

Re: Department of Health and Human Services - Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure

DECLARATION OF GABRIELA MUNOZ

Gabriela Munoz declares under penalty of perjury as follows:

1. I reside in Putnam County, New York.
2. I did not consent, nor do I consent today, to the continuous, involuntary exposure to pulsed modulated, biologically active electrical and radiofrequency / microwave (RF/MW) radiation (henceforth referred to as RF/MW radiation) and other bioactive forms of electromagnetic radiation (EMR), including distortions in electric supply conducted by, and radiated from, electrical wiring.
3. **Q 1.** Gabriela Munoz is submitting these comments as an individual.
4. **Q 2.** I am sharing my perspective as an individual injured and disabled by pulsed or modulated RF/MW radiation and other forms of EMR.
5. **Q 3.** I clearly and beyond doubt established the connection between exposure to RF/MW radiation (and other forms of EMR) and my adverse health effects in 2021. This realization led me to conclude that harm to my health had likely started many years prior.
6. **Q 3.a.** I cannot say with certainty which technology was specifically responsible for the harm, because many exposures in my environment changed around the same time my symptoms exploded. The triggers were most likely the RF/MW radiation from newly installed cell phone antennas (right above my ceiling and about two feet from my head in the bedroom) and smart meters, along with their associated conducted emissions / supraharmonics carried via electrical wires. These two likely triggers compounded 8 years of exposure to pre-existing cell phone antennas at the same location.
7. **Q 3.b.** I was exposed for 8 years (2015-2023) to numerous cell phone antennas on the roof, right above my ceiling, including two antennas mounted on the side of the building right above two bedroom windows. These two antennas were visible when lying on the bed and were located just a couple of feet from my head. I believe the high RF/MW radiation levels (plus the attendant distortion carried by electrical wiring) in this apartment set me on a path of continuous, repeated injury and progressively worsening effects until I eventually crossed a threshold that made the harm severe enough to notice the connection between cause and effect.
8. This was a continuous exposure lasting 8 years, daily, for 7 to 8 hours during sleep—the most critical time, when the body should be able to reset and repair. New antennas were constantly added on the roof without notice and the pace picked up in 2020, when there were contractor crews on the roof regularly, for days on end. I developed symptoms clearly linked to RF/MW radiation exposure in early 2021.

9. Around late 2022 / early 2023 two changes occurred around the same time: 1) 5G antennas were activated on the roof (this is what the contractors told me) and 2) “Smart” electric utility meters were installed in the building and the neighborhood, which resulted in a “mesh network” of RF/MW radiation plus electric distortion generated by the switch mode power supply. Shortly after, I started experiencing even more debilitating symptoms while in my apartment.

10. **Q 3.c.** There is nothing “potential” about the health effect I experienced and continue to experience. In 2021 it became evident and crystal clear that Wi-Fi or other type of RF/MW radiation in my cell phone was causing me harm. I started experiencing stabbing pains in my chest when holding a cell phone actively connected to Wi-Fi. The pain would stop as soon as I let go of the phone and resume every time I picked it up. I was able to hold the phone without pain if the Wi-Fi and other wireless features were turned off. These symptoms came on the heels of additional antennas having been installed on the roof.

11. In 2023 I developed new and even more severe symptoms around/after the time yet more antennas (said to be 5G by the contractors) were activated and “smart” utility meters were deployed in my apartment and surroundings. Symptoms included a shaking/vibration in my head (akin to having a jackhammer in my brain), different types of headaches (from a dull, diffuse discomfort to stabbing, sharp pains, as well as migraines), an inability to think clearly or focus, palpitations and heartbeat irregularities, a constant state of agitation that was unrelated to emotional factors, and much worsened insomnia.

12. The symptoms I experienced were severe enough to interfere with my ability to carry out the most basic tasks of daily life. The simplest chore would require my full attention and effort and took much longer than usual. I was feeling ill all the time and there was no place at home where I would feel well.

13. I eventually had to quit my job, stop visiting friends and family, stop going out or participating in any social activities, stop traveling, and so much more.

14. This has completely upended not only my own life but that of my husband and family, leading to much distress and grief for all involved. I feel fine when I am in a low RF/MW radiation environment but, sadly, society and public places / events are, by and large, out of reach for me. Additionally, it has become a huge financial drain in search for solutions (meters, shielding materials, professional assessments of exposures, etc.).

15. In addition, it is extremely distressing to contemplate what could happen to me if I were to be in an emergency and exposed to emergency personnel, emergency vehicles, hospital or other facilities, or shelters, all of which are typically saturated with extremely high RF/MW radiation. Or what would I do if a family member was in an emergency situation and depended on me to take them to the hospital? Based on my symptoms when exposed to such environments for brief periods leads me to conclude that enduring such exposures for longer times could literally kill me, or result in permanent, severe disabilities.

16. **Q 3.d.** Answered above in 10-11.

17. **Q 3.e.** Once I realized the connection between my symptoms and RF/MW radiation and/or other EMR, I did not seek a diagnosis because, among other reasons, 1) I already had a clear diagnosis from my lived empirical evidence. 2) Having confirmation or official sanction by a practitioner would not have added anything of value. 3) I knew that the vast majority of medical and health care professionals—even alternative ones—are, by and large, ignorant and unhelpful on these matters. 4) Well-informed practitioners are expensive and out-of-pocket; I estimated that money would be better spent in trying to reduce my exposure. 5) I did not want to risk enduring the additional stress and grief of a professional dismissing my experience. 6) I did not want to risk being labeled as a mental / psychiatric patient by an ignorant practitioner.

18. I did pursue alternative modalities which were not very helpful either. Only one line of treatment provided some degree of relief but it is a long-term approach that yields slow results.

19. **Q 3.f.** I implemented measures to avoid or minimize my exposure, which resulted in symptom improvements, as long as I avoid the exposures.

20. I hardwired all my Internet connections and started using a hardwired computer rather than a Wi-Fi connected smart phone for all Internet-based features. I also replaced the cordless phone with a corded one and restricted the use of the cell phone to calls and text only when I had no other option. This eliminated the acute symptoms I was experiencing when using a Wi-Fi connected phone.

21. I purchased a shielding bed canopy, which provided a slight improvement in sleep quality.

22. Once my most severe symptoms set in, I was forced to move out of the apartment, fleeing within 4 months to a low RF/MW radiation location. This led to my sleep improving quickly.

23. However, by this time I had already sustained significant injury and each new exposure to RF/MW radiation outside of my control (daily exposures in public places) signified a re-injury with progressively worsened symptoms over time.

24. Gradually, I became less able to tolerate most exposures. I attribute this not so much to a worsening of my condition but to the relentless increase in wireless infrastructure and devices with a consequent increase in ambient radiation levels.

25. Eventually, I completely stopped any use of a cell phone, and I stopped any activities that are not absolutely necessary or unavoidable.

26. **Q 5.** In terms of standards, the Building Biology Evaluation Guidelines for Sleeping Areas are in accordance with my personal lived experience and should be taken seriously (see https://buildingbiology.com/site/downloads/SBM-2024_EVALUATION_GUIDELINES_EN.pdf). These guidelines “are specifically designed for sleeping areas, the especially sensitive time of restoration associated with long-term risks. They are based on the current body of building biology experience and knowledge and focus on what is feasible.” They also draw from “scientific studies and other recommendations.” For RF/MW radiation, they establish power density values (in microwatt per square meter or $\mu\text{W}/\text{m}^2$) for single sources and peak intensity as follows: No Anomaly: < 0.1 ; Slight Anomaly: $0.1 - 10$; Severe Anomaly: $10 - 1000$; Extreme Anomaly: > 1000 .

27. From my experience, using a Safe & Sound Pro II meter (<https://safelivingtechnologies.com/products/new-safe-and-sound-pro-ii-rf-meter-rechargeable.html>), I generally do feel best within the No Anomaly parameters and OK within Slight Anomaly. Within Severe Anomaly values I start to feel symptoms pretty quickly, and these become more severe the longer I am exposed. Within Extreme Anomaly, I tend to feel symptoms immediately and, if exposure is prolonged, I may end up quite severely affected and may need days, weeks, or months to recover.
28. While the Building Biology Guidelines are developed for sleeping areas, they also apply to places where people spend long hours regularly, such as work places and schools. In addition, vulnerable populations may need to stay within the lower end of the scale, or may require even lower limits.
29. Dr. Dimitris Panagopoulos has made the case for an RF/MW radiation limit of $0.1 \mu\text{W}/\text{m}^2$ for short-term exposure, based on a variety of experimental data showing DNA and chromosomal damage induced by real life mobile telephony signals.¹ This limit should be further reduced by at least by two orders of magnitude for long-term exposure to become $0.001 \mu\text{W}/\text{m}^2$.²
30. **Q 5.n.** If regulations with clear emission limits existed, these emissions would have to be regularly monitored for compliance, and equipment would have to be available for that purpose. It is an embarrassment and a disgrace that this is clearly not the case, after the environment has already been saturated in an incredibly complex mixture of RF/MW and other man-made, highly bioactive emissions. Heterodyning (the combination of many different signals) is known to compound the effects of single signals, yet is not considered in current guidelines. How is it that such a complex EMF scenario was allowed to develop without consideration of all of these factors?
31. In terms of regulatory framework, actual, enforceable limits should be set, along with monitoring to ensure the limits are being met, fines for any contraventions, and permit revocation for non-compliance.
32. In addition, other types of EMR must be taken into account, regulated, addressed, measured, and disclosed: conducted emissions, supraharmonics, dirty electricity, and other distortions in the AC electrical current. These distortions are carried by electrical wires and are generated by all electronic devices, LED lights, variable speed motors (used by some “energy efficient” appliances and other equipment), solar panel inverters, electric vehicle chargers, and more. Any device introducing distortions will affect all the electrical installations sharing the same transformer. Frequencies below

1 See Dimitris J. Panagopoulos. Safety Limits Implied by the Experimental Findings (p. 207-208). In: Panagopoulos, D. ed. (2021). Electromagnetic fields of wireless communications: Biological and Health Effects. CRC Press.

<http://dx.doi.org/10.1201/9781003201052>.

2 Ibid.

150 KHz are currently unregulated but known to be highly bioactive³ and are used in nerve block treatments.⁴ These emissions must be regulated and addressed.

33. **Q 5.p.** In terms of exposure-related metrics, the FCC's current use of specific absorption rates (SAR) is wholly inadequate. A more meaningful and easier to measure parameter is power density. For a detailed critique, rationale, and best approach, please see Panagopoulos (excerpts provided in Appendix A – Why SAR is an Inadequate Metric).⁵

34. **Q 6.** There is more than enough research on the harmful effects of RF/MW radiation on human health and, the health of all living beings. The mechanisms of harm from RF/MW radiation are known in enough degree and can explain the full range of health effects observed and attributed to exposures. See answer to Q 12 below.

35. Protective exposure standards have also been laid out in detail (see answer to Q 5). These need to be acted upon immediately to prevent the onset of new injuries and disabilities due to EMF exposure. There is no reason to delay action. Science can always be refined, and additional research can shed light on the details. However, this must NOT stand in the way of action. The millions of Americans with EMR Syndrome, and those who have been injured unbeknownst to them, cannot keep waiting for more studies. And we must prevent injuries to future generations, who are now being exposed from the moment of conception.

36. The International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF) has characterized EMR Syndrome (which they call Electromagnetic Hypersensitivity or EHS) as an escalating humanitarian crisis that requires an urgent response. They further state that “EHS persons must be provided with low EMF spaces for residence, work, school and general public domain access. Low EMF essential spaces need to be urgently established—not just to reduce severity for people with EHS, but to broadly reduce the incidence of EHS.”⁶

37. **Q 9.** All technical, exposure-related, and other information should be disclosed to the whole population. Currently, decisions on policies and deployment of technologies relying on RF/MW

3 See, e.g., Havas M. Electromagnetic hypersensitivity: biological effects of dirty electricity with emphasis on diabetes and multiple sclerosis. *Electromagn Biol Med.* 2006;25(4):259-68. doi: 10.1080/15368370601044192. <https://pubmed.ncbi.nlm.nih.gov/17178585/>. Accessed 06/21/25.

Milham S, Stetzer D. Dirty electricity, chronic stress, neurotransmitters and disease. *Electromagn Biol Med.* 2013 Dec;32(4):500-7. doi: 10.3109/15368378.2012.743909. Epub 2013 Jan 16. Erratum in: *Electromagn Biol Med.* 2014 Jan;33(1):79. PMID: 23323864. <https://pubmed.ncbi.nlm.nih.gov/23323864/>. Accessed 06/25/25.

4 KHFAC uses charge-balanced alternating currents within the frequency range of approximately 1 kHz to 100 kHz. The mechanism of action is the inactivation/activation of sodium and potassium ion channels. See, e.g., <https://pubmed.ncbi.nlm.nih.gov/17153201/>, <https://pmc.ncbi.nlm.nih.gov/articles/PMC3834124/>, <https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1007766>, and <https://jneuroengrehab.biomedcentral.com/articles/10.1186/s12984-024-01503-w>. Accessed 9/25/25.

5 Panagopoulos D.J., A. Karabarbounis, and C. Lioliousis. Defining Wireless Communication (WC) Electromagnetic Fields (EMFs). (See Part D. Measuring Incident EMFs Is More Relevant than Specific Absorption Rate (SAR), p. 46-51). In: Panagopoulos, D. ed. (2021). *Electromagnetic fields of wireless communications: Biological and Health Effects*. CRC Press. <http://dx.doi.org/10.1201/9781003201052>.

6 <https://icbe-emf.org/activities/electrohypersensitivity>. Last accessed 10/21/26.

radiation are routinely made without providing any meaningful information to the public. Changes are presented as “improvements,” “modernization” or other misleading and empty terms.

38. The public is kept in the dark, and accepts or even openly welcomes the changes under false pretenses because they assume that there are agencies and entities ensuring the safety of these new technologies. Then the companies, utilities, federal agencies, and others, portray massive adoption of new technologies as a sign of the public’s preference. However that is a dishonest characterization because it does not take into account the fact that people possessed hardly any information with which to make an informed, conscious decision.

39. In addition, individuals should have access to adequate and affordable good quality meters in order to evaluate their environment vis-a-vis their symptoms and reactions, and protect themselves from high and/or non-consensual exposures. Currently available meters only cover limited ranges and can be prohibitively costly, especially for those who may need them the most but have been disabled and unable to earn a living. The Safe & Sound Pro II (costing about \$400) covers the frequency range from 200 MHz to 8 GHz. The Safe and Sound Pro mmWave Meter covers from 20 GHz to 40 GHz and costs \$850—out of reach for most people (<https://safelivingtechnologies.com/products/safe-and-sound-pro-mmwave-meter.html>). In addition, there are no consumer level meters covering the range from 8 GHz to 20 GHz.

40. **Q 12.** Ample scientific evidence of harm at or below current exposure guidelines exists. Just a few key publications:

41. A) ICBE-EMF’s 2022 paper⁷ makes precisely this point and develops it in detail: Available research on RF radiation “demonstrates that the assumptions underlying the FCC’s and ICNIRP’s exposure limits are invalid and continue to present a public health harm. Adverse effects observed at exposures below the assumed threshold SAR include non-thermal induction of reactive oxygen species, DNA damage, cardiomyopathy, carcinogenicity, sperm damage, and neurological effects, including electromagnetic hypersensitivity. Also, multiple human studies have found statistically significant associations between RFR exposure and increased brain and thyroid cancer risk”.⁸

42. This paper shows that⁹ (1) Radiofrequency radiation exposure limits set by the FCC (and ICNIRP) are based on invalid assumptions, are not protective of human health, and ignore the impact on wildlife and (2) The general public should be informed of the health effects of radiofrequency radiation and encouraged to take precautions to minimize exposures, especially for vulnerable populations, including children, pregnant women and people with EMR Syndrome. ICBE-EMF rightly calls for an immediate moratorium on further deployment of technologies emitting RF radiation until safety is demonstrated, and not simply assumed. The paper detailed 14 erroneous assumptions that underpin FCC and ICNIRP exposure limits for RF radiation. (<https://icbe-emf.org/fcc-and-icnirp-limits/>).

7 International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF). Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limit determinations for radiofrequency radiation: implications for 5G. Environ Health. 2022;21:92. <https://doi.org/10.1186/s12940-022-00900-9>.

8 Ibid.

9 <https://icbe-emf.org/fcc-and-icnirp-limits/>. Last accessed 10/21/26.

43. B) Yakymenko and Tsybulin provide citations showing that “significant adverse biological effects are known to take place at several orders of magnitude weaker ELF EMFs” than those set by ICNIRP.¹⁰

44. C) Researchers have concluded that overall, high frequency RF radiation even below the FCC limits “can result in: carcinogenicity (brain tumors/glioma, breast cancer, acoustic neuromas, leukemia, parotid gland tumors), genotoxicity (DNA damage, DNA repair inhibition, chromatin structure), mutagenicity, teratogenicity, neurodegenerative diseases (Alzheimer’s Disease, Amyotrophic Lateral Sclerosis), neurobehavioral problems, autism, reproductive problems, pregnancy outcomes, excessive reactive oxygen species/oxidative stress, inflammation, apoptosis, blood-brain barrier disruption, pineal gland/melatonin production, sleep disturbance, headache, irritability, fatigue, concentration difficulties, depression, dizziness, tinnitus, burning and flushed skin, digestive disturbance, tremor, cardiac irregularities, adverse impacts on the neural, circulatory, immune, endocrine, and skeletal systems” and “from this perspective, RF is a highly pervasive cause of disease.”¹¹

45. D) Beyond scientific studies and publications, the lived experiences of millions of people who have been harmed by RF/MW radiation-emitting utility meters, nearby cell towers, and other devices should be more than enough to show that effects do occur well below current FCC guidelines and should be taken seriously. Several publications document this, including Santini et al.¹²

46. There are many more studies, which numerous organizations and individuals have been submitting to all federal agencies over the past decades. An appeal to HHS and the FDA in 2021 provided many references, as well as analyses and critiques from several experts.¹³ A letter to HHS submitted on August 6, 2025 by the National Call for Safe Technology summarizes some of the most relevant evidence of biological harm that already exists.¹⁴ Other organizations also provide lists of some of the most prominent literature, including Americans for Responsible Technology (<https://www.americansforresponsibletech.org/scientific-studies>), Environmental Health Sciences (<https://ehsciences.org/science-and-policy-citations-on-non-ionizing-electromagnetic-fields/>) and EMR Syndrome Alliance (<https://www.emrsyndrome.org/what-is-emr-syndrome>). These are just a few examples—there is no way to make justice to the volume of available evidence, which has been provided numerous times to HSS, the FCC and other agencies.

10 Yakymenko, I. And O Tsybulin. Oxidative Stress Induced by Wireless Communication Electromagnetic Fields. In: Panagopoulos, D. ed. (2021). Electromagnetic fields of wireless communications: Biological and Health Effects. CRC Press. <http://dx.doi.org/10.1201/9781003201052>. p. 101.

11 Ronald N. Kostoff, Paul Heroux, Michael Aschner, Aristides Tsatsakis, “Adverse health effects of 5G mobile networking technology under real-life conditions,” Toxicology Letters, Vol 323, 2020, pp. 35-40, ISSN 0378-4274, <https://doi.org/10.1016/j.toxlet.2020.01.020>.

12 Santini documented worsening of symptoms when closer to a cell tower but a lessening of symptoms when farther away from a cell tower. Dr. Magda Havas created a chart based on the data: https://www.researchgate.net/figure/Symptoms-experienced-by-people-near-cellular-phone-base-stations-based-on-the-work-of_fig2_258313941.

13 CITIZEN PETITION FOR IMMINENT HAZARD RULING by the Department of Health and Human Services (HHS) concerning the current official policy of the Food and Drug Administration (FDA) regarding the safety of human exposure to non-ionizing radiofrequency (RF) radiation. https://www.americansforresponsibletech.org/files/ugd/2cea04_db07f220b02245a88cc4e9e5561dad15.pdf. Last accessed 10/21/26.

14 See Addendum A: BIOLOGICAL HAZARDS OF WIRELESS RADIATION – EXECUTIVE SUMMARY. <https://thenationalcall.org/wp-content/uploads/2025/08/8.17-5-NC4ST-Letter-to-HHS-8-6-25-FINAL.pdf>. Last accessed 10/21/26.

47. In addition, a document by the Cellular Phone Task Force provides a list of studies that found biological adverse effects, in order of increasing power densities, most if not all of which are well below current FCC and ICNIRP guidelines.¹⁵

48. HHS, the FCC and other relevant agencies should engage in continuous, fluid and dynamic communication and discussion with the researchers, organizations, and individuals that have been sounding the alarm and providing the science and evidence for years. In this manner, any objections or disagreements could be dealt with more quickly and efficiently, and reasonable solutions could be found. We need all hands on deck to tackle this matter. Offers and requests for such collaboration have also been made repeatedly by scientists and advocates. The current modus operandi is clearly not working for the American people, particularly for those who have already been injured or disabled by RF/MW radiation and other man-made, bioactive EMR exposure.

49. It is important to note that all signals used in wireless communication consist of a high frequency carrier wave (RF/MW radiation) which are “modulated mainly by Extremely Low Frequency (ELF: 3-3,000 Hz) or Very Low Frequency (VLF: 3-30 kHz) signals, and included in on/off pulses repeated at various ELF rates. Moreover, they exhibit intense random variability in their signal amplitudes with frequencies in the Ultra Low Frequency (ULF: 0-3 Hz) band.”¹⁶

50. “It has been repeatedly documented that modulated (especially in amplitude) or pulsed RF EMFs are significantly more bioactive than non-modulated or non-pulsing fields of the same carrier frequency and the same intensity with that of the pulses.”¹⁷

51. Studies that report no effects of ELF or RF/WC EMFs for several biological and health effects end points tend to employ “simulated signals from generators with invariable parameters and no modulation. By contrast, more than 95% of the studies that employed real-life [modulated RF/MW radiation] exposures, from commercially available devices (mobile/cordless phones, Wi-Fi, etc.) with high signal variability, find effects.”¹⁸

52. The mechanism by which pulsed and modulated RF/MW radiation used in wireless communication harms living beings is well understood and succinctly explained by Panagopoulos et al.: “Exposure to anthropogenic electromagnetic fields (EMFs), especially those of wireless communications (WC) has increased tremendously. This is an unprecedented phenomenon throughout biological evolution because, all anthropogenic EMFs, being fully polarized, coherent, and, especially WC EMFs, highly variable, differ substantially from the natural EMFs. WC EMFs consist of Microwave (MW) carrier waves, modulated, by Extremely Low Frequency (ELF) signals, and included in on/ off pulses repeated

15 Arthur Firstenberg, Cellular Phone Task Force. 2022. Radio Wave Packet: What You Need to Know about Wireless Technology. First published September 2001. Revised August 2022.
<https://www.softlights.org/wp-content/uploads/2022/08/Firstenberg-Rev.-8-2022-Radio-Wave-Packet-What-you-Need-to-Know-about-Wireless-Tech.pdf>. Last accessed 10/21/26.

16 Panagopoulos DJ, Yakymenko I, De Iuliis GN and Chrousos GP (2025) A comprehensive mechanism of biological and health effects of anthropogenic extremely low frequency and wireless communication electromagnetic fields. *Front. Public Health* 13:1585441. doi: 10.3389/fpubh.2025.1585441.
<https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2025.1585441/full> Last accessed 10/21/26.

17 Ibid.

18 Ibid.

at various ELF rates. Moreover, they exhibit intense random variability, mainly in the Ultra Low Frequency (ULF) band. Thus, WC EMFs are a combination of MW and ELF/ULF EMFs. The combination of polarization/coherence and intense low-frequency (ELF/ULF) variability seems to be the key to EMF-bioactivity. Epidemiological and laboratory studies highlight a connection between ELF or WC EMF exposure and cancer, infertility, electro-hypersensitivity, and various other pathologies. Studies also find DNA damage and Oxidative Stress (OS) which explain these pathologies. While man-made EMFs cannot directly ionize molecules, they are capable of doing this indirectly in biological tissue, by triggering the biosynthesis of Reactive Oxygen Species (ROS) which can damage biomolecules, including DNA. The (over)production of ROS and the consequent OS are triggered by irregular gating of Voltage-Gated Ion Channels (VGICs) in the cell membranes as described by the Ion Forced Oscillation (IFO)-VGIC mechanism: Mobile ions within VGICs forced to oscillate by the applied ELF/ULF EMFs exert forces on the voltage sensors of the VGICs, similar to or greater than the forces that physiologically gate those channels, resulting in their irregular gating (dysfunction). Dysfunction of ion channels disrupts intracellular ionic concentrations. This triggers ROS overproduction and OS by the ROS-generating systems/enzymes in the cells, such as the electron transport chain (ETC) in the mitochondria, or the NADPH/NADH oxidases (NOXs), the Nitric Oxide synthases (NOS), etc. The IFO-VGIC mechanism and the consequent OS constitute a comprehensive mechanism that explains all known adverse biological and health effects reported to be induced by anthropogenic EMFs.”¹⁹

53. **Q 14.** Ample evidence exists on the harmful effects of RF/MW radiation on the environment.

54. Panagopoulos et al. describe the mechanisms by which pulsed and modulated RF/MW radiation used in wireless communication cause harm.²⁰ These effects operate at the cellular level and all cells of all living beings are very similar and are thus similarly affected.²¹

55. Resources provided for Q 12 include many studies on effects on wildlife and plants. Additional evidence is listed by Environmental Health Trust (<https://ehtrust.org/environmental-effects-of-wireless-radiation-and-electromagnetic-fields/>) and Environmental Health Sciences (<https://ehsciences.org/how-cell-towers-5g-and-small-cells-affect-trees-and-plants-scientific-insights/>).

56. **Q 16.** The priority should be to study and act upon the already plentiful available evidence of harm. Any additional research should NOT in any way delay the urgent action needed to protect the public from harmful RF/MW radiation, with particular attention to vulnerable populations, and to ensure that people who have already been injured and/or disabled can gain full access to public places and services as established by the Americans with Disabilities Act and other laws.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and barring any inadvertent mistakes.

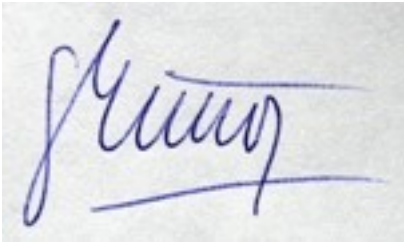
¹⁹ Ibid.

²⁰ Panagopoulos DJ, Yakymenko I, De Iuliis GN and Chrousos GP (2025) A comprehensive mechanism of biological and health effects of anthropogenic extremely low frequency and wireless communication electromagnetic fields. *Front. Public Health* 13:1585441. doi: 10.3389/fpubh.2025.1585441.
<https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2025.1585441/full> Last accessed 10/21/26.

²¹ Ibid.

Date: October 21, 2026

Gabriela Munoz



Appendix A – Why SAR is an Inadequate Metric

The following are excerpts from Panagopoulos 2025²²

- “SAR actually applies only to thermal effects, and it actually expresses the rate by which electromagnetic energy from an incident electromagnetic wave/field is converted into heat within living tissue. But [...] man-made electromagnetic fields at environmentally existing intensities do not normally induce measurable heating within exposed living tissue. Thus, SAR is not a proper metric to describe the biological activity of man-made electromagnetic fields at environmental intensities.”

- “SAR is estimated by 1) insertion of micro-antennas/probes into the tissue to detect the internal electric field [...]; 2) insertion of miniature thermal probes into the tissue to detect changes [...] in the temperature caused by the exposure during a time interval [...] Then SAR is computed by [...] numerical modeling [...]

Apart from the disadvantage of the first method regarding oversimplification [...] in both the first and second methods, the insertion of needles/probes in living tissue disturbs its physiological function and [...] physical properties [...] Moreover, in the case of living animals, it causes trauma and pain. Such methods are improper to be used in live animals and may only be used in *in vitro* experiments [...]

Finally, all methods for SAR estimation are highly complicated and time-consuming, so that SAR cannot be readily measured/calculated by the use of the equipment of an ordinary EMF laboratory. In other words, SAR is not only a flawed metric, but impractical as well.”

- “A more precise and practical EMF exposure metric than SAR is the incident radiation/field intensities on the surface of the exposed biological tissue at the various frequency bands (RF, ELF, VLF, etc.) plus the additional physical parameters of the field and the exposure which can readily and accurately be known, such as pulse and carrier wave frequency, exposure duration, modulation, wave form, etc., as measured by reliable radiation/field meters, frequency meters, and spectrum analyzers.

22 Panagopoulos D.J., A. Karabarbounis, and C. Lioliousis. Defining Wireless Communication (WC) Electromagnetic Fields (EMFs). (See Part D. Measuring Incident EMFs Is More Relevant than Specific Absorption Rate (SAR), p. 46-51). In: Panagopoulos, D. ed. (2021). Electromagnetic fields of wireless communications: Biological and Health Effects. CRC Press. <http://dx.doi.org/10.1201/9781003201052>.

- [...] There are thousands of studies corresponding specific biological effects to specific radiation/field intensities at the different frequency bands plus the other exposure parameters. Therefore, one can approximately predict the biological effect by knowing these field/exposure parameters, which can be readily and objectively measured.”