



# **Wi-Fi in Schools**

## **Radiofrequency Radiation Health Risks**

**Printable Fact Book**

(version 3.1 - November 29, 2016)

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**Calling for the use of traditional hard-wired Internet connections to replace wireless (Wi-Fi) in schools, based on scientific, testimonial, and other evidence showing danger to our children. Warning of the dangers of exposure to radiofrequency radiation from all devices that generate it.**

**A Publication of the International Electromagnetic Health Association**

## **Introduction: What is Radiofrequency Radiation?**

Radiofrequency (RF) radiation, often referred to as RFR, EMR or EMF (electromagnetic radiation or frequency), is the energy emitted by wireless telecommunications devices, such as cell phones, cell towers, Wi-Fi routers, Bluetooth, smart meters, baby monitors, and other wireless devices. Its increasing prevalence is unprecedented in human history. As RF radiation is coming to be found in more and more places, such as our homes, places of work, schools, etc., people are increasingly reporting ill health symptoms in conjunction with exposure. A growing number of scientists, doctors, government health officials, and other experts are calling for serious changes in how we use and expose others to this form of radiation. Though little-discussed by the mainstream medical community, there is in fact a substantial body of research on the significant biological effects of RF radiation.

The World Health Organization's International Agency for Research on Cancer (IARC) has classified EMR as a 2B cancer risk; in this same category of risk, one can also find lead, the substance behind the recent surge of children's toy recalls, and DDT, the controversial mosquito repellent. Currently, none of the major companies responsible for popular RF-emitting products publicly acknowledge the 2B classification of RF radiation.

Most safety limits worldwide are based on decades-old research from times when digital communications were hardly used, or not used at all. These limits are based on the thermal heating effects of RF radiation. However, new research as well as overlooked prior research shows non-thermal biological effects, even at very low levels. Of particular concern is the effect of digital pulsed signals with quick rises and falls - types of signals not found in nature. The fact remains that the long-term effects of RF radiation exposure are unknown, and this concerns many experts.

The purpose of this document is to provide you with a comprehensive list of evidence supporting the classification of RF as carcinogenic, and to encourage our educators to implement the precautionary approach as recommended by the leading researchers.

To further highlight the magnitude of the concern over RFR/EMR/EMF health effects, the International Electromagnetic Health Association (IEHA) has identified over 200 web sites and groups devoted to EMR health concerns and safety. These are listed at [www.CountingOnSafety.org](http://www.CountingOnSafety.org).

The IEHA is a member-based and member-driven organization of doctors, scientists, parents, and caring men and women around the planet. You can help support our continued work by joining the IEHA by going to [www.EMFAction.org](http://www.EMFAction.org), adding the membership to your cart, and completing the checkout.

Hyperlinks in this document have been preserved by web.archive.org - if a link becomes broken, use <http://web.archive.org> to access these preserved pages.

## International

→ On May 31, 2011 the World Health Organization's International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group 2B) based on increase of glioma, a malignant type of brain cancer caused by wireless phone use.

([http://www.iarc.fr/en/media-centre/pr/2011/pdfs/pr208\\_E.pdf](http://www.iarc.fr/en/media-centre/pr/2011/pdfs/pr208_E.pdf))

→ May 11, 2015 - The International EMF Scientist Appeal signed by **223** (as of October 10, 2016) **scientists** from 41 nations was submitted to His Excellency Ban Ki-moon, Secretary-General of the United Nations, to Dr. Margaret Chan, MD, Director General of the World Health Organization, and to the United Nations Member States.

Martin Blank, PhD, of Columbia University, says, *“International exposure guidelines for electromagnetic fields must be strengthened to reflect the reality of their impact on our bodies, especially on our DNA. The time to deal with the harmful biological and health effects is long overdue. We must reduce exposure by establishing more protective guidelines.”*

Joel Moskowitz, PhD, of University of California, Berkeley, says, *“ICNIRP guidelines set exposure standards for high-intensity, short-term, tissue-heating thresholds. These do not protect us from the low-intensity, chronic exposures common today. Scientists signing the Appeal request that the UN and member nations protect the global human population and wildlife from EMF exposures.”*

(<http://www.emfscientist.org>)

→ The Bioinitiative Report, an ongoing report by a working group of leading doctors and scientists in this field from all over the world, has reviewed thousands of studies and issued recommendations such as:

*“There is good evidence to suggest that many toxic exposures to the fetus and very young child have especially detrimental consequences depending on when they occur during critical phases of growth and development (time windows of critical development), where such exposures may lay the seeds of health harm that develops even decades later. Existing FCC and ICNIRP public safety limits seem to be not sufficiently protective of public health, in particular for the young (embryo, fetus, neonate, very young child).”*

(<http://www.bioinitiative.org/conclusions>)

→ The BabySafe Project has issued a Joint Statement signed by **159 signatories** (as of August 13, 2015). The majority of these signatories - 75% or greater are either Medical Doctors (MD) or PhD doctors.

(<http://www.babysafeproject.org/signatories/>)

→ The European Environment Agency (EEA) issued this advisory to all concerned individuals and institutions in and outside of the continent of Europe:

*“All reasonable measures to be taken to reduce exposures to electromagnetic fields, especially radiofrequencies from mobile phones and particularly the exposures to children and young adults. Current exposure limits to be reconsidered.”*

(<http://www.env-health.org/policies/other-issues/electromagnetic-fields/>)

→ Additionally, the Council of Europe has passed a resolution (Resolution 1815, 2011) regulating the use of cell phones in schools and encouraging schools using Wi-Fi to convert to hard-wired internet connections.

(<http://assembly.coe.int/nw/xml/XRef/X2H-Xref-ViewPDF.asp?FileID=17994&lang=en>)

→ A 2009 study published by the International Society for Pathophysiology concluded that:

*“RFR exposure does indeed appear to affect DNA damage and repair, and the total body of available data contains clues as to conditions producing effects and methodologies to detect them. This view is in contrast to that of those who believe that studies unable to replicate the work of others are more credible than the original studies, that studies showing no effects cancel studies showing an effect, or that studies showing effects are not credible simply because we do not understand how those effects might occur.”*

(<http://americanassociationforcellphonesafety.org/uploads/PATHOPHYSIOLOGY.pdf>)

→ A 291-page report, the joint effort of twelve institutes in seven countries, found genotoxic effects and modified expressions on numerous genes and proteins after extremely low-frequency EMF exposure at low levels, below current international safety guidance, to living cells in-vitro. These results confirm the likelihood of long-term genetic damage in the blood and brains of users of mobile phones and other sources of electromagnetic fields. The study can be found here:

([http://www.powerwatch.org.uk/pdfs/20041222\\_reflex.pdf](http://www.powerwatch.org.uk/pdfs/20041222_reflex.pdf))

## **United States of America**

→ The United Federation of Teachers (approx. 200,000 members) published:

*“Wireless radiation is emitted by the myriad of wireless devices we encounter every day. It was once thought to be relatively harmless. However, we now know that wireless radiation can cause non-thermal biological effects as well, including damage to cells and DNA, even at low levels.”*

In addition to this statement, they include links to information on how to reduce exposure.

(<http://www.uft.org/our-rights/wireless-radiation>)

→ The renowned United States National Toxicology Program found significant increase in cancer in rats (\$25 million study) exposed to standard cell phone radiation compared to non-exposed

(<http://ntp.niehs.nih.gov/results/areas/cellphones>)

“These findings appear to support the International Agency for Research on Cancer (IARC) conclusions regarding the possible carcinogenic potential of RFR.”

(<http://biorxiv.org/content/early/2016/06/23/055699.full.pdf>)

→ The American Academy of Pediatrics, in a letter to the commissioners of the FCC and FDA dated August 29, 2013

*“Current FCC standards do not account for the unique vulnerability and use patterns specific to pregnant women and children.”*

*“The FCC has not assessed the standard for cell phone radiation since 1996. Approximately 44 million people had mobile phones when the standard was set; today, there are more than 300 million mobile phones in use in the United States. While the prevalence of wireless phones and other devices has skyrocketed, the behaviors around cell phone uses have changed as well. The number of mobile phone calls per day, the length of each call, and the amount of time people use mobile phones has increased, while cell phone and wireless technology has undergone substantial changes.”*

*“The AAP supports the reassessment of radiation standards for cell phones and other wireless products and the adoption of standards that are protective of children and reflect current use patterns”*

(<http://www.bioinitiative.org/conclusions/>)

→ Firefighters in Los Angeles are currently fighting the installation of new cell towers:

*“The proximity of the towers and people living next to the towers is of grave concern,” said David Gillotte, union president of Firefighters Local 1014. “It’s a very complex issue how those radio issues affect people, all the way up to three miles away. There are health and safety issues that need to be discussed openly with the public.”*

(<http://losangeles.cbslocal.com/2015/03/24/la-county-firefighters-address-lawmakers-over-cell-tower-concerns/>)

→ The Board of the American Academy of Environmental Medicine (BAAEM) issued the following statements in the year of 2012:

*“Adverse health effects, such as learning disabilities, altered immune responses, headaches, etc. from wireless radio frequency fields do exist and are well documented in the scientific literature. Safer technology, such as using hard-wiring, must be seriously considered in schools for the safety of those susceptible individuals who may be affected by this phenomenon.”*

(<http://issuu.com/waynegerald/docs/safeschools2012>)

*“The Board of the American Academy of Environmental Medicine opposes the installation of wireless ‘smart meters’ in homes and schools based on a scientific assessment of the current medical literature (references available on request). Chronic exposure to wireless radiofrequency radiation*

*is a preventable environmental hazard that is sufficiently well-documented to warrant immediate preventative public health action.*

*The Board of the American Academy of Environmental Medicine also wishes to note that the US NIEHS National Toxicology Program in 1999 cited radiofrequency (RF) radiation as a potential carcinogen. Existing safety limits for pulsed RF were termed 'not protective of public health' by the Radiofrequency Interagency Working Group (a federal interagency working group including the FDA, FCC, OSHA, the EPA and others)."*

(<http://emfsafetynetwork.org/wp-content/uploads/2009/11/AAEM-Resolution.pdf>)

→ A 2012 study conducted at Yale University, in which pregnant mice were exposed to RF radiation from cell phones, concluded that the mice's offspring showed symptoms of ADHD and memory loss. This study was discussed in detail in the documentary short *The Science of Exposure*. (<http://www.babysafeproject.org/the-science/>)

→ The American Academy of Pediatrics, in a letter to Congressman Dennis Kucinich dated December 12th, 2012, states:

*"Children are disproportionately affected by environmental exposures, including cell phone radiation. The differences in bone density and the amount of fluid in a child's brain compared to an adult's brain could allow children to absorb greater quantities of RF energy deeper into their brains than adults. It is essential that any new standards for cell phones or other wireless devices be based on protecting the youngest and most vulnerable populations to ensure they are safeguarded through their lifetimes."*

(<http://www.bioinitiative.org/conclusions/>)

→ President Barack Obama's 2010 panel on cancer research issued a statement that children:

*"are at special risk due to their smaller body mass and rapid physical development, both of which magnify their vulnerability to known carcinogens, including radiation."*

(See above link)

Further information on the panel itself can be found here:

<http://deainfo.nci.nih.gov/advisory/pcp/pcp.htm>

→ A study published in 2008 by the American Society for Reproductive Medicine concluded that:

*"...[sperm] motility, count, viability, and morphology are negatively affected by the use of cell phones."*

([http://c4st.org/images/documents/scientific\\_studies/Cleveland-Clinic-Cell-Phone-Sperm-study.pdf](http://c4st.org/images/documents/scientific_studies/Cleveland-Clinic-Cell-Phone-Sperm-study.pdf))

→ A 2009 study by Dr. Sam Milham, MD, MPH, states that:

*“Most cancer in firefighters is due to radiofrequency radiation exposure, not inhaled carcinogens.”*  
([http://c4st.org/images/documents/scientific\\_studies/RF-Cancer-in-firefighters.pdf](http://c4st.org/images/documents/scientific_studies/RF-Cancer-in-firefighters.pdf))

→ In a letter dated February 8th, 2013, Dr. Martha R. Herbert, PhD, MD, advised the Los Angeles Unified School District:

*“I urge you to step back from your intention to go wifi in the LAUSD, and instead opt for wired technologies, particularly for those subpopulations that are most sensitive. It will be easier for you to make a healthier decision now than to undo a misguided decision later.”*

(<http://c4st.org/images/documents/resources/wifi-in-schools/HerbertLettertoLACUSDOjectingToWiFiClassroom2013-0208.pdf>)

Noted EMF researcher Dr. Magda Havas, PhD, seconded Dr. Herbert in a follow-up letter dated February 10th, 2013:

*“The scientific evidence clearly shows that microwave radiation at levels well below the Federal Communication Commission (FCC) guidelines and at levels now commonly found inside classrooms with Wi-Fi routers causes cancer in laboratory animals, causes heart palitations in sensitive adults, causes reduced sperm motility and viability, and is associated with symptoms of electrosensitivity that include, but are not limited to, cognitive dysfunction, pain, fatigue, mood disorders (depression, anxiety, irritability), dizziness, nausea, weakness, skin problems, and tinnitus.*

*As an example, we did a study that showed that microwave radiation (pulsed 2.4 GHz frequency) at levels less than 0.5% of the FCC guidelines caused either an irregular or rapid heart rate in adults who were sensitive to this radiation (Havas et al. 2010). See:*

[http://www.youtube.com/watch?v=\\_EI9fZX4iww](http://www.youtube.com/watch?v=_EI9fZX4iww).”

(<http://c4st.org/images/documents/resources/wifi-in-schools/Havas-LAUSD-Wi-Fi-2013.pdf>)

## **Austria**

→ In Austria, Dr. Gerd Oberfeld, MD, a member of the Austrian Medical Association (AMA) and officiate of the Austrian Federal Ministry of Health (FMH), issued the following statement on behalf of the AMA:

*“Schools should provide the best possible learning environments. In this context, low noise levels, good air quality, and low radiofrequency / microwave radiation are crucial. Wi-Fi environments will lead to high microwave exposure for students and teachers, which might increase the burden of oxidative stress.”*

([http://www.nevvus.com/en/what\\_are\\_emf.php](http://www.nevvus.com/en/what_are_emf.php))

## **Canada**

→ The Canadian Medical Association Journal calls Canada’s EMR exposure limits “a disaster to public health.”

(<http://www.newswire.ca/en/story/1532755/canadian-medical-association-journal-reports-health-canada-s-wireless-limits-are-a-disaster-to-public-health>)

→ 22 Medical Doctors throughout Canada sign a sobering declaration to Health Canada for the need for greater research-based protection of the public from radiofrequency radiation. (<http://media.electrahealth.com/assets/images/research/medical-doctors-submission-to-health-canada-english.pdf>)

→ Former President of Microsoft Canada, Frank Clegg, founded Canadians for Safe Technology (C4ST), “*to educate and inform Canadians and their policy makers about the dangers of the exposures to unsafe levels of radiation from technology...*” ([www.c4st.org](http://www.c4st.org))

## **France**

→ A survey conducted in France of 270 men and 260 women suggested women are more sensitive to EMR than men, with many of the women surveyed complaining of headache, nausea, loss of appetite, sleep disturbance, depression, discomfort and visual perturbations. This first study on symptoms experienced by people living in the vicinity of telecommunication stations shows that, in view of radioprotection, minimal distance of people from cellular phone base stations should be greater than 300 meters. (<http://www.ncbi.nlm.nih.gov/pubmed/12168254>) A follow-up survey also suggested that sensitivity can increase with age: <http://www.ncbi.nlm.nih.gov/pubmed/12948762>.

→ On June 26, 2014, France enacted Proposition 2065, banning the use of Wi-Fi in childcare facilities, requiring Wi-Fi to be disabled in schools when not in use for teaching, calling for reduction in incidental public exposure to RF radiation, and requiring mobile phone companies to advertise radiation-reducing accessories with phones, under penalty of a 75,000 Euro fine. The proposition also called for a report on electromagnetic hypersensitivity (EHS). (<http://www.takebackyourpower.net/news/2015/02/01/france-new-law-bans-wifi-in-daycares-restricts-wireless-infrastructure/>)

## **Germany**

→ Scientists from Jacobs University and the University of Wuppertal successfully replicated a previous study showing that low-levels (“non-thermal”) of RF energy have significant tumor-enhancing effects. The results were described as “*worrying*” by the authors. This was an important study that confirmed and expanded upon previous findings showing increase in tumors. (<http://smartgridawareness.org/2015/03/08/rf-fields-promote-tumors-below-human-exposure-limits/>)

→ A 2015 study by the German Cancer Research Center (DKFZ) in Heidelberg, Germany, indicated a correlation between tumors in mice and cell phone radiation well below the commonly accepted safety threshold. University of Albany Institute for Health and the Environment Director David Carpenter commented on the study:

*“This new study, in conjunction with previous work, makes a much stronger case for an IARC classification of 2A, a probable human carcinogen.”*

(<http://www.microwavenews.com/news-center/rf-animal-cancer-promotion>)

## **Greece**

→ A Greek study has demonstrated protein changes in the brains of animals following whole body exposure to RF electromagnetic fields, similar to the kind of microwave radiation emitted from cell phones, Wi-Fi, and wireless computer and game console equipment. Adamantia F. Fragopoulou, M.Sc., PhD Candidate, in the Dept of Cell Biology and Biophysics at University of Athens, Greece, lead author of the study, says:

*“Our study is important because it shows for the first time protein changes in the mouse brain after EMF exposure, and in particular in very crucial regions like hippocampus, cerebellum and frontal lobe, all involved in learning, memory and other complicated functions of the mammalian brain. We have demonstrated that 143 proteins are altered after electromagnetic radiation, including proteins that have been correlated so far with Alzheimer’s, glioblastoma, stress and metabolism. In its perspective, this study is anticipated to throw light in the understanding of such health effects like headaches, dizziness, sleep disorders, memory disorders, brain tumors, all of them related, to the function of the altered brain proteins.*

*Until now there is limited evidence relating EMFs with the impact on specific brain proteins. Further analysis of the affected proteins as well as replicating the experiment under similar conditions (data presently under analysis) is expected to offer new insights explaining the overall effects.”*

(<http://electromagnetichealth.org/electromagnetic-health-blog/mice-proteome/>)

## **India**

→ Between 2012 and 2014, several petitions were filed in the state of India to remove EMF-emitting telecommunications towers from neighborhoods, schools, and other public areas. They can be found and read about at the following web addresses:

(<http://www.vagbrytaren.org/No%20mobile%20towers%20near%20schools,%20hospitals,%20directs%20Rajasthan%20High%20Court.pdf>)

([http://articles.economicstimes.indiatimes.com/2013-02-06/news/36949860\\_1\\_tower-radiation-mobile-towers-icnirp-guidelines](http://articles.economicstimes.indiatimes.com/2013-02-06/news/36949860_1_tower-radiation-mobile-towers-icnirp-guidelines))

(<http://www.thehindu.com/news/cities/Coimbatore/petition-against-phone-tower/article6460617.ece>)

## **Ireland**

→ The Irish Doctors Environmental Association (IDEA) has unanimously declared that:

*“there is sufficient scientific evidence to warrant more stringent controls on the level and distribution of EMR.”*

(<http://issuu.com/waynegerald/docs/safeschools2012>)

## **Italy**

→ In 2012 the Italian Supreme Court ruled that mobile phones cause brain cancer - a landmark ruling against the cell phone industry.

(<http://rt.com/news/italy-phone-causes-tumor-840/>)

→ A study by Italian doctors published by the Archives of Environmental and Occupational Health on November 1st, 2012, concluded that:

*“...the laptop is paradoxically an improper site for the use of a [laptop computer], which consequentially should be renamed to not induce customers toward an improper use. The use of the word ‘laptop’ is thus misleading, because evidence shows that an incorrect use of the LTC can cause an increased EMF body exposure. Users should be aware about such risk: recommendations for safe use of laptops should avoid close contact between laptop, power supply, and user, in particular during pregnancy.”*

([https://docs.google.com/file/d/17Z-BgRE0Ib-YtEnGFLLO5dmOgrudovBj8mfHLFrzzFkbLkZiwV1Lmth\\_TtxI/edit](https://docs.google.com/file/d/17Z-BgRE0Ib-YtEnGFLLO5dmOgrudovBj8mfHLFrzzFkbLkZiwV1Lmth_TtxI/edit))

## **Russia**

→ On June 19, 2012, the Russian National Committee on Non-Ionizing Radiation Protection (RNCNRP) has issued a precaution against prolonged exposure to EMR, especially for children, stating:

*“It is our professional obligation not to damage the children's health by inactivity.”*

(<http://www.emfacts.com/2012/06/new-report-medical-associations-medical-doctors-and-leading-scientists-call-for-safe-technologies-in-schools/>)

Professor Yury Grigoriev, Chairman of the RNCNRP and a member of the WHO’s International Advisory Committee on EMF and Health, has been quoted as saying:

*“Our recent 4-year monitoring of effects from cell phone radiation on children, published in Radiation Biology. Radiation Ecology (Volume 51, No.5, 2011), demonstrates an increase in phonemic perception disorders, abatement of efficiency, reduced indicators for the arbitrary and semantic memory and increased fatigue. Over the four-year monitoring of 196 children ages 7-12 who were users of mobile communication devices, a steady decline in these parameters from high values to bottom standards compared was observed. The short-term and long-term potential consequences for society from exposing children to microwave radiation from cellular communication devices must be immediately acknowledged, globally, and responsibly addressed.”*

(<http://electromagnetichealth.org/electromagnetic-health-blog/russian-res-children-emf/>)

## **Spain**

→ A 2005 Spanish study of storks who nested near telecommunication towers revealed that the storks exhibited erratic behavior and had greater instances of offspring with birth defects than storks nesting 300 meters or more from the towers:

([http://www.powerwatch.org.uk/news/20051006\\_storks.asp](http://www.powerwatch.org.uk/news/20051006_storks.asp))

## **Sweden**

→ A 2009 study published by Umea University in Sweden states that

*“In summary, our review yielded a consistent pattern of an increased risk for glioma and acoustic neuroma after >10 year mobile phone use. We conclude that the current standard for exposure to microwaves during mobile phone use is not safe for long-term exposure and needs to be revised.”*

([http://americanassociationforcellphonesafety.org/uploads/Hardell\\_Abstract\\_2009.doc](http://americanassociationforcellphonesafety.org/uploads/Hardell_Abstract_2009.doc))

## **Switzerland**

→ Swiss Doctors for Environmental Protection (SDEP) have issued a statement calling for caution with respect to wireless technologies:

*“The International Agency for Research on Cancer (IARC) considers the waves emitted by wireless communication ‘possibly carcinogenic.’ According to the IARC, the risk of cancer for this type of radiation is thus similar to that of the insecticide DDT, rightly banned. Doctors for the Environment is concerned that the limit values expected to protect the Swiss population, notably vulnerable groups such as children and pregnant women, constitute insufficient protection. In a communication sent to the Federal Assembly, Doctors for the Environment thus requests strict application of the principle of precaution and – in view of the risk of cancer – lower limit values. Children’s rooms, housing, trams or offices are experiencing a growing exposure to radiation from diverse sources: baby monitors, mobile telephony, Wi-Fi, etc., yet more and more studies warn against the serious health consequences of electromagnetic pollution for human beings and animals.”*

(<http://www.safeinschool.org/2012/04/switzerland-physicians-for-environment.html>)

→ Dr. Thomas Rau, Medical Director of the Paracelsus Clinic in Lustmühle, Switzerland, has been quoted as saying:

*“We know from our patients, but we also know from studies that were done in Switzerland and Germany, that cell towers can interfere with patients very much...heart rhythm, breathing, digestion...concentration...these can be severely compromised by mobile phone towers.”*

The Paracelsus Clinic now routinely educates patients in EMF remediation strategies.  
(<http://electromagnetichealth.org/electromagnetic-health-blog/medical-director-of-switzerland/>)