

Wireless Technology & Public Health: Health & Environmental Hazards in a Wireless World

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Collaborative on Health & the Environment
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SaferEMR.com



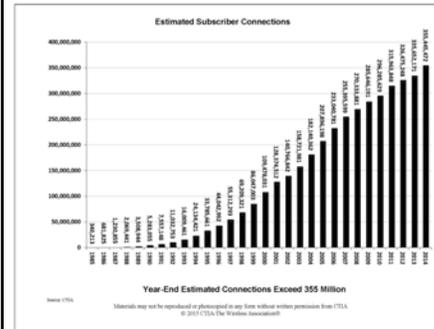
International EMF Scientist Appeal

- Petition calls for precautionary health warnings & stronger regulation of electromagnetic fields
- Submitted to UN & WHO (May 11, 2015)
- Signed by 218 EMF scientists from 40 nations
- EMFscientist.org
- *European Journal of Oncology*

Why have 218 scientists signed the petition?

- Proliferation of wireless technology
- Scientific evidence suggests health risks
- Government regulations fail to protect humans and other species

USA: Rapid growth in cell phone use



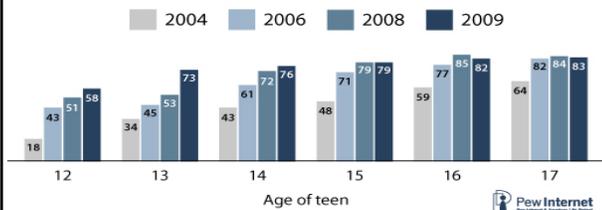
355 mil. connections
208 mil. smartphones
298,055 cell sites
\$188 bil. annual revenue
\$430 bil. investment

CTIA: Dec. 2014
<http://bit.ly/CTIA12-2014>

Adolescent cell phone use

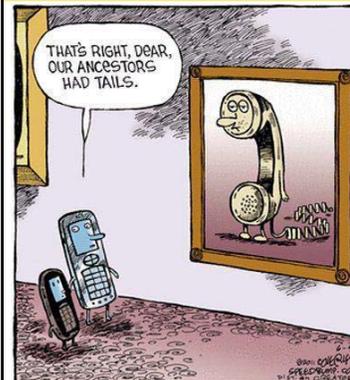
Older teens more likely to own cell phones

The percentage of teens who have a cell phone, by age (2004-2009)



88% of 13-17 year olds in US have cell phones
73% have smartphones
Pew Internet (<http://pewrsr.ch1.03zeq>), 4/9/2015

Demise of the landline telephone



US Households* (Jan-Jun, 2015)

- 47.4% wireless-only
- 14.6% wireless-mostly
- 26.9% mixed-use
- 7.7% landline-only
- 3.4% no phone

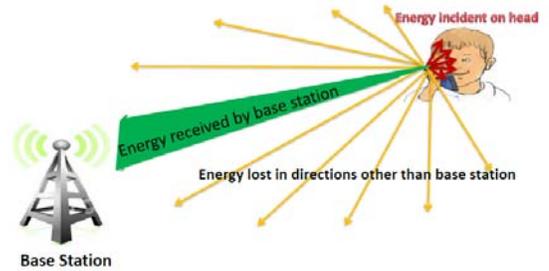
NHIS, NCHS, CDC, Dec., 2015.

<http://bit.ly/wireless1215>

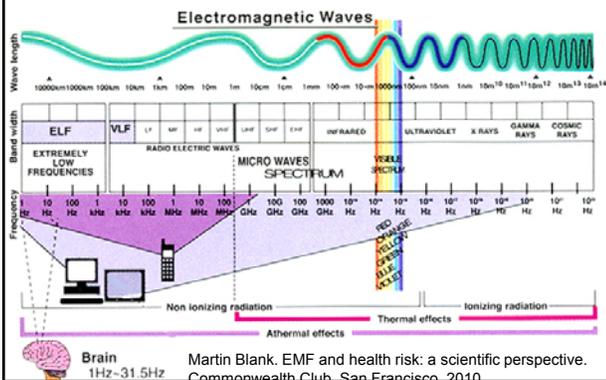
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How do cell phones work?



Electromagnetic spectrum



FDA (1999)

- "The existing exposure guidelines are based on protection from acute injury from thermal effects of RFR exposure, and may not be protective against any non-thermal effects of chronic exposure."
- "A significant research effort is needed... to provide the basis to assess the risk to human health of wireless communications devices."

<http://1.usa.gov/1Mzz6UM>

IARC working group press release



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 cancer, associated with wireless phone use.

Glioma risk: Case-control studies

	Interphone (2010)	Interphone (App. 2) (2010)	Hardell (2013)	CERENAT (2014)
"Heavy" Lifetime Use	1.40*	1.82*	1.75*	2.89*
10+ years	0.98	2.18*	1.79*	1.61

Current estimated lifetime risk of glioma in US is from 1 in 200 to 1 in 250.

Hardell Research Group: Case-control studies since IARC

- Wireless phone use 25+ years
 - Glioma: OR = 3.3 (95% CI: 1.6 – 6.9)
- Wireless phone use 20+ years
 - Acoustic neuroma: OR = 4.4 (95% CI: 2.2 – 9.0)

Hardell et al. *Int J Oncology*, 43:1833-1845. 2013.
Hardell et al. *Int J Oncology*, 43: 1036-1044. 2013.

Child's brain absorbs 2X the radiation

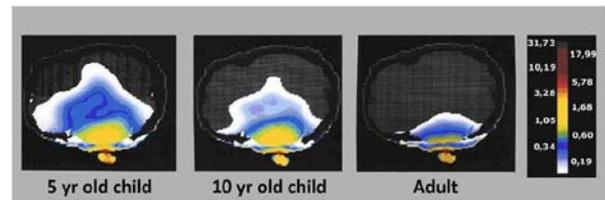


Figure 1. Estimation of the penetration of electromagnetic radiation from a cell phone based on age (Frequency GSM 900 Mhz) (On the right, a scale showing the *Specific Absorption Rate* at different depths, in W/kg) [1]

Gandhi et al., 2012

Children's brain tumor risk (CEFALO)

- Case-control study – Denmark, Sweden, Switzerland, Norway (2004-2008)
- Youth 7-19 years of age
 - 352 cases, 646 controls
- “Regular” cellphone use: OR = 1.36 (0.92-2.02)
 - 3 nations (OR's = 1.49 to 1.73); Norway (OR = 0.51)
- Cell phone company records – 2.8+ years cellphone use: OR = 2.14 (1.07-4.29)

Aydin et al. *J. National Cancer Institute*. 103:1264-1276. 2011.

Recent increases in brain cancer incidence over time

- **USA:** frontal lobe in adults 20-29 years of age; GBM in frontal & temporal lobes & cerebellum (overall population)
- **Norway & Finland:** overall population
- **Denmark:** GBM for males
- **England:** frontal & temporal lobes (overall)
- **Australia & New Zealand:** over age 70
- **Sweden:** no increase; registry unreliable

Existence of biologically plausible mechanisms

- Pall (2013) review paper
 - ELF & RF stimulate voltage-gated calcium channels (VGCC) to increase intra-cellular Ca^{2+} & nitric oxide synthesis
 - Calcium channel blockers eliminate EMF-induced effects (23 studies)
- Blood-brain barrier penetration (Salford)
- See slides at end of presentation for references to other mechanisms

Oxidative stress from low-intensity radiofrequency radiation

Yakymenko et al. (2015) review

- Oxidative stress = imbalance between free radical production & body's ability to counteract harmful effects via antioxidants
- 93 of 100 studies (16 cellular, 73 animal/plant, 4 human) → significant oxidative stress
- Effects: disrupted cell signaling, stress proteins, free radical formation, DNA-damage → carcinogenicity, neurologic disorders (e.g. ADHD, electrohypersensitivity)

Three-fourths of biologic studies yield significant effects

Results of 481 Biologic Studies on the Effects of Exposure to Radiofrequency Radiation
Dr. Henry Lai, Sep 1, 2014

Outcome	Number of Studies w/ Significant Effects	Number of Studies w/ No Significant Effects
Neurologic	163 (71%)	68 (29%)
Genetic	81 (66%)	40 (34%)
Free Radical	115 (87%)	14 (13%)
Overall	359 (75%)	122 (25%)

Other potential health risks in humans from wireless phone use

- **Tumors:** acoustic neuroma, meningioma, parotid, pituitary & thyroid glands; breast
- **Reproductive harm:** sperm damage, male infertility
- **Fetal development:** memory, ADHD, autism?
- **Children:** headaches, hearing, memory, ADHD
- **Electromagnetic hypersensitivity:** headaches, dizziness, fatigue, insomnia, tinnitus, skin rashes, heart palpitations

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US government: Radio Frequency Interagency Work Group



WHO & US federal agency positions

- **WHO:** "To date, no adverse health effects have been **established as being caused by** mobile phone use."
- **FCC:** "currently no scientific evidence **establishes a causal link** between wireless device use and cancer or other illnesses."
- **FDA:** "The scientific evidence does not show a danger to any users of cell phones from RF exposure, including children and teenagers."
- **NCI:** "currently no consistent evidence that non-ionizing radiation increases cancer risk ... The only known biological effect of radiofrequency energy is heating."

Federal government position

- **Wait and see:** wait for conclusive evidence yet make minimal investment in research
 - "the overlap of federal agency responsibilities ... leaves leadership unclear and encourages a **pass-the-buck attitude**." (Cities of Boston & Philadelphia, 2013) <http://bit.ly/1kAYSu7>
 - "the electromagnetic radiation standards used by the FCC continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today." (U.S. Dept. of Interior, 2014) <http://1.usa.gov/1jn3CZg>

Organizations & agencies promote FCC policy changes

- American Academy of Pediatrics
- Amer. Academy of Environmental Medicine
- California Medical Association
- US Department of the Interior
- US General Accountability Office
- Boston and Philadelphia
- Environmental Working Group
- Consumers Union

Consumer Reports magazine: November, 2015 issue

Cell phone personal & policy recommendations

- **Consumer Reports** agrees with **Amer. Academy of Pediatrics** & the **GAO** that **FCC** should develop new cell phone tests that account for children's vulnerability as children's brains absorb more radiation
- Cell-phone **manufacturers** should prominently display advice on how to reduce cell-phone radiation exposure

Industry influence: CTIA—The Wireless Association

CTIA:

“Leading global health organizations such as the American Cancer Society, National Cancer Institute, World Health Organization and the U.S. Food and Drug Administration all concurred that wireless devices are not a public health risk.”



Fierce Wireless, June 9, 2015

<http://bit.ly/1QeuPtb>



Alarmism vs. denialism – what about precaution?



Precautionary principle

“Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”

Principle 15. Report of the U.N. Conference on Environment and Development (Rio de Janeiro, 1992).

European Union: Policy recommendations

- **Governments:** adopt more stringent radiation standards & fund research ([European Environment Agency](#) [EEA], 2011)
- **Manufacturers:** improve cell phone design & issue warning labels (EEA, 2011)
- **Consumers:** reduce exposure (especially children); hands-free use (EEA, 2011)
- **Schools:** restrict Wi-Fi & mobile phone use ([Council of Europe](#), 2011)

Berkeley: Cell phone “right to know” ordinance

- City Council unanimously adopted cell phone consumer disclosure law (May 12, 2015)
- CTIA filed lawsuit in Federal court
- City adopted minor revision
- Court cleared way for implementation (Jan 27, 2016)
- [Saferemr.com](http://www.saferemr.com): updates & media coverage

Contact information



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