be considered and they should be guaranteed a safe place to live, work, go to school and receive medical care. That means that there should be limits on where cell towers, antennas, banks of advanced metering systems, data centers and other health disrupting EMF systems and technology can be located. The trouble is that aside from schools or homes for the elderly, the vulnerable populations you mention are mixed in with the rest of society. EMF-free safe havens should be created for those who especially need them but the overall population needs protection as well in the form of more scientifically based safety limits and regulations. These are necessary to protect us from the increased risk of cancer linked to EMF exposure as well as the genetic impacts, Brain

impacts, memory impacts, impacts on our endocrine system and our immune health. See my answer to question 6 for supporting scientific research.

Question 12:

What scientific evidence exists regarding potential adverse health effects associated with RF radiation exposure at levels below current federal exposure limits?

Many of the papers listed in my answer to Question 6 also address this question.

Question 13:

According to scientific evidence, how do the technologies below affect cumulative exposure patterns?

Here are some scientific studies that relate to this questions:

5G reviews and exposure studies

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Question 14:

What scientific evidence exists regarding potential adverse environmental effects associated with RF radiation?

Here are some scientific studies that relate to this question:

Wildlife and Ecosystems

- Levitt, B. B., Lai, H. C., & Manville, A. M., II. (2022). [*Low-level EMF effects on wildlife and plants: What research tells us about an ecosystem approach*](#). *Frontiers in Public Health*, 10, 1000840.
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Questions 16-17:

What are the highest priority research gaps regarding EMF and RF radiation and public health that the federal health agencies should address?

& How can federal health agencies improve coordination of EMF and RF radiation research?

Here is a summary the excellent article “U.S. policy on wireless technologies and public health protection: regulatory gaps and proposed reforms” The full article can be found here:

<https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2025.1677583/full>

Robust oversight and enforcement is critical, and updated policies should address both human and ecological health as they are inextricably intertwined. Recommendations to address regulatory deficiencies include:

Gap: A lack of agency activities investigating human health effects of wireless technology

Reform: Reinvigorate national research.

1. Reinstatement of a comprehensive national EMF bioeffects research program across key federal agencies with annual reporting.
2. Ensure a thorough ongoing review of the scientific evidence, paired with targeted research activities to address critical data gaps and evaluate industry involvement.
3. Reestablish an interagency group to coordinate among federal agencies.
4. Expand research to encompass all artificial non-ionizing frequencies, including powerlines, charging systems, wireless power transfer, LED systems, satellite systems, and mmWave -THz bands associated with emerging technologies.

Gap: Human exposure limits are only designed to protect against short-term heating related effects.

Reform: Revise limits with an evidence-based approach that protects for effects of non-heating and long-term effects.

1. Update exposure limits using quantitative risk assessments grounded in current scientific research to address adverse biological effects, including those from cumulative and long-term low-intensity exposures, applying an ecosystem-based approach.
2. Address signal characteristics (such as modulation) and exposure parameters (environment, metal, etc.) beyond frequency and intensity.
3. Apply safety margins sufficiently protective for children, different developmental and medical sensitivities, ensuring safety factors consistent with limit-setting practices used for toxic and carcinogenic exposures.
4. Conduct periodic, independent scientific reviews of regulations through a transparent science-based process led by public health and environmental agencies.

Gap: No data gathering on exposures or effects.

Reform: Establish national surveillance programs.

1. Measure and monitor EMF levels, prioritizing sensitive areas like schools and conservation areas, with publicly accessible data dashboard.
2. Establish a comprehensive post-market medical, health, and environmental surveillance and reporting program for consumer devices (phones, computers, etc.) and infrastructure (cell towers, 5G, etc.).

Gap: Premarket and post-market compliance processes lack oversight and do not reflect real-world usage patterns, conditions, or users.

Reform: Modernize oversight and compliance

1. Require rigorous premarket safety testing for all new wireless technologies, considering human and wildlife impacts.
2. Update cell phone and device compliance testing procedures to reflect real-world exposure, including direct contact use, multiple devices/networks functioning at once, and account for various environmental conditions.

3. Perform routine audits of emissions from networks and devices with enforcement measures.
4. Update and standardize RF compliance procedures and reporting for network infrastructure and develop oversight procedures to ensure recommended remediation is completed and that methodologies and measurement tools are empirically validated.

Gap: A lack of transparency regarding infrastructure/device emissions and agency activities

Reform: Ensure publicly accessible information

1. Develop a national registry and database of all existing and proposed wireless infrastructure installations (towers, 4G, 5G, etc.), including permitting and RF compliance data.
2. Launch an easy-to-use online website with mapping tools to host RF measurements and registry information.
3. Ensure RF complaints to the FCC and the agency's response are publicly available.
4. Update the FCC's authorization site platform so that the general public can more easily navigate RF data.

Gap: A lack of consumer awareness

Reform: Inform the public on exposures and measures to reduce exposure

1. Require RF and EMF exposure labeling on all wireless devices and electronics (including charging cables) along with clear instructions on mitigating exposure at the point of sale and packaging.
2. Provide robust public health agency guidance on minimizing exposure from all emitting devices, including cell phones, baby monitors, speakers, printers etc., as well as how to use safer alternatives such as Ethernet and corded connections rather than Wi-Fi and Bluetooth.

Gap: No safeguards to mitigate risk to children and vulnerable groups

Reform: Implement measures to reduce exposures in sensitive areas.

1. Prioritize wired networks, rather than wireless.
2. Issue robust guidance to institutions and local governments on reducing RF exposure for infrastructure and land use planning, as well as in building networks and devices.
3. Prohibit wireless infrastructure on or near schools, daycares, and critical wildlife habitats.
4. Mitigate day care and school exposures (e.g., replacing Wi-Fi with Ethernet and cell phones powered off)
5. Ensure accommodations are implemented in workplaces, educational institutions, public spaces, and residential areas as recommended by medical providers.

Gap: No oversight or research focused on occupational exposures.

Reform: Safeguard workers with a robust occupational RF/EMF protection program.

1. Establish a comprehensive occupational RF & EMF protection program.
2. Evaluate exposures in broad range of exposed occupations, from telecom, plastic industry, welding, utilities, healthcare, military, to retail and education.
3. Implement medical surveillance, cumulative exposure tracking, and reporting channels.
4. Provide robust employer/worker training.
5. Develop workplace-specific protocols regarding on-site measurements, cumulative exposure tracking, and required risk mitigation with enforcement mechanisms.
6. Include medical and pregnancy-specific protections such as modified duties, exposure minimization, and clear risk communication.
7. Ensure accommodations for the medically vulnerable and persons with implants.

Gap: A lack of safer technology consumer options and research

Reform: Support research, innovation, and safer alternatives.

1. Fund research on no/low EMF technology design.

2. Provide economic incentives for industry.
3. Ensure safer options are available to consumers. For example, require a plug-and-play option to connect devices with cables and Ethernet instead of wireless.
4. Require manufacturers and developers to show they have researched and integrated EMF reduction strategies in technologies brought to market and network deployment.
5. Consider a federal certificate program for no/low EMF technology and spaces.

Gap: Limits were not designed for flora or fauna

Reform: Develop a regulatory framework to protect wildlife and habitat.

1. Establish science-based, species-specific exposure limits to protect wildlife from chronic, low-level non-ionizing EMF.
2. Update compliance procedures to include flora and fauna exposure.
3. Update NEPA procedures with processes that ensure thorough evaluation of cumulative RF effects on ecosystems including vulnerable species like pollinators.
4. Designate low-to-no-EMF zones and setback requirements near conservation areas, migratory corridors, wetlands, and ecologically sensitive areas.
5. Measure and monitor EMF in parks, forests, and other ecologically sensitive zones.