

5G, CELL TOWERS AND SMALL CELLS

SCIENTIFIC RESEARCH

CHILDREN'S VULNERABILITY TO WIRELESS RADIOFREQUENCY (RF) RADIATION



The American Academy of Pediatrics states:

“In recent years, concern has increased about exposure to radio frequency (RF) electromagnetic radiation emitted from cell phones and phone station antennas. An Egyptian study confirmed concerns that living nearby mobile phone base stations increased the risk for developing:

- Headaches
- Memory problems
- Dizziness
- Depression
- Sleep problems

Short-term exposure to these fields in experimental studies have not always shown negative effects, but this does not rule out cumulative damage from these fields, so larger studies over longer periods are needed to help understand who is at risk. In large studies, an association has been observed between symptoms and exposure to these fields in the everyday environment.”

-American Academy of Pediatrics
HealthyChildren.org

Cell towers, cell phones and Wi-Fi emit wireless radiofrequency (RF) radiation.

Children are more vulnerable to RF radiation, just as they are to other environmental exposures. They have proportionately more exposure to RF compared to adults. More importantly, a child's brain is rapidly developing and more sensitive. Even very low exposures in childhood can have serious impacts later in life.

Children absorb higher levels of RF radiation deeper into their brains and bodies because they have:

- Thinner skulls allow RF radiation to move easier into the brain.
- Higher water content in brain tissue which is more conductive to electricity.
- Smaller heads result in a shorter distance for the RF to travel from the skull to critical brain regions important for learning and memory.

Children are more sensitive to RF impacts because:

- Their brains are still developing.
- Children have more active stem cells- a type of cell scientifically found to be uniquely impacted by RF.
- Children will have a longer lifetime of higher exposures, starting from before they are born.

CELL TOWER RF RADIATION AND CANCER

International Agency for Research on Cancer



World Health
Organization

PRESS RELEASE
N° 208

31 May 2011

IARC CLASSIFIES RADIOFREQUENCY ELECTROMAGNETIC FIELDS AS POSSIBLY CARCINOGENIC TO HUMANS

Lyon, France, May 31, 2011 -- The WHO/International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group 2B), based on an increased risk for glioma, a malignant type of brain cancer¹, associated with wireless phone use.

The World Health Organization International Agency for Research on Cancer Classified Radiofrequency Radiation as a "Possible" Carcinogen in 2011

In 2011, radiofrequency electromagnetic fields (RF-EMF) were classified as a Group 2B possible carcinogen by the World Health Organization's International Agency for Research on Cancer (WHO/IARC).

The WHO/IARC scientists clarified that this determination was for RF-EMF from any source be it cell phones, wireless devices, cell towers or any other type of wireless equipment.

Since 2011, the published peer-reviewed scientific evidence associating RF-EMF (also known as RF-EMR and RFR) to cancer and other adverse effects has significantly increased.

A large-scale animal study published in Environmental Research found rats exposed to RF levels comparable to cell tower emissions had elevated cancers, the very same cancers also found in the US National Toxicology Program animal study of cell phone level RF that found "clear evidence" of cancer in carefully controlled conditions (Falcioni 2018).

In 2019, the WHO/IARC advisory committee recommended that radiofrequency radiation be re-evaluated as a "high" priority in light of the new research. The date of the re-evaluation has not been set.

Currently, several scientists conclude that the weight of currently available, peer-reviewed evidence supports the conclusion that radiofrequency radiation is a proven human carcinogen (Hardell and Carlberg 2017, Peleg et al. 2022, Miller et al. 2018).

SCIENTIFIC RESEARCH STUDIES



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.

A review entitled "**Evidence for a health risk by RF on humans living around mobile phone base stations: From radiofrequency sickness to cancer**" reviewed the existing scientific literature and found radiofrequency sickness, cancer and changes in biochemical parameters (**Balmori 2022**).

A **study** published in Electromagnetic Biology and Medicine found changes in blood considered biomarkers predictive of cancer in people living closer to cell antenna arrays (**Zothansiana 2017**).

A **study** published in the International Journal of Environmental Research and Public Health found higher exposure to cell network arrays linked to higher mortality from all cancer and specifically lung and breast cancer (**Rodrigues 2021**).

A 10-year **study** published in Science of the Total Environment on cell phone network antennas by the local Municipal Health Department and several universities in Brazil found a clearly elevated relative risk of cancer mortality at residential distances of 500 meters or less from cell phone towers (**Dode 2011**).

A **study** commissioned by the Government of Styria, Austria found a significant cancer incidence in the area around the RF transmitter as well as significant exposure-effect relationships between radiofrequency radiation exposure and the incidence of breast cancers and brain tumors (**Oberfeld 2008**).

A **review** published in Experimental Oncology found "alarming epidemiological and experimental data on possible carcinogenic effects of long term exposure to low intensity microwave (MW) radiation." A year of operation of a powerful base transmitting station for mobile communication reportedly resulted in a dramatic increase of cancer incidence among the population living nearby (**Yakymenko 2011**).



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PUBLISHED RESEARCH STUDIES

OUTDOOR LEVELS OF RF ARE INCREASING DUE TO THE DENSIFICATION OF WIRELESS NETWORKS

An [article](#) published in *The Lancet Planetary Health* documents how RF exposures are increasing and so is the scientific research linking exposure to adverse biological effects. [“It is plausibly the most rapidly increasing anthropogenic environmental exposure since the mid-20th century...”](#)

A [2021 report](#) by the French government on 5G analyzed more than 3,000 measurements and found that while RF levels had *not yet* significantly increased, this was due to the lack of 5G traffic. Additional study specific to 5G in the 3500 MHz band with artificially generated traffic concluded that, “initial results suggest an eventual increase of about 20% in overall exposure.”

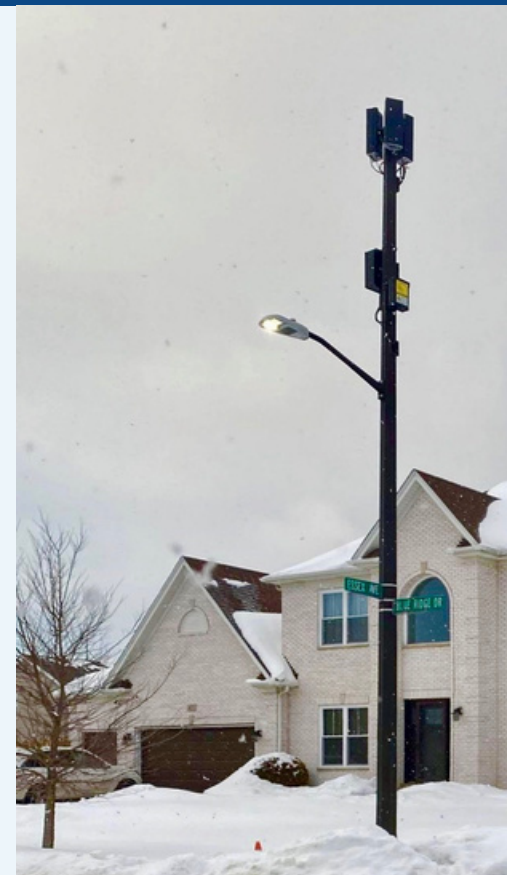
A [2018 multi-country study](#) published in *Environment International* measured RF in several countries and found cell tower/base station radiation to be the dominant contributor to RF exposure in most outdoor areas. Urban areas had higher RF.

A [study](#) measuring RF exposure in the European cities of Basel, Ghent and Brussels found the total RF exposure levels in outdoor locations had increased up to 57.1% in one year (April 2011 to March 2012) and most notably due to mobile phone base stations.

A [2018 study](#) published in *Oncology Letters* documented “unnecessarily high” RF levels in several locations in Sweden and concludes that “using high-power levels causes an excess health risk to many people.”

A [2017 Swedish](#) study of Royal Castle, Supreme Court, three major squares and the Swedish Parliament found that despite the architecturally camouflaged RF-emitting antennas, the passive exposure was higher than RF levels associated with non-thermal biological effects. The researchers noted that the heaviest RF load falls on people working or living near hotspots.

A [2016 study](#) at Stockholm Central Railway Station in Sweden documented higher RF levels in areas where base station antennas were located closest to people. Importantly, the RF from the downlink of UMTS, LTE, GSM base station antennas contributed to most of the radiation levels.



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5G IS RECKLESS

**5G Jumbo Pole
at Hester and Eldridge
New York City, New York**



Children's Playground

SCIENTISTS ARE RINGING THE ALARM BELL

Hundreds of scientists are warning that safety is not assured with 5G and cell tower proliferation. They caution that FCC cell tower radiation limits do not protect against long term health effects nor do they consider children's unique vulnerability.

5G and the proliferation of cell towers and cell antennas in close proximity to where people live, work and play is increasing ambient radiofrequency radiation levels.

The Los Angeles California School District Office of Health and Safety developed a "cautionary level" for radiofrequency radiation 10,000 times lower than FCC regulations because, "it is believed that a more conservative level is necessary to protect children, who represent a potentially vulnerable and sensitive population."



INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS

Since 2004, the International Association of Firefighters has officially opposed cell towers on their stations "until a study with the highest scientific merit and integrity on health effects of exposure to low-intensity RF/MW radiation is conducted and it is proven that such sitings are not hazardous to the health of our members."

In California, firefighter unions repeatedly and successfully lobbied state lawmakers to remove fire stations from the list of 5G cell tower fast track sites.

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PUBLISHED RESEARCH STUDIES



RESEARCHERS RECOMMEND CELL TOWERS BE DISTANCED AWAY FROM HOMES AND SCHOOLS

The review paper entitled “[Limiting liability with positioning to minimize negative health effects of cellular phone towers](#)” reviewed the “large and growing body of evidence that human exposure to RFR from cellular phone base stations causes negative health effects.” The authors recommend restricting antennas near homes, and restricting antennas within 500 meters of schools and hospitals to protect companies from future liability ([Pearce 2020](#)).

An [analysis](#) of 100 studies published in *Environmental Reviews* found approximately 80% showed biological effects near towers. “As a general guideline, cell base stations should not be located less than 1500 ft from the population, and at a height of about 150 ft” ([Levitt 2010](#)).

A [review](#) published in the *International Journal of Occupational and Environmental Health* found people living less than 500 meters from base station antennas had increased adverse neuro-behavioral symptoms and cancer in eight of the ten epidemiological studies ([Khurana 2010](#)).

A [paper](#) by human rights experts published in *Environment Science and Policy* documented the accumulating science indicating safety is not assured, and considered the issue within a human rights framework to protect vulnerable populations from environmental pollution. “We conclude that, because scientific knowledge is incomplete, a precautionary approach is better suited to State obligations under international human rights law” ([Roda and Perry 2014, PDF](#)).

APARTMENTS & CONDO BUILDINGS

INCREASED RF RADIATION FROM CELL ANTENNAS



The study "[Radiofrequency radiation from nearby mobile phone base stations-a case comparison of one low and one high exposure apartment](#)" published in *Oncology Letters* by [Koppel et al. \(2019\)](#) measured 2 apartments and found that the apartment with high RF levels had outdoor areas as close as 6 meters (about 19.6 feet) from transmitting base station cell antennas. In contrast, the apartment with low RF exposure had cell antennas at 40 meters (about 131 feet) away from the balcony.

Furthermore, the researchers also found that both high- and low-RF apartments had good mobile phone reception, and they concluded, "therefore, installation of base stations to risky places cannot be justified using the good reception requirement argument."

A measurement study by [Baltrėnas et al. \(2012\)](#) published in *Journal of Environmental Engineering and Landscape Management* investigated RF power density levels from cell phone antennas located 35 meters away from a 10-story apartment building. The transmitting antennas were approximately at the same height as the 6th floor of the building. The researchers found the highest RF levels at floors 5, 6 and 7. The RF at the 6th floor balcony was three times higher than the 3rd floor balcony. The RF power density at the 6th floor was about 15 times the RF measured at the first floor.

A [case report by Hardell et al. \(2017\)](#) of RF levels in an apartment in close proximity to rooftop cellular network antennas used an exposimeter to measure levels of different types of RF in the apartment and balconies including TV, FM, TETRA emergency services, 2G GSM, 3G UMTS, 4G LTE, DECT cordless, Wi-Fi 2.4 GHz and 5 GHz and WiMAX. The closest transmitting antennas were 6 meters away from the balcony. The researchers found 97.9% of the mean RF radiation was caused by downlink from the 2G, 3G and 4G base stations. (Downlink means frequencies emitted "down" from the base station cellular antennas.) The researchers found that if the base station RF emissions were excluded, the RF radiation in the children's bedrooms was reduced approximately 99%.

The researchers conclude, "due to the current high RF radiation, the apartment is not suitable for long-term living, particularly for children who may be more sensitive than adults."

INCREASED EXPOSURE FROM 5G/4G "SMALL" CELL ANTENNAS LOCATED CLOSE TO PEOPLE

A study entitled "[Very high radiofrequency radiation at Skeppsbron in Stockholm, Sweden from mobile phone base station antennas positioned close to pedestrians' heads](#)" published in *Environmental Research* by Koppel et al. (2022) created an RF heat map of RF measurements, finding that the highest RF measurements were in areas of close proximity to the base station antennas. The researchers concluded with recommendations to reduce close proximity placements such as positioning antennas "as far as possible from the general public" like in high-elevation locations or more remote areas.

A study entitled "[Measurements of radiofrequency electromagnetic fields, including 5G, in the city of Columbia, South Carolina, USA](#)" published in the *World Academy of Sciences Journal* found the highest RF levels in areas where the cell phone base station antennas were placed on top of utility poles, street lamps, traffic lights or other posts near to the street. The scientists compared their [2022 findings](#) to an earlier [2019 published review](#) on the mean outdoor exposure level of European cities and they found the South Carolina measurements to be higher.

The researchers concluded that the highest exposure areas were due to two reasons: cell phone base antennas on top of high-rise buildings provide "good cell coverage reaching far away, but creating elevated exposure to the radiofrequency electromagnetic fields at the immediate vicinity; and cell phone base station antennas installed on top of utility poles have placed the radiation source closer to humans walking on street level."



Figure 7. Gervais Street: Cell phone base station antenna placed close to street level and causing high exposure to pedestrians and nearby café visitors (exposure scenario illustration). The antenna appears camouflaged and seemingly part of a utility pole. The measurer only discovered the antenna due to the high radiofrequency levels in the vicinity.

HEALTH SYMPTOMS REPORTED BY PEOPLE LIVING CLOSE TO CELL ANTENNAS

Image: Figure 1: Top floor apartment adjacent to base stations. Nilsson M, Hardell L. (2023) Development of the Microwave Syndrome in Two Men Shortly after Installation of 5G on the Roof above their Office. Ann Clin Case Rep



RESEARCH ON ANTENNAS CLOSE TO HOMES, SCHOOL AND WORK

Surveys of people living near cell tower antennas in [France](#), [Spain](#), [India](#), [Germany](#), [Egypt](#), [Poland](#) have found significantly higher reports of health issues including sleep issues, fatigue and headaches.

A [study](#) published in *American Journal of Men's Health* linked higher cell tower RFR exposures to delayed fine and gross motor skills and to deficits in spatial working memory and attention in school adolescents.

A [study](#) published in *Environmental Research and Public Health* found higher exposures linked to higher risk of type 2 diabetes.

A [study](#) following people for 6 years linked increased cell phone and cell phone tower antenna exposure to altered levels of hormones including cortisol, thyroid, prolactin and testosterone.

A [study](#) that followed people in a German town after a cell tower was erected found stress hormones adrenaline and noradrenaline significantly increased over the first 6 months after the antenna activation and decreased dopamine and PEA levels after 18 months ([Buchner 2011](#)).

Three published case reports document illness that developed after 5G antennas were installed. A 52-Year healthy woman developed severe microwave syndrome shortly [after installation of a 5G base station](#) close to her apartment.

In another case report, a couple 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.

PUBLISHED RESEARCH ON 5G



New York City Jumbo 5G poles with 5 tiers to house transmitting antennas from numerous carriers.



Cell antennas in front of New York City living room window.

Scientists state that 5G's higher frequencies cannot be assumed safe.

5G systems are using low band frequencies well associated with harmful effects ([ICBE-EMF 2022](#), [European Parliament 2021](#), [Panagopoulos et al. 2021](#)). However 5G networks are also using higher frequencies such as 3.5 GHz and into the mmWave range with 24 GHz and higher.

Contrary to claims that the 5G's higher frequencies simply "bounce" off the skin, researchers have documented that the coiled portion of the skin's sweat duct can be regarded as a helical antenna in the sub-THz band and the skin, our largest organ, can intensely absorb the higher 5G frequencies ([Feldman and Ben Ishai 2017](#)).

Reviews of 5G health effects caution that the expected real-world impact would be far more serious due to the complex waveforms and other combinations with other toxic stimuli in the environment ([Kostoff et al 2020](#), [Russell, 2018](#), [Belyaev 2019](#), [McCredden et al 2023](#)).

Researchers will often experiment with zebrafish, rodents and fruit flies to gain data on potential health effects to humans. 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.

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."

PUBLISHED RESEARCH ON 5G



5G's higher frequencies will be combined with the lower frequencies from current networks already present in the environment.

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.

Recent experimental research on high-band 5G impacts to animal fertility found that 27 GHz damages sperm quality in mussels ([Pecoraro et al 2023](#)).

Yet the US government is not funding any research on biological effects of frequencies at 3.5 GHz or above 6 GHz to humans.

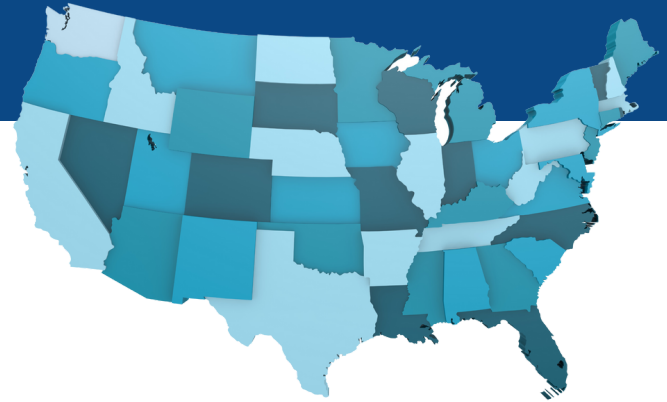
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UNITED STATES OF AMERICA

5G & CELL TOWERS



CALIFORNIA

Numerous CA cities restrict cell antennas near homes with setbacks and strict ordinances including: Los Altos, Petaluma, Mill Valley, Malibu, Santa Barbara, Nevada City, Suisin, Calabasas, San Clemente, Westlake, Sonoma, Sebastopol, San Rafael, Ross Valley, Encinitas, Fairfax, Palo Alto, Walnut City and San Diego County.

As an example of CA ordinances, the Los Altos City ordinance:

- prohibits installation of small cells on public utility easements in residential neighborhoods
- 500 foot setbacks for small cells for multi-family residences in commercial districts
- 500 foot separation from schools
- 1500 foot separation between nodes

Calabasas, CA - no "Tier 2" wireless telecommunications facilities within 1,000 feet of homes and schools.

CONNECTICUT

- Easton CN City Council passed a 5G cease and desist resolution
- Warren, Connecticut Policy defines "adequate coverage" and "adequate capacity," and was designed "to locate towers and/or antennas in a manner which protects property values, as well as the general safety, health, welfare and quality of life of the citizens." Coverage is considered to be "adequate" within that area surrounding a Base Station where the predicted or measured median field strength of the transmitted signal is such that the majority of the time, transceivers properly installed and operated will be able to communicate with the base station.

FLORIDA

- Coconut Creek FL Commission adopted a Resolution on 5G and radio-frequency radiation.
- Hallandale Beach FL Resolution urges the federal government to initiate independent health studies on 5G.
- Lavallette FL Resolution 2021-58: Applicant shall obtain certification from the Federal Aviation Administration and the United States Dept. of Defense demonstrating that the installation does not emit RF frequencies which may interfere with avionics of any approaching civil or military aircraft." The City also requires the applicant to provide RF meters used by their technicians and train City employees. Verizon cannot install more than a total of 20 "small cell" nodes throughout the Borough to support 5G.

HAWAII

- Hawai'i County Council passed a Resolution to halt 5G

ILLINOIS

- Oak Brook IL Resolution calls for local control re small cells.

INDIANA

Carmel City IN Council resolution asks state lawmakers, FCC and Congress to limit 5G until health effects fully understood.

MASSACHUSETTS

Randolph MA 500 ft setback. Yearly RFR measurements.
Lunenburg and Great Barrington MA 500 ft setback
Stockbridge MA prohibits a tower from being built 1000 feet from a school, park or athletic field and 600 ft from residence.

NEW JERSEY

- Little Silver, NJ Carriers should provide notice to property owners within 500 feet of proposed facility.

NEW YORK

- Scarsdale NY: 500 foot setbacks to homes preferred.
- Copake NY: Pre/post testing by RF engineer. No repeater closer than 200 ft to dwelling. No tower closer than 1500 ft to residence/church.
- Community Boards issuing Moratoriums on 5G poles

NEW HAMPSHIRE

- Proposed State Bill - 1640 ft setbacks.
- Keene NH Resolution to halt 5G
- Bedford NH 750 ft. setback

OHIO

- Mason OH Zoning Ordinance No small cells in residential areas or within 100 feet of residential prop; 2000 feet apart (unless colocated); equipment should be underground or wholly contained.

OKLAHOMA

- Sallisaw OK 1,500 feet setback

TENNESSEE

- Farragut City Resolution to halt 5G

WISCONSIN

- Greendale WI passed Resolution R2018-20 referring to the FCC's actions stripping local authority as "an unprecedented attack on local control."

5G & CELL TOWERS



EUROPE

- Resolutions to halt 5G in numerous European cities including Trafford, UK, Lille, France, Ormidia, Cyprus, Councils in Ireland and more.

ITALY

- 600 municipalities have passed resolution to halt 5G.
- Restrictive RF limits for cell tower emissions.

UNITED STATES

- Los Angeles CA Public Schools: RFR Limit 10,000x less than FCC.
- Resolutions to halt 5G passed in Hawaii County HI, Farragut TN, Keene NH & Easton CT.
- Numerous cities restrict cell antennas near homes including: Los Altos, Petaluma, Mill Valley, Malibu and San Diego County CA, Bedford NH and more.
- New Hampshire 5G Commission's 15 Recommendations include increasing transparency, reduce public exposure, research health effects and protect wildlife and trees.
- Oregon investigating health effects of wireless.
- Palo Alto, Los Angeles CA Schools, Bar Harbor ME; *No school cell towers*

CHILE

- Cell antennas prohibited in "sensitive areas" - kindergartens, hospitals and nursing homes.

BANGLADESH

- No cell towers on homes, schools, colleges, playing fields, populated areas and heritage areas.

FRANCE

- 60 mayors/officials petition to halt 5G.
- Federal health agency investigating 5G
- 5G antenna RFR is measured and posted.

SWITZERLAND

- Parliament refused to weaken radio frequency radiation (RFR) limits after 5G Report.

NETHERLANDS

- Health Council recommends against 26 GHz for 5G due to lack of safety data.

RUSSIA

- No cell towers near schools.

ISRAEL

- Cell tower setback 100 m from schools/ homes.

CANADA

- City of Toronto "Prudent Avoidance Policy" for Cell Towers.

BULGARIA

- Mezdra and Balchik have banned 5G.

GREECE

- The installation of cell towers at the premises of schools, kindergartens, hospitals or eldercare facilities is prohibited.

CYPRUS

- Cyprus National Committee on Environment and Child Health 5G Position Paper calls for 5G free zones.

AUSTRALIA

- New South Wales Dept. of Education policy objects to towers on/near schools.

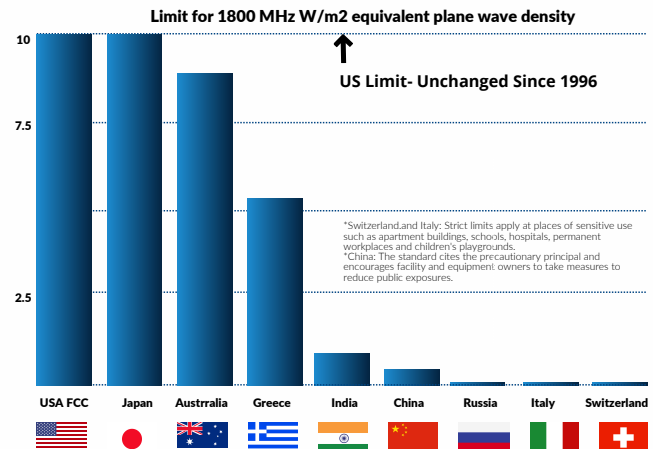
LITHUANIA

- Cell antennas prohibited on kindergartens and hospitals.

INDIA

- RFR limit tightened to 1/10 of ICNIRP limits after Inter-Ministerial Report on impacts to wildlife.
- Mumbai, Zilla Parishad & Karnataka: Cell towers prohibited or removed near schools, colleges, orphanages and old age homes.
- Brihanmumbai Municipal: Cell towers banned at parks and playgrounds.
- State of Rajasthan: Supreme Court of India upheld removal of "hazardous to life" cell towers from vicinity of schools, hospitals/playgrounds.

Environmental RF Exposure Limits For Cell Towers and Wireless Networks
For Homes and Schools



5G, CELL TOWERS AND WIRELESS LEGAL & LIABILITY ISSUES



When a new cell tower is proposed, the first question to ask is: "Do you have insurance for damages from long-term exposure to the radiofrequency radiation (RFR)?"

Usually the answer is "No." Why? Insurance companies rank the risk as "HIGH."

5G and Cell Towers Are an Uninsurable Risk

- Insurers rank wireless, cell tower, and 5G RFR non-ionizing electromagnetic field (EMF) radiation as a "high" risk, comparing the issue to lead and asbestos.
- Most insurance plans have "electromagnetic field exclusions" and do not insure for long-term RFR damages.
- Additionally, some insurance plans will not provide a defense for any supervision instruction or recommendation given "or which should have been given" in connection to EMFs.
- Wireless RFR and non-ionizing electromagnetic radiation are defined as a type of "pollution" by wireless companies themselves.
- U.S. mobile operators have been unable to get insurance to cover liabilities related to damages from long-term RFR exposure.
- Wireless companies warn their shareholders of RFR risk but do not warn users of their products, nor do the companies warn the people exposed to emissions from their infrastructure.

Cell Tower Companies Warn Shareholders of Risk From Cell Tower Radiation

Why Don't They Warn Families Living Near Cell Towers?



Verizon 10-K Report

"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."

Crown Castle 10-K Report

"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."



AT&T 10-K Report

"In the wireless area, we also face current and potential litigation relating to alleged adverse health effects on customers or employees who use such technologies including, for example, wireless devices. We may incur significant expenses defending such suits or government charges and may be required to pay amounts or otherwise change our operations in ways that could materially adversely affect our operations or financial results."



T- MOBILE 10-K Report

"Our business could be adversely affected by findings of product liability for health or safety risks from wireless devices and transmission equipment, as well as by changes to regulations or radio frequency emission standards."



Cell Tower Companies Warn Shareholders of Risk From Cell Tower Radiation

Why Don't They Warn Families Living Near Cell Towers?



AMERICAN TOWER®

NOKIA
CONNECTING PEOPLE



Qualcomm



ERICSSON

American Tower 10-K

"If a scientific study or court decision resulted in a finding that radio frequency emissions pose health risks to consumers, it could negatively impact our tenants and the market for wireless services, which could materially and adversely affect our business, results of operations or financial condition. We do not maintain any significant insurance with respect to these matters."

Nokia 10-K

"Although our products are designed to meet all relevant safety standards and other recommendations and regulatory requirements globally, we cannot guarantee we will not become subject to product liability claims or be held liable for such claims, which could have a material adverse effect on us."

Qualcomm 10-K

"If wireless handsets pose health and safety risks, we may be subject to new regulations, and demand for our products and those of our licensees and customers may decrease."

Ericsson Annual Report

"Any perceived risk or new scientific findings of adverse health effects from mobile communication devices and equipment could adversely affect us through a reduction in sales or through liability claims."

T-Mobile Warns of the Risk of 5G and Lawsuits

The Data on Risk Could Change, Impacting Cash Flow



T-Mobile advertises to the public about going "live" but omits the warnings they give to shareholders regarding 5G, regulatory changes and risk perception.

T-Mobile™

T-Mobile 10-K Report 2/2023

"Negative public perception of, and regulations regarding, the perceived health risks relating to 5G networks could undermine market acceptance of our 5G services" (page 13)

"We, along with equipment manufacturers and other carriers, are subject to current and potential future lawsuits **alleging adverse health effects arising from the use of wireless handsets or from wireless transmission equipment such as cell towers.**"

"In addition, **the FCC has from time to time gathered data regarding wireless device emissions, and its assessment of the risks associated with using wireless devices may evolve based on its findings.** Any of these allegations or changes in risk assessments could result in customers purchasing fewer devices and wireless services, could result in significant legal and regulatory liability, and could have a material adverse effect on our business, reputation, financial condition, cash flows and operating results." (T-Mobile 10-K Report page 21)



A 2000 Ecolog Institute Report commissioned by T-Mobile and DeTeMobil Deutsche Telekom MobilNet recommended an RF exposure limit 1000x lower than the FCC's current power density limit after reviewing the research on biological effects, including impacts to the immune system, central nervous system, hormones, cancer, neurotransmitters and fertility.

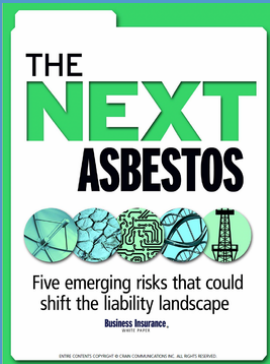
This PDF is hyperlinked. For more on legal liability issues go to ehtrust.org

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5G, CELL TOWERS AND WIRELESS

LEGAL & LIABILITY ISSUES SHAREHOLDER WARNINGS



"Some research has shown biological effects from lower-level "non thermal" exposure and people exposed at lower levels have reported headaches, dizziness, nausea, mood disorders, mental slowing and memory loss."

***Business Insurance White Paper,
The Next Asbestos: Five Emerging Risks
That Could Shift the Liability Landscape***

Insurance Authorities Rate 5G as "High Risk."

5G mobile networks are classified as a "high," "off-the-leash" risk. "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 "as 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."
— Swiss Re Institute (2019)

Insurance Companies Have Electromagnetic Field Exclusions As the Industry Standard

Electromagnetic field exclusions" are clear and common in most insurance companies. It is applied as a market standard. This exclusion serves to exclude cover for illnesses caused by long-term EMF (non-ionizing radiation) exposure." — Complete Markets

"Exclusions: This insurance does not apply to: Bodily injury, personal injury, advertising injury, or property damage arising directly or indirectly out of, resulting from, caused or contributed to by electromagnetic radiation, provided that such loss, cost or expense results from or is contributed to by the hazardous properties of electromagnetic radiation.
— Portland Oregon Public School Insurance (page 30)

Insurance Plans Not Only Exclude EMF Damages, But Some Even Exclude Defending Decision Makers From Actions

"This policy does not apply to and we will not provide a defense for: a. bodily injury... arising out of ... exposure to or contact with electromagnetic radiation... b. costs of abatement .. of EMF" or c. any supervision, instruction, recommendation, warning or advice given or which should have been given in connection with a or b. above."- City of Ann Arbor Michigan Insurance Policy page 14.

Wireless Companies Rank EMF as a Risk with High Impact

"Electro-magnetic signals emitted by mobile devices and base stations may be found to pose health risks, with potential impacts including: changes to national legislation, a reduction in mobile phone usage or litigation."
— Vodaphone 2017 Report ranks EMF as a "Principal Risk with "High" impact.

Wireless Companies Warn Shareholder About Risk But Not People Living Near Their Wireless Infrastructure

Crown Castle says:

"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 Define Pollution in Their Own Policies as Including EMFs, Microwaves and Non-ionizing Radiation.

Verizons Total Mobile Protection Plan says: "Pollution" is 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/or waste."

You work best when your tech works too.

Total Mobile Protection for Business



Applicable for Business customers outside of New York. New York customers, please see the Total Mobile Protection for Business brochure for New York.

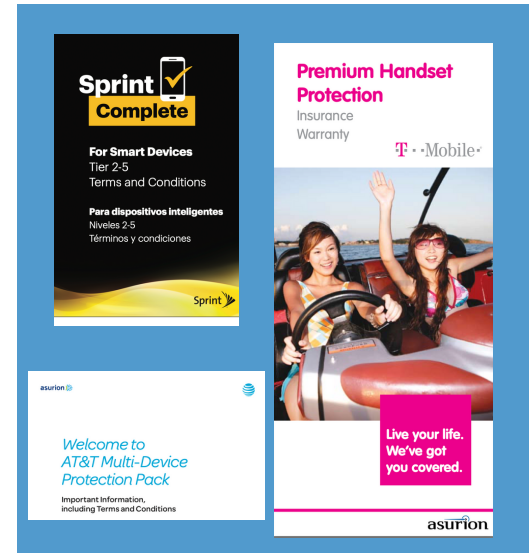
Verizon Total Mobile Protection Plan Defines Non-ionizing Radiation as "Pollution"

16. Pollution

The discharge, dispersal, seepage, migration or escape of pollutants. Pollutants means 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/or waste. Waste includes materials to be recycled, reconditioned or reclaimed.

AT&T, Sprint and T-Mobile also have similar "pollution" definitions and they refuse to cover damages.

Click on image to view the policy.



Insurance Companies Exclude EMF As Industry Standard

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ELECTROMAGNETIC RADIATION EXCLUSION

This endorsement modifies insurance provided under the following:

GENERAL LIABILITY COVERAGE PART
PUBLIC RISK GENERAL LIABILITY RETAINED LIMIT COVERAGE FORM
LAW ENFORCEMENT COVERAGE PART
LAW ENFORCEMENT LIABILITY RETAINED LIMIT COVERAGE FORM
PUBLIC OFFICIALS COVERAGE PART
PUBLIC OFFICIALS LIABILITY RETAINED LIMIT COVERAGE FORM
EMPLOYMENT PRACTICES LIABILITY COVERAGE PART
EMPLOYMENT PRACTICES LIABILITY RETAINED LIMIT COVERAGE FORM

The following **Exclusion** is added:

This policy does not apply to and we will not provide a defense for:

- a. "Bodily injury," "property damage", "personal and advertising injury", "employee benefits wrongful acts", "personal injury", "law enforcement wrongful acts", "public officials wrongful acts", "educator's legal wrongful acts", or "employment practices wrongful acts" arising out of, or which result in, the actual, alleged, threatened, perceived, latent, sudden and accidental or incidental exposure to or contact with electromagnetic radiation in any form, from any source.
- b. The costs of abatement or mitigation of:
 - (1) Electromagnetic radiation; or
 - (2) Exposure to electromagnetic radiation.
- c. Any supervision, instruction, recommendation, warning or advice given or which should have been given in connection with a. or b. above.

Electromagnetic radiation includes but is not limited to, magnetic energy, waves, fields or forces generated, produced, transmitted or maintained by the charges, currents, frequencies, energy or forces of electricity that is generated, flowing or otherwise transmitted through or via the medium, methods and equipment designed to generate, produce, distribute, transport or transmit the electrical charges, currents, frequencies, energy or forces.

Click to Download Insurance Terms That Define Pollution as Including Wireless Electromagnetic

16. Pollution

The discharge, dispersal, seepage, migration or escape of pollutants. Pollutants means 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/or waste. Waste includes materials to be recycled, reconditioned or reclaimed.



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WILDLIFE AND WIRELESS: POLICY IS NEEDED TO PROTECT FLORA AND FAUNA

Escalating levels of wireless RF* radiation from the proliferation of 4G and 5G telecommunication antennas pose serious risks to wildlife and the natural world. Accumulating research studies have found numerous adverse effects at levels much lower than the U.S. Federal Communication Commission (FCC) legal limits and ICNIRP limits for cell tower emissions.

No Safety Standards

The FCC's federal exposure limits were designed for humans, not wildlife. "Safe" levels of RF exposure for wildlife and plants have never been developed by any scientific or government entity.

Serious Regulatory Gaps

There is no U.S. federal agency measuring or monitoring the current levels of RF in the environment, monitoring the scientific research or gathering data on wildlife impacts from wireless infrastructure.

No Environmental Review

There has been no review of the environmental impact of the 5G infrastructure buildout which the FCC states will require 800,000 new wireless "small" cells.

Higher Exposures

Birds, insects and other airborne species fly, nest and perch close to transmitting antennas. "Small" cells and cell towers emit plumes of RF radiation which can greatly exceed FCC limits, even when measured at distances 10 to sometimes over 40 feet away from the antennas. Yet base station antenna emissions are "legal" because telecom compliance tests *for RF only consider areas inhabited by people*. Wildlife habitat is ignored.

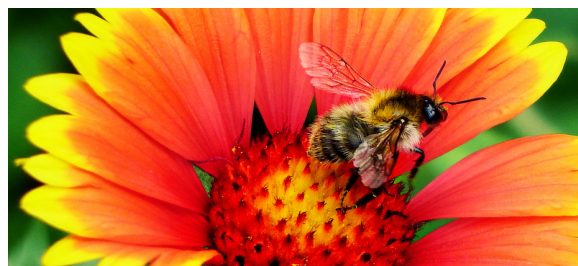
Pollinators at Risk

5G networks will include higher frequencies — submillimeter and millimeter waves — which *studies* have found uniquely absorb at higher intensities into the bodies of bees and insects. Studies on bees and other insects have long linked cell tower frequencies and EMF exposure to increased stress, decreased honey production, memory impacts, and altered pupal development ([Thill et al. 2023](#)).

Damage to Tree Canopy

Trees are being cut down, aggressively trimmed and their roots disturbed to build "small" cell infrastructure. A ten-year field study found damage to trees after years of RF exposure from cell antennas ([Waldmann-Selsam et al 2016](#)).

The need for regulatory action is urgent. Immediate steps must be taken to reduce environmental levels of RF and develop safety standards to ensure wildlife and their habitat are protected now and in the future.



"In addition to its impact on humans, radiofrequency radiation poses harmful effects to flora and fauna."

— Natural Resources Defense Council Amicus Brief in EHT et al. v the FCC

*RF = radiofrequency EMF = non-ionizing electromagnetic fields including extremely low frequency

SCIENCE ON FLORA, FAUNA, WIRELESS AND NON-IONIZING RADIATION

The Science is Adequate To Trigger Regulatory Action To Protect Wildlife

A landmark research review on wildlife by U.S experts of over 1,200 studies entitled “Effects of non-ionizing electromagnetic fields on flora and fauna” published in *Reviews on Environmental Health* found adverse effects from EMF* exposure at very low intensities, including impacts to orientation and migration, reproduction, mating, nest, den building and survivorship (Levitt et al., 2021). Effects were found in all species studied.

“A review of the ecological effects of RF-EMF” published in *Environment International* found RF had a significant effect on birds, insects, other vertebrates, other organisms and plants in 70% of the studies. Development and reproduction in birds and insects were strongly affected (Cucurachi et al., 2013).

Scientific evidence indicates that EMFs should be “considered seriously as a complementary driver for the dramatic decline in insects, acting in synergy with agricultural intensification, pesticides, invasive species, and climate change” (Balmori, 2021).

A 2022 Oregon State University study investigated the long-term behavioral effects to zebrafish from short-term exposures to 5G’s midband 3.5 GHz. The researchers found “subtle but significant abnormal responses...that suggest potential long-term behavioral effects,” and they concluded, “Overall, our study suggests the impacts of RFRs on the developing brain, behavior, and the metabolome should be further explored” (Dasgupta et al., 2022).

U.S. RF Exposure Limits: Unchanged Since 1996

The U.S. has among the most lenient rules regarding allowable RF emissions from cell towers. Many countries, such as Italy, Switzerland, Israel, China, Russia and India, have environmental RF limits 10 to 100 times lower (more stringent). India dropped its RF limits to 1/10th of U.S. limits after an Inter-Ministerial Committee set up by the Ministry of Environment and Forests reviewed the research on birds, bees, plants and animals and found the majority of studies found impacts.

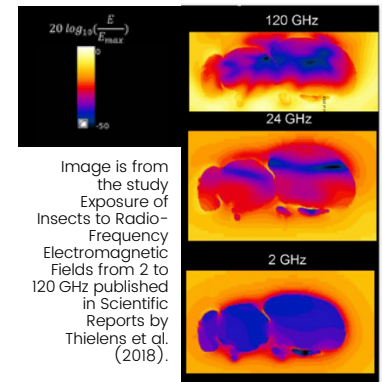
However, none of these countries have safety standards based on science identifying a “safe level” for wildlife and plants.

“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.”

– U.S. Department of the Interior 2014 letter detailing studies showing impacts to birds from cell tower radiation.

“The Federal Communications Commission also completely failed even to acknowledge, let alone respond to, comments concerning the impact of RF radiation on the environment.”

– U.S. Court of Appeals for the D.C. Circuit Ruling in EHT et al. v. FCC



This is an image of the normalized electric field strength (dB) into a Western Honey Bee at various wireless frequencies. It shows that as the wavelengths are higher (as will be used in 5G) the absorption in the bodies of insects also increases, even when the power is the same.

Norway Maple Tree, Damaged by Cell Antennas



Side facing the RF transmitter: 2,100 $\mu\text{W}/\text{m}^2$ Opposite side: 290 $\mu\text{W}/\text{m}^2$



Image: Tree Observation Guide by Helmut Breunig 2017.

*RF = radiofrequency EMF = non-ionizing electromagnetic fields including extremely low frequency

FACTSHEET: EMFS, WILDLIFE AND THE ENVIRONMENT

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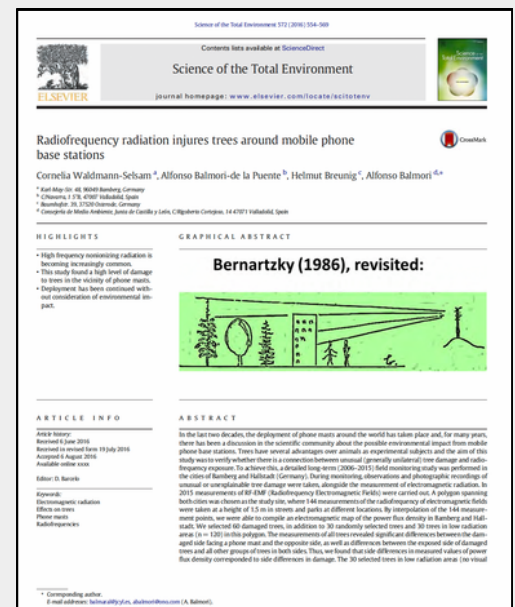
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