ICBE–EMF
INTERNATIONAL COMMISSION ON THE BIOLOGICAL EFFECTS OF ELECTROMAGNETIC FIELDS

The Honorable Ted Cruz
Chairman
Senate Committee on Commerce, Science, and Transportation
United States Senate
Dirksen Senate Office Building, G-50 Washington, D.C. 20510

The Honorable Maria Cantwell
Ranking Member
Senate Committee on Commerce, Science, and Transportation
United States Senate
Hart Senate Office Building
Washington, D.C. 20510

December 15, 2025

Submitted to All Members of the Senate Committee on Commerce, Science, and Transportation

Re: Oversight Hearing of the Federal Communications Commission—December 17, 2025

We write to you as experts of the International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF), an international consortium of scientists, doctors, and researchers with extensive expertise and peer-reviewed publications on the biological and health effects of non-ionizing electromagnetic fields, including the radiofrequency (RF) radiation emitted by cell towers and 4G/5G infrastructure.

We have just submitted our scientific comments to the FCC opposing its "Build America: Eliminating Barriers to Wireless Deployments" NPRM due to the serious public health and environmental implications, its disregard for established scientific research, and its erosion of democratic, community-based decision-making. In our filing, we told the FCC that cell towers, 5G, and wireless infrastructure should not be fast-tracked as this will increase public exposure to RF radiation, an environmental exposure that peer-reviewed scientific research has associated with numerous health and environmental harms. U.S. limits on allowable

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exposures to RF radiation, unchanged since 1996, are not science-based and do not protect the public.

We write you to request that you ask the FCC several questions regarding the FCC's activities related to cell tower and wireless safety.

As documented by ICBE-EMF, in our paper published in *Environmental Health* entitled "Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limit determinations for radiofrequency radiation: implications for 5G," FCC's RF radiation exposure guidelines ignore decades of peer-reviewed research showing biological harm at levels far below those that cause heating.[1] The FCC's outdated 1996 limits are based on scientifically unsupported assumptions, focusing only on short-term heating effects while ignoring the extensive peer-reviewed published scientific evidence of biological harm at lower, non-heating levels. The FCC's 1996 limits were derived almost entirely from short-term behavioral disruption studies in animals, such as heat-induced changes in behavior and the limits do not account for chronic exposure or the pulse-modulated signals transmitted by wireless technologies. Further, despite a federal court order[23] to explain how its limits are adequately protective, FCC limits have not been updated based upon a comprehensive review of the current scientific evidence on cellular, neurological, reproductive, or carcinogenic effects. Thus, they do not account for long-term health effects, children's vulnerability, electromagnetic hypersensitivity, cumulative exposures, or the documented impacts on wildlife and ecosystems.

A rapidly expanding body of peer-reviewed research demonstrates that RF radiation from wireless infrastructure, including cellular towers and 5G small cell towers, can produce harmful effects at levels far below current FCC limits.[4,5,6,7,8,9,10,11]

Large-scale animal research, including the U.S. National Toxicology Program (NTP) and Ramazzini Institute studies, both found increased brain and heart tumors.[12,13] Notably, the Ramazzini Institute (RI) used much lower RF radiation levels as compared to the NTP, with RF levels that were lower than the FCC limit for cell tower emissions. Further, the same types of tumors reported in the NTP and RI studies have also been observed in human studies,[14,15] adding significant confidence that the associations observed in human studies are real.[16,17] Studies of people living near cell towers show increased biomarkers of DNA damage,

oxidative stress, hormonal disruption, sleep disturbance, neurological symptoms, and increased cancer rates.[18,19,20]

The American Academy of Pediatrics has repeatedly urged[21] the FCC to update its outdated wireless radiation regulations to account for children's increased vulnerability, noting that the research shows children absorb higher rates of RF radiation deeper into their more sensitive brains, as compared to adults.[22,23] Further, research has also documented that cell phone radiation exposure can exceed limits when the phone is close to the body, [24,25] and that Wi-Fi and cell towers can increase children's exposure in schools. [26,27]

Further, the FCC plan puts wildlife at risk. The FCC has not established guidelines to protect non-human species from RF radiation even though there is a large and growing body of evidence that demonstrates the biological effects of RF radiation on animals and plants.[28,29,30,31,32]

We caution that the FCC's proposed changes will come at a serious cost to public health and the environment, as well as strip state and local government authority.

In 2021, the D.C. Circuit Court of Appeals issued a remand order on the FCC RF radiation emission limits, requiring it to provide a reasoned explanation for not updating its RF radiation emission limits, which were last set in 1996, when only a fraction of the cell towers and cell phones that we have today existed. The order stated that the FCC had failed to respond to "record evidence that exposure to RF radiation at levels below the Commission's current limits may cause negative health effects unrelated to cancer." The Court ordered the FCC to examine the effects of long-term exposure to humans and the environment, particularly to children. To date, the FCC has not complied.

The FCC's reliance on Section 704 of the Telecommunications Act to preempt local consideration of environmental and health impacts is unjustified because the Commission has not conducted any meaningful review of RF radiation effects, nor ensured that any federal agency is doing so. Without updated safety limits or an up-to-date current scientific evaluation, how can the FCC continue to claim that health and environmental impacts may not be considered by local governments when considering where to place a cell tower? The Commission has failed to perform the very scientific and environmental oversight that Congress presumed when enacting Section 704, and it cannot lawfully claim that

state and local governments are barred from considering impacts the FCC itself has never reviewed.

There is not a consensus for wireless safety. The International EMF Scientist Appeal, a petition submitted to the United Nations and signed by more than 260 scientists who have published over 2,000 papers on EMF, biology, and health, states that the current wireless RF radiation human exposure guidelines set by the FCC and other national and international organizations are based on avoiding heating effects and do not adequately protect against known health risks that do not involve heat that can cause long-term health risks.[3334] The science is far from settled, and numerous medical organizations and public health experts recommend reducing exposure as substantial evidence exists pointing to serious risks.[35]

The FCC's proposal effectively treats American communities as test subjects in an uncontrolled national radiation experiment, one conducted without consent, without monitoring, and without updated safety limits. If the Commission proceeds to fast-track cell towers without revising its outdated 1996 RF radiation exposure limits, it will knowingly promote densification of industrial wireless transmitters and expose millions to cell tower RF radiation levels that multiple peer-reviewed studies associate with increased cancer risk, neurological reproductive harm.

Given the FCC's continued reliance on outdated 1996 cell tower and wireless RF radiation exposure limits and the agency's lack of proper substantive scientific review in the nearly three decades since, we respectfully request clear and direct answers to the following oversight questions.

1. Your RF exposure limits were set in 1996. What specific scientific review since then has the FCC conducted that justifies treating those limits as protective for today's chronic cell tower radiation exposures?
2. What evidence does the FCC rely upon to conclude its limits adequately protect children, especially for long-term exposure?
3. In 2021, the D.C Circuit ordered the FCC to provide a reasoned explanation for not updating its wireless RF limits and to address scientific evidence of harm below FCC RF limits, including impacts on children and the environment. What has the FCC done since that remand, and why has it still not updated the limits? Provide the timeline and deliverables regarding the FCC's response to the court.

4. The FCC relies on Section 704 of the Telecom Act to preempt local consideration of health/environmental effects, yet the FCC has not shown it has conducted any meaningful review of the health effects of RF radiation. On what basis can the FCC bar local consideration of impacts the FCC itself has not fully analyzed?
5. In a February 6, 2019, Senate Commerce, Science, and Transportation Committee hearing on 5G, when industry executives were asked what safety testing has been performed on 5G, wireless industry representatives were asked whether they have supported research on the safety of 5G technology and the industry representatives conceded they have not.[36] Then Senator Blumenthal stated, "we're kind of flying blind here" with respect to the health and safety of 5G.[37] What has the FCC, FDA and federal agencies done during the past 7 years to assure the Senators and the American public that 5G and new technologies are safe?
6. What safety testing has been done on 5G and new and emerging technologies to ensure protection for long-term exposures?
7. In light of the increased daily wireless RF radiation exposure to the population, why isn't the FCC recommending policies to monitor and reduce public exposure to RF radiation as many other countries already have done?
8. What incentives does the FCC provide to support R and D for safer technology[38] with lower RF emissions?

The public cannot be assured of safety, and Congress cannot exercise its oversight function, without a clear accounting of the scientific basis for continued reliance on decades-old limits that predate modern wireless technologies, chronic exposures, and the ubiquity of RF sources in daily life. We welcome continued dialogue that could lead to more health protective solutions.

Our experts stand ready to meet with you and provide any additional information or clarification needed to support the fulfillment of the Committee's oversight responsibilities.

Respectfully submitted,

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[1] International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF), Belyaev I, Blackman C, Chamberlin K, DeSalles A, Dasdag S, Fernández C, Hardell L, Héroux P, Kelley E, et al. Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limit determinations for radiofrequency radiation: implications for 5G. *Environ Health* (2022) 21: doi: 10.1186/s12940-022-00900-9

[2] Environmental Health Trust et al. v. Federal Communications Commission. (2021). https://www.fcc.gov/document/dc-circuit-decision-environmental-health-trust-v-fcc

[3] Landmark Federal Court Decision on Wireless Radiation Human Exposure Limits.

https://ehsciences.org/lawsuit-wireless-radiation-safety/
[4] Lai H, Levitt BB. Cellular and molecular effects of non-ionizing electromagnetic fields. *Rev Environ Health* (2024) 39:519–529. doi: https://doi.org/10.1515/reveh-2023-0023
[5] Lin JC. Health and safety practices and policies concerning human exposure to RF/microwave radiation. *Front Public Health* (2025) 13: doi: 10.3389/fpubh.2025.1619781
[6] Lai H, Levitt BB. Radiofrequency radiation-induced gene expression. *Rev Environ Health*. 2025 Oct 29. doi: 10.1515/reveh-2025-0104.
[7] Henshaw DL, Philips A. A mechanistic understanding of human magnetoreception validates the phenomenon of electromagnetic hypersensitivity (EHS). *Int J Radiat Biol* (2025) 101:186–204. doi: 10.1080/09553002.2024.2435329
[8] McCredden JE, Cook N, Weller S, Leach V. Wireless technology is an environmental stressor requiring new understanding and approaches in health care. *Front Public Health* (2022) 10: doi: 10.3389/fpubh.2022.986315
[9] Davis D, Birnbaum L, Ben-Ishai P, Taylor H, Sears M, Butler T, Scarato T. Wireless technologies, non-ionizing electromagnetic fields and children: Identifying and reducing health risks. *Curr Probl Pediatr Adolesc Health Care* (2023) 53:101374. doi: 10.1016/j.cppeds.2023.101374
[10] Joel M. Moskowitz, *Effects of Exposure to Electromagnetic Fields: Thirty Years of Research*, Science Blog (Feb. 2018) https://www.saferemr.com/2018/02/effects-of-exposure-to-electromagnetic.html
[11] Lai H, Levitt BB. The roles of intensity, exposure duration, and modulation on the biological effects of radiofrequency radiation and exposure guidelines. *Electromagn Biol Med* (2022) 41:230–255. doi: 10.1080/15368378.2022.2065683
[12] Lin JC. Carcinogenesis from chronic exposure to radio-frequency radiation. *Front Public Health* (2022) 10:1042478. doi: 10.3389/fpubh.2022.1042478
[13] Melnick RL. Commentary on the utility of the National Toxicology Program study on cell phone radiofrequency radiation data for assessing human health risks despite unfounded criticisms aimed at minimizing the findings of adverse health effects. *Environ Res* (2019) 168:1–6. doi: 10.1016/j.envres.2018.09.010
[14] 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. *Environ Health* 23, 82. https://doi.org/10.1186/s12940-024-01117-8
[15] Choi, Y-J, Moskowitz JM, Myung S=K, Lee Y-R, Hong Y-C. 2020. "Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis" *Int J Environ Res Public Health* 17, no. 21: 8079. doi: 10.3390/ijerph17218079
[16] Hardell L, & Carlberg M. (2019). Comments on the US National Toxicology Program technical reports on toxicology and carcinogenesis study in rats exposed to whole-body radiofrequency radiation at 900 MHz and in mice exposed to whole-body radiofrequency radiation at 1,900 MHz. *IntJ Oncology*, *54*(1), 111–127. https://doi.org/10.3892/ijo.2018.4606
[17] Prasad M, Kathuria P, Nair P, Kumar A, Prasad K. 2017. "Mobile phone use and risk of brain tumours: a systematic review of association between study quality, source of funding, and research outcomes." *Neurol Sci*.doi: 10.1007/s10072-017-2850-8
[18] Balmori A. Evidence for a health risk by RF on humans living around mobile phone base stations: From radiofrequency sickness to cancer. *Environ Res* (2022) 214:113851. doi: 10.1016/j.envres.2022.113851
[19] Hardell L, Nilsson M. Summary of seven Swedish case reports on the microwave syndrome associated with 5G radiofrequency radiation. *Rev Environ Health* (2025) 40:147–157. doi: 10.1515/reveh-2024-0017
[20] Sailo, L, Laldinpuii, Zosangzuali M, Weller S, Varte CL, Tochhawng L, Zothansiama. (2025). Greater prevalence of symptoms associated with higher exposures to mobile phone base stations in a hilly, densely populated city in Mizoram, India. *Electromagn BiolMed*, *44*(4), 385–404.doi: 10.1080/15368378.2025.2513900
[21] American Academy of Pediatrics. Letter in Support of the Cell Phone Right to Know to The Honorable Dennis Kucinich. (2012). Letter to the FCC Honorable Mignon L. Clyburn and FDA Honorable Dr.

Margaret A. Hamburg Commissioner (2013); Letter to the FCC Honorable Julius Genachowski (2012) Available online at: https://icbe-emf.org/wp-content/uploads/2025/01/American-Academy-of-Pediatrics-Letters-to-FCC-and-Congress-on-cell-phone-radiation-health-effects-.pdf

[22] Fernández C, de Salles, AA., SearsM. E., Morris RD, & Davis D L Absorption of wireless radiation in the child versus adult brain and eye from cell phone conversation or virtual reality. Environmental Research (2018) 167, 694–699 https://doi.org/10.1016/j.envres.2018.05.013

[23] Mohammed B, Jin J, Abbosh AM, Bialkowski KS, Manoufali M and Crozier S, "Evaluation of Children's Exposure to Electromagnetic Fields of Mobile Phones Using Age-Specific Head Models with Age-Dependent Dielectric Properties," *IEEE Access* (2017) vol. 5, pp. 27345-27353, 2017, doi: 10.1109/ACCESS.2017.2767074

[24] Gandhi, O. P. (2019). Microwave Emissions from Cell Phones Exceed Safety Limits in Europe and the US When Touching the Body. *IEEE Access*, *7*, 47050–47052.

[25] Scarato T. U.S. policy on wireless technologies and public health protection: regulatory gaps and proposed reforms. Front Public Health (2025) In press.

[26] Soares NE, Bulla G, Fernández-Rodríguez CE, de Salles AA. "SAR Estimations in a Classroom with Wireless Computers" Journal of Microwaves, Optoelectronics and Electromagnetic Applications (2025) Vol. 24, No. 2, e2025288526 DOI: http://dx.doi.org/10.1590/2179-10742025v24i3288526

[27] Bhatt CR, Redmayne M., Billah B., Abramson MJ., & Benke, G. Radiofrequency-electromagnetic field exposures in kindergarten children. Journal of Exposure Science & Environmental Epidemiology (2017) 27(5), 497–504. https://doi.org/10.1038/jes.2016.55

[28] Levitt BB, Lai HC, Manville AM. Effects of non-ionizing electromagnetic fields on flora and fauna, part 1. Rising ambient EMF levels in the environment. *Rev Environ Health*. 2021 May 27;37(1):81-122. doi: 10.1515/reveh-2021-0026.

[29] Levitt BB, Lai HC, Manville AM. Effects of non-ionizing electromagnetic fields on flora and fauna, Part 2 impacts: how species interact with natural and man-made EMF. *Rev Environ Health*. 2021 Jul 8;37(3):327-406. doi: 10.1515/reveh-2021-0050.

[30] Levitt BB, Lai HC, Manville AM. Effects of non-ionizing electromagnetic fields on flora and fauna, Part 3. Exposure standards, public policy, laws, and future directions. *Rev Environ Health*. 2021 Sep 27;37(4):531-558. doi:10.1515/reveh-2021-0083.

[31] Levitt BB, Lai HC, Manville AM. Low-level EMF effects on wildlife and plants: What research tells us about an ecosystem approach. *Front Public Health* (2022) 10: doi: 10.3389/fpubh.2022.1000840

[32] Levitt BB, Lai HC., Manville AM II, & ScaratoT. Flora and fauna—How nonhuman species interact with natural and man-made EMF at ecosystem levels and public policy recommendations. Frontiers in Public Health, 13. doi:10.3389/fpubh.2025.1693873

[33] EMF Scientist International Appeal. 4G/5G antenna densification is escalating health risks – a global crisis [Internet]. New York, NY: EMFscientist.org; 22 Jul 2019 [cited 2025 Oct 29]. Available from: https://emfscientist.org/

[34] Kelley E, Blank M, Lai H, Havas M, Moskowitz J. International Appeal: Scientists call for protection from non-ionizing electromagnetic field exposure. European J Oncol. 2015;20(3/4):180-182. Available from: https://www.mattioli1885journals.com/index.php/EJOEH/article/view/4971

[35] Environmental Health Sciences. *Doctors and scientists on cell phone radiation health effects* EHSciences.org; 2025. Available from: https://ehsciences.org/doctors-and-scientists-on-cell-phone-radiation-health-effects/

[36] U.S. Sen. Richard Blumenthal, *At Senate Commerce Hearing, Blumenthal Raises Concerns on 5G Wireless Technology's Potential Health Risks*, U.S. Senate Press Release. https://www.blumenthal.senate.gov/newsroom/press/release/at-senate-commerce-hearing-blumenthal-raises-concerns-on-5g-wireless-technologys-potential-health-risks

[37] Video Link https://www.youtube.com/watch?v=2QgGA_dLVYw

[38] Héroux P, Belyaev I, Chamberlin K, Dasdag S, De Salles AAA, Rodriguez CEF, Hardell L, Kelley E, Kesari KK, Mallery-Blythe E, et al. Cell Phone Radiation Exposure Limits and Engineering Solutions. International Journal of Environmental Research and Public Health. 2023; 20(7):5398.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of Notice of Proposed Rulemaking Build America: Eliminating Barriers to Wireless Deployments	))))	**WT Docket No. 25-276**

Comments of

The International Commission on the Biological Effects of Electromagnetic Fields

The International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF) is challenging the safety of the FCC's wireless radiation exposure limits and is calling for an independent evaluation before the FCC moves to fast-track cell towers and wireless infrastructure across the nation. ICBE-EMF is an international consortium of scientists, doctors, and researchers with extensive expertise and peer-reviewed publications on the biological and health effects of non-ionizing electromagnetic fields, including wireless radiation. Wireless radiofrequency (RF) radiation is emitted by wireless devices, including cell phones, cordless phones, Wi-Fi and Bluetooth-connected electronics, as well as by wireless network equipment such as 5G/4G wireless facilities and cell towers.

We respectfully oppose the FCC's proposed rulemaking titled "Build America: Eliminating Barriers to Wireless Deployments." The proposal would substantially diminish local and state authority regarding the placement of cell towers and wireless facilities. We urge the Commission to withdraw this proposal due to its serious public health and environmental implications, its disregard for established scientific research, and its erosion of democratic, community-based decision-making.

Cell towers, 5G and wireless infrastructure should not be fast-tracked as this will increase public exposure to RF radiation, an environmental exposure that decades of scientific research has associated with numerous health and environmental harms.[1] U.S. limits on allowable exposures to RF radiation, unchanged since 1996, are not science-based and do not protect the public. Although there are clear financial benefits to wireless carriers in terms of increased profitability**, we caution that the FCC's proposed changes will come at a serious cost to public health and the environment, as well as strip state and local government authority.**

FCC's 1996 Cell Tower Radiation Exposure Limits Do Not Protect Public Health or the Environment

The FCC's plan to fast-track wireless tower deployment hinges on the assumption that its existing cell tower RF radiation exposure regulations are sound. However, FCC limits fail to provide adequate protection for public health or the environment. The outdated 1996 limits are based on scientifically unsupported assumptions, focusing only on short-term heating effects while ignoring the extensive peer-reviewed published scientific evidence of biological harm at lower, non-heating levels. The FCC's 1996 limits were derived almost entirely from short-term behavioral disruption studies in animals, such as heating-induced changes in behavior and does not account for chronic exposure or the pulse-modulated signals transmitted by wireless technologies. These limits have not been updated based upon a comprehensive review of the current scientific evidence on cellular, neurological, reproductive, or carcinogenic effects.[2,3]

FCC limits do not account for long-term health effects, children's vulnerability, cumulative exposures, electromagnetic hypersensitivity, or the documented impacts on wildlife and ecosystems.

As documented by ICBE-EMF, in our paper published in *Environmental Health* entitled "Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limit determinations for radiofrequency radiation: implications for 5G," FCC's radiofrequency radiation exposure guidelines ignore decades of peer-reviewed research showing biological harm at levels far below those that cause heating. Our paper detailed the scientific evidence and erroneous assumptions that underpin FCC and ICNIRP exposure limits for wireless RF radiation, as detailed in the graphic below. Thus, the FCC's exposure limits do not adequately protect workers, children, people with electromagnetic hypersensitivity, and the public from cell tower radiation.

A) Effects of RF radiation at exposures below the putative threshold SAR of 4 W/kg

Assumption 1) There is a threshold exposure for any adverse health effect caused by RF radiation; in the frequency range of 100 kHz to 6 GHz it is a whole-body exposure that exceeds an SAR of 4 W/kg. Any biological effect of RF radiation above the threshold exposure is due to tissue heating.

Assumption 2) RF radiation is incapable of causing DNA damage other than by heating; there is no mechanism for non-thermal DNA damage.

Assumption 3) Two to seven exposures to RF radiation for up to one hour duration are sufficient to exclude adverse effects for any duration of exposure including chronic exposures.

Assumption 4) No additional effects would occur from RF radiation with co-exposure to other environmental agents.

B) Factors affecting dosimetry

Assumption 5) Health effects are dependent only on the SAR value; carrier wave modulations, frequency, or pulsing do not matter except as they influence the SAR.

C) Human brain cancer risk

Assumption 6) The multiple human studies that find associations between exposure to cell phone RF radiation and increases in brain cancer risk are flawed because of biases in the published case-control studies, and because brain cancer rates have remained steady since the time that use of wireless communication devices became widespread.

D) Individual variations in exposure and sensitivity to RF-EMF

Assumption 7) There are no differences among individuals, including children, in the absorption of RF-EMF and susceptibility to this radiation.

Assumption 8) There are no differences among individuals in their sensitivity to RF radiation-induced health effects.

E) Applied safety factors for EMF-RF workers and the general population

Assumption 9) A 50-fold safety factor for whole body exposure to RF radiation is adequate for protecting the general population to any health risks from RF radiation.

Assumption 10) A 10-fold safety factor for whole body exposure to RF radiation is adequate for protecting workers to any health risks from RF radiation.

Assumption 11) Exposure of any gram of cube-shaped tissue up to 1.6 W/kg, or 10 grams of cube-shaped tissue up to 2 W/kg, (duration not specified) will not increase the risk of that tissue to any toxic or carcinogenic effects in the general population.

Assumption 12) Exposure of any gram of cube-shaped tissue up to 8 W/kg, or 10 grams of cube-shaped tissue up to 10 W/kg, (duration not specified) will not increase the risk of that tissue to any toxic or carcinogenic effects in workers.

F) Environmental exposure to RF radiation

Assumption 13) There is no concern for environmental effects of RF radiation or for effects on wildlife or household pets.

G) 5G (5th generation wireless)

Assumption 14) No health effects data are needed for exposures to 5G; safety is assumed because penetration is limited to the skin ("minimal body penetration").

Growing Scientific Evidence Reports Biological and Health Harm from Wireless RF Radiation at FCC Compliant Levels of Exposure

A rapidly expanding body of peer-reviewed research demonstrates that RF radiation from wireless infrastructure, including cellular towers and 5G small cell towers, can produce harmful effects at levels far below current FCC limits.[4,5,6,7,8,9]

The FCC rulemaking disregards the growing evidence of harm that ICBE-EMF and other independent scientific groups and individuals have published and presented formally in comments made on prior FCC rulemakings. In a February 6, 2019, Senate Commerce, Science, and Transportation Committee hearing on 5G, when industry executives were asked what safety testing has been performed on 5G, wireless industry representatives were asked whether they have supported research on the safety of 5G technology and the industry representatives conceded they have not.[10] Then Senator Blumenthal stated, "we're kind of flying blind here" with respect to the health and safety of 5G.[11] The FCC has not shown any activities to ensure 5G and new technologies are safe since then.

In our 2022 paper, ICBE-EMF documented the numerous harmful effects observed at wireless RF radiation exposures below the FCC's assumed threshold of harm.

"Many studies have demonstrated oxidative effects associated with exposure to low-intensity RFR, and significant adverse effects including cardiomyopathy, carcinogenicity (brain and thyroid cancer), DNA damage, neurological disorders, increased permeability of the blood-brain barrier, and sperm damage," explains Dr. Ronald Melnick, ICBE-EMF's Science Advisor and Past Chair and a former senior toxicologist with the U.S. National Toxicology Program at the National Institute of Environmental Health Sciences. "These effects need to be addressed in revised and health-protective exposure guidelines. Furthermore, the assumption that 5G millimeter waves are safe because of limited penetration into the body does not dismiss the need for health effects studies."

The induction of reactive oxygen species (ROS) has been repeatedly documented across numerous peer-reviewed studies, and oxidative stress is known to contribute to a wide range of chronic health conditions, including cancer, neurological disorders, reproductive dysfunction, metabolic disease, and cardiovascular impacts.[12,13]

Studies of people living near cell towers show increased biomarkers of DNA damage, oxidative stress, hormonal disruption, sleep disturbance, neurological symptoms, and increased cancer rates.[14,15,16]

Large-scale animal research, including the U.S. National Toxicology Program and Ramazzini Institute studies, both found increased brain and heart tumors.[17,18] Notably, the Ramazzini Institute experiments used RF radiation exposure levels the FCC allows to be emitted by cell towers.[19] Further, the same types of tumors have also been observed in human studies,[20,21] adding significant confidence that the associations observed in human studies are real.[22,23]

On April 25, 2025, *Environment International* published a paper entitled a new systematic review of laboratory animals exposed to radiofrequency radiation, partially funded by the World Health Organization, that concluded that these studies and other animal studies provided credible, high certainty evidence linking RF radiation to cancer. The review also found moderate certainty of evidence of an increased risk of rare tumors, such as pheochromocytomas in the adrenal glands and hepatoblastomas in the liver. Additionally, some studies indicated a possible association with lymphomas, although the findings were inconsistent.

According to ICBE-EMF's former Chairperson Ronald Melnick, Ph.D., who served as a senior toxicologist at the National Institute of Environmental Health Sciences and who designed and managed the National Toxicological Review of radiofrequency for the first 10 years of this research project, "the conclusion of the study commissioned by the WHO shows that the long-standing assumption that the "current government limits are based on — that cell phone RF radiation can only cause harm through tissue heating — is wrong." FCC limits are not scientifically defensible.

In 2011 the World Health Organization's International Agency for Research on Cancer (IARC) classified radiofrequency radiation (RF-EMF) as a Group 2B "possibly carcinogenic to humans" based largely on human studies, noting limited animal evidence. This new review concludes "high certainty" animal evidence of cancer causation reinforces calls for IARC to urgently reevaluate RF-EMF for a likely higher cancer classification, for example from a Group 2B possible carcinogenic to humans to Group 2A probably carcinogenic to humans or Group A carcinogenic to humans.[24,25]

The FCC's Plan Would Put Wildlife and Ecosystems at Risk

The FCC's plan to proliferate cell towers would put flora and fauna at risk. The FCC has not established guidelines to protect non-human species from RF radiation even though there is a large and growing body of evidence that demonstrates the biological effects of RF radiation on animals and plants.[26,27,28,29] Expert scientists who published comprehensive reviews of wildlife impacts report that "Numerous studies across all frequencies and taxa indicate that low-level EMF exposures have numerous adverse effects, including orientation, migration, food finding, reproduction, mating, nest and den building, territorial maintenance, defense, vitality, longevity, and survivorship. Cyto- and geno-toxic effects have long been observed. We agree with their recommendation that "it is time to recognize ambient EMF as a novel form of pollution and develop rules at regulatory agencies that designate air as 'habitat' so EMF can be regulated like other pollutants."

Despite claims that such deployments have minimal or no environmental footprint, numerous studies show that siting of cell towers and other wireless facilities can lead to cumulative harms such as habitat disruption, impacts to migratory bird patterns due to light pollution, and adverse effects from ground disturbance activities like trenching and vegetation removal. These foreseeable impacts are critical to understanding the importance of maintaining robust NEPA environmental reviews for cell towers and wireless facilities, especially in ecologically sensitive areas. This raises questions about federal overreach and the Tenth Amendment of the U.S. Constitution which holds that "any powers not granted to the federal government by the Constitution belong to the states or the people, ensuring a clear separation of authority." Many localities want autonomy to set exposure limits, zoning restrictions, or health transparency standards. Courts have already ruled once (Keetoowah vs. FCC, 2019) that the FCC has violated NEPA by not conducting environmental reviews on proposed 5G small cell antennas. Under the National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA) the FCC has a duty to evaluate environmental consequences of nationwide infrastructure expansion. If NEPA reviews were to be curtailed or if more classes of transmitters are exempted from review, FCC would therefore be subject to challenges on legal grounds.

Capping fees, imposing stricter shot clock rules, eliminating local zoning restrictions and allowing for tower densifications without review of radiation exposure or ecological impact would severely limit the local control, timing and strain the funding and other resources available to municipalities to fully assess the environmental impacts of cell tower and wireless deployment projects. Forcing municipalities to accept towers without locally-set compensation would breach the Takings Clause of the Fifth Amendment.

The Administrative Procedures Act requires rulemakings be based on a rational, evidence--based process but this proposed rule does not contain the results of an examination of the evidence that also allows for public comment and due process. The APA also provides that when an agency disregards scientific input, that constitutes "arbitrary and capricious" rulemaking, or "cherry-picking", that is grounds for legal challenges against it.

FCC Limits Cannot Be Relied on by Communities Due to the FCC's Lack of Response to the Federal Court Mandate

In 2021, the D.C. Circuit Court of Appeals issued a remand order[3031] on the FCC RF radiation emission limits, requiring it to provide a reasoned explanation for not updating its RF radiation emission limits which were last set in 1996 when only a fraction of the cell towers and cell phones that we have today existed. The order stated that the FCC had failed to respond to "record evidence that exposure to RF radiation at levels below the Commission's current limits may cause negative health effects unrelated to cancer." The Court ordered the FCC to examine the effects of long-term exposure to humans and the environment, particularly to children. The FCC was also ordered to explain how its limits are relevant in regard to modern technology and how its compliance tests, developed decades ago, were adequate. To date, the FCC has not complied.

The American Academy of Pediatrics has repeatedly urged[32] the FCC to update its outdated wireless radiation regulations to account for children's increased vulnerability, noting that the research shows children absorb higher rates of RF radiation deeper into their more sensitive brains, as compared to adults.[33,34] Further, research has also documented that cell phone radiation exposure can exceed limits when the phone is close to the body, [35,36] and that Wi-Fi and cell towers can increase children's exposure in schools. [37,38]

The FCC's reliance on Section 704 of the Telecommunications Act to preempt local consideration of environmental and health impacts is unjustified because the Commission has not conducted any meaningful review of RF radiation effects, nor ensured that any federal agency is doing so. Without updated safety limits, NEPA analysis, or an up-to-date current scientific evaluation, the FCC cannot continue to claim that health and environmental impacts may not be considered by local governments. Because the Commission has failed to perform the very scientific and environmental oversight that Congress presumed when enacting Section 704, it cannot lawfully claim that state and local governments are barred from considering impacts the FCC itself has never reviewed.

A Scientific Consensus for Safety Does Not Exist

The International EMF Scientist Appeal, a petition submitted to the United Nations and signed by more than 260 scientists who have published over 2,000 papers on EMF, biology, and health, states that the current wireless RF radiation human exposure guidelines set by the FCC and other national and international organizations are based on avoiding heating effects and do not adequately protect against known health risks that do not involve heat that can cause long-term health risks.[3940] The science is far from settled, and numerous medical organizations and public health experts recommend reducing exposure as substantial evidence exists pointing to serious risks.[41]

Summary of our concerns:

This filing addresses the Commission's September 30, 2025 Notice of Proposed Rulemaking (FCC 25-276) because portions of the proposal would expand federal preemption over state and local authority and accelerate wireless infrastructure deployment without up-to-date environmental or health review.

The FCC's proposal is arbitrary and capricious within the meaning of 5 U.S.C. 706(2)(A) because it relies on outdated 1996 RF exposure limits and entirely fails to consider important aspects of the problem, namely non-thermal biological effects and cumulative exposure.

This NPRM replicates elements previously vacated by the Ninth Circuit (League of Cities v. FCC, 118 F. 4th 995 (9th Cir. 2024), constituting legislative rulemaking without proper APA procedure.

The Commission continues to rely on RF exposure limits adopted in 1996, which are based solely on tissue heating and not on peer-reviewed data on non-thermal biological effects or effects of long-term exposure.

By implicitly exempting new facilities from environmental analysis, the rule violates the National Environmental Policy Act (NEPA). The proposal to treat delayed local action as "deemed granted" raises due-process and federalism issues, depriving States and citizens of participation rights. The NPRM's broad preemption of local zoning and fee structures exceeds statutory authority under Sections 253 and 3329(c)(7) of the Communications Act and intrudes upon powers reserved to the States by the Tenth Amendment. Municipalities have a legitimate interest in safeguarding public health, aesthetics, and equitable development.

Our Science-Based Conclusion: The FCC Should Not Fast Track Cell Tower Deployment

This proposed rulemaking is inappropriate. While these preemptions are being promoted to alleviate unnecessary burdens created by state and local rules over the telecommunications industry, the burden would certainly shift to the American people. The public and environment will carry the costs from this inadequately regulated environmental exposure. The FCC's proposal effectively treats American communities as test subjects in an uncontrolled national radiation experiment, one conducted without consent, without monitoring, and without updated safety limits. If the Commission proceeds to fast-track cell towers without revising its outdated 1996 RF radiation exposure limits, it will knowingly promote densification of industrial wireless transmitters and expose millions to cell tower RF radiation levels that multiple peer-reviewed studies associate with increased cancer risk, neurological and reproductive harm.

In recognition of the flaws identified here with the current FCC RF radiation human exposure guidelines and given the high level of certainty in the systematic review commissioned by the World Health Organization reporting "high certainty" of cancers in laboratory animals,[42] and because FCC-25-276 fails to comply with the APA and NEPA requirements, relies on obsolete scientific standards and erodes state and local sovereignty, the Commission should withdraw and re-issue the NPRM only after a comprehensive environmental and health review is completed.

Further questions or concerns may be sent to us at info@icbe-emf.org.

Respectfully Submitted,

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[1] Joel M. Moskowitz, *Effects of Exposure to Electromagnetic Fields: Thirty Years of Research*, Science Blog (Feb. 2018) https://www.saferemr.com/2018/02/effects-of-exposure-to-electromagnetic.html
[2] International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF), Belyaev I, Blackman C, Chamberlin K, DeSalles A, Dasdag S, Fernández C, Hardell L, Héroux P, Kelley E, et al. Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limit determinations for radiofrequency radiation: implications for 5G. *Environ Health* (2022) 21: doi: 10.1186/s12940-022-00900-9
[3] Lai H, Levitt BB. The roles of intensity, exposure duration, and modulation on the biological effects of radiofrequency radiation and exposure guidelines. *Electromagn Biol Med* (2022) 41:230–255. doi: 10.1080/15368378.2022.2065683
[4] Lai H, Levitt BB. Cellular and molecular effects of non-ionizing electromagnetic fields. *Rev Environ Health* (2024) 39:519–529. doi: https://doi.org/10.1515/reveh-2023-0023
[5] Lin JC. Health and safety practices and policies concerning human exposure to RF/microwave radiation. *Front Public Health* (2025) 13: doi: 10.3389/fpubh.2025.1619781
[6] Lai H, Levitt BB. Radiofrequency radiation-induced gene expression. *Rev Environ Health*. 2025 Oct 29. doi: 10.1515/reveh-2025-0104.
[7] Henshaw DL, Philips A. A mechanistic understanding of human magnetoreception validates the phenomenon of electromagnetic hypersensitivity (EHS). *Int J Radiat Biol* (2025) 101:186–204. doi: 10.1080/09553002.2024.2435329
[8] McCredden JE, Cook N, Weller S, Leach V. Wireless technology is an environmental stressor requiring new understanding and approaches in health care. *Front Public Health* (2022) 10: doi: 10.3389/fpubh.2022.986315
[9] Davis D, Birnbaum L, Ben-Ishai P, Taylor H, Sears M, Butler T, Scarato T. Wireless technologies, non-ionizing electromagnetic fields and children: Identifying and reducing health risks. *Curr Probl Pediatr Adolesc Health Care* (2023) 53:101374. doi: 10.1016/j.cppeds.2023.101374
[10] U.S. Sen. Richard Blumenthal, *At Senate Commerce Hearing, Blumenthal Raises Concerns on 5G Wireless Technology's Potential Health Risks*, U.S. Senate Press Release. https://www.blumenthal.senate.gov/newsroom/press/release/at-senate-commerce-hearing-blumenthal-raises-concerns-on-5g-wireless-technologys-potential-health-risks
[11] Video Link https://www.youtube.com/watch?v=2QgGA_dLVYw

[12] Schuermann D, Mevissen M. Manmade Electromagnetic Fields and Oxidative Stress—Biological Effects and Consequences for Health. *Int J Mol Sci* (2021) 22:3772. doi: 10.3390/ijms22073772

[13] Yakymenko I, Tsybulin O, Sidorik E, Henshel D, Kyrylenko O, Kyrylenko S. (2016). Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation. *Electromagn BiolMed*, *35*(2), 186–202. doi:10.3109/15368378.2015.1043557

[14] Balmori A. Evidence for a health risk by RF on humans living around mobile phone base stations: From radiofrequency sickness to cancer. *Environ Res* (2022) 214:113851. doi: 10.1016/j.envres.2022.113851

[15] Hardell L, Nilsson M. Summary of seven Swedish case reports on the microwave syndrome associated with 5G radiofrequency radiation. *Rev Environ Health* (2025) 40:147–157. doi: 10.1515/reveh-2024-0017

[16] Sailo, L, Laldinpuii, Zosangzuali M, Weller S, Varte CL, Tochhawng L, … Zothansiama. (2025). Greater prevalence of symptoms associated with higher exposures to mobile phone base stations in a hilly, densely populated city in Mizoram, India. *Electromagn BiolMed*, *44*(4), 385–404.doi: 10.1080/15368378.2025.2513900

[17] Lin JC. Carcinogenesis from chronic exposure to radio-frequency radiation. *Front Public Health* (2022) 10:1042478. doi: 10.3389/fpubh.2022.1042478

[18] Melnick RL. Commentary on the utility of the National Toxicology Program study on cell phone radiofrequency radiation data for assessing human health risks despite unfounded criticisms aimed at minimizing the findings of adverse health effects. *Environ Res* (2019) 168:1–6. doi: 10.1016/j.envres.2018.09.010

[19] Falcioni, L., Bua, L., Tibaldi, E., Lauriola, M., De Angelis, L., Gnudi, F., Mandrioli, D., Manservigi, M., Manservisi, F., Manzoli, I., Menghetti, I., Montella, R., Panzacchi, S., Sgargi, D., Strollo, V., Vornoli, A., & Belpoggi, F. (2018). Report of final results regarding brain and heart tumors in Sprague-Dawley rats exposed from prenatal life until natural death to mobile phone radiofrequency field representative of a 1.8 GHz GSM base station environmental emission. *Environ Res*, 165, 496–503.

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

[21] Choi, Y-J, Moskowitz JM, Myung S=K, Lee Y-R, Hong Y-C. 2020. "Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis" *Int J Environ Res Public Health* 17, no. 21: 8079. doi: 10.3390/ijerph17218079

[22] Hardell L, & Carlberg M. (2019). Comments on the US National Toxicology Program technical reports on toxicology and carcinogenesis study in rats exposed to whole-body radiofrequency radiation at 900 MHz and in mice exposed to whole-body radiofrequency radiation at 1,900 MHz. *IntJ Oncology*, *54*(1), 111–127. https://doi.org/10.3892/ijo.2018.4606

[23] Prasad M, Kathuria P, Nair P, Kumar A, Prasad K. 2017. "Mobile phone use and risk of brain tumours: a systematic review of association between study quality, source of funding, and research outcomes." *Neurol Sci*.doi: 10.1007/s10072-017-2850-8

[24]Miller AB, Morgan LL, Udasin I, Davis DL. Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102). *Environ Res* (2018) 167:673–683. doi: 10.1016/j.envres.2018.06.043

[25] Hardell L, Carlberg M. Comments on the US National Toxicology Program technical reports on toxicology and carcinogenesis study in rats exposed to whole-body radiofrequency radiation at 900 MHz and in mice exposed to whole-body radiofrequency radiation at 1,900 MHz. *Int J Oncol* (2018) doi: 10.3892/ijo.2018.4606

[26] Levitt BB, Lai HC, Manville AM. Effects of non-ionizing electromagnetic fields on flora and fauna, part 1. Rising ambient EMF levels in the environment. *Rev Environ Health*. 2021 May 27;37(1):81-122. doi: 10.1515/reveh-2021-0026.

[27] Levitt BB, Lai HC, Manville AM. Effects of non-ionizing electromagnetic fields on flora and fauna, Part 2 impacts: how species interact with natural and man-made EMF. *Rev Environ Health*. 2021 Jul 8;37(3):327-406. doi: 10.1515/reveh-2021-0050.

[28] Levitt BB, Lai HC, Manville AM. Effects of non-ionizing electromagnetic fields on flora and fauna, Part 3. Exposure standards, public policy, laws, and future directions. *Rev Environ Health*. 2021 Sep 27;37(4):531-558. doi:10.1515/reveh-2021-0083.
[29] Levitt BB, Lai HC, Manville AM. Low-level EMF effects on wildlife and plants: What research tells us about an ecosystem approach. *Front Public Health* (2022) 10: doi: 10.3389/fpubh.2022.1000840

[30] Environmental Health Trust et al. v. Federal Communications Commission. (2021). https://www.fcc.gov/document/dc-circuit-decision-environmental-health-trust-v-fcc
[31] Landmark Federal Court Decision on Wireless Radiation Human Exposure Limits. https://ehsciences.org/lawsuit-wireless-radiation-safety/
[32] American Academy of Pediatrics. Letter in Support of the Cell Phone Right to Know to The Honorable Dennis Kucinich. (2012). Letter to the FCC Honorable Mignon L. Clyburn and FDA Honorable Dr. Margaret A. Hamburg Commissioner (2013); Letter to the FCC Honorable Julius Genachowski (2012) Available online at: https://icbe-emf.org/wp-content/uploads/2025/01/American-Academy-of-Pediatrics-Letters-to-FCC-and-Congress-on-cell-phone-radiation-health-effects-.pdf
[33] Fernández C, de Salles, AA., SearsM. E., Morris RD, & Davis D L Absorption of wireless radiation in the child versus adult brain and eye from cell phone conversation or virtual reality. Environmental Research (2018) 167, 694–699 https://doi.org/10.1016/j.envres.2018.05.013
[34] Mohammed B, Jin J, Abbosh AM, Bialkowski KS, Manoufali M and Crozier S, "Evaluation of Children's Exposure to Electromagnetic Fields of Mobile Phones Using Age-Specific Head Models with Age-Dependent Dielectric Properties," *IEEE Access* (2017) vol. 5, pp. 27345-27353, 2017, doi: 10.1109/ACCESS.2017.2767074
[35] Gandhi, O. P. (2019). Microwave Emissions from Cell Phones Exceed Safety Limits in Europe and the US When Touching the Body. *IEEE Access*, *7*, 47050–47052.
[36] Scarato T. U.S. policy on wireless technologies and public health protection: regulatory gaps and proposed reforms. Front Public Health (2025) In press.
[37] Soares NE, Bulla G, Fernández-Rodríguez CE, de Salles AA. "SAR Estimations in a Classroom with Wireless Computers" Journal of Microwaves, Optoelectronics and Electromagnetic Applications (2025) Vol. 24, No. 2, e2025288526 DOI: http://dx.doi.org/10.1590/2179-10742025v24i3288526
[38] Bhatt CR, Redmayne M., Billah B., Abramson MJ., & Benke, G. Radiofrequency-electromagnetic field exposures in kindergarten children. Journal of Exposure Science & Environmental Epidemiology (2017) 27(5), 497–504. https://doi.org/10.1038/jes.2016.55
[39] EMF Scientist International Appeal. 4G/5G antenna densification is escalating health risks – a global crisis [Internet]. New York, NY: EMFscientist.org; 22 Jul 2019 [cited 2025 Oct 29]. Available from: https://emfscientist.org/
[40] Kelley E, Blank M, Lai H, Havas M, Moskowitz J. International Appeal: Scientists call for protection from non-ionizing electromagnetic field exposure. European JOncol. 2015;20(3/4):180-182. Available from: https://www.mattioli1885journals.com/index.php/EJOEH/article/view/4971
[41] Environmental Health Sciences. *Doctors and scientists on cell phone radiation health effects* EHSciences.org; 2025. Available from: https://ehsciences.org/doctors-and-scientists-on-cell-phone-radiation-health-effects/
[42] Mevissen M, Ducray A, Ward JM, Kopp-Schneider A, McNamee JP, Wood AW, Rivero TM, Straif K. Effects of radiofrequency electromagnetic field exposure on cancer in laboratory animal studies, a systematic review. *Environ Int* (2025) 199:109482. doi: 10.1016/j.envint.2025.109482