

Corrections Needed for New York Times article on Cell Phone Radiation

The NYT article [Do I Need to Worry About Smartphone Radiation?](#) by Caroline Hopkins has numerous inaccurate and misleading statements. Critical information was omitted. Further, the article uses so-called experts who have not published in the field for years and thus the article presents a slanted, biased one sided view of the opinion of expert scientists falsely stating that there is consensus for cell phone safety.

The NYT should correct the false information, update the article with recent science and interview independent scientific experts who have published in the field to ensure a balanced article. Readers of the New York Times expect fact based unbiased information.

List of inaccuracies, critical omissions and unbalanced reporting

1. [Inaccurate statement by the NYT regarding agreement by federal agencies that there is no evidence that cell phone radiation is harmful.](#)
2. [Critical omission: The findings of cancer and DNA damage in the scientific studies of the National Toxicology Program.](#)
3. [Inaccurate statement and critical omission regarding the World Health Organization International Agency for Cancer classified cell phone radiation as possibly carcinogenic to humans based on scientific evidence finding an increased risk for brain cancer](#)
4. [Inaccurate statements that studies showing harm have been “debunked when numerous credible published studies show harm.](#)
5. [Inaccurate and misleading statements that studies showing harm from 5G have been “debunked”](#)
6. [Inaccurate statement that “There’s no risk of anything hazardous or dangerous with radiation from cellphones”](#)
7. [Critical Omission: The NYT omits the recommendations of numerous expert groups that the public reduce cell phone radiation exposure due to children’s unique vulnerability.](#)
8. [Critical Omission: Wireless companies warn their shareholders but they do not warn the users of these products, nor do they warn the people exposed to emissions from their products.](#)
9. [NYT quotes experts who have no expertise in the area of cell phone radiation bioeffects](#)
10. [NYT Critical Omission: Cell phone radiation limits in the USA have not changed for 27 years and are only based on protection for short term overeating.](#)
11. [NYT Critical omission: When phones are held in body contact, they can violate FCC limits.](#)
12. [NYT Critical Omission: Cell phones have fine print warnings most consumers are unaware instructing users to keep a distance from cell phones](#)
13. [NYT Critical Omission: NYT refuses to publish letters to NYT on the inaccuracies](#)

Inaccurate statement regarding agreement by federal agencies that there is no evidence that cell phone radiation is harmful.

The [article](#) inaccurately states that, “Most experts and health authorities like the F.D.A., Centers for Disease Control and Prevention and World Health Organization agree that there’s no evidence that smartphone radiation causes health problems.” However, none of these agencies has produced an up to date scientific health risk assessment on all of the up to date scientific evidence.

Recommended Factual Correction: The article should be corrected to state: The F.D.A., Centers for Disease Control and Prevention and World Health Organization have not reviewed all of the up to date science to make any safety determinations. In 2011, the World Health Organization International Agency for Cancer (WHO/IARC) classified cell phone radiofrequency radiation as possibly carcinogenic to humans (Group 2B), based on scientific evidence finding an increased risk for glioma, a malignant type of brain cancer, associated with wireless phone use. (See [WHO/ IARC 2011](#) press release).

Furthermore, the WHO/IAARC has not met to review the science since 2011, and in 2019 the WHO/IARC advisory group [recommended wireless be re-evaluated](#) as a “high priority” for a review - largely in part- due to the publication of recent large scale animal research studies ([Falconi. 2018](#); [NTP. 2018](#)) which found evidence for cancer.

Documentation

Fact: None of these agencies have evaluated the latest science on wireless radiation to issue a safety determination. Their website pages link to zero reports that include all of the issues identified as health effects such as impacts to reproduction, the immune system, the endocrine system and brain development. No US regulatory agency with health or environmental expertise has completed a risk analysis or systematic review based on the latest evidence. If such a report does exist, please share it.

Fact: The CDC has not done any research review on wireless radiation.

Several of the CDC web pages on wireless radiation [were drafted with an industry consultant](#). **A now retired top CDC expert now states that the research shows cell phone radiation likely causes cancer.** However, Chris Portier PhD, retired CDC Director of the National Center for Environmental Health and former Director of the Agency for Toxic Substances and Disease Registry submitted [scientific research review](#) in a major cell phone/brain cancer lawsuit where he concludes that “the evidence on an association between cellular phone use and the risk of glioma in adults is quite strong.”

Fact: The FDA has not evaluated the totality of the science to conclude any opinion on the safety of human exposure to wireless. All the FDA has done is to release a now well outdated literature review (ending in 2018) focused solely only on studies of cell phones and cancer. This literature review omitted studies on damage to DNA, the brain and reproduction. It omits any review of the research on cell towers, 5G and Wi-Fi. The FDA literature review is not

a systematic review nor is it a risk analysis and was heavily [criticized by numerous experts](#). The FDA refuses to share who wrote the literature review and when pressed they responded that it was “just a literature review.”

Fact: The EPA has not reviewed research on wireless for nearly 40 years.

The EPA used to have a team of about 30 people working on EMF bioeffects. They also coordinated with the FCC on an EMF monitoring program. Now they have no activities. More recently, [the EPA confirmed](#) they have no funded mandate nor dedicated staff to maintain expertise in the area of non ionizing EMF. Furthermore, they also stated they are not aware of any developed safety limits or research reviews related to impacts of wireless on birds, bees, wildlife and the natural environment.

[Critical omission: The findings of cancer and DNA damage in the scientific studies of the National Toxicology Program.](#)

The NYT article listed a few federal agencies as proof of no evidence but neglected to mention the conclusions of the National Toxicology Program which performed the [only major research of the US government](#) on cell phone radiation and found cancer and DNA damage.

Suggested correction for the NewYork Times: The National Toxicology Program of the National Institutes Health found [clear evidence of cancer in male rats](#) and [DNA damage in rats and mice](#) in their large scale \$30M animal studies of cell phone radiation requested by the FDA. In 1999, the FDA [nominated the NTP](#) to initiate large-scale animal studies in order to gain an understanding of the long-term effects of exposure to RFR stating that, “There is currently insufficient scientific basis for concluding either that wireless communication technologies are safe or that they pose a risk to millions of users. A significant research effort, involving large well-planned animal experiments is needed to provide the basis to assess the risk to human health of wireless communications devices.”

Documentation

The National Toxicology Program (NTP) of the National Institutes Health found clear evidence of cancer in male rats and DNA damage in rats and mice in their large-scale \$30M studies of cell phone radiation. The [final 2018 NTP reports](#) reported adverse effects- an association between RFR and malignant schwannomas (schwann cell tumors) of the heart, malignant gliomas of the brain and adrenal gland tumors in male rats. These results, as well as the findings of significantly increased DNA damage (strand breaks) in the brains of exposed rats and mice, reduced pup birth weights when pregnant dams were exposed to GSM- or CDMA-modulated RFR, and the induction of cardiomyopathy of the right ventricle in male and female rats clearly demonstrate increased risks of cancer, DNA and other damage.

The NTP findings are important because, in 2011, the International Agency for the Research on Cancer (IARC) classified radio frequency radiation as a “possible human carcinogen” based largely on increased risks of gliomas and acoustic neuromas (which are Schwann cell tumors on the acoustic nerve) among long term users of cell phones. One of the reasons the IARC decided not to classify RFR as a “probable” or “proven” carcinogen at that time was that there was a lack of experimental animal data that had investigated long term chronic exposure in a highly controlled setting. The fact that the tumors found in the NTP animal study are of the same cell type as tumors found elevated in people who use cell phones for many years strengthens the animal-to-human association.

After the FDA’s unfounded criticisms were posted Dr. Melnick, a 28-year NIH scientist who led the design of the NTP study, reviewed each criticism and provided the data explaining how each criticism was unfounded in [“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”](#) published in Environmental Research which concludes, “the expert peer-review panel clearly recognized the validity and biological significance of the adverse health effects produced in the NTP’s studies of cell phone RFR. The overall results from the NTP studies indicate that cell phone RFR is potentially carcinogenic to multiple organs of exposed people.”

Dr. Melnick published a second article on the unfounded criticisms leveled against the NTP entitled [“Regarding ICNIRP’S Evaluation of the National Toxicology Program’s Carcinogenicity Studies on Radiofrequency Electromagnetic Fields.”](#) Melnick’s papers address both ICNIRP and the FDA’s criticisms of the study including the issues of design, exposure levels, survival, relevance to humans, statistical power, pathology evaluations and more with data and statistics documenting each criticism is unfounded.

Further, Melnick explains how the NTP study results “clearly demonstrate the induction of proliferative lesions (tumors and hyperplasias in the brain and heart) by RFR in conventional animal models,” referencing how the Ramazzini Institute study also reported a significant increase in heart schwannomas in male Sprague-Dawley rats and how the incidence of heart Schwann cell hyperplasia was also increased. Melnick explains how the combined incidence of schwannomas and preneoplastic Schwann cell hyperplasias is highly significant. The RI findings “are consistent with the results from the NTP study and demonstrate that the proliferative effect of modulated RFR in heart Schwann cells is a reproducible finding.”

Hardell and Carlberg published a 2019 article "[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](#)" analyzing the NTP and RI data and they conclude that, "We conclude that there is clear evidence that RF radiation is a human carcinogen, causing glioma and vestibular schwannoma (acoustic neuroma). There is some evidence of an increased risk of developing thyroid cancer, and clear evidence that RF radiation is a multi-site carcinogen. Based on the Preamble to the IARC Monographs, RF radiation should be classified as carcinogenic to humans, Group 1."

As Dr. Melnick concludes, "Even a small increase in cancer risk could have a serious health impact due to the widespread use of cell phones (~300 million in the US and 5 billion worldwide). In the meantime, precautionary principles should be promoted by health and regulatory agencies, especially for children and pregnant women."

Scientists of the National Institute of Environmental Health Sciences National Toxicology Program published the findings of "significant increases in DNA damage" in groups of male mice, female mice and male rats after just 14 to 19 weeks of exposure to RFR ([Smith-Roe et al., 2020](#)).

The Environmental Working Group then published a study in Environmental Health analyzing the findings of tumor and heart damage from the National Toxicology Program study and concluded that FCC limits should be strengthened by 200 to 400 times to protect children according to current risk assessment guidelines ([Uche 2021](#)).

Inaccurate statement and critical omission regarding the World Health Organization International Agency for Cancer which classified cell phone radiation as possibly carcinogenic to humans based on scientific evidence finding an increased risk for brain cancer.

The NYT [article](#) inaccurately states that, "*Most experts and health authorities like the F.D.A., Centers for Disease Control and Prevention and World Health Organization agree that there's no evidence that smartphone radiation causes health problems.*"

The NYT omits that the World Health Organization International Agency for Cancer (WHO/IARC) classified cell phone radiofrequency radiation as possibly carcinogenic to humans (Group 2B), the WHO/IARC advisory group has recommended wireless be re-evaluated as a "high priority" within 5 years due - largely in part- to the recent large scale animal research studies ([Falconi, 2018](#); [NTP, 2018](#)) which found evidence for cancer ([IARC, 2019](#)).

Recommended Factual Correction for the NewYork Times:

In 2011, the World Health Organization International Agency for Cancer (WHO/IARC) classified cell phone radiofrequency radiation as possibly carcinogenic to humans (Group 2B), based on scientific evidence finding an increased risk for glioma, a malignant type of brain cancer, associated with wireless phone use. (See [WHO/ IARC 2011](#) press release). As that determination was a decade ago, the WHO/IARC advisory group now has recommended wireless be re-evaluated as a “high priority” within 5 years due - largely in part- to the recent large scale animal research studies ([Falconi, 2018](#); [NTP, 2018](#)) which found evidence for cancer ([IARC, 2019](#)).

A [2020 systematic review and meta-analysis](#) of case-control studies found evidence that linked cellular phone use to increased tumor risk. Cellular phone use with cumulative call time more than 1000 h statistically significantly increased the risk of tumors.

Numerous scientists who served in the 2011 WHO/IARC RF EMF working group state the weight of currently available, peer-reviewed evidence supports the updated determination that RF is a probable or proven human carcinogen ([Hardell and Carlberg 2019](#), [Miller et al. 2018](#), [Belpomme et al 2018](#), [European Parliament et al 2021](#)).

Documentation

The World Health Organization has not concluded “there is no evidence.” In May 2011, the World Health Organization International Agency for Cancer (WHO/IARC) classified cell phone radiofrequency radiation as possibly carcinogenic to humans (Group 2B), based on scientific evidence finding an increased risk for glioma, a malignant type of brain cancer, associated with wireless phone use. (See [WHO/ IARC 2011](#) press release).

The [2011 press release by the WHO](#) recommends reducing cell phone radiation stating;

"Given the potential consequences for public health of this classification and findings," said IARC Director Christopher Wild, "it is important that **additional research be conducted into the long- term, heavy use of mobile phones**. Pending the availability of such information, **it is important to take pragmatic measures to reduce exposure such as hands-free devices or texting.** "

However, the IARC/WHO has not met since then to review the latest scientific evidence. As that determination was a decade ago, the WHO/IARC advisory group now has recommended wireless be re-evaluated as a “high priority” within 5 years due - largely in part- to the recent large scale animal research studies ([Falconi, 2018](#); [NTP, 2018](#)) which found evidence for cancer ([IARC, 2019](#)).

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Inaccurate statements that studies showing harm have been “debunked”

Inaccurate Statement: “Still, several studies over the years have made headlines for suggesting their links to brain tumors. Many of these studies have since been debunked, Dr. Fine said...”

Fact: Studies have not been “debunked.”

The NYT should have asked what documents show studies which have been “debunked?” What studies is Dr. Fine referring to? The New York Times has a responsibility to its readers to investigate such statements and verify. It is egregious that the NYT would forward this to readers without checking or clarifying this statement as numerous studies have been published indicating bio-effects. Hundreds of studies show harm and these studies have not been “debunked.”

A 2023 study [Analysis of global DNA methylation changes in human keratinocytes immediately following exposure to a 900 MHz radiofrequency field](#) published in Bioelectromagnetics, found epigenetic effects, 114 genes that were “significantly differentially methylated,” in human skin cells after a single, one-hour exposure to very weak 900 MHz radiation—a frequency commonly used in wireless communications. The exposure was very low, less than 0.01 W/Kg—a fraction of 4W/kg, the level that current FCC standards assume to be the threshold for harmful RF effects. DNA methylation has [been described](#) as “a major epigenetic factor influencing gene activities and improper methylation of a single gene can have “drastic consequences.” The lead author is **Jody Cantu** of the Biological Effects Division of the US Air Force Research Lab at Fort Sam Houston.

Was this study debunked?

Recommended Factual Correction: This statement should be removed, numerically documented or clarified as to exactly what studies Dr. Fine is referring to. There are hundreds of studies showing harm. Have all of these studies been “debunked?” The studies which are not not “debunked” (whatever this means) should be presented to readers. The majority of studies show adverse effects.

Documentation

An ever growing body of [scientific evidence](#) links non-ionizing cell phone radiation to a broad range of harmful effects at at legally allowed levels including [cancer](#), [memory damage](#) and impacts on [brain development](#), [the endocrine system](#), [thyroid function](#), [reproduction](#), and [DNA/genetic damage](#) ([Panagopoulos et al. 2021](#), [Lai 2021](#), [Davis et al 2023](#), [ICBE-EMF 2022](#), [Lai and Levitt 2022](#)).

Yale researchers published a study supported by the American Cancer Society linking thyroid cancer to cell phone use in people with a type of common genetic variation ([Luo et al., 2020](#)). **Was this study debunked?**

A review on impacts to the thyroid found RFR might be associated with alterations in thyroid hormone levels, with a possible disruption in the hypothalamic-pituitary-thyroid axis ([Alkayyali et al., 2021](#)). **Were these studies debunked?**

A systematic review on the effects of RFR to male reproductive hormones found that wireless can decrease testosterone ([Maluin et al. 2021](#)). **Were these studies debunked?**

A systematic review published in the Annals of the New York Academy of Sciences found that neuronal ion channels are particularly affected ([Bertagna et al 2021](#)). **Were these studies debunked?**

Fact: The majority of studies show effects.

The respected journal Lancet Planetary Health published [Bandara and Carpenter 2018](#) that states: “A recent evaluation of 2,266 studies (including in-vitro and in-vivo studies in human, animal, and plant experimental systems and population studies) found that most studies (n=1546, 68·2%) have demonstrated significant biological or health effects associated with exposure to anthropogenic electromagnetic fields. We have published our preliminary data on radiofrequency electromagnetic radiation, which shows that 89% (216 of 242) of experimental studies that investigated oxidative stress endpoints showed significant effects. This weight of

scientific evidence refutes the prominent claim that the deployment of wireless technologies poses no health risks at the currently permitted non-thermal radiofrequency exposure levels.”

In 2022, Henry Lai PhD updated his reports on published studies finding effects from RFR and non ionizing radiation. He posted this analysis as well as [all the abstracts for the studies](#).

- Neurological RFR studies report effects in 73 % of studies on RF radiation -- or 244 of 355 studies. ([Bioinitiative 2022](#)).
- Genetic effect studies report effects in 68 % of studies on RF radiation -- or 291 of 423 studies ([Bioinitiative 2022](#)).
- Free Radical (Oxidative Damage) effect studies report effects in 91 % of studies on RF radiation -- or 263 of 288 studies ([Bioinitiative 2022](#)).
- RFR Comet Assay effect studies report effects in 65 % of studies on RF radiation -- or 78 of 125 studies ([Bioinitiative 2020](#)).

A review concluding that the majority of [animal and cell studies](#) find non ionizing EMF exposure leads to increased oxidative stress was published by [Schuermann and Mevissen, in 2021](#).

Oxidative stress contributes to many chronic illnesses including cancer, immunological dysfunction and neurodegenerative diseases.

Here is just a small sampling of studies for the NYT to reference:

- Dasdag, S., Muzaffer T., Mehmet Z.A., & Korkut Y., (2015) [Effect of long-term exposure of 2.4 GHz radiofrequency radiation emitted from Wi-Fi equipment on testes functions](#). *Electromagnetic Biology and Medicine*, 34:1, 37-42
- Jangid, P., Rai, U., Sharma, R. S., & Singh, R. (2022). [The role of non-ionizing electromagnetic radiation on female fertility: A review](#). *International Journal of Environmental Health Research*, 0(0), 1–16.
- Maluin, S. M., Osman, K., Jaffar, F. H. F., & Ibrahim, S. F. (2021). [Effect of Radiation Emitted by Wireless Devices on Male Reproductive Hormones: A Systematic Review](#). *Frontiers in Physiology*, 12.
- Yu, G., Bai, Z., Song, C., Cheng, Q., Wang, G., Tang, Z., & Yang, S. (2021). [Current progress on the effect of mobile phone radiation on sperm quality: An updated systematic review and meta-analysis of human and animal studies](#). *Environmental Pollution*, 282, 116952.
- Chongchitpaisan, W., Wiwatanadate, P., Tanprawate, S., Narkpongphan, A., & Siripon, N. (2021). [Trigger of a migraine headache among Thai adolescents smartphone users: A time series study](#). *Environmental Analysis Health and Toxicology*, 36(1).
- Farashi, S., Bashirian, S., Khazaei, S., Khazaei, M., & Farhadinasab, A. (2022). [Mobile phone electromagnetic radiation and the risk of headache: A systematic review and](#)

[meta-analysis](#). *International Archives of Occupational and Environmental Health*, 95(7), 1587–1601.

- Lerchl, A., Klose, M., Grote, K., Wilhelm, A. F. X., Spathmann, O., Fiedler, T., Streckert, J., Hansen, V., & Clemens, M. (2015). [Tumor promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans](#). *Biochemical and Biophysical Research Communications*, 459(4), 585–590.
- Zhao, L., Yao, C., Wang, H., Dong, J., Zhang, J., Xu, X., Wang, H., Yao, B., Ren, K., Sun, L., & Peng, R. (2022). [Immune Responses to Multi-Frequencies of 1.5 GHz and 4.3 GHz Microwave Exposure in Rats: Transcriptomic and Proteomic Analysis](#). *International Journal of Molecular Sciences*, 23(13), 6949.
- Zhu, R., Wang, H., Xu, X., Zhao, L., Zhang, J., Dong, J., Yao, B., Wang, H., Zhou, H., Gao, Y., & Peng, R. (2021). [Effects of 1.5 and 4.3 GHz microwave radiation on cognitive function and hippocampal tissue structure in Wistar rats](#). *Scientific Reports*, 11(1), 10061.
- Lai, H. (2021). [Genetic effects of non-ionizing electromagnetic fields](#). *Electromagnetic Biology and Medicine*, 40(2), 264–273.
- Cantu, J. C., Butterworth, J. W., Peralta, X. G., Payne, J. A., & Echchgadda, I. (2023). [Analysis of global DNA methylation changes in human keratinocytes immediately following exposure to a 900 MHz radiofrequency field](#). *Bioelectromagnetics*, 44(3–4), 77–89.
- Luo, J., Li, H., Deziel, N. C., Huang, H., Zhao, N., Ma, S., Ni, X., Udelsman, R., & Zhang, Y. (2020). [Genetic susceptibility may modify the association between cell phone use and thyroid cancer: A population-based case-control study in Connecticut](#). *Environmental Research*, 182, 109013.
- Smith-Roe, S. L., Wyde, M. E., Stout, M. D., Winters, J. W., Hobbs, C. A., Shepard, K. G., Green, A. S., Kissling, G. E., Shockley, K. R., Tice, R. R., Bucher, J. R., & Witt, K. L. (2020). [Evaluation of the genotoxicity of cell phone radiofrequency radiation in male and female rats and mice following subchronic exposure](#). *Environmental and Molecular Mutagenesis*, 61(2), 276–290.
- Aldad, T. S., Gan, G., Gao, X.-B., & Taylor, H. S. (2012). [Fetal Radiofrequency Radiation Exposure From 800-1900 Mhz-Rated Cellular Telephones Affects Neurodevelopment and Behavior in Mice](#). *Scientific Reports*, 2(1), 312.
- Tan B, Canturk Tan F, Yalcin B, Dasdag S, Yegin K, Yay AH. (2022) [Changes in the histopathology and in the proteins related to the MAPK pathway in the brains of rats exposed to pre and postnatal radiofrequency radiation over four generations](#) [published online ahead of print, 2022 Oct 29]. *J Chem Neuroanat*.126:102187
- Bektas, H., Bektas, M. S., & Dasdag, S. (2018). [Effects of mobile phone exposure on biochemical parameters of cord blood: A preliminary study](#). *Electromagnetic Biology and Medicine*, 37(4), 184–191.

- Dasdag et al. "[Effects Of 2.4 Ghz Radiofrequency Radiation Emitted From Wi-Fi Equipment On microRna Expression In Brain Tissue.](#)" International Journal of Radiation Biology, vol. 16, 2015, pp. 1-26.
 - [Read more studies here](#)
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Inaccurate statements that studies showing harm from 5G have been "debunked"

Inaccurate Statement: The NYT states, "Many of these studies have since been debunked, Dr. Fine said, including those focused on fifth-generation [mobile networks, or 5G.](#)"

Fact: Studies on 5G frequencies and health have not been debunked and the NYT has a responsibility to fact check this statement. In fact, there are very few studies on the biological effects of 5G technology specifically and yet numerous studies on biological impacts of the low band non ionizing frequencies which will be in use in 5G networks 5G cannot be considered safe.

European Parliament requested a research report "[Health Impact of 5G](#)" released in July 2021 concluding that commonly used RFR frequencies (450 to 6000 MHz) are probably carcinogenic for humans *and* clearly affect male fertility with possible adverse effects on the development of embryos, fetuses and newborns. **Was this analysis debunked?**

As Dr. Joel Moskowitz [states](#),

To date, little research has been published on the biological or health effects of 5G. According to [EMF-Portal](#), an archive that contains more than 40,000 publications on electromagnetic fields, of the 610 papers published on "5G," [only 23 were medical/biological studies](#) (as of September 4, 2023). The 23 studies reported evidence of oxidative stress and adverse effects on the neuroendocrine system, the cardiovascular system, sleep quality, sperm quality, bone quality, gene expression, and sensorimotor responses. Most studies used animal models and short-term exposures to microwave radiation (especially continuous wave 3.5 GHz).

However, only four of these 23 studies actually tested the effects of 5G. The biologic and health effects associated with exposure to 5G radiation depend on more than just the carrier frequency. Although these 23 studies employed carrier frequencies used in 5G (e.g., 3.5 GHz, 27-28 GHz), only four studies tested exposures with 5G modulation and had other 5G components (e.g., beamforming, massive MIMO) that are likely to affect

the nature and extent of biological or health effects from exposure. Most studies employed a continuous wave generator whereas 5G requires a complex modulated OFDM signal.

Here are some of the studies on 5G technology and the higher frequency bands used in 5G that the NYT should reference:

An Oregon State University study on zebrafish exposed to 3.5 GHz ([Dasgupta et al. 2022](#)) found “significant abnormal responses in RFR-exposed fish” which “suggest potential long-term behavioral effects. [Yang et al 2022](#) found 3.5 GHz induced oxidative stress in guinea pigs.

Male rats exposed to a 5G base station (4 months) that transmitted at 3.6 GHz, 28 GHz, and 36 GHz had moderately increased stress on the neuroendocrine system ([Perov et al 2022](#)).

A study on 3.5 GHz exposure to both diabetic and healthy rats ([Bektas et al 2022](#)) found an increase in degenerated neurons in the hippocampus of the brains, changes in oxidative stress parameters and changes in the energy metabolism and appetite of both healthy and diabetic rats. The researchers conclude that, “5G may not be innocent in terms of its biological effects, especially in the presence of diabetes.”

Studies on rats have found exposure to both 1.5 and 4.3 GHz microwaves induced: cognitive impairment and hippocampal tissue damage ([Zhu et al 2021](#)); impairments in spatial learning and memory, with the combined simultaneous exposures resulting in the most most severe effects ([Wang et al 2022](#)); and immune suppressive responses ([Zhao 2022](#)). Long-term exposure to 2.856 and 9.375 GHz microwaves impaired learning and memory abilities as well as EEG disturbance, structural damage to the hippocampus, and differential expression of hippocampal tissue and serum exosomes ([Wang et al. 2023](#)).

Studies on fruit flies exposed to 3.5 GHz have found the exposure led to increases in oxidative stress, changes in the microbial community ([Wang et al 2022](#)) and alterations of the expression of several types of genes ([Wang et al 2021](#)).

A review by [Russell 2018](#) found evidence for millimeter wave effects to the skin, eyes, immune system, gene expression, and bacterial antibiotic resistance. While recent experimental research on high-band 5G impacts to animal fertility found that 27 GHz damages sperm quality in mussels ([Pecoraro et al 2023](#)), the US is not funding any research on biological effects of frequencies at 3.5 GHz or above 6GHz to humans.

Recommended correction:

The NYT should reference the current body of science on 5G modulation and the lack of studies indicating safety after long term exposure. The NYT should reference the 5 case reports on

symptoms reported after 5 installations.

Five published case reports document illness that developed after 5G antennas were installed.

In [Hardell L. and Nilsson M. \(2023\)](#) a 52-Year healthy woman developed severe microwave syndrome shortly after installation of a 5G base station close to her apartment.

In [“The Microwave Syndrome after Installation of 5G Emphasizes the Need for Protection from Radiofrequency Radiation” \(Hardell and Nilsson 2023\)](#), a man and woman developed microwave syndrome symptoms (e.g., neurological symptoms, tinnitus, fatigue, insomnia, emotional distress, skin disorders, and blood pressure variability) after a 5G base station was installed on the roof above their apartment.

Similarly, in [“Development of the Microwave Syndrome in Two Men Shortly after Installation of 5G on the Roof above their Office”](#) two men developed symptoms after 5G antennas were activated on the roof of their workplace. The symptoms disappeared in both men within a couple of weeks (case 1) or immediately (case 2) after leaving the office.

In [5G Radiofrequency Radiation Caused the Microwave Syndrome in a Family Living Close to the Base Stations](#) a family of three living at distances of about 50 and 70 meters to two 5G base stations reported symptoms included in the microwave syndrome. The daughter had the most severe health issues, for example sleeping problems, headache, concentration and memory problems, skin disorders, irregular heartbeat, light sensitivity, anxiety and panic attacks.

In Nilsson M, Hardell L (2023) [“A 49-Year-Old Man Developed Severe Microwave Syndrome after Activation of 5G Base Station 20 Meters from his Apartment”](#) published in the Journal of Community Med Public Health a man rather immediately developed a variety of symptoms that are part of the microwave syndrome including headache, dysesthesia (abnormal sensation), loss of immediate memory, high and irregular pulse, chest squeeze, burning and lancinating skin after a 5G base station was installed 20 meters from his apartment. After moving to another apartment with low RF radiation the symptoms disappeared or decreased within a short time period but they reappear whenever he returns to his apartment close to the 5G antennas.

In addition, the NYT should cite the following published papers regarding 5G:

The study, "[Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limit determinations for radiofrequency radiation: implications for 5G](#)" by the International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF) which highlights studies that found cancer, increased production of ROS and mutagenic effects that "demonstrate the fallacy of inherent assumptions in the FCC/ICNIRP guidelines for RF radiation exposure limits." The paper by international experts states "we find that the limits fail to protect human and environmental health" and concludes regarding 5G that "there are too many uncertainties with exposure to 5G to support an assumption of safety without adequate health effects data. There are no adequate studies on health effects from short-term or long-term exposures to 5G radiation in animal models or in humans."

Lin, J. C. (2023) [Incongruities in recently revised radiofrequency exposure guidelines and standards](#) published in *Environmental Research* which states of FCC and ICNIRP limits that:

These limits are devised largely for restricting short-term heating by RF radiation to raise tissue temperatures. They [FCC and ICNIRP] disregarded decisions by scientific organizations such as IARC. Furthermore, the limits are based on obsolete information, circumvent important animal data, and even more so in the case of mm-wave radiation from 5G mobile communications for which there is a paucity of health effects studies in the published literature. They are flawed and are not applicable to long-term exposure at low levels.

McCredden, J. E., Weller, S., & Leach, V. (2023). [The assumption of safety is being used to justify the rollout of 5G technologies](#) published in *Frontiers in public health*

The mmWave evidence base that has been made visible in this article suggests that plausible health effects cannot be ruled out, and that urgent action is needed on two fronts:

1. Further sound scientific research, done carefully, using the best laboratory practices and sufficiently large samples to produce significant results, funded and overseen by trusted bodies with appropriate expertise (38).
2. Precautionary actions to be taken by policy makers via use of risk aversion strategies such as the actions recommended in an EU commissioned report [(47), p. 152–153]. Risk aversion constitutes good leadership.

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](#). Publications Office of the European Union.

- European Parliament requested a research report "[Health Impact of 5G](#)" which was released in July 2021 and concluded that commonly used RFR frequencies (450 to 6000 MHz) are probably carcinogenic for humans and clearly affect male fertility with possible adverse effects on the development of embryos, fetuses and newborns.

Inaccurate statement that "There's no risk of anything hazardous or dangerous with radiation from cellphones"

The NYT should fact check before putting forward inaccurate statements by individuals without expertise in the area. NYT has a responsibility to readers to ensure factual accuracy.

Fact: Extensive published scientific evidence indicates that radiofrequency radiation at levels compliant with federal government limits can cause [cancer](#), [increased oxidative stress](#), [genetic damage](#), structural and functional changes of the [reproductive system](#), [memory deficits](#), [behavioral problems](#), and [neurological impacts](#). Numerous experts consider radiofrequency radiation (RFR) to be a human carcinogen based on the [current body](#) of evidence.

Suggested corrections: The NYT needs to list the critical health endpoints that scientists have linked to cell phone radiation exposure.

Documentation

"The majority of animal and cell studies have found nonionizing RFR can induce oxidative stress—a key characteristic of human carcinogens and a way that RFR can initiate or promote tumor development as well as play a role in the development of other diseases."

Linda S. Birnbaum, PhD

Former Director, National Institute of Environmental Health Sciences and National Toxicology Program of the National Institutes of Health. She is currently a Scholar in Residence at the Nicholas School of the Environment at Duke University.

Read her and colleagues [Journal of National Cancer Institute Letter](#)

"The National Toxicology Program studies clearly showed that non-ionizing cell phone radiofrequency radiation can cause cancers and other adverse health effects. An important

lesson that should be learned is that we cannot assume any current or future wireless technology such as 5G is safe without adequate testing.” -**Ronald Menick PhD**

28 year scientist at National Institutes of Health, now retired. He led the design of the National Institutes of Health National Toxicology Program animal studies on cell phone radiation.

[Opinion in The Hill](#)

“To safeguard young people’s well-being, we suggest limiting their use of cellphones and cordless phones to less than 15 minutes daily, and employing a speaker-phone device for longer daily use. We recommend parental measures are taken to prevent young people being woken by their cell phones.”

[The relationship between adolescents’ well-being and their wireless phone use: a cross-sectional study | Environmental Health](#)

“The lowest level of RF EMF at which the effect in EEG was detected is 2.45 V/m (SAR = 0.003 W/kg). ...The changes in EEG caused by RF EMF appeared similar in the majority of analyzed studies and similar to these in depression. The possible causal relationship between RF EMF effect and depression among young people is highly important problem.”

[Threshold of radiofrequency electromagnetic field effect on human brain](#)

The overwhelming scientific investigations concerning the health effects of NIR have highlighted their potential to affect the well-being of biological organisms. Some of the documented bioeffects include changes in melatonin levels, induction of heat shock protein (hsp), effects on spatial memory [27, 28], alteration of intracellular calcium concentration [29], changes in blood-brain-barrier permeability (BBB) [30], enzyme activity [31], genotoxicity [32, 33], nonspecific disabilities, and subjective symptoms [34–37] to name a few. Also, radiation exposure from mobile phones (MPs) has been linked with tinnitus, brain tumors, and acoustic neuroma [38–41]. Additionally, studies at cellular/molecular level are important in illuminating the actual primary injury produced by EMFs [17, 27].

<https://www.hindawi.com/journals/ab/2014/198609/>

“Numerous studies have shown that electromagnetic radiation of a certain intensity can cause injuries to the brain, heart, reproductive organs, and other organs, among which the brain is an especially consequential target.”

[“The dose-dependent effect of 1.5-GHz microwave exposure on spatial memory and the NMDAR pathway in Wistar rats](#)

“Radiofrequency electromagnetic waves emitted from cell phones may lead to oxidative stress

in human semen. We speculate that keeping the cell phone in a trouser pocket in talk mode may negatively affect spermatozoa and impair male fertility.”

[Effects of radiofrequency electromagnetic waves \(RF-EMW\) from cellular phones on human ejaculated semen: an in vitro pilot study - Fertility and Sterility](#)

Critical Omission: The NYT omits the recommendations of numerous expert groups that the public reduce cell phone radiation exposure due to children’s unique vulnerability.

The NYT misleadingly and inaccurately states that “most experts and health authorities agree” that there’s no evidence that smartphone radiation causes health problems. This inaccurate statement is not based on facts regarding the number of experts as hundreds of scientists are calling to reduce exposure. T

Fact: In France [cell phone radiation consumer information](#) states “Keep radio equipment away from the belly of pregnant women, and away from the lower abdomen of adolescents.”

Fact: Worldwide, over 20 countries clearly recommend that children reduce cell phone radiation exposure and several have banned the sale and advertising of cell phones to young children.

Numerous countries also label cell phones for radiation at point of sale and have robust radiation post market compliance programs ([Davis et al 2023](#)). The [Parliamentary Assembly of the Council of Europe](#), [Austrian](#), [Vienna](#), [Cyprus](#) and [Athens](#) Medical Associations, the [International Doctors for the Environment](#) and [hundreds of scientists](#) all recommend reducing child’s exposure to wireless radiation.

Fact: In the US, the [American Academy of Pediatrics](#), [California Department of Health](#) as well as [California Department of Health](#), [Maryland State Children’s Environmental Health and Protection Advisory Council](#), [New Jersey Education Association](#), [New Hampshire State 5G Commission](#) and [Santa Clara Medical Association](#) have released advisories to reduce wireless radiation.

Fact: Children are considered more vulnerable. This is because children absorb higher levels of wireless radiation [deeper](#) into their brain compared to adults because they have thinner skulls, smaller heads and a higher water content in their brains ([Fernandez et al 2018](#), [Mohammed et al. 2017](#)). Furthermore, children’s rapidly developing brains are [uniquely sensitive](#) due to their

rapidly developing brains and systems ([Markova et al., 2010](#), [Redmayne and Johansson, 2014](#) and [2015](#)).

Recommended Correction: The New York Times should quote the [American Academy of Pediatrics](#), and include information on what other expert organizations and entire countries are doing to inform the public to reduce exposure. The expert recommendations of the [American Academy of Pediatrics](#), [California Department of Health](#) as well as [California Department of Health](#), [Maryland State Children's Environmental Health and Protection Advisory Council](#), [New Jersey Education Association](#), [New Hampshire State 5G Commission](#) and [Santa Clara Medical Association](#) should be referenced.

Critical Omission: Wireless companies warn their shareholders but they do not warn the users of these products, nor do they warn the people exposed to emissions from their products.

Fact: Wireless companies warn their shareholders of a financial risk should they lose lawsuits or should regulations change regarding radiofrequency radiation. Wireless companies [warn their shareholders](#) but they do not warn the users of these products, nor do they warn the people exposed to emissions from their products and infrastructure. These corporate investor [warnings](#) by companies such as [AT&T](#), [Verizon](#), [Vodafone](#) and [Crown Castle](#) are contained in their Annual Reports filed on Form 10-K (or Form 20-F or 40-F for foreign companies) with the Securities and Exchange Commission (SEC) and they clearly inform shareholders that companies may incur significant financial losses related to electromagnetic fields. Safety is not assured.

- Verizon Wireless warns their shareholders in their [10-K form](#) to the US Securities and Exchange Commission that: "Our wireless business also faces personal injury and wrongful death lawsuits relating to alleged health effects of wireless phones or radio frequency transmitters. We may incur significant expenses in defending these lawsuits. In addition, we may be required to pay significant awards or settlements."
- As another example, Crown Castle states in their [2020 Annual Report](#), "If radio frequency emissions from wireless handsets or equipment on our communications infrastructure are demonstrated to cause negative health effects, potential future claims could adversely affect our operations, costs or revenues. The potential connection between radio frequency emissions and certain negative health effects, including some forms of cancer, has been the subject of substantial study by the scientific community in recent years. We cannot guarantee that claims relating to radio frequency emissions will

not arise in the future or that the results of such studies will not be adverse to us...If a connection between radio frequency emissions and possible negative health effects were established, our operations, costs, or revenues may be materially and adversely affected. We currently do not maintain any significant insurance with respect to these matters.”

- Wireless companies themselves define non-ionizing radiation as a “pollutant”. Both [AT&T Mobile Insurance \(pg. 4\)](#) and [Verizon Total Mobile Protection\(page 10\)](#) state that coverage is excluded for pollutants, which are defined as “Any solid, liquid, gaseous, or thermal irritant or contaminant including smoke, vapor, soot, fumes, acid, alkalis, chemicals, artificially produced electric fields, magnetic field, electromagnetic field, sound waves, microwaves, and all artificially produced ionizing or non-ionizing radiation and waste.”
- [Insurers](#) rank 5G and electromagnetic radiation as a “high” risk, comparing the issue to lead and [asbestos](#). A 2019 Report by [Swiss Re Institute](#), a world leading provider of insurance, classifies 5G mobile networks as a “high”, “off-the-leash” risk stating, “Existing concerns regarding potential negative health effects from electromagnetic fields (EMF) are only likely to increase. An uptick in liability claims could be a potential long-term consequence” and “[a]s the biological effects of EMF in general and 5G in particular are still being debated, potential claims for health impairments may come with a long latency.”
- US Mobile operators have been [unable to get insurance](#) to cover liabilities related to damages from long term exposure to radiofrequency emissions for over a decade.
- Due to the high risk that electromagnetic (EMF) field exposure poses, many insurance companies do not cover electromagnetic fields as standard practice and have very clear “electromagnetic field exclusions.” EMFs are classified as a “pollutant” alongside smoke, chemicals and asbestos. [A&M Insurance for Medical Professionals – No Coverage for Electromagnetic Fields](#) states “GENERAL INSURANCE EXCLUSIONS: Electromagnetic fields directly or indirectly arising out of, resulting from or contributed to by electromagnetic fields, electromagnetic radiation, electromagnetism, radio waves or noise.”
- If you want insurance that will cover EMFs you often have to purchase additional “[Pollution Liability](#)” or “Policy Enhancement” coverage.
 - The Electromagnetic Fields Exclusion (Exclusion 32) is a General Insurance Exclusion and is applied across the market as standard. The purpose of the exclusion is to exclude cover for illnesses caused by continuous long-term non-ionising radiation exposure i.e. through mobile phone usage.” - CFC Underwriting LTD in London, the UK agent for Lloyd’s
 - Complete Markets “[Electromagnetic Fields \(Utilities\) Liability Insurance](#)” states: “Classified alongside chemicals, smoke, and asbestos as “pollutants” electromagnetic fields (EMF) poses a high risk to various persons such as users of electrical power, electrical power generating companies, power transmission companies, and large generators. Sources of possible EMF health risks include radio frequencies, extremely low frequencies, and static magnetic fields. In

homes, EMF exposures come from electrical appliances. The public has targeted cell phone manufacturers and electric power lines as likely EMF targets. Electromagnetic Fields (Utilities) Liability Insurance is a way for prudent companies to minimize exposure to vexatious litigation and adverse publicity.

- Some insurance companies not only exclude coverage for harm, but also exclude coverage for defense related to recommendations that should or should not have been given. For example, the [City of Ann Arbor Michigan Insurance Policy: Electromagnetic Radiation Exclusion](#) not only excludes mitigation and harm from electromagnetic radiation but also excludes paying for the defense of “any supervision, instruction, recommendation, warning or advice given or which should have been given in connection with bodily injury, property damage, abatement and/or mitigation etc. ([page 14](#))

NYT quotes experts who have no expertise in the area of cell phone radiation bioeffects

None of the NYT sources have any recent publications regarding cell phone radiation bioeffects that we are aware of. If one exists in the last decade, we apologize in advance. We searched pubmed and the emf portal but found none.

Recommended correction for the NYT:

The NYT should request the opinions of experts who have published in the field and ensure that sources are absent of corporate funding.

Examples of authors who have recent publications

- Belpomme, D., Hardell, L., Belyaev, I., Burgio, E., & Carpenter, D. O. (2018). [Thermal and non-thermal health effects of low intensity non-ionizing radiation: An international perspective](#). *Environmental Pollution*, 242, 643–658.
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- Davis, D., Birnbaum, L., Ben-Ishai, P., Taylor, H., Sears, M., Butler, T., & Scarato, T. (2023). [Wireless technologies, non-ionizing electromagnetic fields and children:](#)

Identifying and reducing health risks. *Current Problems in Pediatric and Adolescent Health Care*, 53(2), 101374.

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- 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. Publications Office of the European Union.
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- International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF), (2022). Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limit determinations for radiofrequency radiation: implications for 5G. *Environ Health*. Oct 18;21(1):92.
-
- Lai H, Levitt BB. (2023) Cellular and molecular effects of non-ionizing electromagnetic fields. *Rev Environ Health*.
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- McCredden, J. E., Cook, N., Weller, S., & Leach, V. (2022). Wireless technology is an environmental stressor requiring new understanding and approaches in health care. *Frontiers in Public Health*, 10.
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- Miller, A. B., Morgan, L. L., Udasin, I., & Davis, D. L. (2018). Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102). *Environmental Research*, 167, 673–683.
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- Panagopoulos, D. J., Karabarbounis, A., Yakymenko, I., & Chrousos, G. P. (2021). Human-made electromagnetic fields: Ion forced-oscillation and voltage-gated ion channel dysfunction, oxidative stress and DNA damage (Review). *International Journal of Oncology*, 59(5), 92.

Documentation

NYT Source	Link to Author in pub med	Link to latest paper on cell phone wireless radiofrequency and biological impacts
Dr. Howard Fine	Pubmed profile for author shows no recent publications on non ionizing radiofrequency, or cell phones and health https://pubmed.ncbi.nlm.nih.gov/?term=Fine+HF&sort=date EMF portal search finds nothing https://www.emf-portal.org/en/article/search/v2/results?query=author%3D%22howard+fine%22	Can't find any recent publications on cell phone radiation

	Invivox profile https://invivox.com/en/profile/2432	
Gayle Woloschak	Pubmed profile for author shows no recent publications on non ionizing radiofrequency, or cell phones and health https://pubmed.ncbi.nlm.nih.gov/?term=Gayle+Woloschak&sort=date EMF portal search finds nothing https://www.emf-portal.org/en/article/search/v2/results?query=author%3D%22Gayle+Woloschak%22	Note: Gayle Woloschak is part of NCRP which has not published any review on wireless radiation since 1986 Further it seems Gayle Woloschak has expertise in nuclear radiation but not non ionizing radiation. Cant find any recent publications on cell phone radiation
Emily Caffrey	Pubmed search https://pubmed.ncbi.nlm.nih.gov/?term=Emily+Caffrey&sort=date Pubmed search with middle initial https://pubmed.ncbi.nlm.nih.gov/?term=Caffrey+EA&sort=date EMF portal search finds nothing https://www.emf-portal.org/en/article/search/v2/results?query=author%3D%22Emily+Caffrey%22 We note that some of the authors publications show funding by the industry creating the ionizing radiation pollution . For example https://journals.lww.com/health-physics/fulltext/2023/04000/potential airborne_releases_and_deposition_of.3.aspx was funded by Boeing. Source of funding: The Boeing Company. She has a consulting firm Radian Scientific, LLC See her CV here https://www.racteam.com/wp-content/uploads/2016/05/EAC_CV_May2016.pdf	Can't find any recent publications on cell phone radiation https://pubmed.ncbi.nlm.nih.gov/?term=Caffrey+EA+radio-frequency&sort=date

	January CV https://racteam.com/wp-content/uploads/2022/05/CaffreyEA_CV_Jan2022.pdf	
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NYT Critical Omission: Cell phone radiation limits in the USA have not changed for 27 years and are only based on protection for short term overheating.

The issue: The NYT article says “Still, the Federal Communications Commission and its international counterparts [set radiation limits for new phones](#), “ but nowhere mentions the FCC limits were set in 1996 and remain unchanged.

Suggested correction

The NYT article should say “Still, the Federal Communications Commission and its international counterparts set radiation limits for new phones in 1996 to protect for overheating from short term exposure. FCCs limits are not designed to protect against chronic long term exposure as people experience today. A 2021 court ruling in a lawsuit against the FCC found the FCC had ignored the issue of long term impact as well as environmental impacts such as harm to bees and insects.

Documentation:

On August 13, 2021, the United States Court of Appeals for the District of Columbia Circuit [ruled in our case](#) against the FCC that the decision by the Federal Communications Commission (FCC) not to update it’s 1996 safety limits for human exposure to wireless radiation (which includes cell tower emissions) was “arbitrary and capricious.” One of the most important aspects of the court decision was that the court found the FCC did not adequately explain why it ignored scientific evidence on impacts from long term wireless radiation exposure, especially in regards to children, who the American Academy of Pediatrics states are more vulnerable to wireless radiation. The court ordered the FCC to examine the record evidence regarding long term exposure to children. So far, the FCC has not responded. Thus, this landmark [ruling](#) highlights how no federal health agency has reviewed the full body of current research to ensure current safety standards are protective.

Federal Agencies confirming FCC limits are for short term heating effects

EPA: In 2002: Norbert Hankin of [EPA clarified that the FCC's 1996 RF limits do not protect against all effects](#) as, “federal health and safety agencies have not yet developed policies concerning possible risk from long-term, nonthermal exposures. “

“The standards are intended to prevent adverse health effects that may be associated with tissue heating, but are not intended to address low intensity (nonthermal), longterm (chronic) exposures. Investigation as to whether there may be effects from exposures too low to cause heating is continuing.”

[George Brozowski Regional Health Physicist | US EPA 2014 Letter](#)

More recently, the EPA has confirmed the EPA's lack of research activities and expertise. Two letters from Lee Ann B. Veal, the Director of EPA's Radiation Protection Division Office of Radiation and Indoor Air to EHT's Theodora Scarato state that 1. they have no funded mandate nor dedicated staff to maintain expertise in the area of wireless and non ionizing EMF, 2. Evaluation and sharing academic EMF research is “outside of EPA's expertise” 3. They have no EMF or RF environmental monitoring and measuring program, 4.

Furthermore, they also stated they are not aware of any developed safety limits or research reviews related to impacts of wireless on birds, bees, wildlife and the natural environment.

- [Letter from Lee Ann Veal EPA office of Radiation and Air to Theodora Scarato Environmental Health Trust March 7, 2023](#)
- [Letter from Lee Ann Veal EPA office of Radiation and Air to Theodora Scarato Environmental Health Trust, July 8, 2020](#)

FCC: “Since the Commission is not a health and safety agency, we defer to other organizations and agencies with respect to interpreting the biological research necessary to determine what levels are safe.”

<https://docs.fcc.gov/public/attachments/FCC-13-39A1.pdf>

FDA: “As noted above, the existing exposure guidelines are based entirely on protection from acute injury from thermal effects of RF exposure, and may not be protective against any non-thermal effects of chronic exposures.”

[FDA Letter Nominating Cell Phone Radiation to Be Studies by NIH NTP 1999](#)

US Department of the Interior

“However, the electromagnetic radiation standards used by the Federal Communications Commission (FCC) continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today “ [US Department of the Interior](#)

Published articles that document the fact that FCC limits are based on addressing heating effects from high intensity short term (under 60 min) radiation exposures only.

International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF), (2022). [Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limit determinations for radiofrequency radiation: implications for 5G](#). Environ Health. Oct 18;21(1):92.

"In the late-1990s, the FCC and ICNIRP adopted radiofrequency radiation (RFR) exposure limits to protect the public and workers from adverse effects of RFR. These limits were based on results from behavioral studies conducted in the 1980s involving 40–60-minute exposures in 5 monkeys and 8 rats, and then applying arbitrary safety factors to an apparent threshold specific absorption rate (SAR) of 4 W/kg. The limits were also based on two major assumptions: any biological effects were due to excessive tissue heating and no effects would occur below the putative threshold SAR, as well as twelve assumptions that were not specified by either the FCC or ICNIRP. In this paper, we show how the past 25 years of extensive research on RFR 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. Yet, in 2020, and in light of the body of evidence reviewed in this article, the FCC and ICNIRP reaffirmed the same limits that were established in the 1990s. Consequently, these exposure limits, which are based on false suppositions, do not adequately protect workers, children, hypersensitive individuals, and the general population from short-term or long-term RFR exposures.

Lin, J. C. (2023). [Incongruities in recently revised radiofrequency exposure guidelines and standards](#). Environmental Research, 222, 115369.

The currently promulgated RF exposure guidelines and standards cover the entire range of RF radiation and apply predominantly to restrict RF-induced short-term heating and in guarding against raising tissue temperatures, including the 5G frequencies. There are substantial abnormalities in these putative health safety protection guidelines and standards. Some of the safety limits are irrelevant, debatable, and absent of scientific justification from the standpoint of safety and public health protection.

As mentioned, recently, both ICES and ICNIRP have published revisions of their recommendations for exposure limits (IEEE-ICES, 2019; ICNIRP, 2020). The revised limits are clearly tied to heating effects associated with measurable tissue temperature changes. They are based primarily on biological data from short-term (6 or 30 min) exposures to RF and microwave radiation and do little to placate the troubling questions on recommended limits for long-term, low-level exposures. The scenarios of a

persistently expressed lack of confidence in these RF exposure guidelines are recurring in many parts of the world involving wireless and mobile telecommunication devices and installations (ICBE-EMF, 2022; Elkind, 2022; Investigate Europe, 2019; Koepfel, 2022

Lopez I, Rivera M, Feliz N, Maestu C. (2022) [It is mandatory to review environmental radiofrequency electromagnetic field measurement protocols and exposure regulations: An opinion article](#). Front. Public Health, 24 October

“existing regulations **do not consider a chronic exposure to a pulsed or modulated signal**, such as mobile phone signals.”

Davis, D., Birnbaum, L., Ben-Ishai, P., Taylor, H., Sears, M., Butler, T., & Scarato, T. (2023). [Wireless technologies, non-ionizing electromagnetic fields and children: Identifying and reducing health risks](#). Current Problems in Pediatric and Adolescent Health Care, 53(2), 101374.

“The ICNIRP and IEEE³⁸ standards used as the basis for many governments’ limits remain largely unchanged since the 1990s and **they are intended to protect for effects caused by short term high powered exposures**. These limits are not designed to protect for effects from long term, low level chronic exposures because ICNIRP and IEEE do not consider such effects as “established.”

Barnes, F., & Freeman, J. E. R. (2022). [Some thoughts on the possible health effects of electric and magnetic fields and exposure guidelines](#). Frontiers in Public Health, 10.

“Current IEEE and FCC guidelines protect against large amplitude/high energy EM fields that could lead to shocks and burns.”

McCredden, J. E., Weller, S., & Leach, V. (2023). [The assumption of safety is being used to justify the rollout of 5G technologies](#). Frontiers in public health, 11, 1058454.

“When setting exposure limits, ICNIRP [FCC limits are similar] has not addressed the early evidence of biological effects with the potential to cause harm ([18](#)), as would be required by a risk management approach.”

See also—McCredden, J. E., Cook, N., Weller, S., & Leach, V. (2022). [Wireless technology is an environmental stressor requiring new understanding and approaches in health care](#). *Frontiers in Public Health*, 10.

“Unfortunately, damage from heating as the only mechanism of harm is assumed and used as the basis for the ICNIRP safety guidelines, which specify power density

thresholds for radiofrequency exposures beyond which the public must not be exposed. Industry must comply with these limits to prevent short-term heating effects from medical devices, smart devices and wireless technologies. However, the types of biological harm from radiofrequency described in the sections above are not necessarily due to heating yet may lead to short- and long-term harm to the population. The guidelines do not protect against these biological effects because such effects occur at exposures with much lower power densities than ICNIRP guidelines permit, which set the “safety” thresholds at a power density of 10,000 milliwatts/m² (69) and an average whole-body heat absorption (SAR) of 0.08 Watts/kilogram.”

Thill A, Cammaerts MC, Balmori A. [Biological effects of electromagnetic fields on insects: a systematic review and meta-analysis](#). Rev Environ Health. 2023 Nov 23

Panagopoulos et al. detected a bioactive window at a distance of 20–30 cm from GSM mobile phones, where the power density equaled 100 mW/m² (~6 V/m), and where toxic effects in *Drosophila* are already observed after a 1-min exposure. These results have been replicated several times [148–150]. If this is generally true for insects, the limit for toxic effects would be 100 times below the current ICNIRP limit (10 W/m² or 61 V/m), [comparable to FCC] which protects only against thermal effects (in humans), and possibly 1,000 times lower than current limits for chronic exposure, i.e. 10 mW/m² or 2 V/m (all comparisons based on power densities, i.e. energy per surface area units) [94]. A recent study found significant effects on gene transcription and chromosomal abnormalities using a WiFi signal at 4.8 mW/m² or 1.35 V/m in *Drosophila* exposed for 9 days [145]. These findings of biological effects in insects starting at around 2 V/m imply that existing standards would have to be revised and made more stringent, to include nature protection/wild-life concerns.

[Exposure of 1800 MHz Radiofrequency with SAR 1.6 W/kg Caused a Significant Reduction in CD4+ T Cells and Release of Cytokines In-Vitro](#)

“Exposure to electromagnetic fields at low levels (nonthermal) can impair immune function if it occurs continuously for a certain period of time. Scientific evidence shows that the current safety standards for low-frequency EMF are inadequate because most of the standards were made by only considering thermal effects. Therefore, the authorities need to re-evaluate safety standards.

NYT Critical omission: When phones are held in body contact, they can violate FCC limits.

Inaccuracy in NYT article due to critical omission: The NYT omits that when phones are held in body contact, they can violate FCC limits.

Suggested correction: the NYT should include the fact that when cellphones are tested in body contact positions, the way most people use phones today, they [can emit levels of radiation](#) that violate the government regulatory limits. [Published research](#) estimates the radiation levels that can be absorbed into the body can exceed FCC's radiation exposure limits over 11 times.

See 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.

NYT Critical Omission: Cell phones have fine print warnings most consumers are unaware of instructing users to keep a distance from cell phones

The NYT omits instructions for cell phone use. All cell phone manufacturers' instructions state that the cell phone user should maintain a specified distance between their body and the phone in order to ensure compliance with regulatory safety limits.

Suggested correction: The NYT should mention that manufacturers' instructions state that the cell phone user should maintain a specified distance between their body and the phone in order to ensure compliance with regulatory safety limits.

Documentation

“iPhone is evaluated in positions that simulate uses against the head, with no separation, and when worn or carried against the torso of the body, with 5 mm separation... To reduce exposure to RF energy, use a hands-free option, such as the built-in speakerphone, headphones or other similar accessories.”

[-Apple iPhone 13](#)

“Body-worn SAR testing has been carried out at a separation distance of 1.5 cm. To meet RF exposure guidelines during body-worn operation, the device should be positioned at least this distance away from the [body](#).”

[-Samsung Galaxy Z Fold 3 5G](#)

“Body-worn Operation This device was tested for typical use with the back of the device kept 0.39 inches (1.0 cm) from the body. To comply with FCC RF exposure requirements, a minimum separation distance of 0.39 inches (1.0 cm) must be maintained between the user’s body and the back of the device.”

[-LG G8 page 166](#)

“Use accessories such as a carrying case, etc., to keep the product at least 1.5 inches away from your body, and make sure there is no metal (part) in between.”

-Docomo Smartphone (Japan) [SC-51C\(Galaxy S22\)](#)

“This device has also been tested and meets the FCC RF exposure guidelines for use with an accessory that contains no metal and positions the handset a minimum of 15mm from the body. Position the handset a minimum of 15mm from your body when the device is switched on.

” - [OnePlus 10 Pro 5G](#)

Where can I find this information for my cell phone?

- Apple iPhone: Go to “Settings” and then “General” and then “Legal & Regulatory” and then “RF Exposure”
- Samsung has a website on [RF instructions here](#).
- Motorola has a website on [RF instructions here](#).
- LG has a website on [RF instructions here](#).

- Docomo Products [\(Japan\) has a website which links to RF information here](#)

Where can I find this information for my Wi-Fi or wireless device?

- For Apple products like the iPad, iMac, iPod and Apple Watch to [Go to Apple's RF section and search your device here.](#)
- For Google Products [go to their Safety and Regulatory Information Page here.](#)
- For Amazon Echo Products go to their [Safety and Compliance information page here.](#)
- In addition to the phones, these company have a SARs for [Samsung products](#), [Motorola products](#), [LG products](#), [Docomo Products](#)

For other products simply search for the manual online or search for the make and model with the additional phrase “RF exposure” and you can access the instructions. Be aware that many manuals will omit this information and it will be located on a separate “safety and legal compliance manual” or online in a less than obvious place.

Did you know that baby monitors, Wi-Fi printers, Apple computers and even Wi-Fi printers have fine print warnings?

Here are some examples:

“...it is advised to use the Products in such a manner that minimizes the potential for human contact during normal operation.” “This Device should be installed and operated with at least 20 cm between the radiator and your body.”

–[Amazon Echo Dot \(4th Generation\) Kids Edition Safety and Compliance](#)

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance 20cm between the radiator & your body.”

–[Samsung Smart TV 6200 User Manual](#)

“This device should be installed and operated with a minimum distance of 20 cm between the radiator and your body.”

–[Amazon Echo](#)

This device should be operated with a minimum separation distance of 20 cm (8 inches) between the equipment and a person’s body.”

–[Apple iMac Regulatory Compliance Info OS Monterey 12](#)

“When placing the Apple Watch near your face, keep at least 10 mm of separation to ensure exposure levels remain at or below the as-tested levels.”

–[Apple Watch Model A1553](#)

”To be sure that human exposure to RF energy does not exceed the FCC, IC, and European Union guidelines, always follow these instructions...Orient the device in portrait mode with the Home button at the bottom of the display, or in landscape mode with the cellular antenna away from your body or other objects.”

–[Apple iPad IOS4 Important Product Information Guide](#)

“This equipment should be installed and operated with at least 20 cm (8 inches) or more between the radiator and the person’s body.” –[Playstation 4 Pro](#)

“This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.”

–[OC1A Owlet Baby Camera User Manual](#)

Read [more fine print warnings here](#).

What are other countries doing?

Starting in 2012, the French Government’s National Frequency Agency ANFR began testing hundreds of phones in body contact positions, with 0 mm between the phone and body phantom. After pressure from Dr. Marc Arazi from the [Phonagate Association](#), the [data is now posted online](#) and it showed that the majority of cell phones exceeded EU regulations. In 2016, the European Union laws [were strengthened](#) and they must use a separation distance no higher than 5 mm.

French Ministers later issued a press release [recommending that the regulation](#) be further strengthened to 0 mm, but the EU regulations have not yet been changed at this time.

France: A [2019 Ministerial order](#) stated consumers should be informed to use a hands-free or speakerphone, limit frequency and duration of calls for children, keep away from the belly of pregnant women, Keep away from the lower abdomen of adolescents.”

Belgium: In 2013 the government banned [the sale of phones](#) designed for young children.

Cyprus: Multimedia campaign with [full scale bus ads](#), brochures and videos for [teens](#) and [parents](#).

French Polynesia: Multimedia campaign to reduce exposure- [video](#), [posters](#) and [brochure](#) promoted on television, radio, and social networking platforms translated into [Tahitian](#) and [French](#).

Republic of Korea: “Children are advised to avoid using cell phones whenever possible.” - [Gov Webpage](#)

NYT Critical Omission: NYT refuses to publish letters to NYT on the inaccuracies

The NYT should publish submitted letters to the editor that question the NYT article [Do I Need to Worry About Smartphone Radiation?](#) (11/14/23). Yet the NYT refuses. In fact as far as we know not a single letter questioning the NYT article was published.

See below **submitted letters the NYT did not publish**.

Suggested correction: The NYT should publish letters to the editor on the cell phone radiation article.

Documentation

Letter submitted by Devra Davis PHD, MPH to the New York Times

“Do I Need to Worry About Smartphone Radiation?” (11/14/23) gets it wrong. [Hundreds of expert scientists](#) have concluded that cell phone radiation carries serious health risks. There is [no scientific consensus](#) that phones are safe.

A growing body of [peer-reviewed evidence](#) links radiofrequency radiation (RFR) from cell phones and Wi-Fi to a [broad range of harm](#). Even at levels compliant with current government limits, RFR can damage [reproductive health](#), [memory](#), [behavior](#), and [brain development](#). Published [NIH animal studies](#) found [“clear evidence” of cancer](#) and [DNA damage](#).

Because their skulls are thinner and contain more fluid, children absorb RFR [more deeply](#) into their brains than adults. More than [20 countries](#) recommend that children reduce cell phone radiation exposure. In the US, the [American Academy of Pediatrics](#), [California Department of](#)

[Health](#), the New Hampshire Commission on 5G, and others have advised parents to reduce children's exposure to wireless radiation.

There is no health agency with funded activities to study, test or control radiation from phones or the towers that connect them. While radiation from towers is much lower than from phones, long-term exposures are also associated with a range of [negative impacts on human health](#) and [the environment](#).

New York Times Letter To Editor submitted by Theodora Scarato

Theodora Scarato

[Do I Need to Worry About Smartphone Radiation?](#) (11/14/23) inaccurately states: *"Health authorities like the FDA, CDC and WHO agree that there's no evidence that smartphone radiation causes health problems."*

None of these agencies have completed an up to date health effects risk assessment. The FDA has no reports on Wi-Fi, 5G [nor cell towers](#) and only has an outdated [well criticized literature review](#) focused solely only on cell phones and cancer, [rejecting](#) the [major cancer findings](#) of a NIH study [it had requested](#) and omitting review of impacts to the [immune system](#), [brain](#) and [reproduction](#).

The WHO [has not](#) concluded "there is no evidence." In 2011, the WHO/International Agency for Cancer [classified cell phone radiofrequency radiation](#) as possibly carcinogenic to humans, based on studies finding an increased risk for brain cancer. Evidence has [increased](#).

The EPA was [defunded](#) just as it was [poised to issue safety standards](#) and, like the CDC (which [hired an industry consultant](#) to draft its webpages), has not made any safety determinations.

Try to find a recent scientific report by the WHO, FDA, CDC or EPA that concludes with an official opinion on safety. Good Luck. It simply does not exist.

Statement by Devra Davis Ph.D, MPH, President of [Environmental Health Trust](#), a scientific think tank that won a [lawsuit against the federal government](#) regarding cell phone radiation exposure guidelines.

"Extensive published scientific evidence indicates that radiofrequency radiation at levels compliant with federal government limits can cause [cancer](#), [increased oxidative stress](#), [genetic damage](#), structural and functional changes of the [reproductive system](#), [memory deficits](#), [behavioral problems](#), and [neurological impacts](#). We consider radiofrequency radiation (RFR) to be a human carcinogen based on the [current body](#) of evidence. Many of these effects could be irreversible with grave consequences for our children's future."

A Lack of Federal Accountability

Environmental wireless exposures from cell towers and base stations are largely unregulated in the United States as there is no agency with health expertise evaluating the exposure for health impacts. There are no funded activities by the EPA, FDA or CDC related to cell tower radiation. There is no scientific group of governmental experts reviewing the up to date science to ensure public health or environmental (i.e wildlife and trees) protection from rising ambient levels.

The Food And Drug Administration

The FDA has engaged in limited activities related to cell phones and cancer. In 2020, the FDA released a now outdated literature review (ending in 2018) focused solely only on cell phones and cancer. Impacts to memory, the brain and reproduction were omitted.

A January 11, 2022 letter by Ellen Flannery of the Director of the FDA Office of Policy Center for Devices and Radiological Health confirms the absence of FDA authority and research in the area. When asked about 5G “small” cell tower safety by a California mother who had a wireless facility in front of her home, FDA’s Flannery responded, “The FDA does not regulate cell towers or cell tower radiation. Therefore, the FDA has no studies or information on cell towers to provide in response to your questions.” [Link to FDA’s Ellen Flannery Letter.](#)

A June 20, 2016 email by FDA’s David Kassiday also confirms that the FDA does not address the environmental, ambient exposures from cell phone towers. Kassiday stated, “We don’t have jurisdiction over cellphone towers since those are environmental emitters.”

A Pittsburgh Law Review [article](#) on the FDA and its role in ensuring public safety in regards to wireless radiation entitled, [The FCC Keeps Letting Me Be: Why Radiofrequency Radiation Standards Have Failed to Keep Up With Technology](#) concludes, “The FCC and FDA have failed in their obligation to prescribe safe RFR guidelines produced from wireless communication devices to protect the public health and safety.”

National Institute for Occupational Safety and Health

OSHA has never developed occupational EMF exposure limits and currently has no funded activities nor staff with bioeffects expertise. Before it's EMF activities ceased, NIOSH experts recommended precautionary measures to reduce exposure and also had proposed a comprehensive RF protection program, including workplace RF exposure surveillance as well as medical monitoring. (See 1999 [OSHA's proposed a comprehensive RF Protection Program.](#)) None of these programs were finalized.

“ it would be judicious to keep exposure levels as low as reasonably possible until the safety of microwave exposures can be determined. Recommendations for lowering exposure...”

-1992 NIOSH Report: [HEALTH HAZARD EVALUATION REPORT HETA 92-0224-2379 The Hazard Evaluations and Technical Assistance Branch of NIOSH CDC](#)

The Centers for Disease Control and Prevention

There are no scientific reports by the CDC on wireless safety, nor does the agency have staff with expertise monitoring the science and evaluating risk. EHT's FOIA investigations have found [an industry consultant](#) was brought in to help draft several CDC webpages.

National Cancer Institute

Although the NCI has a lengthy web page on cell phones, the NCI has repeatedly stated that “Neither the literature reviews, nor the fact sheets, make safety determinations.” ([Letter from NCI to Scarato](#)).

When directly asked about its opinion on cell phone safety issues, the National Cancer Institute [responded](#), “As a Federal research agency, the NCI is not involved in the regulation of radiofrequency telecommunications infrastructure and devices, nor do we make recommendations for policies related to this technology...Our sister agencies, the FDA as well as the FCC, retain responsibility for reviewing guidance on safety concerns and informing the public if those circumstances change.”