

Cell Towers and Radiofrequency Radiation International Policy, Scientific Concern The Problem with FCC Limits

Theodora Scarato MSW

Executive Director , Environmental Health Trust

Presentation To the Hempfield School District 1/9/18

Why are scientists concerned about health effects?

What are examples of recent research studies?

Is there proof of safety?

Do FCC limits ensure safety?



Disclaimer: This presentation is on the issue of radiofrequency and health. This is not an opinion on the specifics of health effects regarding any specific cell tower, nor an analysis of documentation related to the specific emissions of any specific cell tower or cell towers. No US health agency has determined a proper safety standard to ensure human health is protected based on a systematic review of the science. Adequate research on the impact to human health from chronic exposure that is proof of or establishes a safety limit as a benchmark is simply not available. Due to these data gaps and due to research evidence of adverse effects at levels lower than FCC limits- no adequate documentation on proof of safety exists in regards to potential health effects to children from daily exposures from the various sources of radiofrequency radiation be the source as cell phones, cell towers or Wi-Fi routers. Environmental Health Trust is calling on the US government to re-evaluate current regulatory limits and to task a health agency to develop proper safety limits based on a systematic review that will protect human health and protect children's long term health. Until such safety limits are determined by a US health agency , which would allow for benchmarks - Environmental Health Trust cannot provide documentation to back an opinion that establishes any level as "safe" - in regards to radiofrequency radiation. Many countries have set RF limits much lower than FCC limits to account for non thermal biological effects. Environmental Health Trust cannot be held liable for presenting this information.



ENVIRONMENTAL HEALTH TRUST

A scientific think tank * publishes research*educates policy makers and the public.

Scientific advisors and scientific collaborators include:

Anthony Miller MD, Physician epidemiologist, National Cancer Institute of Canada, WHO/IARC, German Cancer Research Centre,

Ronald Melnick, PhD, NIH/NIEHS Senior scientist, lead NIH NTP design

Om Gandhi Sc.D, University of Utah, Children's Exposure

Frank Barnes, Ph.D. University of Colorado, Chair of National Academy Of Sciences Committee on Cell Phone Research.

Lloyd Morgan , electronic engineer

Claudio Fernandez, Professor at the Federal Institutes of Brazil

Annie Sasco, M.D., D.S.C, Team Leader, Epidemiology for Cancer Prevention, Victor Segalen Bordeaux 2 University

Priyanka Bandara, Ph.D., Mary Redmayne, Ph.D. Anne Steinemann, Ph.D.

Devra Davis PhD, visiting Professor at Ondokuz Mayis University Medical School, Samsun, Turkey, Founding Director, Center for Environmental Oncology, University of Pittsburgh Cancer Institute

Theodora Scarato MSW, LCSW-C Executive Director

More at <https://ehtrust.org>

An ounce of prevention is worth a pound of cure





Anthony B. Miller MD, FRCP,
A physician and epidemiologist
Professor Emeritus, Dalla Lana School of
Public Health University of Toronto
Advised World Health Organization IARC for decades
Served as Director of the Epidemiology Unit of the
National Cancer Institute of Canada.
Senior Epidemiologist, International Agency for
Research on Cancer, and as Head of the Division of
Cancer Epidemiology, German Cancer Research
Centre, Served as a consultant to the U.S. National
Cancer Institute and the World Health Organization and
Senior Medical Advisor Environmental Health Trust

Anthony Miller MD, Statement to Hempfield Pennsylvania School District

Watch the Video Statement from Dr. Miller to Hempfield School
District

Click here <https://youtu.be/LPs6PAG1H6c>

International EMF Scientist Appeal

236 Scientists From 41 Countries

“the weight of evidence reported in peer-reviewed, scientific studies strongly supports greater precautionary measures be taken to reduce or eliminate EMF exposure...”

“Numerous recent scientific publications have shown that EMF affects living organisms at levels well below most international and national guidelines.

Effects include increased cancer risk, cellular stress, increase in harmful free radicals, genetic damages, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on general well-being...”

-European Journal of Oncology, 2015

American Academy of Pediatrics (AAP) Research on Cell Towers “Confirmed Concerns”

The AAP Healthy Child Website on Electromagnetic Fields states:

“In recent years, concern has increased about exposure to radio frequency electromagnetic radiation emitted from cell phones and phone station antennae. 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.

Last Updated 11/21/2015

Source Adapted from Pediatric Environmental Health, 3rd Edition (Copyright © American Academy of Pediatrics 2011)

“Radiofrequency-electromagnetic field exposures in kindergarten children”

Monash University (Bhatt 2017)

World’s first research study on comparing RF levels in kindergartens near and far from cell towers.

RF-EMF for 20 kindergartens (Inside, outside, playground).

- RF measurements compared -Base Stations closer than 300 meters, further than 300 meters
- Ten individual children also carried a personal meter for a single session to see how their exposure differed from that of the kindergarten.

Findings:

Cellular antennas near schools increased kindergartener radiation exposures by 3.5 times.

- Children’s exposure mostly environmental. [Bhatt 2017](#)

Scientific Studies on RF

Safe or not Safe?

There are over 4 decades of published research studies on the issue of radio frequency radiation. Some studies show no effect and some show effects.

Numerous research studies have found adverse effects at radiofrequency exposures that are lower than international limits.

Yet serious data gaps remain- as adequate research has not been done to determine a “safe” level of exposure.

No proof of safety for children who have a lifetime of exposure to even low levels of radiofrequency exists.

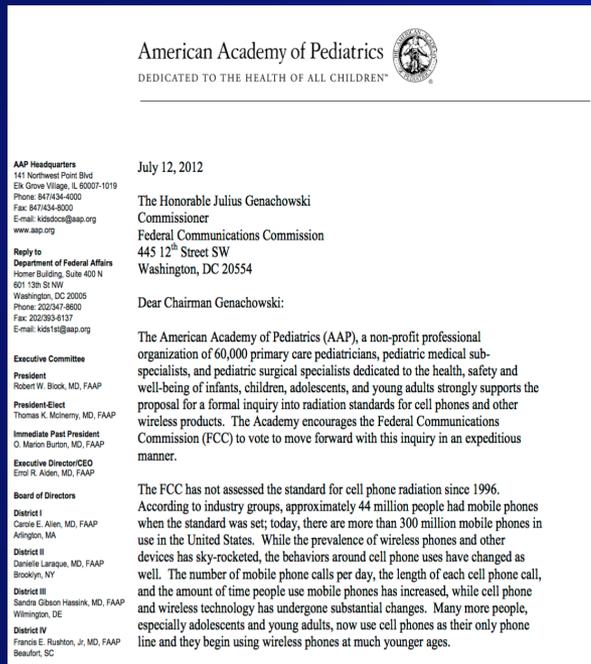
Some scientists now state this radiation meets criteria to be a human carcinogen.

Over 230 scientists are calling for the public to reduce exposure to this radiation.

Assurances of safety with FCC compliance are unavailable.

American Academy of Pediatrics 2012 Letter to Federal Communications Commission “Move Forward” to Update Outdated Radiofrequency Limits

AAP President Dr. Robert Block wrote a letter to FCC Chair Julius Genachowski



- The FCC has not reviewed the standard since 1996.
- The FCC exposure limit is based only on heat.
- Concerns have been raised that long term RF exposure affects the brain and may be connected to brain cancer.
- The average RF energy disposition in children is 2x higher in the brain and 10x higher in bone marrow of the skull.

[AAP July 2012 Letter to FCC to Open RF Inquiry](#)

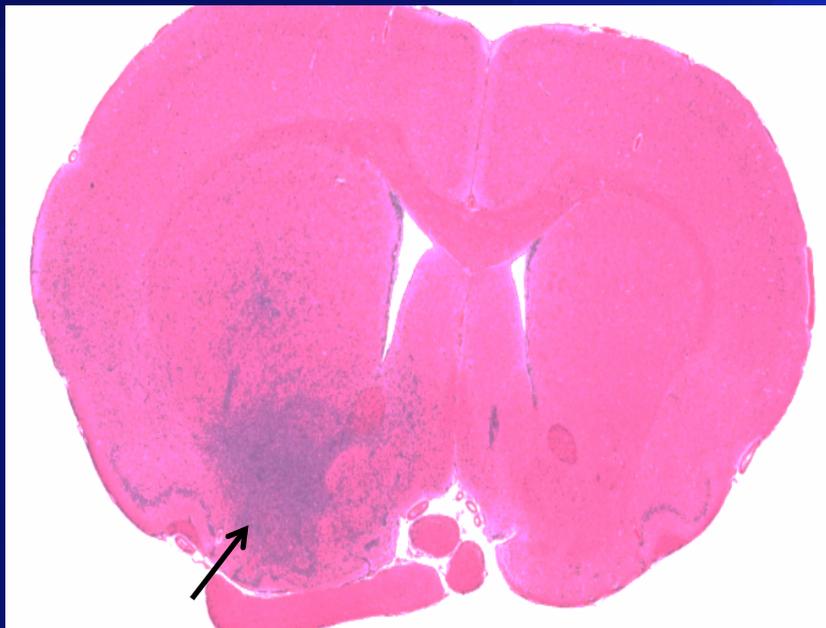


National Toxicology Program

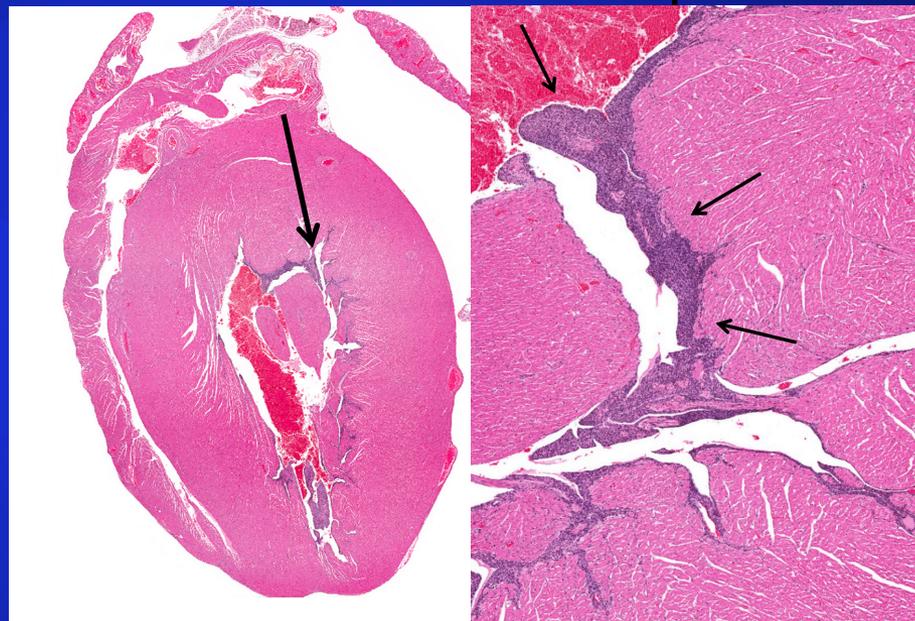
U.S. Department of Health and Human Services

Cancers found in NTP Rats Parallel Studies of Humans, DNA Damage Study was designed to test FCC limits.

Glioma of Brain



Schwannoma of Heart



Incidence of glioma of the brain -statistical significance in males with CDMA modulation.

DNA damage in mixed brain regions

“exposure to RFR [radio frequency radiation] has the potential to induce measurable DNA damage under certain exposure conditions.” – National Toxicology Program

GSM or CDMA modulations of RFR in male rats resulted in a statistically significant, positive trend in the incidence of schwannomas.

Impact of RFR on DNA damage & antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations. (Zothansيامa et al. 2017)



- Study evaluated the effect of radiofrequency radiation from mobile phone base stations.

Compared residents- matched for demographics.

- Exposed group: Within 80 meters
- Control group: Over 300 meters

RF measurements ensured all RF levels were below India's limits (1/10 of ICNIRP)

Significant biological effects found on individuals closer to mobile base stations (within 80 meters).

- Alteration in antioxidant status in the plasma of exposed individuals
- Decreased glutathione concentration, activities of catalase, superoxide dismutase
- Increase in lipid peroxidation

Authors Conclusion

“The present study demonstrated that staying near the mobile base stations and continuous use of mobile phones damage the DNA, and it may have an adverse effect in the long run.

The persistence of DNA unrepaired damage leads to genomic instability which may lead to several health disorders including the induction of cancer.”

Zothansياما et al. 2017

Biological Effects from Exposure to Electromagnetic Radiation Emitted by Cell Tower Base Stations and Other Antenna Arrays, Levitt & Lai, Environmental Reviews, 2010

Over 100 citations, approximately 80% of which showed biological effects near towers. “Both anecdotal reports and some epidemiology studies have found headaches, skin rashes, sleep disturbances, depression, decreased libido, increased rates of suicide, concentration problems, dizziness, memory changes, increased risk of cancer, tremors, and other neurophysiological effects in populations near base stations. Built case for ‘setbacks’ and need for new exposure guidelines reflecting multiple and cumulative exposures

Examples of Studies re Cell Towers

[Mobile phone infrastructure regulation in Europe: Scientific challenges and human rights protection Claudia Roda, Susan Perry, Environmental Science & Policy, Volume 37, March 2014, Pages 204-214.](#)

This article was published in Environmental Science & Policy by human rights experts. It argues that cell tower placement is a human rights issue for children.

[SAFETY ZONE DETERMINATION FOR WIRELESS CELLULAR TOWER Nyakyi et al, Tanzania \(2013\)](#)

This research looked at the radiation that cell towers emit and states a safety zone is needed around the towers to ensure safe sleeping areas. The authors state that “respective authorities should ensure that people reside far from the tower by 120m or more depending on the power transmitted to avoid severe health effect.”

[Neurobehavioral effects among inhabitants around mobile phone base stations \(Egypt\) Abdel-Rassoul et al, Neurotoxicology, 2007](#)

Egyptian study confirmed concerns that living nearby mobile phone base stations (cell towers) increased the risk for neuropsychiatric problems (Headaches, Memory problems, Dizziness, Tremors, Depression, Sleep problems and some changes in the performance of neurobehavioral functions.

[Long-term exposure to microwave radiation provokes cancer growth: evidences from radars and mobile communication systems. Yakymenko, 2011](#)

We conclude that recent data strongly point to the need for re-elaboration of the current safety limits for non-ionizing radiation using recently obtained knowledge. We also emphasize that the everyday exposure of both occupational and general public to MW radiation should be regulated based on a precautionary principles which imply maximum restriction of excessive exposure.

[A cross-sectional case control study on genetic damage in individuals residing in the vicinity of a mobile phone base station. Ghandi et al, 2014 \(India\):](#)

This cross-sectional case control study on genetic damage in individuals living near cell towers found genetic damage parameters of DNA were significantly elevated. The authors state, “The genetic damage evident in the participants of this study needs to be addressed against future disease-risk, which in addition to neurodegenerative disorders, may lead to cancer.”

[Mortality by neoplasia and cellular telephone base stations. Dode et al. \(Brazil\), Science of the Total Environment, Volume 409, Issue 19, 1 September 2011, Pages 3649–3665](#)

A clearly elevated relative risk of cancer mortality at residential distances of 500 meters or less from cell phone transmission towers.

This 10 year study on cell phone antennas was released by the Municipal Health Department in Belo Horizonte and several universities in Brazil. Shortly after this study was published, the city prosecutor sued several cell phone companies and requested that almost half of the cities antennae be removed. Many were.

Misleading Factsheets of the EMF Project/ WHO

“There is no convincing scientific evidence that the weak RF signals from base stations and wireless networks cause adverse health effects.” (2006)

This outdated statement is often used by cell phone companies in response to concerns about health. The writers of this statement are unknown as the EMF Project will not state who wrote it or what it was based on.

WHO EMF Project

- **Lack of transparency**
- **EMF Project won't say who wrote the factsheet.**
- **criticized due to conflict of interest/ industry connections.**
- **Different entity than the International Agency for the Research on Cancer**

Hardell, Lennart. [“World Health Organization, radiofrequency radiation and health – a hard nut to crack \(Review\).” *International Journal of Oncology*, vol. 51, no. 2, 2017, pp. 405-13.](#)

<https://ehtrust.org/science/research-industry-influence-emfs/>

Collaborative For High Performance Schools

Low EMF Criteria developed in 2014

“Best practices to help schools with high performance design, construction and , environmentally friendly, safe school buildings

EQ 15.1

“Schools districts and design teams should:

1. Prohibit cell phone towers and base stations on school buildings or school property.”

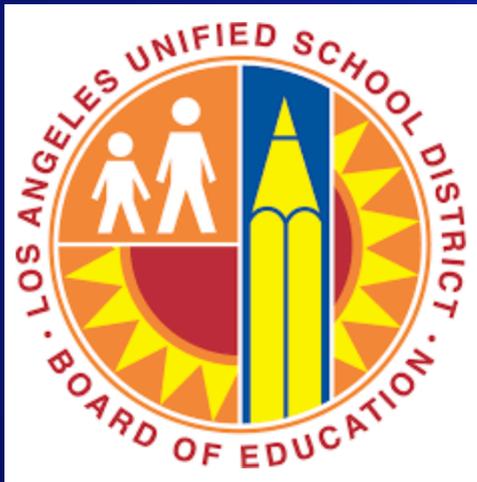
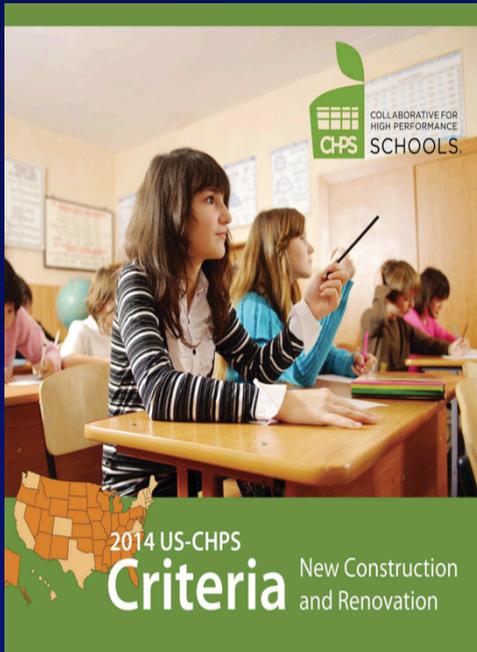
The Los Angeles School District

- Prohibits cell tower placement on school grounds.
- Set a RF threshold at *10,000 times lower than the FCC.*

Several countries have RF limits much lower than FCC limits such as China, Belgium, Italy and Russia. Some cities and governments prohibit cell towers on schools grounds and consider schools as “sensitive areas” with more protections.

[RADIOFREQUENCY \(RF\) EVALUATION REPORT Use of Wireless Devices in Educational Settings](#)

[Read the LA Schools Office of Environmental Health and Safety Factsheet About Radiofrequency](#)



Misleading: The FCC limit has “very large 50 fold safety margin”.

FCC limits are based on

- science from about three decades ago
- Protecting against largely thermal effects, not biological effects
- Protecting against acute exposures, *not* long term chronic exposures
- animal studies applied to model of large adult male.

In public health safety factors for food and drink are commonly set at 100 fold or more. If anything, the safety margins set are incredibly low in comparison to other hazardous chemicals. Adequate scientific data on children’s vulnerability was not used in determining the FCC limits.

The large data gaps regarding potential impacts to children, pregnant women and long term exposure do not allow for exposures to be adequately documented as “safe”.

See Documentation at <https://ehtrust.org/wp-content/uploads/2013/11/FCC.pdf>

FCC Compliance Does NOT Equal Safety

No Systematic Review on Health Risks by EPA, FDA

“The IARC 2B classification implies an assurance of safety that cannot be offered—a particular concern, given the prospect that most of the world’s population will have lifelong exposure to radiofrequency electromagnetic fields”

-Dr. Samet, Senior Scientist, Chair of the World Health Organization’s International Agency for the Research on Cancer 2011 EMF Working Group, (Samet 2014)

“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.”

-The Department of the Interior (2014)

[Samet 2014](#)

[The US Department of the Interior](#)

[LAUSD Office of Environmental Health and Safety Factsheet About Radiofrequency](#)

Once A Cell Tower Is Built

- More antennas, more use, higher radiation emissions over time.
- Any permitted tower can go 20 feet or 20% higher- no community input.
- 5G new technology- untested on humans- higher frequencies, effect on skin.
- Emissions can go *up to* the FCC limit so it might be 1/1000 of the limit now but could increase over the years.
- Fires, falling debris, high death rate of workers, accidents, myriad of safety issues posed by cell towers.

[Learn about about firefighters opposed to cell towers on their stations and watch videos of them testifying against cell towers due to the radiation health risks.](#)

[Fire Hazards of Cell Towers](#)

[Learn about 5G and watch videos with scientific presentations on 5G](#)

[Learn about occupational health and safety issues, the high accident and death rate of cell tower workers.](#)



“...our wireless business also faces personal injury and consumer class action 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.”

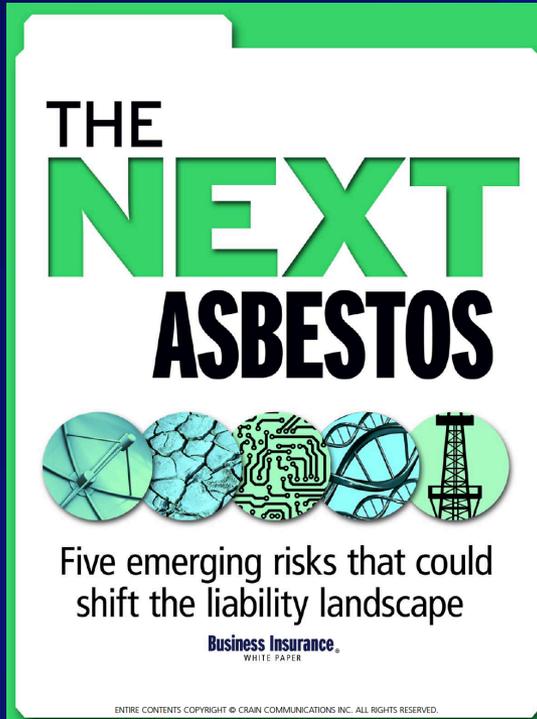
Verizon Communications Inc.

2016 10-K ANNUAL REPORT

[READ ALL THE ANNUAL REPORTS WITH SIMILAR WARINGS OF RISK HERE](#)

Electromagnetic Field Exclusions

Many Insurance Company's Will Not Take The Risk

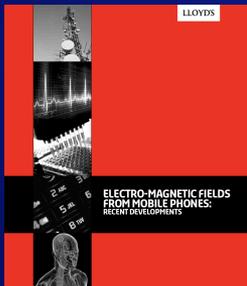


“The electromagnetic radiation exclusion not only excludes mitigation and harm from electromagnetic radiation

but also excludes paying for the defense of “any supervision, instruction, recommendation, warning or advice given or *which should have been given* in connection with bodily injury, property damage, abatement and/or mitigation etc.”

-City of Ann Arbor Michigan Insurance Policy

2011 Business Insurance White Paper



Insurance White Papers on Risk

[Read Reports and White Papers of Insurance Industry that compare cell phone radiation to asbestos](#)
[Read how most insurance companies exclude damage from electromagnetic fields](#)

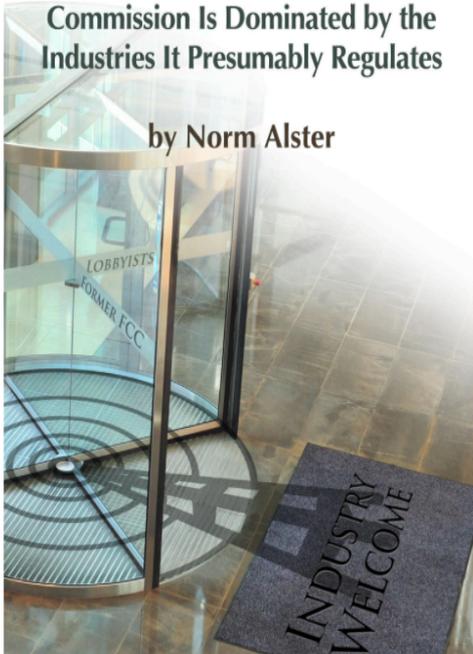


HARVARD UNIVERSITY
**Edmond J. Safra
Center for Ethics**

Captured Agency:

How the Federal Communications
Commission Is Dominated by the
Industries It Presumably Regulates

by Norm Alster



www.ethics.harvard.edu

Harvard Press Investigation FCC, Industry Influence, RF Radiation & Health

“...consumer safety, health, and privacy, along with consumer wallets, have all been overlooked, sacrificed, or raided due to unchecked industry influence.”

[“Captured Agency: How the Federal Communications Commission is Dominated by the Industries It Presumably Regulates”.](#)

Published Research on Industry \$ Influence

- Affects the quality of results (Prasad 2017)
- Existence of sponsorship and publication biases (Valentini 2011)
- Substantially less likely to report statistically significant effects (Huss 2007)

Product Defense Firms of Big Tobacco now protecting cell phone companies- same scientists/lawyers/PR firms. [References](#)

Radiofrequency penetrates deeper into children in comparison to adults. Modeling simulations of far field exposure show children are more exposed proportionate to adults.



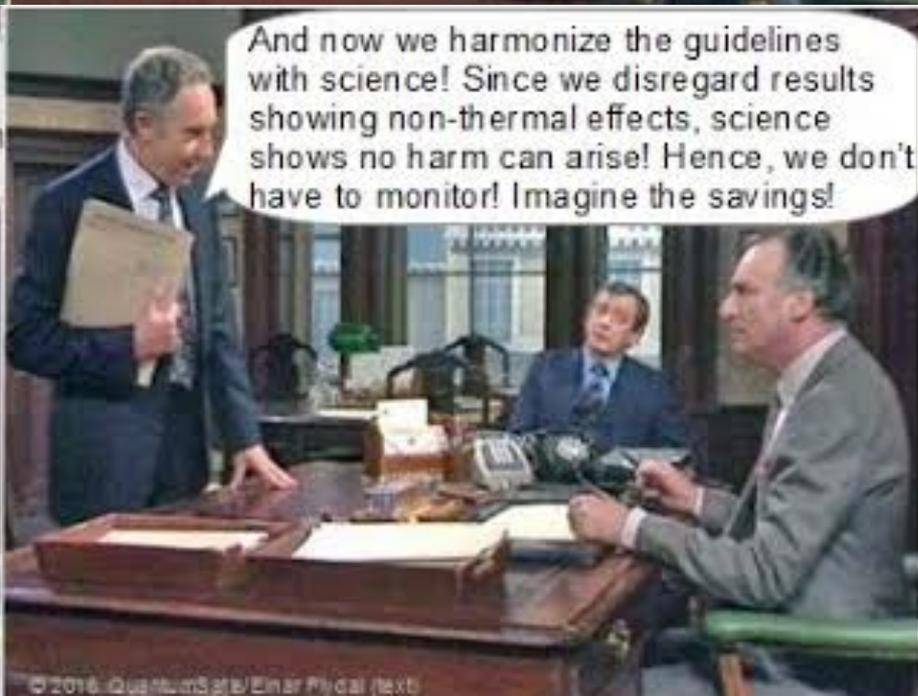
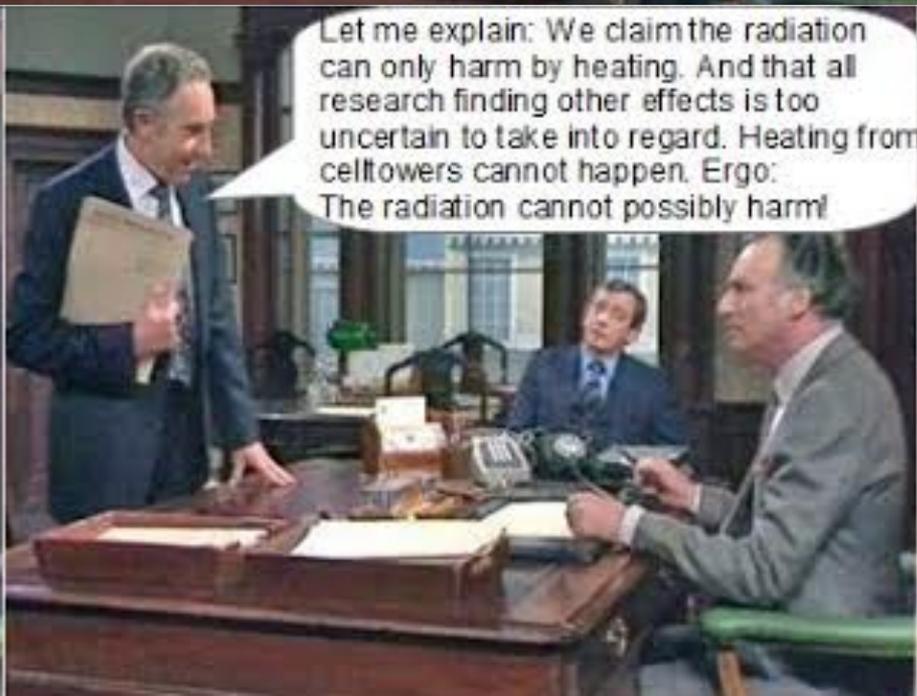
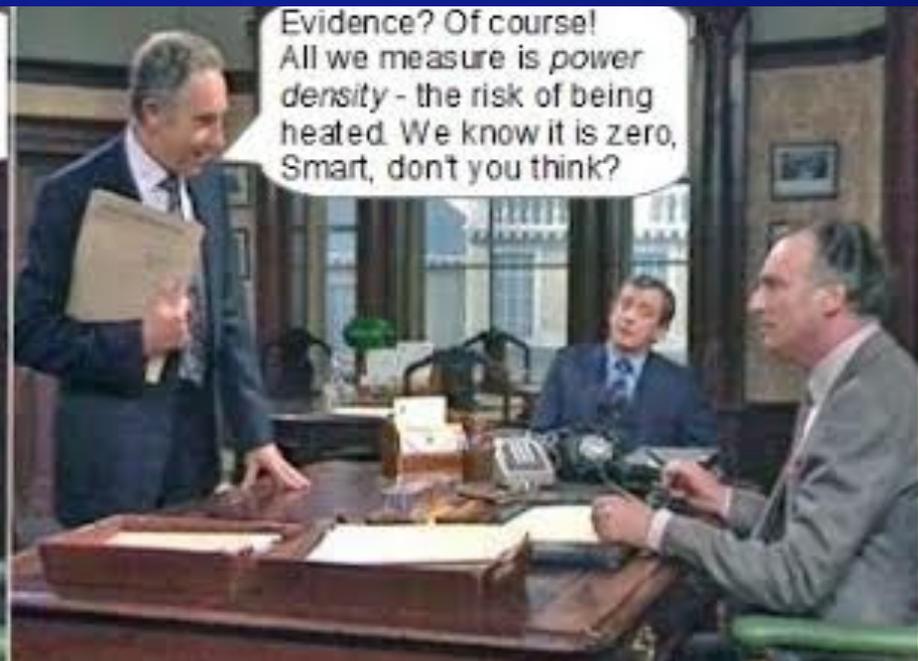
Figure 5: Far field exposure of the Virtual Family (Duke, Ella, Thelonious)

Image of the simulation of far field radiation penetration into differently aged humans. Seawind Project, EU Commission.

SAR values related to this image have been requested.

See report at http://seawind-fp7.eu/uploads/SEAWIND_FINAL.pdf

The Daily Dose by Einar Flydal



Excerpts from a Letter from Dr. De-Kun Li, MD, PhD, MPH
Kaiser Permanente Division of Research 2000 Broadway Oakland, CA 94612

“The safety standards are not likely to be available anytime soon. **The bottom line is that the safety level for RF exposure related to non-thermal effect is unknown at present and whoever claims that their device is safe regarding non-thermal effect is either ignorant or misleading.**

In summary, we do not currently have scientific data to determine where the safe RF exposure level is regarding the non-thermal effect. Therefore, it should be recognized that we are dealing with uncertainty now and most likely for the foreseeable future. The question for governmental agencies, especially those concerned with public health and safety, is that given the uncertainty, should we err on the side of safety and take the precautionary avoidance measures? Unknown does not mean safe.”

“Currently there are no national or international **“standards”** for safety levels of radiofrequency (a range of 3 kHz to 300 GHz) devices. What FCC is currently using are **“guidelines”** which have much lower certainty than a **“standard”**. One can go to many governmental agencies’ websites like NIOSH, EPA, FDA, etc. to verify this. Therefore, for anyone to claim that they meet **“FCC”** standards gives a false impression of safety certainty compared to **“guidelines”** which implies that a lot is **“unknown.”**

<https://ecfsapi.fcc.gov/file/7022311506.pdf>

LA Firefighters Oppose Cell Towers



David Gillotte

Los Angeles County Fire Fighters Local 1014 - President

25 Year Veteran Fire Captain Opposes Cell Towers

Los Angeles California Board of Supervisors Meeting March 24, 2015

[Watch This Video and Learn About Unions Opposing Cell Towers Based on Health](#)

Synergistic effects of electromagnetic fields and chemicals

Medical applications to treat cancer are relying on interactions

- (Kostoff and Lau, 2015)
- “Substantial credible scientific evidence” supports that RF results in synergistic effects-beneficial *and* adverse.
- RF changes biochemical markers of inflammation
- RF enhances carcinogenesis, cellular or genetic mutations, and teratogenicity.

Research *needed* on real world conditions: EMF + multiple exposures

[Technological Forecasting and Social Change \(2015\)](#)

Letter from Paul Ben Ishai, PhD, Professor of Physics, Ariel University

“In light of our work and a growing number of publication showing the frequency range of 5G can have serious biological effects, we believe that current efforts to accelerate the implementation of 5G should be delayed until additional studies are made to assess the critical impact on human health.”

– Paul Ben Ishai, 08 September 2017

Letter from Cindy Russell, MD, Santa Clara Medical Association, V.P. Community Health

“The telecommunications industry is rolling 5G antennas out so rapidly that they are ahead of any evidence that this will be safe for the public or the environment. The frequencies, modulation and power have not been fully vetted by industry, let alone given consideration of the long term adverse effects of this widespread exposure to the public. Current FCC testing looks only at heat or thermal damage, not the biological effects widely demonstrated in the literature. This bill gives industry the power to place antennas even if it is deemed by scientific experts potentially unsafe or harmful to humans or wildlife.” – [Cindy Russell, 19 September 2017](#)

Degradation of Brain Tissue and Function:

Parallels between EMF effects and Autism findings



- Challenges to health of brain cells documented in brain tissue studies
- Some evidence for increased stress response
- Melatonin depletion
- Altered sleep architecture
- Altered brain waves
- More brainwave “entropy” (disorganization)
- Can increase seizure risk
- Suspect creation of brain noise that interferes with signal and information

Dr. Martha Herbert

Yale University Study: Fetal Radiofrequency Radiation Exposure Affects Neurodevelopment and Behavior in Mice

- A muted and silenced 800–1900Mhz cellular phones with a SAR of 1.6W/kg was used.
- The phones were positioned above each cage over the feeding bottle area at a distance of 4.5–22.3cm from each pregnant mouse.
- Mice exposed as a fetus were tested as adults.
- Exposed mice were more hyperactive and poorer memory, altered brain development.

[Aldad et al, 2012.](#)

Conclusions of Dr. Anthony Miller

- ✓ From epidemiology: Radiofrequency Radiation is a Probable Human Carcinogen (IARC Category 2A)
- ✓ With NTP: There is *Sufficient evidence* that Radiofrequency radiation is carcinogenic to humans (IARC Category 1)

Implications

- ✓ Radiofrequency radiation is now ubiquitous
- ✓ Although the risk per individual is low, the radiation is widely distributed and could result in major public health problems
- ✓ The Precautionary Principle must be applied now and exposure reduced to As Low a level As Reasonably Achievable.

Slide courtesy of Dr. Anthony B. Miller



Conflict of Interest at WHO EMF Project Hardell 2017

- 2011: International Agency for the Research WHO/IARC : Experts evaluated cancer risks from RF radiation.
- WHO/IARC *is not the same* as the WHO EMF Project
- 2014 the WHO EMF Project launched a draft of a Monograph on RF fields and health for public comments.
- Five of the six members of the Core Group in charge of the draft are affiliated with International Commission on Non-Ionizing Radiation Protection (ICNIRP)
- ICNIRP is an industry loyal NGO “a serious conflict of interest.”
- Evidence has been published which indicated that members of ICNIRP have written scientifically incorrect and misleading information.
- Non-thermal biological effects from RF radiation are dismissed as scientific evidence of adverse health effects in the Monograph.
- [“World Health Organization, radiofrequency radiation and health – a hard nut to crack \(Review\).”](#)

Impact of RFR on DNA damage & antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations. Zothansيامa et al. 2017



- Study evaluated the effect of radiofrequency radiation from mobile phone base stations.
- The study groups matched for various demographic data including age, gender, dietary pattern, smoking habit, alcohol consumption, duration of mobile phone use and average daily mobile phone use.

Compared objective and subjective symptoms of residents in close and far proximity from base station

- Exposed group: Within 80 meters
- Control group: Over 300 meters

RF measurements ensured all RF levels were below India's limits (1/10 of ICNIRP)

Significant Biological Effects on Individuals Living in Close Proximity to Cell Tower at RF Levels Below FCC Limits

Significant biological effects found on individuals closer to mobile base stations (within 80 meters).

- Alteration in antioxidant status in the plasma of exposed individuals
- Decreased glutathione concentration, activities of catalase, superoxide dismutase
- Increase in lipid peroxidation

DNA damage was assessed by cytokinesis blocked micronucleus (MN) assay in the binucleate lymphocytes.

- Significant DNA damage in exposed individuals (as measured by micronuclei assay)

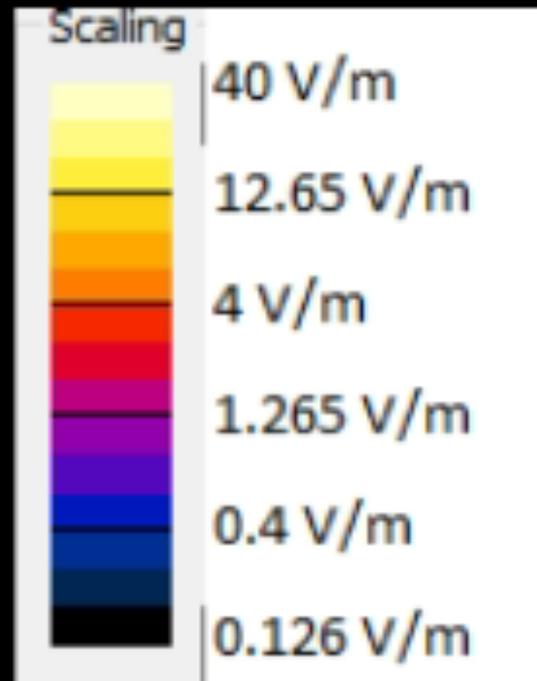
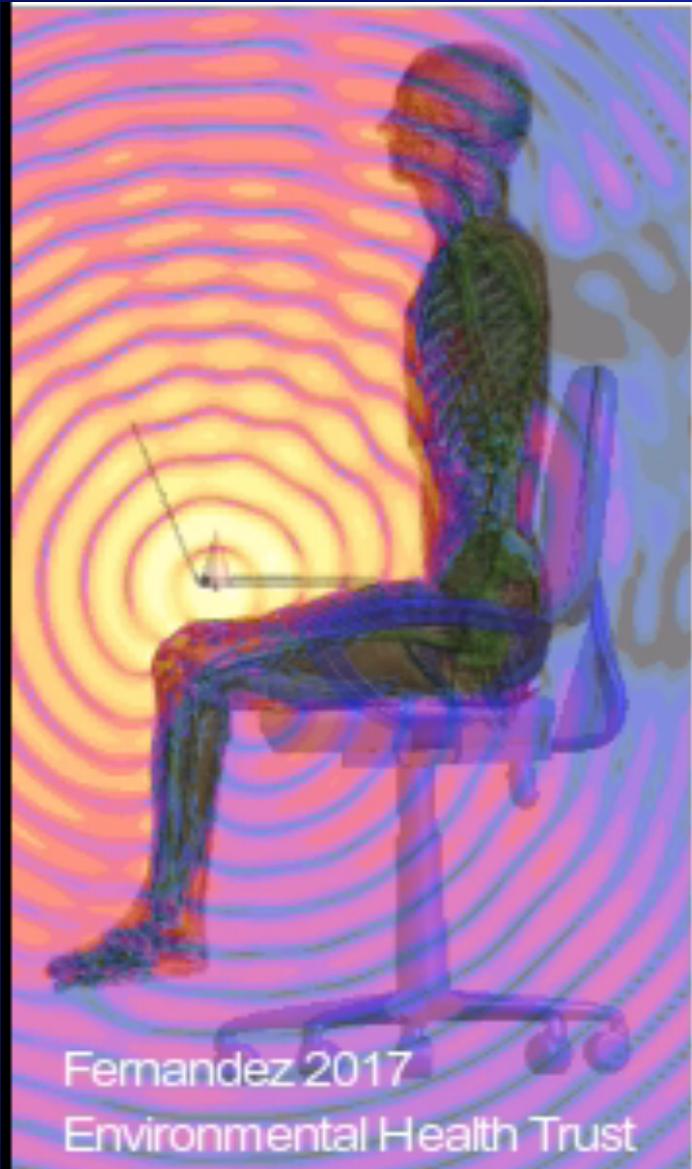
The RF power density of exposed was significantly higher when compared to the control group

- Exposed individuals who lived within 80 meters of cell antennae average of 5.00 mW/m² of RFR in their bedrooms.
- Highest recorded value 7.52 mW/m² of RFR.
- Sampling addressed other EMF exposures.
- Measurements showed a highly significant decrease in RF density with increased distance from antennas.

[Zothansiana et al. 2017](#)

Wi-Fi Radiation From A Laptop

Simulation of Peak Exposures from 2.45 GHz Wi-Fi Laptop



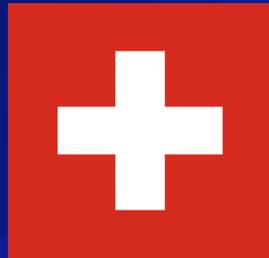
Government Health Agencies Advise Reducing Children's Cell Phone Radiation Exposure



United Kingdom



Russia



Switzerland



Finland



Ireland



Germany



Belgium



Greece



Israel



Turkey



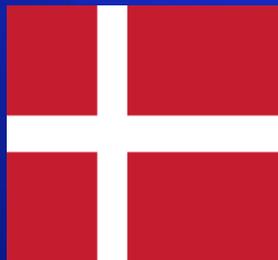
Austria



Singapore



France



Denmark



India



Australia

REVIEW ARTICLE

International policy and advisory response regarding children's exposure to radio frequency electromagnetic fields (RF-EMF)

Mary Redmayne^{1,2}

¹Population Health Research on Electromagnetic Energy (PRESEE), Monash University, Melbourne, VIC, Australia and ²School of Geography, Environment and Earth Sciences, Victoria University of Wellington, Wellington, New Zealand

Abstract

Radiofrequency electromagnetic field (RF-EMF) exposure regulations/guidelines generally only consider acute effects, and not chronic, low exposures. Concerns for children's exposure are warranted due to the amazingly rapid uptake of many wireless devices by increasingly younger children. This review of policy and advice regarding children's RF-EMF exposure draws material from a wide variety of sources focusing on the current situation. This is not a systematic review, but aims to provide a representative cross-section of policy and advisory responses within set boundaries. There are a wide variety of approaches which I have categorized and tabulated ranging from ICNIRP/IEEE guidelines and "no extra precautions needed" to precautionary or scientific much lower maxima and extensive advice to minimize RF-EMF exposure, ban advertising/sale to children, and add exposure information to packaging. Precautionary standards use what I term an exclusion principle. The wide range of policy approaches can be confusing for parents/carers of children. Some consensus among advisory organizations would be helpful acknowledging that, despite extensive research, the highly complex nature of both RF-EMF and the human body, and frequent technological updates, means simple assurance of long-term safety cannot be guaranteed. Therefore, minimum exposure of children to RF-EMF is recommended. This does not indicate need for alarm, but mirrors routine health-and-safety precautions. Simple steps are suggested. ICNIRP guidelines need to urgently publish how the head, torso, and limbs' exposure limits were calculated and what safety margin was applied since this exposure, especially to the abdomen, is now dominant in many children.

Keywords

Radiofrequency guidelines, children, precautionary approach, ICNIRP, WHO International EMF Project

History

Received 4 January 2015
Accepted 28 March 2015
Published online 19 June 2015

Countries with Precautionary RF Standard For Locations Where Children Spend Time

Table 2. Countries with a precautionary Standard for locations where children spend time (Approaches 3 and 4), year of implementation, and where specified zones to which they apply.

Year	Country	Max. $\mu\text{W}/\text{cm}^2$ (power density) or V/m (E-Field) (at 900 MHz except as specified)	Area it applies
1980	Poland	6 V/m; 10 $\mu\text{W}/\text{cm}^2$	
1996	Ukraine	3 V/m; 10 $\mu\text{W}/\text{cm}^2$	
2000	Salzburg	1 $\mu\text{W}/\text{cm}^2$	
	Switzerland	4 V/m	Sensitive areas, e.g., playgrounds
	THB, Canada	4.5 $\mu\text{W}/\text{cm}^2$	Areas accessible to public
2001	Turkey	15 V/m; 250 $\mu\text{W}/\text{cm}^2$	
2003	Italy	6 V/m; 10 $\mu\text{W}/\text{cm}^2$	Precautionary
2004	Paris	1–10 $\mu\text{W}/\text{cm}^2$	
2005	Peru	30 V/m (2 GHz)	Sensitive sites inc. schools
	Monaco	6 V/m; 10 $\mu\text{W}/\text{cm}^2$	
	Lithuania	1 $\mu\text{W}/\text{cm}^2$	Work & living places (special restriction in child zones and school internet rooms)
2006	Greece	600 $\mu\text{W}/\text{cm}^2$	<300 m of "Child" zone perimeters
2008	Slovenia	6 V/m; 10 $\mu\text{W}/\text{cm}^2$	Sensitive areas, e.g., school, day care, playgrounds, housing
2009	Brazil (regional)	6 V/m; 10 $\mu\text{W}/\text{cm}^2$	
	Israel	4 V/m	
	Spain (Plenum)		ALARA in sensitive/child zones
2010	Brussels reg., Belgium	3 V/m	All accessible places
	Wallonia reg., Belgium	3 V/m per antenna	All residential areas
	Flanders reg., Belgium	3 V/m	Sensitive areas, e.g., schools
2011	Bulgaria	10 $\mu\text{W}/\text{cm}^2$	Zones
2012	India	10 $\mu\text{W}/\text{cm}^2$	All base stations
	Luxembourg	3 V/m per antenna	Extended human presence areas
	Greece	450 $\mu\text{W}/\text{cm}^2$	Existing base stations <300 m of school perimeter. New BS at pre/school perimeter banned

Sources include WHO International EMF project, listed representatives, EC Report (European Commission, May 2008).

Chile 2012 "Antennae Law"

Law Prohibits cell antennae/towers in "sensitive areas." Sensitive areas are those areas that demand special protection due to the presence of educational institutions, nurseries, kindergartens, hospitals, clinics, nursing homes or other institutions of similar nature.

Chile's Minister of Transportation and Telecommunications Pedro Pablo Kuczynski stated, "...in addition to protecting the urban landscape and the goodwill of the neighborhoods, the new law takes care of the most important: the health of people in a precautionary manner as recommended by the World Health Organization, setting strict limits on the powers of the antennas. Chile is setting standards in this regard."

Cell Towers banned at schools:

Los Angeles Unified School District
Rajasthan, India
Zilla Parishad India
Brihanmumbai India
Cities would not even consider antennas near schools.

Policy/Government Recommendations To Reduce Children/Public Exposure

Take steps to minimize RF-EMF Exposure Official government advice	United Kingdom, Russia, Switzerland, Finland, Ireland, Germany, Belgium, Greece, Israel, Turkey, Singapore, France, Denmark, India, Australia, Austria, Canada, Italy Decree of Environment Minister 2017, Connecticut, Maryland USA,
Ban on mobile phone advertising to children	France, Belgium, French Polynesia, Russia
Ban on sale of children's cell phones	Belgium, France
SAR labeling (on device, packaging, point of sale)	France, Israel, India, Belgium, Russia
Educational Programs (schools/ professionals)	France, French Polynesia, Israel, Cyprus, <u>Tunisia</u> ,
Prefer wired over Wi-Fi LAN in schools	France, Israel, Germany, French Polynesia, <u>Salzberg Austria</u> , Maryland <u>CEHPAC USA</u> ,
WiFi ban in pre school/ kindergartens	France, Israel, Ghent Belgium,
Wi-Fi Off/Minimized in elementary	France, Israel, Cyprus, Growing list of schools worldwide

Breast Cancers From Cell Phone in Bra



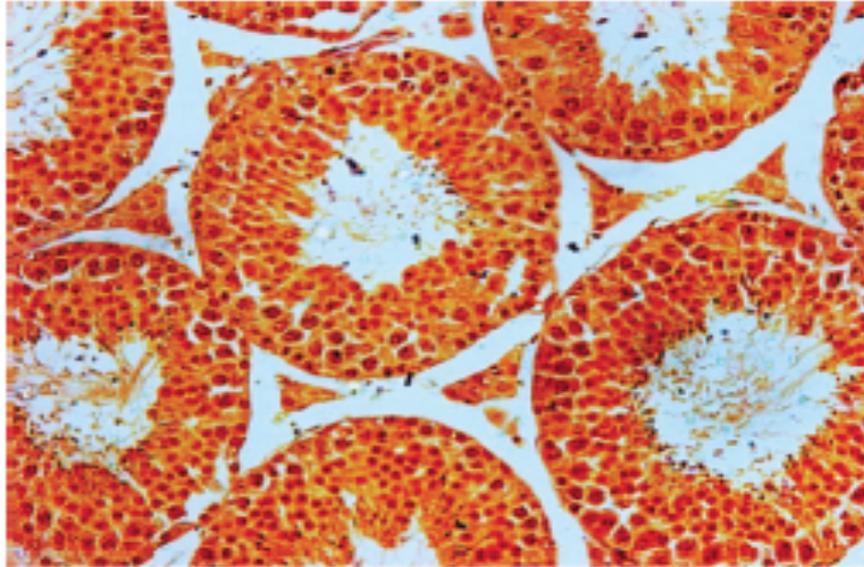
Published Case Reports

- No Genetic Predisp
- No Risk Factors
- Unusual Tumors
- Multifocal
- Directly at antennae location

[Multifocal Breast Cancer in Young Women with Prolonged Contact between Their Breasts and Their Cellular Phones](#)

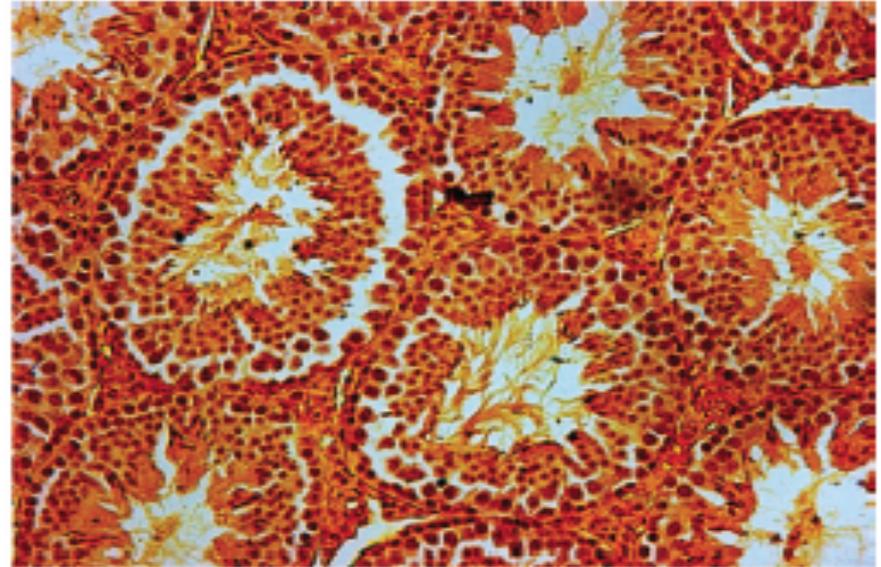
Microwave radiation impairs male reproduction

Multiple research studies and reviews find significant effects.



Control

Shahin et al 2014



Exposed

Testis slides show significantly increased i-NOS immunostaining in the spermatogonial cells

Mice exposed to nonthermal Wi-Fi 2.45-GHz 2h/d x 30 d

- ↑ ROS in liver, kidney, hypothalamus, and testis
- ↑ RNS, lipid peroxidation
- ↑ Antioxidant capacity, % viable sperm

[More studies on reproduction impacts](#)

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.

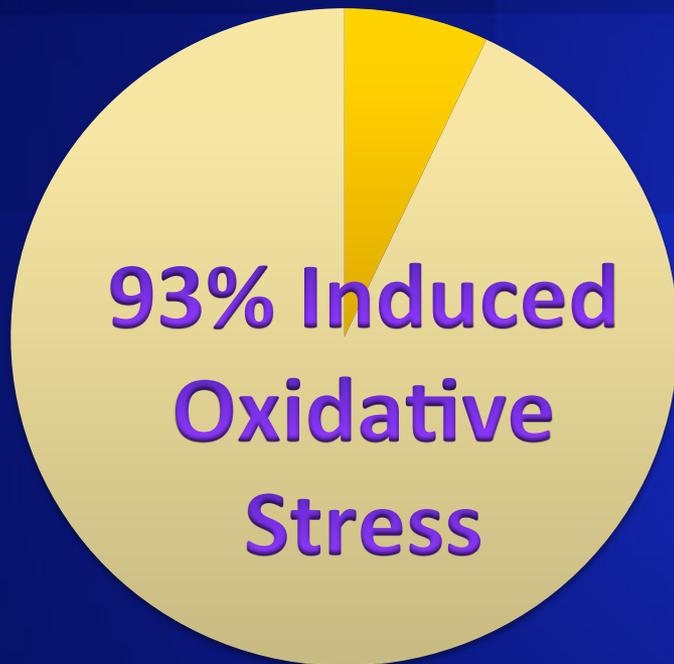
This classification applies to all RF-emitting devices, including WiFi.

- Robert A. Baan, PhD, IARC

- Studies used include: case-control, cohort, registries, and in vitro and in vivo toxicology

Increased Oxidative Stress After Radiofrequency Radiation Exposure

2015 Analysis of 100 Peer-Reviewed Science

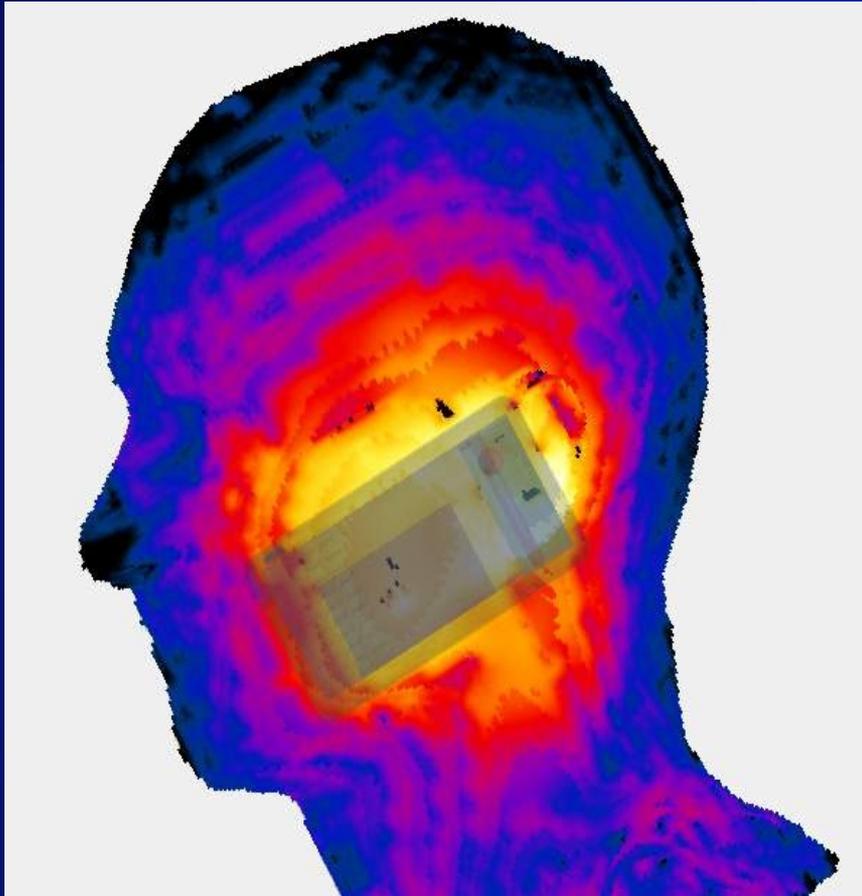


- 93% did induced oxidative stress
- 7% RFR did not induce oxidative stress
- Oxidative DNA damage can lead to cellular events that can result in cancer development ([Berquist and Wilson, 2012](#)).
- Induction of oxidative stress is a key characteristic of many human carcinogens ([Smith et al., 2016](#)) Thus, without causing direct DNA damage, **RFR may induce oxidative DNA damage and thereby initiate or promote tumor development.**

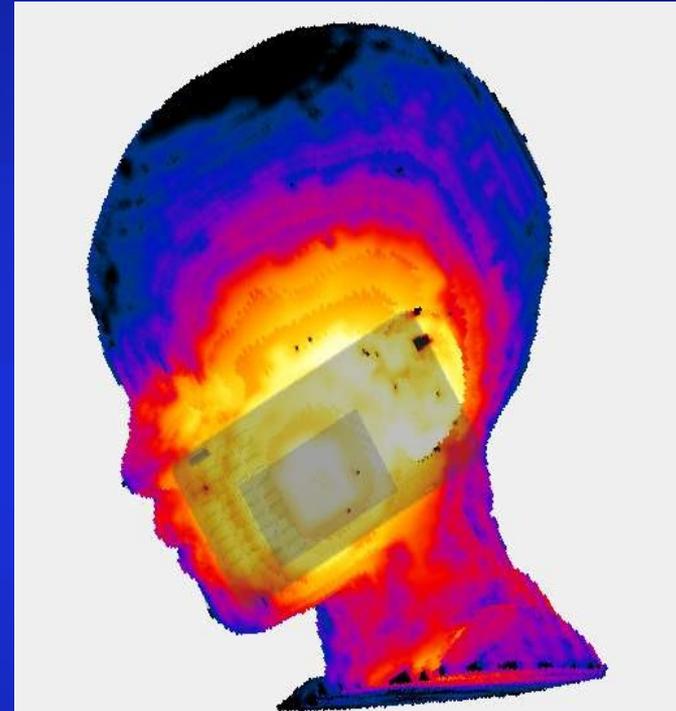
[Electromagnetic Biology and Medicine](#)
[Yakymenko et al., 2015](#)

Children are More Vulnerable

34 Year Old Male



6 Year old



Anatomically based Model of
Porto Alegre Environmental
Health Trust (PAEHT)

Wireless radiation penetrates into children's brains and bodies more deeply than into adults- Up to two times in their brain and ten times into the bone marrow of their skull. Their brain and immune system is still developing.

Children's Exposure Dependent on Age, Unique Physiology, Frequency

Children are more exposed and more so at higher frequencies. Higher percentage of their bodies have higher SARs. These images show intensity of penetration into the body.

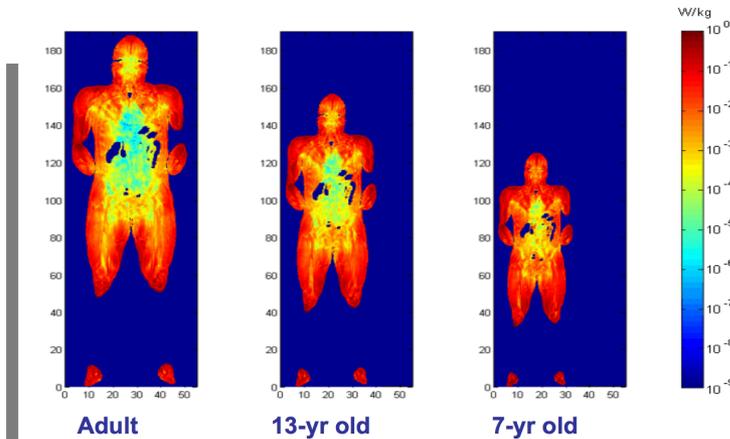
These slides are from part of a presentation made by Professor James Lin re ICNIRP limits.



ICNIRP 7th International NIR Workshop
Edinburgh, United Kingdom, 9-11 May 2012

SAR Distributions in Scaled Human Bodies at 2.45 GHz

$E_{inc} = 61 \text{ V/m Plane Wave}$

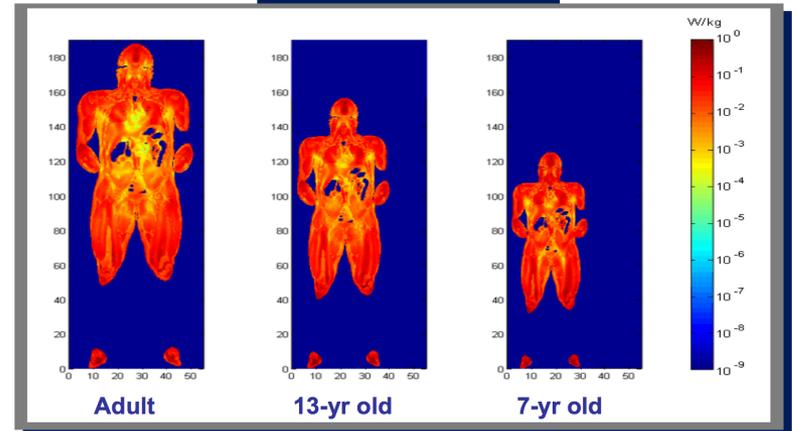


ICNIRP 7th International NIR Workshop
Edinburgh, United Kingdom, 9-11 May 2012



SAR Distributions for 3 Sizes of Scaled Human Bodies at 900 MHz

$E_{inc} = 42 \text{ V/m Plane Wave}$



Slides are from PowerPoint presentation by JAMES LIN, ICNIRP MEMBER May 2012 regarding SAR averaging at various frequencies and they are presented as part of this educational presentation. Please

see the full slide presentation at <http://www.icnirp.org/cms/upload/presentations/NIR2012pdf/lin.pdf> The program details are at <http://www.icnirp.org/en/workshops/article/workshop-nir2012.html>

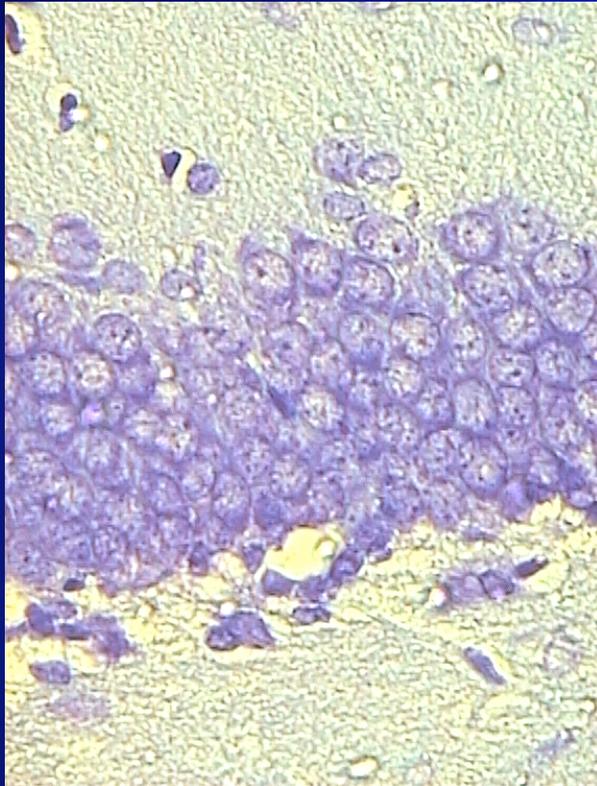
FCC Human Exposure to Radiofrequency Limits Set in 1996



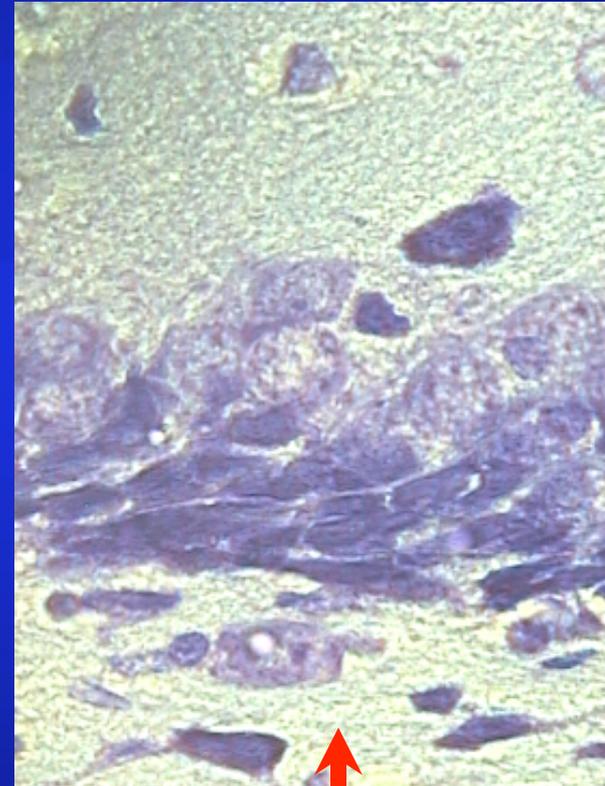
- 20 years outdated limit based on 30 year old science
- Accounts only for heating effects.
- Inadequate for children and pregnant women.

Neurological Development Damaged by Radiofrequency Radiation: Multiple Published Studies

Control



EMF exposed



Odaci et al, 2009

Prenatal 900 MHz EMF exposure decreased hippocampal granular cell number in the dentate gyrus of newborn rats

[More Studies that found damage to brain development](#)

Doctors Recommend Reducing Wireless Exposure to Pregnant Women To Protect the Baby Brain

10 WAYS TO HELP REDUCE YOUR EXPOSURE.

The BabySafe Project



www.BabySafeProject.org
#KnowYourExposure

- Avoid carrying your cell phone on your body (e.g. in a pocket or bra).
- Avoid holding any wireless device against your body when in use.
- Use your cell phone on speaker setting or with an “air tube” headset.
- Avoid using your wireless device in cars, trains or elevators.
- Avoid cordless phones, especially where you sleep.
- Whenever possible, connect to the internet with wired cables.
- When using Wi-Fi, connect only to download, then disconnect.
- Avoid prolonged or direct exposure to Wi-Fi routers.
- Unplug your home Wi-Fi router when not in use (e.g. at bedtime).
- Sleep as far away from wireless utility meters (i.e. “smart” meters) as possible.

The [BabySafe Project](http://www.BabySafeProject.org) is signed by over 140 medical experts



Maryland State Children's Environmental Health and Protection Advisory Council, 19 Members (pediatricians & public health)

“The Council recommends limiting (radiofrequency radiation) exposures as much as feasibly practical.”

The Maryland State Department of Education

- “Should consider using wired devices in classrooms”
- “If a new classroom is to be built... network cables can be added at the same time, providing wired network access.”

“The Maryland Department of Health and Mental Hygiene should provide suggestions to the public on ways to reduce exposure.”

New Jersey Educational Association

2016 Published Recommendations to Reduce Radiation Exposure

HEALTH & SAFETY

Minimize health risks from electronic devices

By Adrienne Markowitz and Eileen Senn

Desktops, laptops, tablets, eBook readers, printers, projectors, smart boards, smart TVs, cellphones, cordless phones and wireless networks (WiFi) have become ubiquitous in schools. At their best, they are powerful tools for education. At their worst, they threaten the physical and mental health of teachers, paraeducators, secretaries, librarians and other school staff members and students who spend numerous hours using the devices.

Physical health risks from electronic devices include pain and tingling from repetitive strain injuries to the hands and wrists; pain in the neck, shoulders and back; dry, burning, itchy eyes, blurred vision and headaches; altered sleep patterns and next-day fatigue from exposure to blue screen light; distracted driving; and various health problems from exposure to radiation.

Mental health risks arise from stress due to raised expectations for multitasking, productivity and proficiency with devices; dealing with malfunctioning devices; student and colleague distraction from and addiction to devices; and intrusion of devices into

Local associations should work with their UniServ field representative to negotiate solutions that are in the control of district administrators such as providing training and ergonomic equipment and hard-wiring devices. Individuals should take steps within their control, such as:

For repetitive strain injuries

- Use voice control/speech recognition.
- Use ergonomic alternatives to traditional mice and keyboards.
- Use as many fingers as possible when typing and both thumbs when texting.

For neck, shoulder and back pain

- Ensure an ergonomic workstation.
- When using a hand-held device, support it and the forearms.
- Avoid bending the head down or jutting it forward.
- Take frequent, short breaks from the device.
- Ensure good posture and change positions frequently.
- Stand and do stretching exercises.

For eye pain, blurred vision and headaches

- Use sufficient, but not excessive, lighting.
- Use assistive technology built into Apple, Android and Windows devices.
- Enlarge and darken the cursor and pointer.
- Enlarge the font; magnify the text.
- Use text-to-speech instead of reading.
- Use special computer glasses.
- Relax the eyes on a minibreak.

For altered sleep patterns and next-day fatigue

- Stop using devices at least one hour before bedtime.

For distracted driving

- Use hands-free devices, preferably speakerphones.
- Pull over and park.
- Let someone else drive.

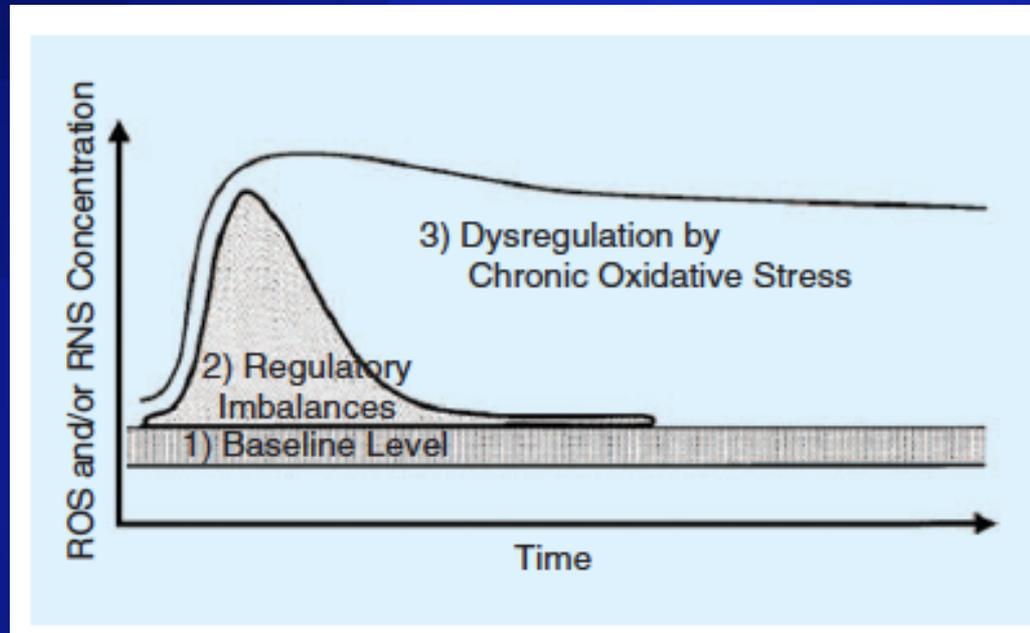
For radiation exposure

- Keep devices away from the body and bedroom.
- Carry phones in briefcases, etc., not on the body.
- Put devices on desks, not laps.
- Hard wire all devices that connect to the internet.
- Hard wire all fixed devices such as printers, projectors and boards.
- Use hard-wired phones instead of cell or cordless phones.
- Text rather than call.

For radiation exposure

- Keep devices away from the body and bedroom.
- Carry phones in briefcases, etc., not on the body.
- Put devices on desks, not laps.
- Hard wire all devices that connect to the internet.
- Hard wire all fixed devices such as printers, projectors and boards.
- Use hard-wired phones instead of cell or cordless phones.
- Text rather than call.
- Keep conversations short or talk in person.
- Put devices in airplane mode, which suspends EMF transmission by the device, thereby disabling Bluetooth, GPS, phone calls, and WiFi.
- Use speaker phone or ear buds instead of holding the phone next your head.
- Take off Bluetooth devices when not using them.

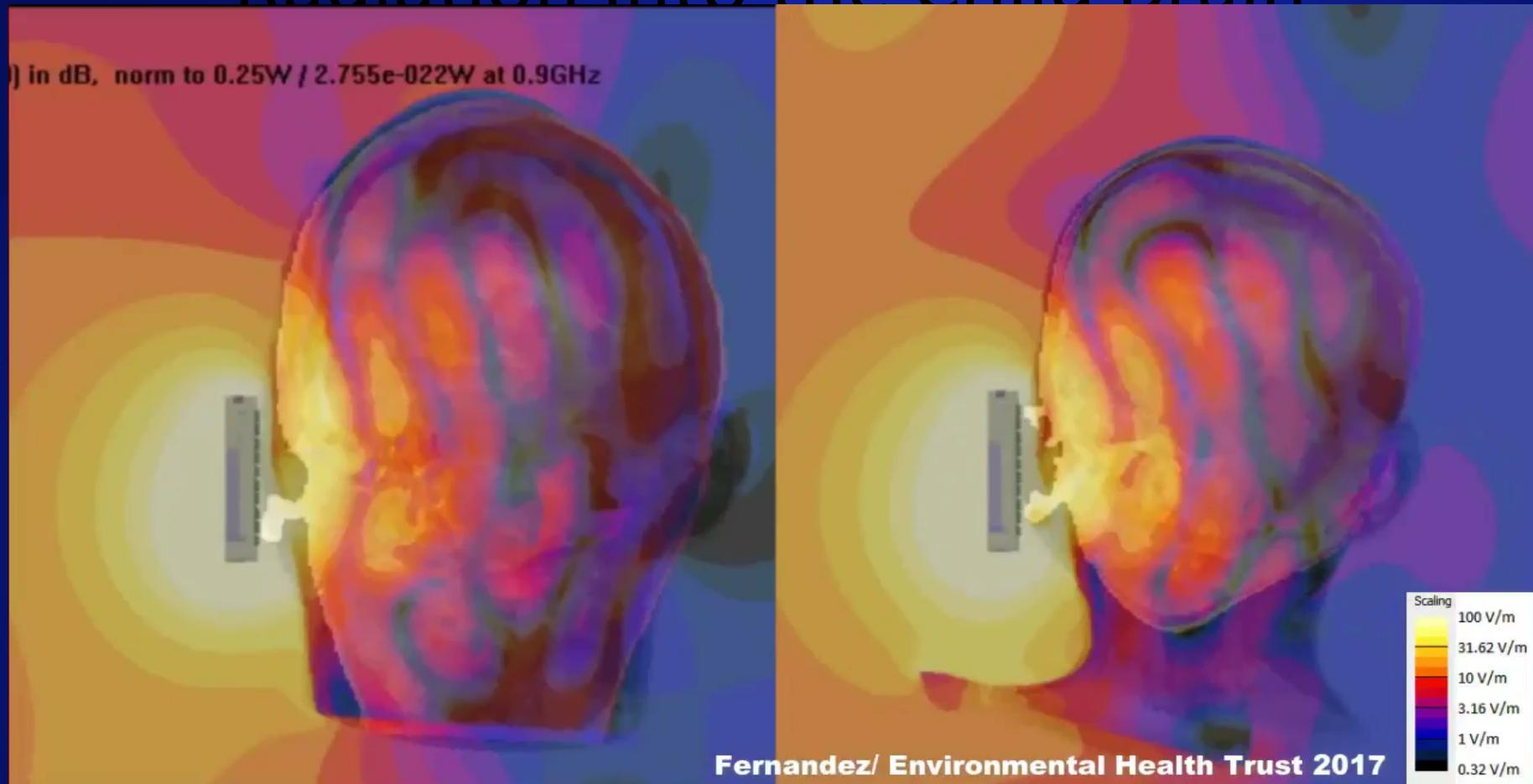
Effects of Weak Magnetic Fields on Biological Systems: RF fields can change radical concentrations and cancer cell growth rates



“Weak magnetic fields change the rate of recombination for radical pairs that are generated by the metabolic activity in cells, which, in turn, change the concentration of radicals such as O_2^- and molecules such as H_2O_2long-term exposure to elevated magnetic fields can lead to elevated radical concentrations and an association with aging, cancers, and Alzheimer’s.”

[Frank Barnes and Ben Greenebaum, IEEE Power Electronics Magazine 2016](#)

Relatively Greater Absorption Into Faster Growing Brain Tissues of Children



Cell Phone Radiation into Adult Male and 6 Year Old Child

“two times higher in the brain and 10 times higher in the bone marrow of the skull compared with mobile phone use by adults.” - International Agency for the Research on Cancer

Many medical organizations, expert groups and government health ministries recommend reducing radiofrequency exposure to children.

- American Academy of Pediatrics
- Vienna Medical Association
- Athens Medical Association
- American Academy of Environmental Medicine
- EMF Scientists: Over 200 scientific experts
- The Russian National Committee on Non-Ionizing Radiation Protection
- The French National Agency of Health, Food, Environment and Labour
- The Council of Europe
- **Maryland State Children's Environmental Health and Protection Advisory Council**
- Swiss Physicians Association of Doctors for Environmental Protection
- International Society of Doctors for the Environment
- Irish Doctors Environmental Association
- New Jersey Education Association
- Over a dozen governments



World Wide Precautionary Action



France: Phones sold with headsets. Wi-Fi Banned for Kindergarten/Wi-Fi off when not in use. New national law



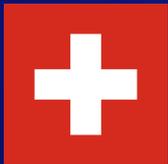
Belgium: Banned cell phones for children.



Israel: Wi-Fi to be removed from all Haifa schools as of April 2016, Health Ministry recommends lowering exposure at home and school.



Italy and Spain: Several local governments voted to declare precautionary principle: protect children and use wires.



UK, Switzerland, Australia, Germany, Canada: Health agencies recommend reduced cell phone exposures.



India: Exposure limits lowered to 1/10 of the ICNIRP level, recommendations to reduce cell phone exposure, SAR labeling on phones, some govs ban towers near schools.



- In general, keep calls short and as few as possible.
- Children and teenagers under the age of 16 should carry mobile phones for emergencies only!
- “Distance is your friend.” Keep the phone away from your body and head.
- Do not keep the phone directly on your body when using a headset or the built-in speakerphone. Pregnant women should be especially cautious.
- Do not use in vehicles (car, bus, train). Without an external antenna, the radiation inside the vehicle is higher.
- Make phone calls at home and at work via a hardwired network. Constantly radiating DECT cordless phones, Wi-Fi access points, data sticks and LTE modems should be avoided!
- Work offline more often or put your phone in airplane mode.
- Fewer apps means less radiation. Minimize the number of apps and disable the most unnecessary background services on your smartphone.
- Avoid making calls in places with poor reception (basement, elevator and the like).



United States

San Francisco, California and the Connecticut Department of Health: Recommends reducing cell phone radiation and informs public on how to reduce exposure.

Berkeley California: Right To Know Ordinance informs public on fine print FCC instructions.

Maryland State Advisory Council: Reduce wireless in school by preferring wired computers.

More US policy initiatives at <http://ehtrust.org>

US Government EPA Reports

Inquiry Letter to EPA from Physicist George Brozowski

In response to an inquiry about chronic exposure to cell tower radiation the EPA stated,

“The standardsare not intended to address low-intensity (non-thermal), long-term (chronic) exposures. Investigation as to whether there may be effects from exposures too low to cause heating is continuing... “telecommunication service providers and device manufacturers having little more to tell people except “don’t worry.”” – [EPA, 23 September 2014](#)

1995 EPA Briefing To the FCC and NTIA on EPA “Development of RF/MW Radiation Guidelines”

In this powerpoint presentation, the EPA briefs the FCC and NTIA about their progress in developing human exposure guidelines- that consider thermal AND nonthermal effects for microwave radiation. The EPA was in a two phase process. First they were setting “interim RF radiation guidelines” which “did not account for modulation, chronic exposure or non thermal effects.” Then they were going to focus on “modulated and nonthermal exposures” in Phase 2 by convening national experts.

A year later, the EPA was defunded from RF work and standards were never set.

EPA Briefing To the FCC and NTIA on EPA “Development of RF/MW Radiation Guidelines”

Modulated and Nonthermal Exposures

- ◆ **Phase 2: Modulation**
 - **NCRP Commentary** (two years)
 - **Current situation**
 - insufficient data
developing issue
 - **Approach**
 - NCRP Commentary**
focus on **exposure limits**
convenes **National experts**
 - **Commentary**
 - Addresses **important/controversial issues**
basis for **Background Information Document**
 - **Input from ongoing research**
 - SAG - wireless communications

0583

2002 EPA Letter about the Inadequacy of the FCC guidelines.

“Federal health and safety agencies have not yet developed policies concerning possible risk from long term, non thermal exposures...”

The generalization by many that the guidelines protect human beings from harm by any or all mechanisms is not justified... “[exposure limits] are thermally based, and do not apply to chronic, nonthermal exposure situations”

-

Norbert Hankin, lead scientist of the EPA Center for Science and Risk Assessment
Radiation Protection Division (2002)

US Radio Frequency Interagency Workgroup's 2003 Letter to CK Chou on Additional Concerns about US RF Exposure Guidelines

The RFIWG submitted three following subjects for consideration from the International Committee on Electromagnetic Safety:

1. The sensitivity of different tissues to temperature
2. A relaxation of standards would allow for higher exposures
3. The pinna - or ear - is being considered an extremity and will be allowed far higher RF limits without considerations of different body sizes. – Norbert Hankin, EPA (2003)

To our knowledge neither the 2003 or 1999 letter were ever responded to.

1999: US Radio Frequency Interagency Workgroup (RFIW) Letter to Richard Tell Chair, IEEE SCC28 (SC4) Risk Assessment Work Group on Critical Concerns About RF guidelines.

In this letter, members of the RFIW identify several critical issues with the RF exposure guidelines. Their concerns include the need for a biological basis for SAR limit and they point out that the limits for brain and bone marrow should be lower than those from muscles and fat as tissues are not equally sensitive. They question the selection criteria for the adverse effect and state there is extensive data on acute effects but that the lower-level non-thermal chronic exposure effects may be very different and chronic effects need to be accounted for. They state the uncertainties in the data should be addressed. “These studies have resulted in concern that exposure guidelines based on thermal effects, and using information and concepts (time-averaged dosimetry, uncertainty factors) that mask any differences between intensity-modulated RF radiation exposure and CW exposure, do not directly address public exposures, and therefore may not adequately protect the public.”

[Read the 1999 Federal Radio -Frequency Interagency Workgroup \(RFIW\) Letter to Richard Tell](#)

The USA EPA Public Website Changed in 2014 Minimizing Health Concerns

Up until August 2014 the EPA website stated the following:

“Wireless technology is still relatively new, and world-wide, researchers continue to study the effects of long-term exposure. To date, the scientific evidence linking long-term use of cell phones to cancer or other health effects is not conclusive. More research is needed to clarify the question of safety. “ [-pre 2014 webpage](#)

The EPA Webpage was changed in August 2014 to say:

“Scientists continue to study the effects of long-term exposure to low levels of RF. If you are concerned, you can take these simple steps to reduce exposure to RF radiation:

- Limit use – Reduce the number and length of your calls or time spent on a wireless device.*
- Use hands-free devices – Using hands-free devices keeps mobile phones away from your head. Increase distance between the wireless device and your body.’* - [The Current EPA Webpage](#)

FDA states there is no proof of absolute safety

“Do wireless phones pose a health hazard?”

The available scientific evidence does not show that any health problems are associated with using wireless phones. There is no proof, however, that wireless phones are absolutely safe.

Wireless phones emit low levels of radiofrequency energy (RF) in the microwave range while being used. They also emit very low levels of RF when in the stand-by mode. Whereas high levels of RF can produce health effects (by heating tissue), exposure to low level RF that does not produce heating effects causes no known adverse health effects. Many studies of low level RF exposures have not found any biological effects. Some studies have suggested that some biological effects may occur, but such findings have not been confirmed by additional research. In some cases, other researchers have had difficulty in reproducing those studies, or in determining the reasons for inconsistent results.” - FDA, 2002

1983 The EPA publishes Biological Effects Of RadioFrequency Radiation.

- “The objective of this report was to summarize and evaluate the existing database for use in developing RF radiation exposure guidance for the general public. The frequency range covered in this document is .5 MHz to 100 GHz. The existing database provides sufficient evidence about the relation between RF radiation exposure and biological effects to commit development of exposure limits to protect the health of the general public. It has been concluded from this review that biological effects occur at SAR up to about 1 W/kg some of them may be significant under certain environmental conditions.”
- Read the [Biological Effects Of RadioFrequency Radiation.](#)
- [EPA Document online, PDF,](#)
- [Read the 1983 Project summary of the EPA Bioeffects research here.](#)

1984: US Science Advisory Board (SAB) Recommendation to the EPA To Develop RF Guidelines:

- In this letter, the SAB Board recommends that the EPA develop radiation protection guidance to protect the public. The report contains a 1983 letter from FCC Chairman Mark Fowler to the EPA Administrator Kathleen Bennett which states, **“We believe that a definitive federal standard is imperative. Therefore we would like to make clear our support for your guidance development. We encourage the EPA to complete this process as expeditiously as possible so that her uniform federal standard will be available for use by the FCC and other affected agencies.”**
- Page 14 has a list of “Significant events in EPA RF Radiation Guidance Program”
- Page 30 lists Biological Effects
- **[US Science Advisory Board \(SAB\) Recommendation to the EPA To Develop RF Guidelines:](#)**
- Note: A standard was NEVER Set. The EPA was defunded in 1996.

Links To Learn More

[Learn about the health effects of cell tower radiation and research studies on cell tower radiation](#)

[Learn about the effects of cell tower radiation on birds, bees and wildlife.](#)

[Read about a study that found cell towers are linked to damage in human blood that predicts cancer.](#)

[Learn about why FCC limits do not protect the public.](#)

[Learn about 5G and watch videos with scientific presentations on 5G](#)

[Learn about occupational health and safety issues, the high accident and death rate of cell tower workers.](#)

[Learn about how cell tower companies do not give safety assurances to their shareholders and even warn that they may lose money in lawsuits related to the RF radiation.](#)

[Learn about research that shows property values decrease when a cell tower is near a home.](#)

[Read what the American Academy of Pediatrics states about cell towers](#)

[Read a scientific factsheet about cellular antennas placed near homes and 5G.](#)

[Read letters from doctors and experts about small cell antennas near homes.](#)

[Read a PDF compilation of Doctors letters on cell towers near schools.](#)

[Learn about links between cellular radiation and ADHD and Autism.](#)

[Read a letter from a PTA about a cell tower proposed on their elementary school](#)

[Learn about about firefighters opposed to cell towers on their stations and watch videos of them testifying against cell towers due to the radiation health risks.](#)

[Fire Hazards of Cell Towers](#)

[How To Get A 1500 Cell Tower Setback in Your Town](#)

[Read a Harvard Press Book on Telecom Industry Influence To The US FCC – Captured Agency by Norm Alster](#)

[Read Reports and White Papers of Insurance Industry that compare cell phone radiation to asbestos](#)

[Read how most insurance companies exclude damage from electromagnetic fields](#)