

ELECTROMAGNETIC RADIATION & WIRELESS

Health Impacts

Wireless Exposure Has a Negative Effect on Your Health and the Health of Your Children

Decades of science, especially over the past 20 years, have found strong evidence of [two types of brain tumors statistically correlated to cell phone radiation](#). The first, always malignant and usually fatal, [GBMs or glioblastomas](#), were once extremely rare tumors. They are increasingly in the public eye through familiar names like Sen. John McCain, Sen. Ted Kennedy, famed attorney Johnnie Cochran and Biden's son, Beau Biden, former attorney general for the state of Delaware. The second tumor correlated to cell phone radiation is a usually benign tumor of the auditory nerve, [acoustic neuromas](#). Research also connects [thyroid tumors, oxidative stress, DNA damage, sperm damage, leaks in the blood-brain barrier](#), which is supposed to protect our brains from toxins and [cognitive impairment](#).

[Research](#) has found that some individuals are particularly sensitive to radiofrequency radiation (RFR), which can cause tinnitus — ringing in the ears, headaches, fatigue, sleep disruption, vertigo, ADHD symptoms, cognitive impairment and loss of memory. This syndrome or constellation of neurological symptoms is referred to as [Electrosensitivity \(EHS\)](#). The [U.S. Access Board](#), which acknowledged this sensitivity as a disability beginning 20 years ago, refers to it as Electromagnetic sensitivity (EMS).

Experts from within the government as well as academia studying the [U.S. diplomats' "Havana Syndrome"](#) symptoms suggest RF-EMF, radiofrequency electromagnetic radiation, is the likely cause.

Scientists have been warning in greater and greater numbers about the [late lessons learned from early warnings](#) among tobacco, asbestos, DDT (dichloro-diphenyl-trichloroethane) and lead. Substances presumed safe and touted as safe by the industries behind them left scars on the health and well-being of millions of consumers of those products. In the beginning, doctors advertised cigarettes as relaxing, asbestos was synonymous with fire safety, advertisements from manufacturers of [DDT](#) featured an ad with a woman representing a maternal figure standing next to a singing cow: ["DDT is good for me-e-e-e!"](#) and lead has left a legacy of

robbing [children of intellectually resilient futures](#). The telecom communications industry is no exception.

With each one of these environmental and medical harms, the industries that produced the substances rallied behind their claims of safety even when internal company documents, in many instances, revealed that the companies had known for decades their products were anything but safe.

The telecommunications industry, aided by governments around the world, rolled out their infrastructure that makes this technology available in virtually every corner of our lives. Yet they did so before exposure to RF-EMF, radiofrequency electromagnetic radiation had been fully evaluated. In fact, the [safety of cell towers and cell phones](#) was not studied for continual human exposure by the U.S. government before the [rollout of the cell tower infrastructure](#) or when cell phones first went to market.

It often takes decades for science to catch up with technologies or products for which the consequences warranted earlier warnings. There is now a robust body of science showing harm. Proof of harm is increasing yet the RF radiation guidelines, which are not true safety guidelines, only address the thermal effects of RF radiation. Because it takes heat to directly break the bonds of DNA, the Federal Communications Commission ([FCC](#)), along with its unofficial collaborative partner International Commission on Non-Ionizing Radiation Protection [ICNIRP](#) in Europe set regulatory limits as if there were no nonthermal effects. Those regulatory limits have [never been changed](#) since they were implemented in 1996 in spite of five generations of wireless.

Numerous health advocates urged the [Precautionary Principle](#) in the U.S. and Europe, but health cautions appear to have been suppressed — glossed over by government and world health websites suggesting there are no known health concerns. This lack of transparency is deeply concerning as [thousands of peer-reviewed studies](#) accumulate showing non-thermal biological effects at the cellular level including oxidative stress, DNA damage, sperm damage, neurological effects, cognitive impairment and [electrosensitivity](#).

Health Risks to Children From Wireless Technologies

Children, particularly the unborn, are [more vulnerable](#) to everything on the RF-EMF spectrum because of the greater susceptibility of their developing nervous systems — in addition, their brain tissue is more conductive so they absorb more microwave radiation than adults, RF penetration is

greater relative to head size and they will have a longer lifetime of exposure than adults. The legal [exposure limits have remained unchanged](#) for over a quarter of a century, yet in that time five generations of radiofrequency emitting technologies have developed and created a cumulative effect that is difficult to even quantify.

Add the vulnerability of children to the World Health Organization's cancer committee [IARC's](#) classification of everything on the RF-EMF spectrum as a [2B "possible human" carcinogen](#), and the heightened risk to children becomes impossible to deny.

A combination of animal and human studies covering ELF, RF radiation and magnetic fields have combined to suggest these environmental exposures may be linked to the following:

- [Leukemia](#)
- [Congenital Heart Disease in Infants](#)
- [Behavior problems in young children](#)
- [Learning and memory reduction](#)
- [Autism](#)
- [Hyperactivity](#)
- [Asthma](#)

In response to the [U.S. National Toxicology Program study](#) results finding exposure to wireless radiation significantly increased the prevalence of malignant heart and brain cancers in rodents, the [American Academy of Pediatrics \(AAP\)](#) has issued recommendations to reduce wireless cell phone exposure.

"They're not toys. They have radiation that is emitted from them and the more we can keep it off the body and use (the phone) in other ways, it will be safer," said Jennifer A. Lowry, M.D., FAACT, FAAP, chair of the AAP Council on Environmental Health Executive Committee in the [AAPs press release](#) on the results of the NTP study.

In 2017, the [California Department of Public Health](#) issued cell phone warnings for families, particularly those families with children including teens, which include:

- Keep the phone away from the body.
- Reduce cell phone use when the signal is weak.

- Reduce the use of cell phones to stream audio or video, or to download or upload large files.
- Keep the phone away from the bed at night.
- Remove headsets when not on a call.
- Avoid products that claim to block radiofrequency energy. These products may actually increase your exposure.

Electromagnetic Properties of the Human Body

The human body generates internal EMFs to achieve a variety of physiological functions, some of which include the [pulsing of the heart](#), [cellular respiration](#) and [neural activity](#). Research from the [HeartMath Institute](#) shows that according to [EKG](#) measurements, a device that measures electrical signals of the heart, the electric field generated by the heart is around [60 times greater](#) in [amplitude](#) than that of the brain and can be detected anywhere on the surface of the body. Additionally, measurements from superconducting quantum interference device (SQUID) magnetometers show that the magnetic field produced by the heart is more than [100 times greater](#) in strength than that of the brain, and can be detected up to 3 feet away from the body. They [show](#) that the heart is the most powerful source of electromagnetic energy in the human body, and produces the largest electromagnetic field of any of the body's organs.

At the cellular level, the human body uses charged elements called [ions](#), to generate electricity in order to achieve specific bodily functions. A resting cell is such that it is negatively charged on the inside and positively charged on the outside. Ion channels on the cell membrane allow for certain ions to pass through into the cell. When a cell is stimulated, the ion channels on the cell membrane [allow for positive ions to enter the cell](#), ultimately creating an environment that, compared to the outside, is more positively charged. The movement of positive charges into the cell membrane generates electric currents which can turn into electric pulses, called [action potentials](#). The body uses certain patterns of action potentials to initiate processes within the body, such as the periodic contraction of the heart muscle.

What is Electrosensitivity?

Electrosensitivity (EHS) is a constellation of neurological symptoms, referred to by the [U.S. Access Board](#) since 2002 as Electromagnetic Sensitivity (EMS).

In 2020, [Dominique Belpomme](#) and [Philippe Irigaray](#) wrote the [paper](#), "Electrohypersensitivity as a Newly Identified and Characterized Neurologic Pathological Disorder: How to Diagnose, Treat and Prevent It," that best defines the current state of medical knowledge about how to diagnose, treat and hopefully prevent this condition. EHS/EMS is characterized by the occurrence of neurologic symptoms including:

- Headache
- Tinnitus (ringing in the ears)
- Hyperacusis (increased sensitivity to sound)
- Dizziness
- Balance disorder
- Superficial and/or deep sensibility abnormalities
- Fibromyalgia
- Vegetative nerve dysfunction (organs and vessels lose the ability to respond correctly to signals supplied by the body or from outside)
- Reduced cognitive capability, including immediate memory loss
- Attention–concentration deficiency
- Tempo-spatial confusion (relating to, or occurring in both time and space)
- Chronic insomnia
- Fatigue
- Depressive tendency
- Mood swings
- Irritability
- [Heart palpitations](#)
- [Blood pressure problems](#)
- [Anxiety](#)
- [Lack of energy](#)
- [Flu-like symptoms](#)
- [Anomia](#) (difficulty finding words)

A major observation is that symptoms were repeatedly reported by the patients to occur each time they reported

being exposed to EMF sources, even of weak intensity, and to be relieved or even disappear after they left these RF-EMF sources.

Documented Health Effects of RF-EMF: From 2G to 5G: Global Warnings of Harm

- Ronald Melnick, Ph.D., retired [NIEHS senior toxicologist](#) who won the American Public Health Association's 2007 David P. Rall Award for public health advocacy states:

"I strongly feel health and regulatory agencies should promote policies that reduce cell phone radiation exposure, especially for children and pregnant women. The agencies in the U.S. say, 'if you are concerned' rather than 'we are concerned.' Agencies should be clear and straightforward educating the public on 'here is what you should do.'

"The risk can be greater for children than adults due to the increased penetration of the radiation within brains of children and the fact that the developing nervous system is more susceptible to tissue-damaging agents."

- In 2011, the World Health Organization's (WHO) International Agency for Research on Cancer (IARC) classified wireless radiation as a [Group 2B "possible human" carcinogen](#). This conclusion was based upon an increased risk of malignant brain cancer ([glioma](#)) identified in those who used cell phones for over 10 years for an average of 30 minutes per day.

The study that convinced medical experts to vote, nearly unanimously, for a 2B classification was that of Swedish oncologist and epidemiologist, Dr. Lennart Hardell. In [a paper](#) with Michael Carlberg warning of other late lessons we failed to learn from early warnings such as DDT, dioxins, tobacco and glyphosate, Hardell reflects on the 2B status. "Since then," wrote Hardell, "the evidence on RF-EMF carcinogenesis has strengthened based on further human studies on use of wireless phones, as reviewed. Also, animal studies show increased cancer risk, both near field RF-EMF exposure and far-field exposure. Mechanistic studies show an increase of reactive oxygen species (ROS) as well as DNA damage. These

results give support to the increased cancer risk in humans and laboratory-tested animals for RF radiation. In fact, RF-EMF may now be classified as a human carcinogen, Group 1. However, such classification can only be made by IARC.”

- The American Academy of Pediatrics is a non-profit professional organization of 60,000 primary care pediatricians. AAP President Robert W. Block [wrote a letter](#) to the FCC on July 12, 2012, urging the FCC to review their radiofrequency radiation exposure guidelines and to lower them to protect children:

“Children ... are not little adults and are disproportionately impacted by all environmental exposures, including cell phone radiation. In fact, according to IARC, when used by children, the average RF energy deposition is two times higher in the brain and 10 times higher in the bone marrow of the skull, compared with mobile phone use by adults.”

- The [Bioinitiative Report, 2007](#) and [2012](#) with [Research Summary Updates 2020](#), reviewed approximately thousands of studies that report health effects, some of which include abnormal gene transcription, genotoxicity and single-and double-strand DNA damage, stress proteins because of the fractal RF-antenna like nature of DNA, chromatin condensation and loss of DNA repair capacity in human stem cells, reduction in free-radical scavengers — particularly melatonin, neurotoxicity in humans and animals, carcinogenicity in humans, serious impacts on human and animal sperm morphology and function, effects on offspring behavior and effects on brain and cranial bone development in the offspring of animals, including evidence of autism, that are exposed to cell phone radiation during pregnancy.

Based on strong evidence for vulnerable biology in autism, EMF/RF can plausibly increase autism risk and symptoms. Explains Martha Herbert, M.D., Ph.D.:

“While we aggressively investigate the links between autism disorders and wireless technologies, we should minimize wireless and EMF exposures for people with autism disorders, children of all ages, people planning a baby, and during pregnancy.”

- Researchers at the National Toxicology Program (NTP), a federal interagency group under the National Institutes of

Health, led A [\\$30,000,000 10-year study](#) of rats and mice chronically exposed to carefully calibrated radio-frequency (RF) radiation levels designed to roughly emulate what humans with heavy cell phone use or exposure could theoretically experience in their daily lives. The first part of the study was completed in 2016.

Since completion of the \$30 million [NTP study](#) (originally sponsored by the FDA to research possible biological effects of RFR), the results have been replicated by the [Ramazzini Institute](#) in another study using exposures below the FCC thermal thresholds simulating emissions from cellular base stations and wireless transmitters.

The NTP studies found that high exposure to RFR (900 MHz) used by cell phones was associated with:

- Clear evidence of an association with tumors in the hearts of male rats. The tumors were malignant schwannomas.
- Some evidence of an association with tumors in the brains of male rats. The tumors were malignant gliomas.
- Some evidence of an association with tumors in the adrenal glands of male rats. The tumors were benign, malignant, or complex combined pheochromocytoma.
- Measurable DNA [damage](#) under certain exposure conditions.
- In 2021, the U.S. D.C. Circuit Court of Appeals in [EHT et al v. FCC](#) ruled that the FCC's 2019 decision to maintain their 26-year old thermal-based exposure "safety" guidelines demonstrated that the FCC was acting in an "arbitrary and capricious" manner "in its complete failure to respond to comments concerning environmental harm caused by RF radiation" below the current FCC limits.

The Court further ruled that "The factual premise — the non-existence of non-thermal biological effects — underlying the current RF guidelines may no longer be accurate." The Court pointed out that the FCC had ignored scientific evidence documenting biological harm at non-thermal levels (i.e., at levels hundreds and even thousands of times below the current FCC wireless exposure "safety" guidelines). Indeed, [11,000 pages of scientific studies](#) of biological hazards from RFR and hundreds of personal accounts of injuries from RFR were in the FCC docket which the FCC ignored, and the D.C.

Circuit Court of Appeals admonished the FCC that it cannot ignore.

The ruling called into question the underlying basis for the FCC's extremely high thermal-only "safety" threshold and ruled, in an historic win, in favor of [Children's Health Defense](#) and Environmental Health Trust who sued the FCC.

Extremely Low Frequency EMFs

"These proposals reflect the evidence that a positive assertion of safety with respect to chronic exposure to low-intensity levels of ELF and RF cannot be made."

— [The BioInitiative Report 2007](#)

Extremely low frequency EMFs use frequencies between [3 hertz \(Hz\)](#) and [3 kilohertz \(kHz\)](#). Reported health effects include:

- **Nervous System**
 - [Brain tumors](#)
 - [Sensitization of cells to the pro-Parkinson's disease toxin](#)
- **Children**
 - [Childhood leukemia](#)

Radio Frequency EMFs

Radiofrequency EMFs consist of frequencies between [3 kilohertz \(kHz\)](#) and [300 gigahertz \(GHz\)](#). In 2011, the International Agency for Research on Cancer ([IARC](#)), classified radiofrequency electromagnetic fields (RF EMFs) as [possibly carcinogenic to humans \(Group 2B\)](#). This puts the radiation emitted by cell phones, cell towers, Wi-Fi, Bluetooth, laptop computers, routers and baby monitors in the same category where DDT, diesel fuel and lead have resided before being boosted to the [\(Group 2A\) probably carcinogenic to humans](#) status. Reported health effects include:

- **Cardiovascular System**
 - [Alteration of heart rhythm](#)
 - [Lung tumors](#)
 - [Cardiovascular disease](#)
- **Genetic**
 - [Altered gene expression](#)

- DNA damage and reduced ability to repair DNA
- DNA breakage

- **Male Reproductive System**
 - Male infertility and sex ratio of offspring
 - Sperm damage
 - Reduced sperm motility and viability.
 - Impaired sperm function and quality

- **Female Reproductive System**
 - Reproductive system
 - Impaired fetal growth
 - Multifocal breast cancer in young women
 - Miscarriage

- **Nervous System**
 - Vestibular nerve tumors
 - Brain tumors
 - Brain damage
 - Altered brain activity
 - Central nervous system diseases
 - Neurological damage
 - Altered stem cell development
 - Cognitive impairment
 - Learning and memory deficits

- **Metabolic System**
 - Altered metabolism

- **Immune System**
 - Weakened immune systems
 - Increased free radical.
 - Oxidative stress

- **Endocrine System**
 - Diabetes

- [Obesity and diabetes](#)
- **Digestive System**
 - [Salivary gland tumor](#)
 - [Liver tumors](#)
- **General Well-being**
 - [General well-being](#)
 - [Electromagnetic hypersensitivity.](#)
- **Children**
 - [Behavior problems in young children](#)
 - [Leukemia](#)
 - [Congenital Heart Disease in Infants](#)
 - [Behavioral problems in young children](#)
 - [Learning and memory reduction](#)
 - [Autism](#)
 - [Hyperactivity](#)
 - [Asthma](#)

Millimeter Wave Exposure

[Preliminary observations](#) show that [millimeter waves](#) (MMW) increase skin temperature, alter gene expression, promote cellular proliferation and synthesis of proteins linked with oxidative stress, inflammatory and metabolic processes, could generate ocular damages, and affect neuro-muscular dynamics. Another [review](#) of MMW mobile networking technology emphasizes that most of the laboratory experiments conducted to date are not designed to identify the more severe adverse effects reflective of the real-life operating environment in which wireless radiation systems operate. Many experiments do not include [pulsing and modulation](#) of the carrier signal. The vast majority do not account for [synergistic adverse effects](#) of other toxic stimuli (such as chemical and biological) acting in concert with wireless radiation. Although it has been stated that MMW has adverse impacts on the skin and eyes, an [article](#) by Kostoff et al in Toxicology Letters suggests MMW will also have adverse systemic effects.

[Thermal injury](#) due to MMW exposure is expected to produce conventional burns such as those produced when a person

touches objects or flames. MMW are [strongly absorbed](#) in the cornea of the eye.

[“Systemic signaling in the skin can result in physiological effects on the nervous system, heart, and immune system mediated through neuroendocrine mechanisms.”](#)

5G health risks to your family the U.S. government is not examining

If telecom has studied 5g health risks, they are withholding the results.

“So there really is no research ongoing. We’re kind of flying blind here, as far as health and safety is concerned.” — U.S. Sen. Richard Blumenthal, February 2019

How can 5G be rolled out in our communities, next to our children’s schools and our homes, without the telecommunications industry doing a single study — at least a study they are willing to show the U.S. government? It is this absence of testing prior to the 5G buildout that worried U.S. Sen. Richard Blumenthal, member of the Commerce, Science, and Transportation Committee, in a hearing held in February 2019, one month after the [Federal Communications Commission](#) Declaratory Ruling forced cities and counties across the country to lease their public rights-of-way to telecom carriers for “small cell” cell towers that were virtually unstoppable. [See [video](#) of proceedings: 2:04:00]

Blumenthal raised concerns about the lack of any scientific research and data on the technology’s potential health risks. During an exchange with wireless industry representatives, Blumenthal asked representatives from each of the major carriers whether they had conducted research on the safety of 5G and MMW technology and potential links between radiofrequency and cancer, and the industry representatives conceded they had not.

“So my question for you,” Blumenthal asked each of the telecom representatives, “How much money has the industry committed to supporting additional independent research — I stress independent — research? Is that independent research ongoing? Has any been completed? Where can consumers look for it? And we’re talking about research on the biological effects of this new technology.” None of the five representatives from major telecom carriers or infrastructure builders sent to appear before Blumenthal’s committee could

confirm any money spent on research, nor could they confirm that any research was planned.

Blumenthal concluded, "So there really is no research ongoing. We're kind of flying blind here, as far as health and safety is concerned."

In the Absence of the Federal Government Protecting Health, New Hampshire Takes Action on 5G

New Hampshire formed a State Commission to examine the health effects of the evolving 5G technology and whether wireless radiation is indeed harmful to human health. The majority of the New Hampshire State Commission came to the conclusion that exposure to wireless radiation is harmful to human health and the environment. The commission was convened through [bipartisan legislation](#) that was signed by the governor.

Commission membership included unbiased experts in fields relating to health and radiation exposure, and they issued their [Final Report](#) in November 2020. A quote from that report taken from the recommendation provides the Commission's findings with regard to the effectiveness of FCC regulations:

"The majority of the Commission believes that the FCC has not exercised due diligence in its mission to manage the electromagnetic environment by not setting exposure limits that protect against health effects. They have failed to support technical means and investigations aimed at reducing human exposures to electromagnetic radiation (EMR) in telecommunications systems and optimize wireless modulations to reduce biological and health impacts."

As powerful as the recommendations were, the 30,000-foot view from the New Hampshire Commission on 5G Report Summary captured some important truths:

Then the Commission was presented with varying facts about the Federal Communication Commission (FCC) having total say over this issue as granted to it by Congress in the Telecommunication Act of 1996. In brief, this Act says, among many other things, that the siting of any antennae cannot be denied due to health concerns. Many on the Commission are concerned that this Act did not contemplate small cell towers being located on the public rights-of-way in front of people's homes.

"In addition, the FCC, using the science that they receive from other agencies and scientific/engineering associations, has set

the allowable power intensity that can be emitted from these antennae. Testimony shows these limits are set well above many other industrialized nations. There are concerns by many Washington, DC watchers that the FCC is a captive agency whose Commission members come from the industry they are overseeing. These are the realities that can only be altered by Congressional action.”

“As a New Hampshire Commission, as we moved through the Commission process, many of the members concluded we could first encourage our federal delegation to enact changes and second, assuming the federal realities cannot be changed, recommend protective measures that will stay within the current federal framework.”

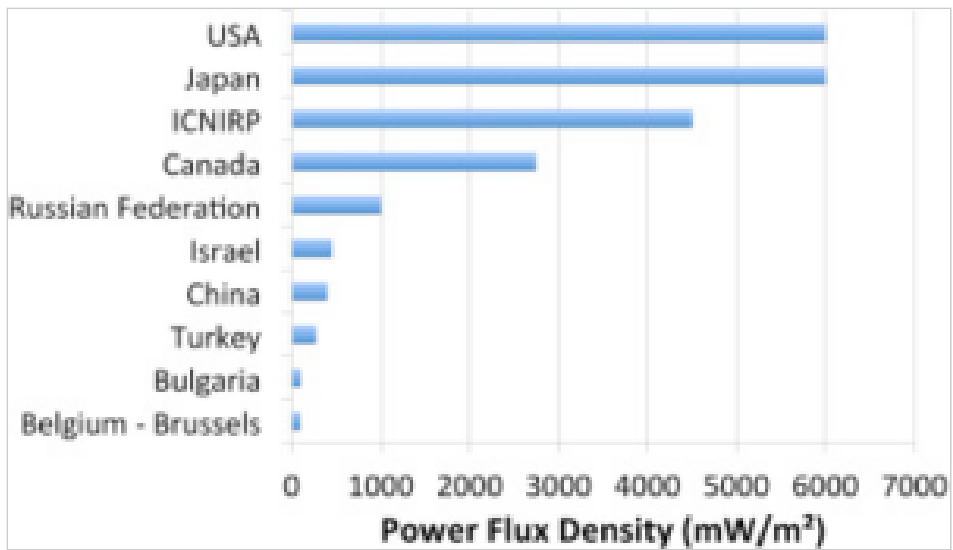
Comparing Exposure Limits in Various Geographic Regions:

Evidence the FCC is a Captured Agency

In the absence of protective Federal action regarding the mushrooming growth of wireless radiation and the unprecedented land grab that facilitated “small cells” ending up in schoolyards, adjacent to daycare centers, office buildings, parks and literally in front of people’s homes, and with local councils and boards repeating the same refrain, “Our hands are tied. Write to Washington DC.” — the New Hampshire legislature formed a State Commission to examine the health effects of the evolving 5G technology and whether wireless radiation is indeed harmful to human health. The majority of the New Hampshire State Commission came to the conclusion that exposure to wireless radiation is harmful to human health and the environment.

From the New Hampshire Commission on 5G, an invitation was extended to the Federal Communications Commission (FCC) and went unanswered. The Commission concluded:

“The FCC, using the science that they receive from other agencies and scientific/engineering associations, has set the allowable power intensity that can be emitted from these antennae. Testimony shows these limits are set well above many other industrialized nations. There are concerns by many Washington, DC watchers that the FCC is a captive agency whose Commission members come from the industry they are overseeing.”



[Sign up](#) for free news and updates from Robert F. Kennedy, Jr. and the Children's Health Defense. CHD is implementing many strategies, including legal, in an effort to defend the health of our children and obtain justice for those already injured. Your [support](#) is essential to CHD's successful mission.