

Why the FCC Must Strengthen Radiofrequency Radiation Limits in the U.S.

Joel M. Moskowitz, Ph.D., Director
Center for Family and Community Health
The UC Berkeley Prevention Research Center
School of Public Health
University of California, Berkeley

November 5, 2013

Since 2009, when my colleagues and I published a review of the research on mobile phone use and tumor risk in the *Journal of Clinical Oncology*¹, I have advocated for stronger radiofrequency radiation limits that adequately protect children and adults from **non-thermal** as well as thermal health risks. Wireless devices must be tested in a manner that resembles how consumers actually use them, and the wireless industry should be required to provide to consumers meaningful disclosure of health risks and ways to reduce harm without pre-empting the rights of localities to require additional disclosures.

Following is a compilation of press releases I have prepared since April, 2012, along with selected news articles related to these releases. These materials summarize the latest health research on wireless radiation and related public health policy developments.

¹ Myung SK, Ju W, McDonnell DD, Lee YJ, Kazinets G, Cheng CT, Moskowitz JM. Mobile phone use and risk of tumors: a meta-analysis. *Journal of Clinical Oncology*. 27(33):5565-5572. 2009.

Page No. Table of Contents

Overview

- 3 Cellphones and Health
- 7 Cellphone Radiation and Health: References and Further Reading

Federal Communications Commission & Governmental Accountability Office

- 10 Does The FCC Plan To Rubber Stamp Outdated Cell Phone Radiation Standards?
- 12 Better Late Than Never? FCC to Review Cell Phone Radiation Standards
Did Tom Wheeler, Nominee for FCC Chair,
- 14 Subvert Research Showing Harm From Cell Phone Radiation?
- 15 What's Wrong with the GAO Report on Cell Phone Radiation?

Brain Tumor Risk

- 16 WHO Monograph on Cancer Risk from Mobile Phone Use Released
- 17 Most Significant Government Health Report on Mobile Phone Radiation Ever Published
- 18 Brain Cancer Risk Increases with the Amount of Wireless Phone Use
- 22 Cell Phone Use, Acoustic Neuroma and Cancer of the Pituitary Gland
U.K. Cell Phone Study Points to Acoustic Neuroma, Not Brain Cancer Risk;
- 24 Fourth Study To Show Tumor Link
- 26 Studies Show Cell Phone Use Increases Brain Cancer Risk

- 29 Your Cell Phone Company May Affect Your Risk of Brain Cancer
- 32 Cellphones Can Increase Brain Cancer Risk in Children | "Scientists Challenge No Risk Conclusion"
- 34 Cell Phones and Cancer: Critics Say Kids Risk Brain Tumors
- 36 A close call: Why the jury is still out on mobile phones
- 41 'The biggest experiment of our species': With five billion mobile users in the world, conference calls for research into potential brain cancer risk
- 44 Radiation from mobile phones: Tumour rumours return
- 48 The Million Women Study ... shoddy design ... shoddy results ... shoddy conclusions

Sperm Damage and Male Infertility

- 52 Cell Phone Radiation Damages Sperm
- 54 Cell phones may damage sperm, health advocacy group says
- 56 Cell Phone Radiation, Pregnancy, and Sperm

Domestic Governmental Actions

- 57 Big Week for Cell Phone Radiation Legislation
- 58 San Francisco's Cell Phone Fact Sheet is Factual
- 60 San Francisco Updates Cell Phone Safety Warnings
- 64 Florida City Adopts Cell Phone Precautionary Health Warnings

Global Governmental Actions and Major Reports

- 67 Call for Action to Reduce Harm from Mobile Phone Radiation (European Environment Agency Report)
- 69 Belgium Adopts New Regulations to Promote Cell Phone Radiation Safety
- 71 French Health Agency Recommends Children and Vulnerable Groups Reduce Cell Phone Radiation Exposure
- 73 India Adopts Health Warnings & U.S. Mobile Phone Standards
- 77 Russian Cell Phone Standards Offer Better Protection than American Standards
- 79 Italian Supreme Court Rules Cell Phones Can Cause Cancer: What are the implications of this ruling for the United States?

Smart Meters and Wi-Fi

- 81 Smart Meters: Correcting the Gross Misinformation
- 86 Health Experts Caution About Smart Meters
- 88 Adoption of Wi-Fi in Los Angeles USD Classrooms
- 90 Wireless Industry's Patented System to Reduce Cancer Risk from Wireless Local Networks Never Adopted
- 91 Boeing Tests In-Flight Wireless on Potatoes, Not People

Miscellaneous

- 92 Children's Cell Phone Use May Increase Their Risk of ADHD
- 95 Secondhand Exposure to Cell Phone Radiation: An Emerging Public Health Problem?
- 98 LTE Cell Phone Radiation Affects Brain Activity in Cell Phone Users (4G)
- 101 Samsung Scores with Lowest Radiation Cell Phones: Why Samsung Phones are a "Win-Win"
- 104 Comments on the 2012 GAO Report: "Exposure and Testing Requirements for Mobile Phones Should be Assessed" (Aug. 24, 2012 revision)

Cellphones and Health by Dr. Joel Moskowitz

Reprinted from *The Green Gazette* (British Columbia), Issue #22, Sept/Oct 2013, pp. 8-9

In the last issue we explored the potential hazards of electromagnetic radiation from iPad use. We learned about warnings from the European parliaments and doctors' associations in various countries, and discussed the differences between pulsed digital wireless signals and continuous analogue radio waves. This time we are pleased to invite Dr. Joel Moskowitz to share his research findings regarding the health effects of cellphones.

I started studying the effects of cellphone radiation when Dr. Seung-Kwon Myung, a physician and epidemiologist from the National Cancer Center of South Korea, spent a year working in my center at UC Berkeley. He specializes in meta-analysis, a method by which data are combined across studies to generate more robust conclusions.

My colleagues and I reviewed research that examined the association between cellphone use and tumor risk. When we grouped the 23 studies based upon quality of the research, we found strong group differences. In the 13 studies which failed to meet scientific best practices, we found what appeared to be reduced tumor risk. The 10 higher-quality studies found a harmful association between cellphone use and tumor risk. Also, the higher quality studies had no funding from the cellular industry whereas the lower quality studies had at least partial industry funding.

Since our study was published in the *Journal of Clinical Oncology* in 2009, I have reviewed hundreds of cellphone radiation studies. There is evidence that cellphone radiation may damage sperm and increase male infertility, increase risk of reproductive health problems, increase brain glucose metabolism, and alter EEG readings.

Many individuals have reported developing a sensitivity to cellphone radiation and other forms of radiofrequency energy. They experience various allergic symptoms which may include ringing in their ears, headaches, dizziness, an irregular heartbeat, and memory and sleep problems. This condition, known as electromagnetic hypersensitivity, is considered a functional impairment in Sweden. The incidence of this condition, which is not easily diagnosed, appears to be increasing in many countries with the proliferation of “electrosmog.”

We need more research on the short-term and long term risks; risks to children and adolescents who are more vulnerable; reproductive health risks, and risks of newer technologies. We need to better understand the mechanisms that contribute to health effects and how to reduce the risks. Many scientists believe that there are mechanisms other than “heat” at work. Currently, the regulations adopted by most governments, including Canada and the U.S., only address the heating effect produced by cellphone radiation. They completely ignore biologic reactivity.

Cellphone and Brain Tumour Risk

It's premature to estimate long-term tumor risk because tumors can take several decades to develop. A few studies suggest that the risk of glioma, a serious and often deadly brain tumor, doubles after 10 years of cellphone use. This could amount to an additional 10,000 cases per year in the U.S.

Many people have come to rely on their cellphones over land lines, and many children start using cellphones at a young age, so we may see increased risk in the future. On the other hand, changes in the pattern of use (e.g. hands-free, texting) can reduce health risks. Also, technology is changing; yet we don't know if newer technologies are safer or more harmful. It is difficult for scientific research about long-term effects to keep up with the speed at which companies bring forth new consumer radiofrequency microwave devices. This behooves us to practice precaution.

Cellphone Radiation Damages Sperm

On June 28, 2012 the Environmental Working Group (EWG) reported: "EWG scientists have analyzed 10 scientific studies documenting evidence that cellphone radiation exposure leads to slower, fewer and shorter-lived sperm. The research raises concerns for men who carry their phones on their belts or in pants pockets. This conclusion is supported by a review paper recently published in the *Journal of Andrology*:

"The results showed that human spermatozoa exposed to RF-EMR (radio frequency electromagnetic radiation) have decreased motility, morphometric abnormalities, and increased oxidative stress, whereas men using mobile phones have decreased sperm concentration, decreased motility (particularly rapid progressive motility), normal morphology, and decreased viability. These abnormalities seem to be directly related to the duration of mobile phone use." (La Vignera et al, 2012).

Infertility has become a mounting problem in America and Canada. According to Statistics Canada, infertility in Canada has almost doubled between 1992 and 2010, not just among couples who got married older, but also among younger couples in their 20's.

Cellphone Radiation, Pregnancy and Children

The latest, peer-reviewed science finds prenatal cellphone radiation exposure damages test mammals' offspring. Several new, independent studies confirm previous research that pulsed digital signals from cellphones disrupt DNA, impair brain function, and damage sperm.

Many studies have found that exposure to low-intensity cellphone radiation can open the blood-brain barrier. This can enable toxins in the blood to penetrate the brain. A recent study found that children who used cellphones were more likely to exhibit ADHD (attention-deficit hyperactivity) symptoms than children who did not use them, but this effect was observed only among children who used cellphones who had slightly elevated lead levels in their blood. Moreover, in the children with some lead in their blood, the more they used their cellphones, the more likely they had ADHD symptoms.

On December 12, 2012, the American Academy of Pediatrics sent a letter to the U.S. Federal Communications Commission (FCC) requesting reassessment of cellphone exposure limits:

“Children are disproportionately affected...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 (radiofrequency) energy deeper into their brains than adults. It is essential that any new standards for cellphones or other wireless devices be based on protecting the youngest and most vulnerable populations to ensure they are safeguarded through their lifetimes.”

The U.S. Government Accountability Office (GAO) issued a report last summer calling on the FCC to update cellphone exposure limits and testing requirements. The report noted that the testing requirements are inadequate as cellphones are being used closer to the head and body than the test requires. Thus, actual users' exposure to cellphone radiation may exceed the legal limit.

Are all Cellphones Equal with regards to Radiation?

The amount of cellphone radiation your phone emits depends on various factors, including your location and distance from cell towers. Some cellphones generate as much as eight times more radiation than others. A measurement, called the SAR (Specific Absorption Rate), is available on the internet for every cellphone, but this measures the maximum amount of radiation emitted, not the typical amount. You can't find out how much radiation a phone generates during average daily use, which may be more important in terms of cumulative health risk. Some low SAR phones may generate more radiation on average than high SAR phones.

Your cellphone carrier also matters. One study shows that GSM phones can emit 28 times more radiation on average than CDMA phones. Another study shows GSM affects EEG readings more than CDMA. Your cellphone carrier determines which type of phone you have. In the U.S., people can choose to use a CDMA phone by selecting Verizon or Sprint; however, in Canada all carriers use GSM phones. Soon voice calls will use 4G technology, that is LTE, instead of GSM or CDMA. More comparative studies on different carrier standards are needed, especially the newer standards.

Recommendations on Cellphone Usage

Although further research is needed, we cannot afford to wait for conclusive evidence. There are more than 300 million cellphones in use in the U.S. Two-thirds of children eight and older use them. The government's regulations are outmoded and need to be revised. About a dozen nations have issued precautionary health warnings. It is time to publicize practical ways in which people can minimize their personal health risk. In addition, I have recommended an annual assessment of \$1 on each cellphone. In the U.S., this would generate \$300 million annually for vitally needed research and education.

Here are some practical steps which cellphone users can easily adopt:

- Keep your cellphone away from your body. Don't keep the phone near your head or reproductive organs whenever it is turned on. Don't sleep with the phone near your bed. The amount of radiation is related to the square of the distance, so keeping your phone 10 inches away reduces your exposure 100-fold compared to an inch.
- Use a corded headset or other hands-free method such as a speakerphone or text. Keep your calls short.
- Minimize cellphone use among children, teens, and pregnant women. A child's brain absorbs twice as much radiation as an adult brain.
- Don't use your phone when the signal is weak, for example, on an elevator or in a moving vehicle, as the phone is designed to increase its signal strength to compensate.
- When carrying a cellphone in your pocket: Keep the cellphone turned off, or deactivate its signals (i.e. keep it on airplane mode, plus turn off the WiFi and Bluetooth functions). Turn it on or activate it periodically to check for messages, or check for messages from a land line. The cellphone is designed to send signals to cell towers regularly to identify its location, whenever it's turned on. The WiFi antenna in a smartphone sends beacon signals continually if it's not turned off.
- Demand that the government revise regulations, fund research, and issue precautionary health recommendations.

Dr. Joel Moskowitz is on the research faculty at the University of California, Berkeley, School of Public Health. He has conducted research on chronic disease prevention and health promotion for more than 30 years, has authored dozens of peer-reviewed health publications, and is Director of UC Berkeley's Center for Family and Community Health

Article References: <https://docs.google.com/file/d/0BxkLXVmAl0ilaGVsVUZTbVUzdG8/edit>

For more information, contact: Joel M. Moskowitz, Ph.D., email: jmm@berkeley.edu; Electromagnetic Radiation Safety Website: <http://www.saferemr.com/> or on Facebook at <https://www.facebook.com/SaferEMR>.

For the online version of this magazine article published in the Sept./Oct. issue of ***TheGreenGazette*** including graphics: <http://bit.ly/18RXE7x>

Dr. Joel Moskowitz: Cellphone Radiation and Health

References and Further Reading

Myung SK, Ju W, McDonnell DD, Lee YJ, Kazinets G, Cheng CT, Moskowitz JM, Mobile phone use and risk of tumors: a meta-analysis, *J Clin Oncol*. 2009 Nov x20;27(33):5565-72. Epub 2009 Oct 13. <http://jco.ascopubs.org/content/27/33/5565>

Byun Y-H, Ha M, Kwon H-J, Hong Y-C, Leem J-H, et al. (2013) Mobile Phone Use, Blood Lead Levels, and Attention Deficit Hyperactivity Symptoms in Children: A Longitudinal Study. *PLoS ONE* 8(3): e59742. doi:10.1371/journal.pone.0059742. <http://www.plosone.org/article/info:doi/10.1371/journal.pone.0059742>

Süleyman Kaplan, MD

Slides: **Effects of prenatal and adult EMF exposure on brain development**

http://www.healthandenvironment.org/uploads/docs/Cell_phone_and_neuron_health_November_11-11-2012_Short.pdf

Effects of prenatal exposure to a 900 MHz electromagnetic field on the dentate gyrus of rats: a stereological and histopathological study. Odaci, et al
http://www.healthandenvironment.org/uploads/docs/Odaci_Effects_of_prenatal_exp_to_a_MWR_on_brain_of_babies_2008.pdf

Nesrin Seyhan, PhD

Slides: **Gazi non-ionizing radiation protection center and Gazi biophysics department**

http://www.healthandenvironment.org/uploads/docs/Dr_SEYHAN_EHT_10_min.pdf

The effect of radiofrequency radiation on DNA and lipid damage in female and male infant rabbits. Guler, et al

http://www.healthandenvironment.org/uploads/docs/Guler_Effect_of_RFR_on_Infant_Rabbits_4-12.pdf

Devra Davis, PhD, MPH

Slides: **Cellphone toxicology, exposure assessment and epidemiology--an update**

http://www.healthandenvironment.org/uploads/docs/Nov2012DLDavis_for_CHE.pdf

Slides: **Expert forum: Cellphone radiation risk to pregnancy and sperm**

<http://www.healthandenvironment.org/uploads/docs/DLDNPCFinal.pdf>

Cellphone safety: The right to know about gray matters, Devra Davis

[http://www.healthandenvironment.org/uploads/docs/Right To Know About Grey Matters .pdf](http://www.healthandenvironment.org/uploads/docs/Right_To_Know_About_Grey_Matters_.pdf)

Doctors' advice to patients and their families: Cellphones and Health: Simple precautions make sense, Environmental Health Trust

[http://www.healthandenvironment.org/uploads/docs/Doctors Advice to Patients Their Family 11-9-12.pdf](http://www.healthandenvironment.org/uploads/docs/Doctors_Advice_to_Patients_Their_Family_11-9-12.pdf)

Igor Belyaev, PhD

Slides: **Exposure to microwaves from mobile communication, DNA repair and cancer risk**

[http://www.healthandenvironment.org/uploads/docs/2nd 2012 NPC Belyaev final.pdf](http://www.healthandenvironment.org/uploads/docs/2nd_2012_NPC_Belyaev_final.pdf)

Role of physical and biological variables in bioeffects of non-thermal microwaves, Igor Belyaev

[http://www.healthandenvironment.org/uploads/docs/BelyaevPhysical Bio Variables Bioeffets 10-23-12.pdf](http://www.healthandenvironment.org/uploads/docs/BelyaevPhysical_Bio_Variables_Bioeffets_10-23-12.pdf)

Microwaves from mobile phones inhibit 53BP1 focus formation in human stem cells more strongly than in differentiated cells: Possible mechanistic link to cancer risk. Markova, et al

[http://www.healthandenvironment.org/uploads/docs/Belyaev Cellphones Stem Cells with Link to Cancer 3-10.pdf](http://www.healthandenvironment.org/uploads/docs/Belyaev_Cellphones_Stem_Cells_with_Link_to_Cancer_3-10.pdf)

Hugh Taylor, MD, PhD

Slides: **Fetal cellphone exposure affects behavior**

[http://www.healthandenvironment.org/uploads/docs/Taylor Fetal Affects from Cellphone Radiation in Mice 3-15-12.pdf](http://www.healthandenvironment.org/uploads/docs/Taylor_Fetal_Affects_from_Cellphone_Radiation_in_Mice_3-15-12.pdf)

Fetal radiofrequency radiation exposure from 800-1900 Mhz-rated cellular telephones affects neurodevelopment and behavior in mice. Aldad, et al

[http://www.healthandenvironment.org/uploads/docs/Taylor Fetal Affects from Cellphone Radiation in Mice 3-15-12.pdf](http://www.healthandenvironment.org/uploads/docs/Taylor_Fetal_Affects_from_Cellphone_Radiation_in_Mice_3-15-12.pdf)

EHHI report: The cellphone problem, February 2012

http://www.healthandenvironment.org/uploads/docs/cell_phone_report_EHHI_Feb2012_1.pdf

EHHI cellphone report summary

http://www.healthandenvironment.org/uploads/docs/summary_cell_phone_report_EHHI_Feb2012.pdf

Ronald Herberman, MD

Slides: **Cellphone radiation risks--the case for precaution**

<http://www.healthandenvironment.org/uploads/docs/HerbermanStart.pdf>

Exposure limits: The underestimation of absorbed cellphone radiation, especially in children. Gandhi, et al

http://www.healthandenvironment.org/uploads/docs/Gandhi_et_al_Printed_Version_2-14-121.pdf

Dr. De-Kun Li, MD, PhD

Senior Research Scientist, Division of Research, Kaiser Foundation Research Institute; Lecturer, Stanford University

A prospective study of in-utero exposure to magnetic fields and the risk of childhood obesity. Li, et al

http://www.healthandenvironment.org/uploads/docs/Li_EMF_and_childhood_obesity_7-27-12.pdf

Collaborative on Health and the Environment:

http://www.healthandenvironment.org/partnership_calls/11452?res

GAO Report:

<http://www.gao.gov/products/GAO-12-771>

Environmental Health Trust:

<http://ehtrust.org/>

Environmental Working Group review of sperm damage research

<http://www.prlog.org/11911996>

Dr. Dariusz Leszczynski's science blog on mobile phone radiation and health:

<http://betweenrockandhardplace.wordpress.com/>

Video (1 hour, 58 minutes):

<http://www.youtube.com/watch?v=tnn6gNyRU7g>

Infertility rates rising for Canadian couples <http://o.canada.com/2012/02/15/infertility-rates-rising-for-canadian-couples/>

BlackBerry: Keep Our Phones Away From Your Body

<http://swampland.time.com/2010/10/15/blackberry-keep-our-...>

Environmental Working Group. Cellphone Radiation Damages Sperm, Studies Show. Jun 28, 2012

http://www.ewg.org/cellphoneradiation/sperm_damage.

La Vignera et al. Effects of the exposure to mobile phones on male reproduction: a review of the literature. Journal of Andrology. 2012 May/June: 33(3):350-356.

<http://www.andrologyjournal.org/cgi/content/full/33/3/350>.

CNET Report: Cellphone use could reduce sperm count

Dong Ngo, August 18, 2011

http://www.cnet.com/8301-17918_1-20093675-85/report-cell-phone-use-could-reduce-sperm-count/

Does The FCC Plan To Rubber Stamp Outdated Cell Phone Radiation Standards?

More research on cell phone radiation is needed before we replace our outdated guidelines. In the interim the US should disseminate precautionary health warnings. A \$1 annual fee per cell phone would generate \$300 million for research and education.

Joel M. Moskowitz, PRLog (Press Release), Jun 15, 2012

The Federal Communications Commission (FCC) will conduct a formal review of the U.S. cell phone radiation standards according to a Bloomberg news report.

An FCC spokesperson emailed a statement to a Bloomberg reporter that is truly alarming. Her message suggests that the FCC has already decided that the current standards are fine, and will conduct a review to rubber stamp the 1996 FCC guidelines:

"Tammy Sun, a spokeswoman for the agency, said in an e-mailed statement. The notice won't propose rules, Sun said.

'Our action today is a routine review of our standards,' Sun said. 'We are confident that, as set, the emissions guidelines for devices pose no risks to consumers.'"

(Todd Shields, Bloomberg, Jun 15, 2012; "Mobile-Phone Radiation Safety to Be Reviewed by U.S. FCC"; <http://www.bloomberg.com/news/2012-06-15/mobile-phone-rad...>)

The Bloomberg article cites a major review of the literature conducted by our research center in which we found an association between mobile phone use and increased brain tumor risk especially after 10 years of cell phone use:

"There is possible evidence linking mobile-phone use to an increased risk of tumors, according to a study of scientific studies and articles that was published in 2009 in the Journal of Clinical Oncology." (<http://jco.ascopubs.org/content/27/33/5565.abstract>)

The research we reviewed and subsequent research strongly suggest that the current standards for cell phone radiation are not adequate to protect us from health risks associated with exposure to cell phone radiation. A year ago, a 31-member group of experts convened by the World Health Organization agreed with our conclusions and classified cell phone radiation a "possible carcinogen."

The FCC standards were established in 1996 at a time when few adults used cell phones. Today, children and most adults are exposed to far more cell phone radiation than the FCC-approved test models are subjected to when new cell phones are certified. Moreover, the test assumes that cell phones can harm us only by heating tissue. This is not true as there are numerous studies that demonstrate non-thermal effects from cell phone radiation including increased glucose metabolism in the brain, generation of heat shock proteins, free radicals, and double-strand DNA breaks; penetration of the blood-brain barrier, damage to sperm and increased male infertility.

The FCC admits on its web site* that

"there is no federally developed national standard for safe levels of exposure to radiofrequency (RF) energy."

"The FCC's guidelines and rules regarding RF exposure are based upon standards developed by IEEE and NCRP and input from other federal agencies." (<http://www.fcc.gov/guides/wireless-devices-and-health-con...>)

I have grave concerns if the FCC continues to rely on industry-funded expert groups because our research found that industry-funded epidemiologic research was generally of lower quality and biased against finding harmful effects. Dr. Henry Lai at the University of Washington has come to a similar conclusion in his analysis of the toxicology research.

In my opinion, it is premature to adopt new safety standards because we need more research that is independent of the wireless industry's influence. The Federal government needs to sponsor a major research initiative on the health effects of electromagnetic radiation. Martin Blank and Reba Goodman from Columbia University recently published a paper in the journal, *Electromagnetic Biology and Medicine*, calling for the development of a biologically-based measure of electromagnetic radiation (Blank and Goodman, Electromagnetic fields and health: DNA-based dosimetry. *Electromagnetic Biology and Medicine*. Posted online on June 7, 2012; <http://informahealthcare.com/doi/abs/10.3109/15368378.2011.624662>).

In the interim, to protect cell phone users we must adopt and disseminate precautionary health warnings that promote safer cell phone use. Although the FCC web site provides some simple steps to reduce exposure to cell phone radiation, it "does not endorse the need for these practices." A dozen nations and the city of San Francisco have issued precautionary warnings about cell phone use to its citizens. It is time for our Federal government to do so.

<http://prlog.org/11901340>

Better Late Than Never? FCC to Review Cell Phone Radiation Standards

After procrastinating for almost ten years, the FCC seems prepared to review its outmoded wireless radiation standards. But will industry force the FCC to maintain the status quo or even weaken the inadequate standards?

Joel M. Moskowitz, PRLog (Press Release), Feb. 5, 2013

The FCC will close the public comment period on proposed changes in rules and procedures regarding human exposure to radiofrequency electromagnetic energy tomorrow, February 6. (1) The outmoded rules and procedures that regulate cell phones and other wireless devices were originally adopted in 1996 when there were only 38 million cell phone subscriptions in the U.S. (2)

The FCC's public comment period was opened almost ten years ago on July 14, 2003. (1) At that time there were 148 million cell phone subscriptions in the U.S. (2)

Now there are 322 million cell phone subscriptions. (2) Today, many children, teenagers, and women use cell phones that are tested using a model of a large male adult's brain and body. Meanwhile research has shown that a child's brain absorbs 2-3 times more electromagnetic radiation (EMR) than an adult's brain.

Why has the FCC procrastinated in revising these rules and procedures? The standards were developed prior to 1996 by industry groups to protect workers and the general population only from the thermal or heating effects of exposure to EMR.

The standards ignore the health risks posed by nonthermal effects of EMR which have been reported in hundreds of peer-reviewed laboratory studies. Also, we now have evidence from human studies of increased risk of cancers of the brain and salivary gland from long term use of cell phones that comply with these outdated standards. The World Health Organization has classified radiofrequency EMR as "possibly carcinogenic" to humans, based on the results of large case-control studies of cell phone use among adults.

We also have evidence of sperm damage from cell phone radiation and increased male infertility among cell phone users and preliminary evidence of reproductive health effects.

Although more research is needed to assess the long term risks to children who use cell phones, Wi-Fi and other wireless devices, the research to date suggests that these risks will exceed those found among adult users. We must not continue to experiment with our children by exposing them to increasing amounts of EMR through wireless technologies. Installing Wi-Fi in schools and on buses and airplanes is likely to increase health risks over the life span.

Last summer the Government Accountability Office issued a report calling on the FCC to review cell phone standards and testing procedures. Although this report made numerous mistakes which have been documented by myself (3) and other experts, it appears to have succeeded in prompting the FCC to close the public comment period and initiate a review.

It is critically important that the public and those with expertise weigh in on the review process because the FCC pre-empted the GAO Report last summer and announced to the media that they either do not plan to change the standards or may even weaken them. (4) The industry has been lobbying the FCC for many years to adopt international standards which are far weaker than the standards adopted by the U.S. and a handful of other nations.

In the comments I filed on the FCC website today, I entered into the public record the contents of my Electromagnetic Radiation Safety web site, <http://saferemr.com> , which contains commentary, news releases, and media coverage. (5) I also attached my comments on the problems with the GAO Report that were prepared at the request of staff members for Representatives Waxman, Markey, and Eshoo, the three members of Congress who requested this report from the GAO. (3)

The recommendations I made are as follows:

- “In my professional opinion, the FCC should request the EPA to empanel a Working Group composed of health experts who have no conflicts of interest with industry to review the scientific literature on EMR. The Group should recommend biologically-based EMR standards that ensure adequate protection for the general public and occupational health based upon the precautionary principle. Finally, the FCC should adopt the standards, testing procedures, and appropriate precautionary warning language recommended by the Working Group.” (5)
- “The FCC should not take any actions that may increase exposure of the population to EMR from cell phones, base stations, Wi-Fi, Smart Meters and other RF- or ELF-emitting devices. The FCC must especially protect vulnerable groups in the population including children and teenagers, pregnant women, men of reproductive age, individuals with compromised immune systems, seniors, and workers.” (5)

For more information on the health effects of electromagnetic radiation exposure from cell phones, Wi-Fi, and Smart Meters, and discussion of health policies to reduce potential harm, see my Electromagnetic Radiation Safety website at <http://saferemr.com> .

References

(1) Office of Engineering and Technology, Federal Communications Commission. "FCC Proposes Changes in the Commission's Rules and Procedures Regarding Human Exposure to RadioFrequency Electromagnetic Energy". Proceeding Number: 03-137. July 14, 2003. URL:

<http://apps.fcc.gov/ecfs/proceeding/view?name=03-137>

(2) CTIA--The Wireless Association. Semi-Annual Mid-Year 2012 Top-Line Survey Results. URL:

http://files.ctia.org/pdf/CTIA_Survey_MY_2012_Graphics-final.pdf .

(3) Joel M. Moskowitz. "Comments on the 2012 GAO Report: 'Exposure and Testing Requirements for Mobile Phones Should Be Reassessed'. August 24, 2012. URL:

<http://saferemr.blogspot.com/2013/01/commentary-gao-2012-report-on-mobile.html>

(4) Joel M. Moskowitz. "Does The FCC Plan To Rubber Stamp Outdated Cell Phone Radiation Standards?" PRLog. June 5, 2012. URL: <http://www.prlog.org/11901340>

(5) Joel M. Moskowitz. Comments filed on "FCC Proposes Changes in the Commission's Rules and Procedures Regarding Human Exposure to RadioFrequency Electromagnetic Energy." FCC 03-137. February 5, 2013. URL: <http://bit.ly/12qisoj>

<http://www.prlog.org/12073996-better-late-than-never-fcc-to-review-cell-phone-radiation-standards.html>

**Did Tom Wheeler, Nominee for FCC Chair,
Subvert Research Showing Harm From Cell Phone Radiation?**

A wireless industry publication alleged that Mr. Wheeler suppressed and biased the research from the nation's largest mobile phone health research project.

Joel M. Moskowitz, PRLog (Press Release), May 28, 2013

Tom Wheeler, head of the CTIA from 1992-2004, has been nominated to become the next Chairman of the Federal Communications Commission (FCC).

RCR Wireless News, an industry publication, alleged that Mr. Wheeler suppressed and biased the research from the nation's largest mobile phone health research project while he served as head of the CTIA, the wireless telecommunications industry association.

Wireless Technology Research L.L.C. was a 6-year, \$28 million research program funded by mobile phone carriers and manufacturers from 1993 to 1999.

The strategies allegedly used by the CTIA were similar to those employed by the Tobacco Industry for many decades to downplay the dangers of cigarette smoking. After six years of litigation by the Department of Justice, a Federal court finally found the Tobacco Industry guilty of fraud and racketeering in 2006.

How long will it take before the curtain is pulled back on the Wireless Industry's longstanding strategy to co-opt the scientific community, and suppress and bias the research on the health effects of cell phone and wireless radiation?

RCR Wireless News has been reporting about the wireless and mobile phone industry for industry executives since 1981. It is the official show daily for some of the industry's biggest trade shows including the CTIA. (4)

For a summary of the allegations against Mr. Wheeler according to *RCR Wireless News*, see <http://saferemr.blogspot.com/2013/05/did-tom-wheeler-nominee-for-chairman-of.html>.

<http://www.prlog.org/12146045>

What's Wrong with the GAO Report on Cell Phone Radiation?

The US General Accountability Office issued a report calling for reassessment of mobile phone exposure and testing requirements. The report had many flaws although it made one good recommendation -- the FCC needs to re-assess testing requirements.

Joel M. Moskowitz, PRLog (Press Release), Jan 10, 2013

Comments on the 2012 GAO Report: ***“Exposure and Testing Requirements for Mobile Phones Should Be Reassessed”***

Joel M. Moskowitz, Ph.D.
Director, Center for Family and Community Health
School of Public Health
University of California, Berkeley

August 24, 2012

Introduction

U.S. General Accountability Office (GAO). ***Exposure and Testing Requirements for Mobile Phones Should Be Reassessed***. GAO-12-771. Washington, DC: General Accountability Office.
<http://www.gao.gov/products/GAO-12-771> .

The GAO Report selectively reviewed scientific literature that supports the FCC’s claim that cell phones which comply with the federal standards are safe. The GAO did not consider the methodologic limitations of this research or the alternative interpretations of the results from these studies. The GAO Report did not review the scientific evidence that strongly suggests the FCC standards which control only for thermal effects do not adequately protect the public from harm due to non-thermal effects from long-term exposure to cell phone radiation.

Although we do not have conclusive proof that cell phone radiation is harmful to humans, the FCC certainly cannot prove its claim that cell phones that comply with current federal standards are safe. The claim relies on many assumptions about the science. A critical review of the science—as opposed to simply “weighting the evidence”—reveals that these assumptions have dubious validity, and that there is sufficient evidence to require the development of stronger, biologically-based standards that protect against sub-thermal exposures.

A link to my 11 page commentary on the GAO report is available on my blog site at <http://saferemr.blogspot.com/2013/01/commentary-gao-2012-report-on-mobile.html>.

<http://www.prlog.org/12057270-whats-wrong-with-the-gao-report-on-cell-phone-radiation.html>

WHO Monograph on Cancer Risk from Mobile Phone Use Released

The World Health Organization concludes there is “limited evidence” in both humans and laboratory animals for the carcinogenicity of radiofrequency radiation, especially from cell phones.

Joel M. Moskowitz, PRLog (Press Release), Apr 19, 2013

The International Agency for Research on Cancer (IARC) of the World Health Organization (WHO) published its long-awaited monograph on the cancer risk to humans from exposure to cell phone radiation and other radiofrequency electromagnetic fields. The primary focus of the review is on the microwave radiation emitted by cell phones.

According to the monograph, “Radiofrequency electromagnetic fields are possibly carcinogenic to humans (Group 2B).” (p. 421) Children are particularly vulnerable to this carcinogenic effect as “the average exposure from use of the same mobile phone is higher by a factor of 2 in a child’s brain and higher by a factor of 10 in the bone marrow of the skull.” Also, the child’s brain is developing at a greater rate than the adult brain.

The human research reviewed by IARC examined people who used legally-acquired cell phones that passed regulatory standards. They were exposed to nonthermal doses of microwave radiation from their cell phones. Yet IARC concluded there is evidence, though somewhat limited still, that these exposures caused increased risk of glioma and acoustic neuroma. Thus, it is time for all nations to review their cell phone regulatory standards and testing procedures in order to protect their citizens from preventable risks. Also, it is critical that governments provide ample warnings to cell phone users how to use their phones safely.

This 471 page report is based on the consensus of a Working Group of 31 international experts who met in Lyon, France in May, 2011. Although a few studies published since this meeting were included in this monograph, other recent studies that further support the evidence for increased cancer risk due to exposure to cell phone radiation were not reviewed.

The monograph only examines research on cancer risk. Other research has found that cell phone radiation has additional harmful effects on humans, especially on sperm and the fetus.

To see what I consider the most important quotes from the monograph, go to my Electromagnetic Radiation Safety web site: <http://saferer.com> . A link to the full monograph is available there.

<http://www.prlog.org/12122198-who-monograph-on-cancer-risk-from-mobile-phone-use-released.html>

Most Significant Government Health Report on Mobile Phone Radiation Ever Published

Today, the World Health Organization's (WHO) new monograph on cancer risk from mobile phones and other sources of RF radiation is featured on the home page of the WHO's International Agency for Research on Cancer (IARC).

Joel M. Moskowitz, PRLog (Press Release), Apr 24, 2013

The new W.H.O. monograph explains why the W.H.O. classified mobile phone and other sources of radiofrequency radiation as "possibly carcinogenic" for humans. (1) These forms of electromagnetic radiation have been categorized as a Group 2B carcinogen along with lead, automobile exhaust and other toxic substances. (2)

According to the monograph:

- "Positive associations have been observed between exposure to radiofrequency radiation from wireless phones and glioma and acoustic neuroma" (p.421).
- "Radiofrequency electromagnetic fields are possibly carcinogenic to humans (Group 2B)." (p. 421)

Children are particularly vulnerable as "the average exposure from use of the same mobile phone is higher by a factor of 2 in a child's brain and higher by a factor of 10 in the bone marrow of the skull." Also, the child's brain is developing at a much greater rate than the adult's brain.

According to Dr. Joel Moskowitz, this monograph is likely the most significant governmental health report ever published about mobile phone radiation. All governments should study this report and follow the precautionary principle to take appropriate actions including educating the public about safe use, adopting stringent safety regulations, and funding research to develop safer technologies.

For a summary of the contents of this monograph, see the press release I prepared last Friday, <http://www.prlog.org/12122198>, along with supplementary materials, <http://saferemr.com>.

Also, see the coverage by Microwave News: <http://microwavenews.com/short-takes-archive/iarc-publishes-rf-cancer-review>.

The monograph appears today on the WHO/IARC home page (<http://www.iarc.fr>) today and is listed under IARC News: "24/04/2013 Volume 102: Non-Ionizing Radiation, Part 2: Radiofrequency Electromagnetic Fields."

The 400+ page monograph is available online at:

<http://monographs.iarc.fr/ENG/Monographs/vol102/index.php>

References

(1) Non-ionizing radiation, Part II: Radiofrequency electromagnetic fields / IARC Working Group on the Evaluation of Carcinogenic Risks to Humans (2011: Lyon, France). Vol. 102 (2013). URL: <http://monographs.iarc.fr/ENG/Monographs/vol102/index.php>.

(2) List of IARC Group 2b carcinogens. Wikipedia. URL: http://en.wikipedia.org/wiki/List_of_IARC_Group_2B_carcinogens

Brain Cancer Risk Increases with the Amount of Wireless Phone Use

New research indicates that brain cancer risk increases with more years of cell phone and cordless phone use and more hours of use.

Joel M. Moskowitz, PRLog (Press Release), Sep 15, 2013

Dr. Lennart Hardell and his colleagues in Sweden just published the third in a series of papers on the use of wireless phones, including cell phones and cordless phones, and the risk of malignant and non-malignant brain tumors. The latest paper describes a new case-control study that examines the association between mobile phone use and brain cancer risk. In these studies, the cases were diagnosed with brain tumors between 2007 and 2009. (1)

The study updates earlier research from case-control studies conducted by the Hardell group and extends the prior research by examining the effects of wireless phone use, i.e., cell phone and cordless phone use, on brain tumor risk for people who have used these phones for up to 25 or more years.

Overall, the research found that people who used wireless phones for more than a year were at 70% greater risk of brain cancer as compared to those who used wireless phones for a year or less. Those who used wireless phones for more than 25 years were at greatest risk—300% greater risk of brain cancer than those who used wireless phones for a year or less.

The total number of hours of wireless phone use was as important as the number of years of use. A fourth of the sample used wireless phones for 2,376 or more hours in their lifetime which corresponds to about 40 minutes a day over ten years. These heavier users had 250% greater risk of brain tumors as compared to those who never used wireless phones or used them for less than 39 hours in their lifetime.

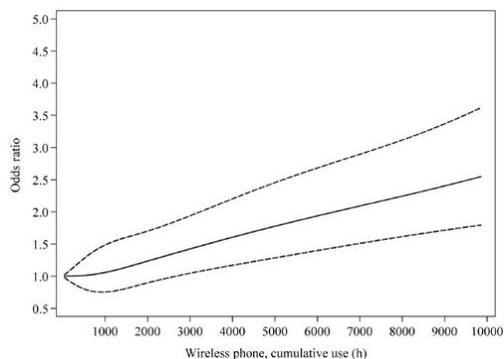
A similar analysis reported in the 13-nation Interphone study funded partly by the World Health Organization found a 182% greater risk of brain cancer among those who used cell phones for 1,640 or more hours in their lifetime.

In the current study, for all types of wireless phone use, brain cancer risk was found to be greater in the part of the brain where the exposure to wireless phone radiation was highest—in the temporal or overlapping lobes of the brain on the side of the head where people predominantly used their phones.

Given consistent results from multiple case-control studies that long-term use of mobile phones (i.e., ten or more years) is associated with brain cancer especially near where the phone is predominantly used, the International Agency for Research on Cancer should strengthen its 2011 assessment of radiofrequency energy from “possibly carcinogenic” to “probably carcinogenic” to humans.

More importantly, governments around the world should heed the results of these studies. The public must be educated about the need to take simple precautions whenever using wireless devices. Governments must strengthen regulatory standards for wireless radiation and must fund research independent of industry to develop safer technologies.

The paper was published online in the peer-reviewed journal, *International Journal of Oncology*. The abstract and a link to this paper appears below along with the abstracts for the Hardell group’s two prior papers from this study. All three papers are open access. (1-3)



References

(1) Lennart Hardell, Michael Carlberg, Fredrik Söderqvist, Kjell Hansson Mild. Case-control study of the association between malignant brain tumours diagnosed between 2007 and 2009 and mobile and cordless phone use. *International Journal of Oncology*. Published online September 24, 2013.

Abstract

Previous studies have shown a consistent association between long-term use of mobile and cordless phones and glioma and acoustic neuroma, but not for meningioma. When used these phones emit radiofrequency electromagnetic fields (RF-EMFs) and the brain is the main target organ for the handheld phone. The International Agency for Research on Cancer (IARC) classified in May, 2011 RF-EMF as a group 2B, i.e. a 'possible' human carcinogen. The aim of this study was to further explore the relationship between especially long-term (>10 years) use of wireless phones and the development of malignant brain tumours.

We conducted a new case-control study of brain tumour cases of both genders aged 18-75 years and diagnosed during 2007-2009. One population-based control matched on gender and age (within 5 years) was used to each case. Here, we report on malignant cases including all available controls. Exposures on e.g. use of mobile phones and cordless phones were assessed by a self-administered questionnaire. Unconditional logistic regression analysis was performed, adjusting for age, gender, year of diagnosis and socio-economic index using the whole control sample.

Of the cases with a malignant brain tumour, 87% (n=593) participated, and 85% (n=1,368) of controls in the whole study answered the questionnaire. The odds ratio (OR) for mobile phone use of the analogue type was 1.8, 95% confidence interval (CI)=1.04-3.3, increasing with >25 years of latency (time since first exposure) to an OR=3.3, 95% CI=1.6-6.9. Digital 2G mobile phone use rendered an OR=1.6, 95% CI=0.996-2.7, increasing with latency >15-20 years to an OR=2.1, 95% CI=1.2-3.6. The results for cordless phone use were OR=1.7, 95% CI=1.1-2.9, and, for latency of 15-20 years, the OR=2.1, 95% CI=1.2-3.8. Few participants had used a cordless phone for >20-25 years. Digital type of wireless phones (2G and 3G mobile phones, cordless phones) gave increased risk with latency >1-5 years, then a lower risk in the following latency groups, but again increasing risk with latency >15-20 years. Ipsilateral use resulted in a higher risk than contralateral mobile and cordless phone use. Higher ORs were calculated for tumours in the temporal and overlapping lobes. Using the meningioma cases in the same study as reference entity gave somewhat higher ORs indicating that the results were unlikely to be explained by recall or observational bias.

This study confirmed previous results of an association between mobile and cordless phone use and

malignant brain tumours. These findings provide support for the hypothesis that RF-EMFs play a role both in the initiation and promotion stages of carcinogenesis.

<http://www.spandidos-publications.com/10.3892/ijo.2013.2111>

(2) Lennart Hardell, Michael Carlberg, Fredrik Söderqvist, Kjell Hansson Mild. Pooled analysis of case-control studies on acoustic neuroma diagnosed 1997-2003 and 2007-2009 and use of mobile and cordless phones. *International Journal of Oncology*. 43(4):1036-1044. October 2013.

Abstract

We previously conducted a case-control study of acoustic neuroma. Subjects of both genders aged 20-80 years, diagnosed during 1997-2003 in parts of Sweden, were included, and the results were published. We have since made a further study for the time period 2007-2009 including both men and women aged 18-75 years selected from throughout the country. These new results for acoustic neuroma have not been published to date.

Similar methods were used for both study periods. In each, one population-based control, matched on gender and age (within five years), was identified from the Swedish Population Registry. Exposures were assessed by a self-administered questionnaire supplemented by a phone interview. Since the number of acoustic neuroma cases in the new study was low we now present pooled results from both study periods based on 316 participating cases and 3,530 controls. Unconditional logistic regression analysis was performed, adjusting for age, gender, year of diagnosis and socio-economic index (SEI).

Use of mobile phones of the analogue type gave odds ratio (OR) = 2.9, 95% confidence interval (CI) = 2.0-4.3, increasing with >20 years latency (time since first exposure) to OR = 7.7, 95% CI = 2.8-21. Digital 2G mobile phone use gave OR = 1.5, 95% CI = 1.1-2.1, increasing with latency >15 years to an OR = 1.8, 95% CI = 0.8-4.2. The results for cordless phone use were OR = 1.5, 95% CI = 1.1-2.1, and, for latency of >20 years, OR = 6.5, 95% CI = 1.7-26. Digital type wireless phones (2G and 3G mobile phones and cordless phones) gave OR = 1.5, 95% CI = 1.1-2.0 increasing to OR = 8.1, 95% CI = 2.0-32 with latency >20 years. For total wireless phone use, the highest risk was calculated for the longest latency time >20 years: OR = 4.4, 95% CI = 2.2-9.0. Several of the calculations in the long latency category were based on low numbers of exposed cases. Ipsilateral use resulted in a higher risk than contralateral for both mobile and cordless phones. OR increased per 100 h cumulative use and per year of latency for mobile phones and cordless phones, though the increase was not statistically significant for cordless phones. The percentage tumour volume increased per year of latency and per 100 h of cumulative use, statistically significant for analogue phones. This study confirmed previous results demonstrating an association between mobile and cordless phone use and acoustic neuroma.

<http://www.spandidos-publications.com/10.3892/ijo.2013.2025>

(3) Michael Carlberg, Fredrik Söderqvist, Kjell Hansson Mild, and Lennart Hardell. Meningioma patients diagnosed 2007–2009 and the association with use of mobile and cordless phones: a case–control study. *Environmental Health* 2013, 12:60. Published online Jul 19, 2013.

Abstract

Background To study the association between use of wireless phones and meningioma.

Methods We performed a case–control study on brain tumour cases of both genders aged 18–75 years and diagnosed during 2007–2009. One population-based control matched on gender and age was used to each case. Here we report on meningioma cases including all available controls. Exposures were assessed by a questionnaire. Unconditional logistic regression analysis was performed.

Results In total 709 meningioma cases and 1,368 control subjects answered the questionnaire. Mobile phone use in total produced odds ratio (OR) = 1.0, 95% confidence interval (CI) = 0.7-1.4 and cordless phone use gave OR = 1.1, 95% CI = 0.8-1.5. The risk increased statistically significant per 100 h of cumulative use and highest OR was found in the fourth quartile (>2,376 hours) of cumulative use for all studied phone types. There was no statistically significant increased risk for ipsilateral mobile or cordless phone use, for meningioma in the temporal lobe or per year of latency. Tumour volume was not related to latency or cumulative use in hours of wireless phones.

Conclusions No conclusive evidence of an association between use of mobile and cordless phones and meningioma was found. An indication of increased risk was seen in the group with highest cumulative use but was not supported by statistically significant increasing risk with latency. Results for even longer latency periods of wireless phone use than in this study are desirable.

<http://www.ehjournal.net/content/12/1/60>

<http://www.prlog.org/12216483-brain-cancer-risk-increases-with-the-amount-of-wireless-phone-use-study.html>

Cell Phone Use, Acoustic Neuroma and Cancer of the Pituitary Gland

Cell phone use was associated with increased risk of two types of brain tumors in a new study of 790,000 women.

Joel M. Moskowitz, PRLog (Press Release), May 10, 2013

Cell phone use was associated with increased risk of acoustic neuroma and cancer of the pituitary gland in a prospective study of more than 790,000 women in the United Kingdom. (1)

Acoustic neuroma is a rare, non-malignant tumor that develops on the main nerve leading from the inner ear to the brain. The pituitary gland is an organ that produces hormones which regulate important functions of the body and is located in the middle of the base of the brain.

Women who used cell phones for ten or more years were two-and-a-half times more likely to develop an acoustic neuroma. Their risk of acoustic neuroma increased with the number of years they used cell phones.

The results for acoustic neuroma re-affirm one of the two major conclusions by the World Health Organization (WHO) in its recent monograph about radiofrequency electromagnetic fields and form the basis for classification of cell phone radiation as "possibly carcinogenic" to humans:

"Positive associations have been observed between exposure to radiofrequency radiation from wireless phones and glioma, and acoustic neuroma." (p. 421) (2)

The risk of cancer of the pituitary gland more was more than twice as high among women who used a cell phone for less than five years as compared to never users. Although the risk was elevated for women who used a cell phone for ten or more years (about 60% greater than never users), this effect was not significant. Since this may be the first study to find an association between cell phone use and pituitary cancer, further research on this cancer is necessary.

The women reported their cell phone use in 2005 to 2009 and again in 2009 and were followed through 2011 to see whether they developed tumors. The analyses controlled for other factors associated with tumor risk.

The study had numerous weaknesses which may explain why the research failed to replicate the increased risk of glioma associated with cell phone use of ten or more years found in several previous studies. Although this was a prospective study, the assessment of cell phone use was poor. Cell phone use was measured only at two time points and in a crude manner. The authors considered anyone who used a cell phone at least a minute per week to be a cell phone user. Although the authors measured the amount of cell phone use per week at follow-up, they did not report these results. The study did not assess cordless phone use or other microwave radiation exposures that are similar to cell phone emissions. If the never-cell phone users were cordless phone users, the effect of cell phone use on brain tumor risk would have been underestimated.

Since brain tumors can take decades to develop, the study underestimates the long term risk due to cell phone use as the average follow-up period for cell phone users was only seven years. Few women (about 8%) in this study used cell phones for ten or more years. Moreover, the women in this study may have used their cell phones much less than women do today.

The study was published online in the International Journal of Epidemiology on May 8, 2013. The authors are affiliated with the University of Oxford and the World Health Organization's International Agency for Research on Cancer.

For more information about electromagnetic radiation safety, see <http://saferemr.com>

Also see: U.K. Cell Phone Study Points to Acoustic Neuroma, Not Brain Cancer, Risk
<http://microwavenews.com/short-takes-archive/uk-study-points-acoustic-neuroma-not-glioma-risk>

References

(1) Benson VS, Pirie K, Schüz J, Reeves GK, Beral V, Green J; for the Million Women Study Collaborators. Mobile phone use and risk of brain neoplasms and other cancers: prospective study. *Int J Epidemiol*. 2013 May 8. [Epub ahead of print]. <http://www.ncbi.nlm.nih.gov/pubmed/23657200>

(2) Non-ionizing radiation, Part II: Radiofrequency electromagnetic fields. IARC Working Group on the Evaluation of Carcinogenic Risks to Humans (2011: Lyon, France). Vol. 102. 2013.
<http://monographs.iarc.fr/ENG/Monographs/vol102/index.php>

U.K. Cell Phone Study Points to Acoustic Neuroma, Not Brain Cancer Risk Fourth Study To Show Tumor Link; Is This Really Prospective Epidemiology?

Microwave News, May 10, 2013, Updated May 12, 2013

A [new study from the U.K.](#) is adding support to the still controversial proposition that long-term use of a cell phone increases the risk of developing [acoustic neuroma](#), a tumor of the auditory nerve. No higher risk of glioma or meningioma, two types of brain cancer, was observed.

Women who used a mobile phone for more than ten years were two-and-half-times more likely to have an acoustic neuroma than those who never used a phone. The finding is based on a smaller number of cases than the brain tumor results but is statistically significant. The U.K. epidemiological study is the fourth to show an association between long-term use of a cell phone and acoustic neuroma.

"[W]e did find a trend of increasing risk of acoustic neuroma with increasing duration of mobile phone use," according to the team led by [Victoria Benson](#), [Jane Green](#) and [Valerie Beral](#) of the University of Oxford. IARC's [Joachim Schüz](#), an avowed tumor risk skeptic, is a coauthor. The trend of more tumors with more phone use is also statistically significant. The paper is being published by the *International Journal of Epidemiology*; a copy was posted on its Web site on May 8th.

Without explanation, the increase in acoustic neuroma is omitted in the study conclusion presented in the published abstract. Only the lack of an association with brain cancer is reported there.

But perhaps the most controversial aspect of the new study is that it is being touted as "prospective." Prospective studies are considered superior to retrospective studies — such as [Interphone](#)— because they do not rely on people's memories to estimate past exposures. The fear with retrospective studies is that subjects with tumors, eager to explain their condition, will overestimate their cell phone use and skew the results in favor an association. In a prospective study, subjects fill out regular questionnaires detailing phone use and other possible changes over the span of the study.

It is true that the women were recruited into the U.K. study population before they developed a tumor and would not have had any incentive to misreport their phone use. But, beyond that, nothing about monitoring their radiation exposure could be called prospective. The U.K. study offers scant improvement over past efforts.

Calling the new study prospective cuts two ways. On the one hand, it gives additional support to the finding of no brain cancer from cell phones, but, on the other hand, it lends greater credibility to the acoustic neuroma association. This might explain the absence of the observed acoustic neuroma risk in the conclusion.

Exposure Assessment: “Crude” and “Extremely Limited”

"The evidence presented is less than a slam dunk," said [Joe Bowman](#), an industrial hygienist with the [U.S. NIOSH](#), who worked on the [Interphone study](#). "The exposure assessment in the new study was pretty crude and no attempt was made to estimate radiation exposure," he told *Microwave News* from his office in Cincinnati. "While it is better than in past retrospective studies in some ways, it is worse in others," he added. "For example, in Interphone, a user's entire phone history was obtained."

Cell phone use in the U.K. study was based on the answers to only one or two questions posed at the time the women were recruited for the study. They were asked, "About how often do you use a mobile

phone?" and were given three options: "never," less than once a day" and "every day." Those who did use a cell phone were also asked "for how long?" At the end of the study in 2009, participants were asked two more questions about their cell phone use, but those answers were not used in the data analysis.

"The study has extremely limited exposure assessment," concurred [Joel Moskowitz](#), an epidemiologist at the University of California, Berkeley. In 2009, Moskowitz published a [meta-analysis](#) pointing to a tumor risk from cell phones. In an interview, Moskowitz pointed out that the U.K. team had not collected any information on the use of cordless phones. "This could have been an important source of RF exposure," he said.

The Oxford paper also reports a higher than expected incidence of [tumors of the pituitary gland](#), but this increase is not statistically reliable.

Both the [Interphone project](#) and [Lennart Hardell's group](#) in Sweden have previously linked long-term cell phone use with acoustic neuroma, as did a [Japanese team](#) in 2010. The new paper does not cite the Japanese study.

Last fall, the [Italian Supreme Court ruled](#) in favor of such an association.

Two years ago, an expert panel convened by IARC classified [RF radiation as a possible human carcinogen](#). In April, IARC published the [rationale for the decision](#).

<http://microwavenews.com/uk-study-points-acoustic-neuroma>

Studies Show Cell Phone Use Increases Brain Cancer Risk

A newly published review of the research on mobile phone radiation and brain tumor risk calls on governments " to protect public health from this widespread source of radiation."

Joel M. Moskowitz, PRLog (Press Release), Jan 3, 2013

Dr. Lennart Hardell and his research group just published a review paper in the journal, Pathophysiology, that examined the evidence for brain tumor risk associated with wireless phone use (1, 2). The researchers conducted a meta-analysis in which data from previous studies were subjected to a systematic, quantitative analysis.

The authors reported that ...

“There is a consistent pattern of increased risk for glioma and acoustic neuroma associated with use of wireless phones (mobile phones and cordless phones) mainly based on results from case-control studies from the Hardell group and Interphone Final Study results.” (1)

The meta-analysis found that the risk of glioma, a tumor which constitutes 80% of all malignant (i.e. cancerous) brain tumors, was 2.29 times greater on the side of the head where users held their phones among those who used mobile phones 1,640 or more hours in their lifetime (as compared to non-regular users). The corresponding risk for acoustic neuroma, a non-malignant tumor of the nerve that connects the ear to the brain, was similar—2.55 times greater. In contrast, the corresponding risk for meningioma, a tumor of the outer covering of the brain, was not significantly greater among regular cell phone users. (Over a ten year period, 1,640 hours would correspond to 27 minutes of cell phone use per day on average; however, many of those with brain tumors used their phones less than 10 years). (Over a ten year period, 1,640 hours would correspond to 27 minutes of cell phone use per day on average; however, many of those with brain tumors used their phones less than 10 years).

This review of the epidemiologic research is a follow up to a review sponsored by the International Agency for Research on Cancer (IARC) of the World Health Organization (WHO) in May 2011. After careful study of hundreds of scientific articles, thirty experts from fourteen countries classified cell phone radiation as “possibly carcinogenic to humans.” The “Group 2B” classification was based largely on the Interphone Study which was conducted by investigators in thirteen countries, and the work of the Hardell research team.

In their review paper, Hardell and his colleagues argued that ...

“a causal association between use of mobile phone and glioma and acoustic neuroma comes from the meta-analyses as presented in this publication and also reviewed elsewhere. Supportive evidence comes also from anatomical localisation of the tumour to the most exposed area of the brain, cumulative exposure and latency time that all add to the biological relevance of an increased risk. In addition risk calculation based on estimated absorbed dose gives strength to the findings as well as the impact on survival of glioma patients relating to their use of mobile and cordless phones.”

The Hardell paper also critically reviewed several flawed studies that have been published since the IARC review including the Danish cohort study and the CEFALO study.

The Hardell peer-reviewed paper noted that there are 5.9 billion cell phone subscriptions worldwide, and that “Many users are children and adolescents, which is of special concern regarding potential health effects.”

They cited the recent Italian Supreme Court ruling (3) and noted that based on the epidemiologic evidence ...

“... RF-EMF should be classified as a human carcinogen. “The current safety limits and reference levels are not adequate to protect public health. New public health standards and limits are needed.”

In the United States, the General Accountability Office issued a report this summer that called on the Federal Communications Commission to review our outmoded cell phone safety standards and testing procedures (4).

Also this summer, “The Cell Phone Right to Know Act” was introduced in the Congress. This bill calls for: (a) a review of cell phone safety standards by the Environmental Protection Agency, (b) adoption of a national research program to study cell phones and their effects on users’ health, and (c) publication of cell phone warning labels to alert users about the risks from cell phone radiation (5).

Cell phone radiation safety measures are long overdue. We called for similar measures in an op-ed in 2010 (6) following the publication of our 2009 research review (7).

A dozen nations have issued precautionary warnings about cell phones. It is time for the U.S. to act to protect the health of our population, especially children, adolescents, and pregnant women.

References

- (1) Hardell L, Carlberg M, Hansson Mild K. Use of mobile phones and cordless phones is associated with increased risk for glioma and acoustic neuroma. *Pathophysiology*. 2012 Dec 20. pii: S0928-4680(12)00110-1. doi: 10.1016/j.pathophys.2012.11.001. [Epub ahead of print]. URL: <http://www.ncbi.nlm.nih.gov/pubmed/23261330>.
- (2) Dr. Hardell (lennart.hardell@orebroll.se) is located in the Department of Oncology, University Hospital, Orebro, Sweden.
- (3) Italian Supreme Court Rules Cell Phones Can Cause Cancer. URL: <http://www.prlog.org/12004383>.
- (4) U.S. General Accountability Office (GAO). Exposure and Testing Requirements for Mobile Phones Should Be Reassessed. GAO-12-771. Washington, DC: General Accountability Office. URL: <http://www.gao.gov/products/GAO-12-771> (accessed January 3, 2013).
- (5) H.R. 6358 (112th): Cell Phone Right to Know Act. URL: <http://www.govtrack.us/congress/bills/112/hr6358>.
- (6) Moskowitz JM. Government must inform us of cell phone risk. *San Francisco Chronicle*. April 28, 2010. URL: <http://www.sfgate.com/opinion/openforum/article/Government-must-inform-us-of-cell-phone-risk-3190907.php>.

(7) Myung SK, Ju W, McDonnell DD, Lee YJ, Kazinets G, Cheng CT, Moskowitz JM. Mobile phone use and risk of tumors: a meta-analysis. *Journal of Clinical Oncology*. 2009. 27(33):5565-5572. URL: <http://www.ncbi.nlm.nih.gov/pubmed/19826127>.

<http://www.prlog.org/12052898-studies-show-cell-phone-use-increases-brain-cancer-risk.html>

Your Cell Phone Company May Affect Your Risk of Brain Cancer

Regardless of your carrier, always keep your cell phone away from your head and your reproductive organs. Children's cell phone use should be very limited.

Joel M. Moskowitz PRLog (Press Release), Mar 27, 2013

A new study found that the average amount of microwave radiation your head absorbs when you use your cell phone for voice communications is greater if your phone company employs GSM technology (i.e., AT&T or T-Mobile) than if it uses CDMA technology (i.e., Verizon or Sprint):

"... the dominant factor for SARs during use is the time-averaged antenna input power, which may be much less than the maximum power used in testing. This factor is largely defined by the communication system; e.g., **the GSM phone average output can be higher than CDMA by a factor of 100.**" (1)

The Telecom industry and consumer organizations ignore cell phone carrier differences and focus only on the Specific Absorption Rate or SAR of different cell phone models when they provide precautionary safety information to the public.

SAR is the maximum amount of energy absorbed in 1 gram of tissue in a simulated model of a large male adult's head in a laboratory setting. However, under normal use, your cell phone company may matter more in terms of your microwave radiation exposure than which cell phone you own.

The Federal government regulates cell phones based on the SAR. The maximum legal SAR, 1.6 watts per kilogram of tissue, established in 1996, protects users from overheating body tissue. However, it does not protect users from the subthermal, harmful effects observed in hundreds of laboratory studies. The government needs to establish a biologically-based safety standard for microwave radiation.

Although the Telecom industry has known for over a decade that GSM emits more microwave radiation under normal use than CDMA, the public has been kept in the dark. Perhaps, this is because such knowledge could have major ramifications for the industry should people decide to switch cell phone companies to reduce their microwave radiation exposure.

The new study was published online in the journal, ***Bioelectromagnetics***, by Sven Kuehn and four colleagues who are employed by several industry technical organizations. The U.S. Food and Drug Administration (FDA) provided technical oversight to this study which was funded by the CTIA—The Wireless Association.

(Side note: CTIA spokespersons have argued in legislative hearings in the U.S. that they do not fund research.)

Two years ago, I issued a news release based on the available research because I was concerned that people who use GSM cell phones may be at greater risk for brain cancer. Also, I wanted to encourage the Federal government to fund comparative health effects studies on the different carrier technologies. Although there was some media coverage of this story (2-4), no new research studies were funded.

Following are key points from my 2011 news release:

- Currently in the U.S., we can choose between two 2G technologies for voice communication: CDMA and GSM. CDMA phones (e.g., Verizon, Sprint) emit less radiation on average than GSM phones (e.g., AT&T, T-Mobile). A study conducted in the San Francisco Bay Area found that GSM phones emitted 28 times more radiation on average than CDMA phones (Kelsh et al, 2010). Cardis et al (2011) assumed that GSM phones emit 15 times more radiation on average than CDMA phones based on Canadian research.

In contrast, the highest SAR phones available in the U.S. have a maximum SAR that is about eight times greater than the lowest SAR phones. Hence, the cell phone carrier may matter more than the cell phone model in terms of average exposure to cell phone radiation.

- Perhaps, even more importantly, unlike CDMA, GSM is pulsed at extremely low frequencies (217 Hertz, 8 Hertz and 2 Hertz) which may increase its bioactivity. In 2001, the International Agency for Research on Cancer of the World Health Organization classified this extremely low frequency electromagnetic radiation (EMR) (3-3000 Hertz) as a possible carcinogen (Group 2B).

- In 2011, the IARC classified cell phone radiation as a possible carcinogen (Group 2B) based heavily on human studies of glioma risk. The exposures in these studies were largely due to analog and GSM technology and not CDMA technology.

Thus, we have two reasons to be concerned that GSM phones are more likely to be bioactive compared to CDMA: greater average power output and emission of extremely low frequency EMR.

- A review of toxicology study abstracts that examined 2G technology found that 43% (n=16) of 37 GSM studies reported bioactivity as compared to 15% (n=5) of 33 CDMA studies.

After the IARC 2011 meeting, news stories cited Robert Bann of IARC who stated that 3G technology emits 100 times less energy than 2G technology. He implied that 3G may be much safer than 2G. However, ...

- A review of toxicology study abstracts that examined 3G technology found that 30% (n=6) of 20 UMTS studies reported bioactivity as compared to 0% (n=0) of 9 W-CDMA studies. UMTS is the successor to GSM, and W-CDMA is the successor to CDMA. 3G does **not** appear to be safer than 2G. Again, the specific carrier technology seems to matter greatly.

- I did not find any studies that examined the health effects of 4G technology. Yet, the major cellular companies plan to move voice communications to 4G (i.e., LTE) in the near future despite the absence of health studies.

Although the evidence may still be circumstantial, some cell phone carrier systems appear to be safer than others. We need to provide precautionary health warnings to the public to promote harm reduction.

Finally, the government should fund a major research program to develop biologically-based safety standards and safer wireless technologies. A nickel a month cell phone fee could generate \$180 million per year in funding for research on wireless technologies.

References

(1) Sven Kuehn, Michael A. Kelsh, Niels Kuster, Asher R. Sheppard, Mona Shum. Analysis of mobile phone design features affecting radiofrequency power absorbed in a human head phantom. Bioelectromagnetics. Published online first, Mar 26, 2013.

<http://onlinelibrary.wiley.com/doi/10.1002/bem.21784/abst...>

(2) Electromagnetic Health Blog, Radiation risk to humans differs between GSM and CDMA cell phone technology, says UC Berkeley's Joel Moskowitz, PhD, Director of Family & Community Health. June 1, 2011. <http://electromagnetichealth.org/electromagnetic-health-b...>

(3) Natalie Wolchover. Radiation Risk: Are Some Cellphones More Dangerous Than Others? LiveScience, June 23, 2011. <http://www.livescience.com/14755-radiation-risk-cellphone...>

(4) Heather Knight. S.F. Puts Cell Phone Radiation Law on Hold. San Francisco Chronicle: May 6, 2011, page A - 1. <http://www.sfgate.com/bayarea/article/S-F-puts-cell-phone-radiation-law-on-hold-2372817.php>

<http://prlog.org/12106833>

Cellphones Can Increase Brain Cancer Risk in Children | "Scientists Challenge No Risk Conclusion"

This study provided evidence that children and adolescents have a substantial risk of brain cancer from cellphone use and that the time between first use and diagnosis of the cancer may be quite short.

Joel M. Moskowitz, PRLog (Press Release), Apr 5, 2012

Last July, the first study of the risk of brain cancer associated with cellphone use among children and adolescents was published in the Journal of the National Cancer Institute. The study (<http://jnci.oxfordjournals.org/content/early/2011/07/27/jnci.djr244.abstract>) concluded that,

“The absence of an exposure–response relationship either in terms of the amount of mobile phone use or by localization of the brain tumor argues against a causal association.”

Today, the Journal published Letters to the Editor (Correspondences) by highly respected scientists that refute this conclusion and makes it clear that the published findings, in contrast to the authors’ cryptic conclusion, indicates a serious risk of brain cancer associated with cellphone use.

These Letters to the Editor also pointed out multiple examples of contradictory data that implied that the peer review was inadequate

For example, using cellphone billing records (which do not rely on the children’s memory of their cellphone use) the study found a statistically significant 115% increased risk of brain cancer after more than 2.8 years since they first had a cellphone subscription. The study also reported a 99.9% of confidence that the more the cellphone was used, the higher the risk of brain cancer (indicating a dose-response relationship).

One example of these contradictory data was: the reported percentages of children with billing records would mean that there should be 123 children with brain cancer (cases), and 200 children without brain cancer (controls). Yet the table that reported the number of cases and controls listed 196 cases and 360 controls. It is surprising that peer reviewers would not have noted this contradiction.

When the study was published, Dr. Joel Moskowitz, from the School of Public Health at the University of California—Berkeley commented,

“In my opinion, the interpretation of the results from this study and the accompanying editorial were biased in an attempt to reduce concerns that cell phone use increases brain tumor risk among children and adolescents.”

The Cleveland Plain Dealer quoted Moskowitz,

“They did report a number of significant associations between cell phone use, in terms of number of years of use, with brain tumor risk in children, and they try to dismiss those, as well.”

Dr. Sam Milham in his Correspondence writes,

“If, as the authors ... conclude, mobile phone use is not associated with brain cancer in children ..., there should be as many odds ratios greater than 1 as the number of odds ratios less than 1.1 In table 2, all of the 13 calculated odds ratios are greater than 1.0. ...”and goes on to show

similarly skewed odds ratios in other tables.

Last December another highly respected group of researchers published a Commentary (<http://www.ehjournal.net/content/10/1/106>) in the journal Environmental Health. They stated,

“... in spite of low exposure, short latency period and limitations in study design, analyses and interpretation, there are nevertheless indications of increased risk in [the study].”

In sum, this study provided evidence that children and adolescents have a substantial risk of brain cancer from cellphone use and that the time between first use and diagnosis of the cancer may be quite short.

L. Lloyd Morgan, Environmental Health Trust
Devra Davis, Ph.D, MPH, Founder Environmental Health Trust
Ronald B. Herberman, MD, Environmental Health Trust & Intrexon Corp
Alasdair Philips, Founder Powerwatch UK

<http://www.prlog.org/11843017-cellphones-can-increase-brain-cancer-risk-in-children-scientists-challenge-no-risk-conclusion.html>

<http://electromagnetichealth.org/electromagnetic-health-blog/cell-phone-cancer-risk-children/>

Cell Phones and Cancer: Critics Say Kids Risk Brain Tumors

Carrie Gann, ABC News Medical Unit, *ABC Good Morning America*, Apr 5, 2012

Scientists are calling into question a study published last year that failed to find a link between cell phone use and brain tumors in children and teens. They say the study actually shows that cell phone use more than doubles the risk of brain tumors in children and adolescents.

The concerns come from the Environmental Health Trust, a group whose stated mission is to promote awareness of environmental issues they believe are linked to cancer.

In July 2011, the [Journal of the National Cancer Institute published](#) the first study on cellphone use and risk of brain tumors in children and adolescents, which was conducted by researchers at the Swiss Tropical and Public Health Institute. The scientists interviewed children and teens in Norway, Denmark, Switzerland and Sweden about their cell phone use and also collected cell phone records for a portion of them. Of the children studied, 350 had been diagnosed with brain cancer and 650 of them were healthy.

The July paper concluded that the data showed no link between cell phone use and brain tumors and "argues against a causal association" between the two.

In a letter published today in the journal, the Environmental Health Trust said the interpretation of the study's results was flawed and contained several statistical errors.

Lloyd Morgan, a senior research fellow at the Environmental Health Trust and one of the authors of the letter, called the study "sloppy" and said the data reported in the original study actually shows that children who used cell phones had a 115 percent increased risk of brain tumors over those who did not.

"There's every indication that this study actually found that children have a doubled risk of brain cancer," Morgan said. "For them to just state that we don't think there's a problem is, for me, quite mystifying."

Messages to the journal and the authors of the original study asking for comment were not returned.

The authors of the original study do note some limitations of their work, including that a relatively small number of children were studied. They also wrote that they could not "rule out the possibility that mobile phones confer a small increase in risk."

International concern over the potential health risks posed by cell phones has gone on for years. In May, the World Health Organization's International Agency for Research on Cancer put the devices in the same category as lead and engine exhaust, citing the possibility that long-term exposure to cell phone radiation could have long-term health effects. Roughly 30 studies so far have failed to draw a conclusive link.

In October, the Environmental Health Trust also [criticized the test](#) used by the Federal Communications Commission to measure cellphone radiation, saying the measure did not accurately reflect the radiation transmitted to children and adults while using cell phones.

Concerns over risks to children are particularly heightened, considering the rising use of cell phones among kids and teens and the fear that children's developing brains might be more susceptible to the effects of cellphone radiation.

However, only two studies so far have investigated the link between brain tumors and cell phone use specifically among young people -- one is the disputed study, and the other is a [research project](#) currently underway in 13 countries.

Joel Moskowitz, director of the Center for Family and Community Health at the University of California-Berkeley's School of Public Health, said current evidence showing a link between cell phone radiation and cancer risk is enough for him to say scientists should not dismiss concerns.

"You can't prove that it's cell phone radiation, but we certainly have a smoking gun," Moskowitz said.

Dr. Michael Thun, vice president emeritus of epidemiology and surveillance research for the American Cancer Society, said because cell phones are a fairly new phenomenon, no one really knows just what their health effects are yet, but he sees no evidence to support the concerns voiced by the Environmental Health Trust.

"The issue of whether cell phones do have adverse effects is an important one and needs further surveillance, but I don't find this particular letter to be very compelling," Thune said.

Experts agree that all cell phone users, regardless of age, can take steps to minimize any potential risks, such as keeping phones a moderate distance away from the head and body and using headsets or earpieces instead of placing the phone next to one's head.

Tips for Reducing Your Exposure to Cellphone Radiofrequency (RF) Radiation

Use a headset. RF waves are transmitted through the phone's antenna, so avoid placing the antenna against your head.

Use a landline phone when you can.

Minimize the length of your calls, or send an email or text.

Cell phones send out more RF waves when they are searching for a signal, so during those times, keep the device away from you or turn it off.

A little distance goes a long way. Doubling your distance from the phone cuts your risk by 75 percent.

Some manufacturers claim cell phone radiation shields can protect users from the effects of your cell phone's RF waves, but according to the FCC, the devices aren't proven to be effective. In fact, using these devices could increase your exposure to RF, because your phone has to work harder to overcome the physical barrier.

<http://gma.yahoo.com/cell-phones-cancer-critics-kids-risk-brain-tumors-212955668--abc-news-health.html>

A close call: Why the jury is still out on mobile phones

Is a rise in brain tumours linked to the radiation sources we hold so close to our heads? Experts can't agree on the answer

Nina Lakhani, *The Independent* (London), Apr 24, 2012

Allegations of lobbying, bad science, not enough science, conflicts of interest, political inertia, scaremongering and lawsuits: the debate surrounding the safety of mobile phones has it all. With more than 5 billion users worldwide, mobile phones have undoubtedly become central to modern life in just two decades, but could they be a health hazard?

Scientists at the Children with Cancer conference in London this week will advocate that governments adopt the 'precautionary principle' – advising phone users to take simple steps to protect themselves and their children from potential, not proven, long term health risks of electromagnetic fields - especially head cancers.

They will call for urgent research into new Office of National Statistics figures that suggest a 50 per cent increase in frontal and temporal lobe tumours – the areas of the brain most susceptible to the electromagnetic radiation emitted by mobile phones – between 1999 and 2009.

Caroline Lucas, MP for Brighton Pavilion and Green Party leader, will next week table an Early Day Motion calling for mandatory safety information at the point of sale, and for widely publicized advice, for young people in particular, to text, use headsets or corded landlines for long calls.

But the Health Protection Agency's new report on the "potential health effects" on mobile phone technologies on Thursday is likely to conclude that there is only one established risk, and that is crashing the car if people talk and drive.

The scientists cannot agree, so what should the public be told?

The Department of Health currently has a confusing online-only leaflet which states that there is no immediate concern but under-16s should be encouraged to minimise phone use and if concerned about risks, choose hands free kits or texting.

In stark contrast France has banned phones from primary schools and advertising targeted at children, and companies must provide headsets with every phone.

Israel recently became the latest of a very small, but growing number of governments to introduce legislation requiring all mobile phones and adverts to come with a health alert: "Warning – the Health Ministry cautions that heavy use and carrying the device next to the body may increase the risk of cancer, especially among children."

The law, which last month passed its first reading, also seeks to ban, like with tobacco, companies from marketing to children.

An attempt by San Francisco's lawmakers to require similar health warnings is being vigorously fought by the industry on the grounds it would violate the companies' first amendment rights.

Professor Darius Leszczynski, from the Radiation and Nuclear Safety Authority in Finland, has warned about possible health hazards of mobile phones for more than a decade. He was one of 30 experts at the International Agency for Research on Cancer [IRAC], the global authority on cancer risks, who last year concluded mobile phones radiation is “possibly carcinogenic”. (Other scientists disagree entirely.)

Leszczynski will tell conference delegates that there is enough laboratory evidence to support an even stronger classification of ‘probably carcinogenic’. He said: “Since 2001 I have continuously spoken about the need for precautionary measures, especially for children. We have had enough evidence to call for that for a long time.”

Dr Annie Sasco from the Epidemiology for Cancer Prevention unit at Bordeaux Segalen University is at the conference discussing the 1 to 2 per cent annual increase in childhood brain cancers.

“It’s not age, it’s too fast to be genetic, and it isn’t all down to lifestyle, so what in the environment can it be? We now live in an electro-smog and people are exposed to wireless devices that we have shown in the lab to have a biological impact. It makes sense that kids are more sensitive – they have smaller heads and thinner skulls, so EMFs get into deeper, more important structures.

“It is totally unethical that experimental studies are not being done very fast, in big numbers, by independently funded scientists. The industry is just doing their job, I am more preoccupied with the so called independent scientists and institutions saying there is no problem.”

The rate of frontal and temporal brain tumours has risen from two to three per 100,000 people in a decade. Denis Henshaw, Emeritus Professor of Human Radiation Effects at the University of Bristol, said: “The public have a right to know this information. We cannot and do not say there is a causal link between brain cancer and mobile phones, but we are right to consider them as one possible explanation for the increase and the public have the right to expect that this is properly investigated.”

He added: “Even if the risk is still only one in a million, with 5 billion phone users, it means a lot of extra brain cancers.”

The UK’s Mobile Operators Association says that most health agencies agree that there is “no credible evidence of adverse health effects from mobile phone technology.”

Yet buried in the small print, companies issue precautionary advice.

For example, BlackBerry’s booklet states: “use hands-free operation if available and keep the BlackBerry device at least 0.98in (25mm) from your body (including the abdomen of pregnant women and the lower abdomen of teenagers) when the BlackBerry is turned on and connected to the wireless network... reduce the amount of time spent on calls.”

The iPhone4 guide says: “...when using the iPhone near your body for voice calls or wireless data transmission over a cellular network, keep it at least 5/8inch (15mm) away from the body, and only use carrying cases, belt clips or holders that do not have metal parts and that maintain at least 5/8inch (15mm) separation between iPhone and the body.”

And in 2009 the European Parliament said it was “... greatly concerned that insurance companies are tending to exclude coverage for the risks associated with EMFs from the scope of liability insurance policies, the implication clearly being that European insurers are already enforcing their version of the precautionary principle.”

The research is split almost 50:50, on whether mobile phones pose a health hazard or not. But the balance changes if funding sources are considered, with around three quarters of the 'negative' studies - no health risks - funded by industry, according to analysis by Joel Moskowitz, director of the Center for Family and Community Health at the University of California, Berkeley.

Anthony Swerdlow, professor of epidemiology at the Institute of Cancer Research and chair of the HPA's Advisory Group on Ionizing Radiation – behind next week's report, said: "Individual results from particular studies have shown there is a link but in order to believe there is an established effect, it needs to be shown consistently across the literature.

"There are no established ill-effects from cell phones other than the genuine and serious hazard of driving while talking due to poor concentration. I don't think any causes of cancer have been established. If there are very long term effects we don't know it yet. Long term effects from childhood use are also largely unknown, but we don't have reason to believe there are ill-effects."

Most current studies are at least part funded by industry, or involve researchers with industry links.

Moskowitz said: "The mantra that 'we need more research' is true, but there is already enough evidence to warrant better safety information, tighter regulation, mass public education and independently funded research carried out by teams of specialists who are not beholden to industry.

"This is the largest technological experiment in the history of our species and we're trying to bury our head in sand about the potential risks to cells, organs, reproduction, the immune system, behaviour, risks we still know next to nothing about.

Campaigners had hoped that IRAC's "possibly carcinogenic" classification in 2011 would trigger public health warnings.

Instead, most governments emphasised the need for more research, largely without committing any funds, even though simple steps like texting, using hands free devices, better phone design and not carrying phones next to the body, significantly reduce exposure to EM radiation.

Campaigners claim that the mute response can partly be blamed on industry successfully spinning the message as good news, a claim which the Mobile Operator's Association vehemently denies.

In December 2010, MP Tom Watson said in parliament: "It is my view that the more an industry or organisation wishes to hide something unpleasant or do something unpopular, the more lobbyists it employs to talk to MPs. The \$1 trillion telecoms industry hires a lot of lobbyists."

Industry has been accused of trying to discredit and marginalise scientists who produce 'unfavourable' results for almost 20 years.

In 1995, Professor Henry Lai, a bioengineering researcher at the University of Washington, accidentally discovered that exposing rats to microwave radiation, the same type emitted by phones, damaged the DNA in their brain cells. He has publicly described industry efforts to discredit his work and stop him working in the field as "scary".

A decade later the EU funded Reflex study found that EMF radiation had the potential to cause genetic damage in human cells, at much lower levels than considered safe by regulators.

High-profile efforts to discredit the study by one scientist alleging scientific fraud followed, and despite being dismissed by an ethics committee, the smear campaign stuck, according to Professor Franz Adlkofer, coordinator of Reflex.

Adlkofer said: "The poor state of knowledge is due to selective funding of research through governments and telecommunication industry combined with the willingness of hired scientists to adjust their findings to the needs of the awarding authorities, while the governmental blindness is the result of lobbyism in the antechambers of political power. National governments and international industries have in common that they only trust the false messages of scientists they co-operate with, and not the contradicting data of researchers like me."

Despite the controversies and disagreements, the European Environment Agency suggests governments learn from previous public health failures such as tobacco and asbestos where better regulation came decades after the first medical warnings about lung cancer.

John Cooke, Executive Director Mobile Operators Association, disagrees: "There is no evidence to suggest that warning labels for mobiles are warranted. In fact, there is good evidence that the proliferation of warnings about risk, where there is no good evidence for such risk, is counter-productive and is bad for public health. Industry funds research. It's morally the right thing to do and governments ask us to do it... industry does not set or control the research agenda. Alleging undue influence and conspiracy theories impugns the integrity of scientists, and is the last refuge of the desperate who have lost the argument based on the facts."

Vicky Fobel from campaign group MobileWise said: "This latency problem is what caused so many unnecessary deaths from smoking and asbestos. We need to learn from those mistakes and take steps now before it's too late. That more research is needed shouldn't be an excuse for inaction."

A DH spokeswoman said: "As a precaution children should only use mobile phones for essential purposes and keep all calls short. We keep all scientific evidence under review."

Facts

5 billion Number of mobile phones in use around the world

50% The 10-year rise in tumours located in areas of the brain most vulnerable to mobile phone radiation

25mm Distance that BlackBerry recommends keeping its phones away from the body

16 The age under which people are advised by the NHS to keep mobile use to a minimum

Always read the small print: Official advice

Research is split on whether mobile phones pose a health hazard or not. Buried in the small print, companies already issue precautionary advice.

BlackBerry

BlackBerry's booklet states: "Use hands-free operation if available and keep the BlackBerry device at least 0.98in (25mm) from your body (including the abdomen of pregnant women and the lower abdomen

of teenagers) when the BlackBerry is turned on and connected to the wireless network... reduce the amount of time spent on calls."

iPhone

The iPhone4 guide says: "...when using the iPhone near your body for voice calls or wireless data transmission over a cellular network, keep it at least 5/8inch (15mm) away from the body, and only use carrying cases, belt clips or holders that do not have metal parts and that maintain at least 5/8inch (15mm) separation between iPhone and the body."

UK Department of Health

A spokeswoman says: "As a precaution children should only use mobile phones for essential purposes and keep all calls short. We keep all scientific evidence under review."

<http://www.independent.co.uk/life-style/gadgets-and-tech/news/a-close-call-why-the-jury-is-still-out-on-mobile-phones-7670543.html>

'The biggest experiment of our species': With five billion mobile users in the world, conference calls for research into potential brain cancer risk

- Scientists at London conference call for independent research into potential links between using a mobile phone and brain cancer
- Figures from ONS show 50 per cent increase in brain tumours since 1999
- Studies 'are split 50/50' in conclusions, leaving the issue open for debate
- But believers fear fall-out from the 'biggest technological experiment in the history of our species'

Eddie Wrenn, *Daily Mail* (London), Apr 24, 2012

A scientific conference starting in London today will urge governments across the world to support independent research into the possibility that using mobile phones encourages the growth of head cancers.

The Children with Cancer conference will highlight figures just published by the Office of National Statistics, which show a 50 per cent increase in frontal and temporal lobe tumours between 1999 and 2009.

The ONS figures show that the incident rate has risen from two to three per 100,000 people since 1999, while figures from Bordeaux Segalen University show a one to two per cent annual increase in brain cancers in children.

Scientists and academics have long argued over the suggestion that radiation from mobile phones causes cancers. Those who believe there is a link say that - with five billion mobile phones being used worldwide - urgent research must be carried out to establish the risk.

But not everyone agrees. While governments, phone companies, and health agencies give precautionary advice about minimising mobile phone use, the Health Protection Agency is likely to conclude in a report due on Thursday that the only established risk when using a mobile is crashing a car due to being distracted by a call or text.

Professor Denis Henshaw, emeritus professor of human radiation effects at Bristol University, is opening the three-day conference in Westminster today.

He has previously advocated cigarette-style warnings on mobile phone packets and urges more independent research.

Professor Henshaw said: 'Vast numbers of people are using mobile phones and they could be a time bomb of health problems - not just brain tumours, but also fertility, which would be a serious public health issue.'

'The health effects of smoking alcohol and air pollution are well known and well talked about, and it's entirely reasonable we should be openly discussing the evidence for this, but it is not happening.'

'We want to close the door before the horse has bolted.'

The International Agency for Research on Cancer (IARC) rang alarm bells last year when it classified mobile phones as 'possibly carcinogenic'.

Professor Darius Leszczynski, of the Radiation and Nuclear Safety Authority in Finland, said: 'For the first time a very prominent evaluation report states it so openly and clearly: RF-EMF [radio frequency electromagnetic field] is possibly carcinogenic to humans.'

'One has to remember that IARC monographs are considered as "gold standard" in evaluation of carcinogenicity of physical and chemical agents.'

'If IARC says it so clearly then there must be sufficient scientific reason for it, or IARC would not put its reputation behind such claim.'

However not everyone believes there is a significant risk from mobile phone radiation.

Ken Foster, professor of bio-engineering at the University of Philadelphia, downplayed the IARC's classification.

He is quoted on [Science Based Medicine](#) as saying: 'Saying that something is a "possible carcinogen" is a bit like saying that someone is a "possible shoplifter" because he was in the store when the watch was stolen.'

'The real question is what is the evidence that cell phones actually cause cancer, and the answer is - none that would persuade a health agency.'

The Independent said the research is split almost 50:50 on whether mobile phones pose a health hazard or not, but pointed out research from Joel Moskowitz, director of the Center for Family and Community Health at the University of California, who said that the balance changes if funding sources are considered, with around three quarters of studies implying no health risks being funded by the mobile phone industry.

He told the paper: 'The mantra that "we need more research" is true, but there is already enough evidence to warrant better safety information, tighter regulation, mass public education and independently funded research carried out by teams of specialists who are not beholden to industry.'

'This is the largest technological experiment in the history of our species and we're trying to bury our head in sand about the potential risks to cells, organs, reproduction, the immune system, behaviour, risks we still know next to nothing about.'

Governments and mobile phone companies often play down the risks and the UK's Mobile Operators Association says there is 'no credible evidence of adverse health effects'.

The Department of Health says: 'As a precaution children should only use mobile phones for essential purposes and keep all calls short. We keep all scientific evidence under review.'

The NHS also advises children under 16 to minimise their use of mobile phones.

The iPhone, Apple's smartphone which popularised mobile computing, comes with the advice that you should keep your phone at least 15mm away from your body at all times - which may come as a surprise to those who keep the phone in their pockets at all times.

The guide that comes with the phone warns: 'When using the iPhone near your body for voice calls or wireless data transmissions over a cellular network, keep it at least 15mm away from the body, and only use carrying cases, belt clips or holders that do not have metal parts and that maintain at least 15mm separation between iPhone and the body.'

Other guides, such as the one that comes with a BlackBerry, have similar warnings. The BlackBerry guide suggests that users, particularly pregnant women and teenagers, keep their phone 25mm from their body.

The guide, almost ironically, also suggest that users 'reduce the amount of time spent on calls'.

Professor Leszczynski will use the conference to urge for a stronger IARC classification - 'probably carcinogenic'.

He told the Independent: 'Since 2001 I have continuously spoken about the need for precautionary measures, especially for children. We have had enough evidence to call for that for a long time.'

The conference will also discuss other reasons for childhood cancer, such as chemical toxins in the air, food and water, and infection and genetic effects.

But the main message coming from the Children with Cancer conference is: more independent research is needed.

Professor Denis Henshaw told the Independent: 'The public have a right to know this information.'

'We cannot and do not say there is a causal link between brain cancer and mobile phones, but we are right to consider them as one possible explanation for the increase and the public have the right to expect that this is properly investigated.'

'Even if the risk is still only one in a million, with 5 billion phone users, it means a lot of extra brain cancers.'

The conference can be streamed online at www.childhoodcancer2012.org.uk

CANCER IN CHILDREN ON THE RISE

Speaker Dr Annie Sasco, from the Epidemiology for Cancer Prevention unit at Bordeaux Segalen University, will highlight the one to two per cent annual increase in brain cancers in children.

She has concerns over the effect of radiation on children's brains.

She said: 'If the penetration of the electromagnetic waves goes for four centimetres into the brain, four centimetres into the adult brain is just the temporal lobe.'

'There are not too many important functions in the temporal lobe - but in a child the more central brain structures are going to be exposed.'

'In addition kids have a skull which is thinner, less protective, they have a higher content of water in the brain, so there are many reasons that they absorb more of the same radiation.'

Speaking to the Independent about the rise in brain cancer in children, she said: 'It's not age, it's too fast to be genetic, and it isn't all down to lifestyle, so what in the environment can it be?'

'We now live in an electro-smog and people are exposed to wireless devices that we have shown in the lab to have a biological impact.'

'It is totally unethical that experimental studies are not being done very fast, in big numbers, by independently funded scientists.'

'The industry is just doing their job, I am more preoccupied with the so called independent scientists and institutions saying there is no problem.'

--

WHAT IS THE RISK? STUDY OF 350,000 PEOPLE FAILS TO FIND CANCER LINK

A study held in Denmark last October compared medical records against phone records of around 358,000 people.

They correlated the data to see how long people owned their phones, and how many of these people developed brain cancer. Some users had owned mobile phones for more than 20 years.

In total, the group had owned their phones for '3.8 million years', and suffered 10,729 cases of tumours.

When compared to the average population, they found no indication of 'dose-response' relation either by years since first subscription for a mobile phone or by anatomical location of the tumour - that is, in regions of the brain closest to where the handset is usually held to the head.

They concluded 'there were no increased risks of tumours of the central nervous system, providing little evidence for a causal association'.

<http://www.dailymail.co.uk/news/article-2134382/Risks-biggest-technological-experiment-history-species-Calls-research-links-using-mobile-phones-brain-cancer.html>

Radiation from mobile phones: Tumour rumours return

TelecomTV One, Apr 25, 2012

Over past years reports upon reports have been published claiming to prove either that radiation from mobile handsets does cause brain cancers or that it doesn't. Basically you read the research, meld it with your personal prejudices pro or con the arguments and take a stance accordingly. For, in the house of mobile technology there are many mansions peopled by apologists for one side or the other, as Martyn Warwick reports.

Yesterday, London saw the launch of the three-day "Children With Cancer" conference whereat scientists and medics are calling for yet more "completely objective and independent" research to be carried out into this emotive subject. That's apparently because all the studies undertaken to date " are split 50:50" in concluding that mobiles do/do not cause cancers.

The conference is being held shortly after new figures from Britain's Office of National Statistics(ONS) show that in the UK there was a big increase in the incidence of frontal and temporal lobe brain tumours between 1999 and 2009, with many delegates believing the mass uptake of mobiles over that decade is hardly co-incidental to the rise in cancer cases.

The new UK figures indicate that the rate of incidence of brain tumours associated (in some people's belief and in some research results) with the use of cellphones rose from two in 100,000 in 1999 to three in 100,000 in 2009 - that's a 50 per cent increase and as such is statistically highly significant.

Meanwhile, in France, independent research carried out at Segalen University in Bordeaux also shows that the incidence of brain cancers in children under the age of 15 has risen by between one and two per cent annually over the past decade and this too, it is claimed, is linked to the use of mobile phones.

Dr Annie Sasco from Segalen University says of the increased incidence of brain cancers, "It's not age, it's too fast to be genetic, and it isn't all down to lifestyle, so what in the environment can it be? We now live in an electro-smog and people are exposed to wireless devices that we have shown in the lab to have a biological impact. It makes sense that kids are more sensitive – they have smaller heads and thinner skulls, so EMFs get into deeper, more important structures."

The Children with Cancer Conference says national governments should apply the "precautionary principle" with regard to mobiles and provide their citizens with "sensible" advice about the possible health risks associated with the prolonged and continual use of cellphones.

Some sort of coherent approach to the issue is needed because things are all over the place at the moment. For example, in the UK, an online posting by the Department of Health says there is no health risk allied to the use of mobiles, but also advises that children under the age of 16 shouldn't be allowed to spend too long on their phones and adds that if parents are worried about cancer scares, their offspring should be "encouraged" to go "hands-free" and use headsets!

Meanwhile, across the Channel in France, mobile are totally banned from primary schools, TV and other advertising of mobile phones, apps and services aimed at children is illegal and vendors must provide a headset with each and every handset sold.

Elsewhere, several countries (Israel being the latest) have passed laws requiring all mobile phone

advertising and all handsets and devices to carry a "health alert" not dissimilar to the cancer warnings printed on cigarette packets.

The Israeli alert says, "Warning – the Health Ministry cautions that heavy use and carrying the device next to the body may increase the risk of cancer, especially among children."

Some scientists and cancer specialists are concerned because about 75 per cent of research projects that have concluded that radiation emanating from mobile comms devices is not detrimental to human health have been, at least in part, funded by vested interests within the industry itself or have had industry insiders on the research teams. Many of these reports end by saying that yet more research is needed before an informed judgement can be made - and on ad infinitum

Dr. Joel Moskowitz, the Director of the Centre for Family and Community Health, which is part of the School of Public Health at the University of California, says, "The mantra that 'we need more research' is true, but there is already enough evidence to warrant better safety information, tighter regulation, mass public education and independently funded research carried out by teams of specialists who are not beholden to industry".

Meanwhile, Denis Henshaw, Emeritus Professor of Human Radiation Effects at the University of Bristol, says "We cannot and do not say there is a causal link between brain cancer and mobile phones, but we are right to consider them as one possible explanation for the increase and the public have the right to expect that this is properly investigated. Even if the risk is still only one in a million, with 5 billion phone users, it means a lot of extra brain cancers."

It is also interesting to speculate just why, if there absolutely is no connection of any sort between mobile radiation and tumours, the likes of Apple and RIM go to the bother of providing some advice (albeit in the small print of their user handbooks and documents) about, literally, maintaining a distance between oneself and an iPhone or Blackberry.

For example, the iPhone 4 guide advises "when using the iPhone near your body for voice calls or wireless data transmission over a cellular network, keep it at least 5/8inch (15mm) away from the body, and only use carrying cases, belt clips or holders that do not have metal parts and that maintain at least 5/8inch (15mm) separation between iPhone and the body."

Meanwhile, RIM says BlackBerry owners should "use hands-free operation if available and keep the BlackBerry device at least 0.98in (25mm) from your body (including the abdomen of pregnant women and the lower abdomen of teenagers) when the BlackBerry is turned on and connected to the wireless network."

Dr. Moskowitz comments, "This [mobile telephony] is the largest technological experiment in the history of our species and we're trying to bury our head in sand about the potential risks to cells, organs, reproduction, the immune system, behaviour - risks we still know next to nothing about."

Critics say that mobile industry bodies and associations around the world devote much time and many resources to putting a positive spin on those pieces of research claiming that there is no evidence that radiation from mobile devices can cause illness while either ignoring, ridiculing, discrediting and traducing the results of research that does indicate a correlation between mobile radiation and tumours.

Speaking in the UK's House Of Commons in December 2010, the MP Tom Watson, (who is now rather famous for being a major thorn in the side of News Corp and the Murdoch media empire), commented, "It is my view that the more an industry or organisation wishes to hide something unpleasant or do

something unpopular, the more lobbyists it employs to talk to MPs. The US\$1 trillion telecoms industry hires a lot of lobbyists.” That observation holds true to this day.

http://www.telecomtv.com/comspace_newsDetail.aspx?n=48650&id=e9381817-0593-417a-8639-c4c53e2a2a10

The Million Women Study ... shoddy design ... shoddy results ... shoddy conclusions

Dariusz Leszczynski, *Washington Times Communities*, Oct 3, 2013

HELSINKI, Finland, October 3, 2013 —The only two epidemiological cohort studies in existence examining the link between cell phone radiation exposures and brain cancer have embarrassingly poor design.

The two cohorts were established in Denmark and in UK. The original purpose was not to study cell phone radiation effects but other health problems. At some point in designing cohorts, scientists decided to ask questions about cell phone use and, as an aside, to examine brain cancer risk.

The problem is that the questions concerning cell phone use were not well thought out. It seems that epidemiologists did not care at all about details of exposure to cell phone radiation. They just wanted to know it - "roughly".

In the first cohort, called 'Danish Cohort', the information on exposure of persons to cell phone radiation is completely useless for the purpose of determining whether causality exists between radiation exposure and cancer (for details see letters to the British Medical Journal and The Scientist Magazine story).

In the spring of 2013, the results from the second cohort were published and called The Million Women Study. As seen from the description of the study, its primary goal was to examine the effects of hormone replacement therapy in women over 50 years of age.

This, by design, indicates that the results of this study apply only to a certain sex (females) and age (over 50) group and can not be freely extrapolated to the cell phone users as a whole. Furthermore, period of the exposure to cell phone radiation examined in The Million Women Study is far too short to be relevant when examining causality link between cell phone radiation and cancer.

The information about cell phone radiation exposures obtained for the study was as follows (quote from the study): "Women in the study have been asked twice about mobile phone use. In a survey conducted between 1999 and 2005 (to which about 65% of women recruited in 1996–2001 replied [sic!]), women were asked: 'About how often do you use a mobile phone?', and given three options to respond: 'never', 'less than once a day', 'every day'; and 'For how long have you used one?' (participants were asked to provide total years of use)."

The authors did not obtain information about cell phone usage per day or week. Cell phone users talking on the phone for few minutes or for few hours per week were analyzed together. When considering the latency of brain cancer, the follow-up period was far too short to provide relevant and reliable information. This extremely limited information about the exposures to cell phone radiation is absolutely inadequate to determine whether exposures have, or have not, causal link with cancer.

The inadequacy of the collected the information on the exposure is very disturbing. It is like scientists evaluating the health risk in smokers and not asking how many cigarettes per day someone smokes.

The Million Women Study has shoddy exposure design leading to shoddy results and ending with shoddy conclusions.

The Million Women Study is, similarly with the Danish Cohort, yet another example of the complete failure of epidemiologists to design scientifically relevant study on cell phone radiation and brain cancer.

It is embarrassing to hear that some scientists consider the “epidemiological failure”, called The Million Women Study, as a “well designed” research.

Forbes’ Magazine blogger, Geoffrey Kabat of the Albert Einstein College of Medicine in New York City, in his recent post says about The Million Women Study: “The strengths of this design are two-fold. First, it follows the actual temporal sequence, with exposure preceding disease. Second, since information on exposure is obtained before the onset of illness, this information cannot be biased (distorted) by the presence of illness.”

Indeed, these could be the strengths of the study if the information on exposures was relevant.

Mr. Kabat writes also that: “Because of its large size and prospective design, the Million Women Study results represent an important contribution.”

Big is not always beautiful, especially when one side of the examined equation, the radiation exposure data, are shoddy.

I asked also opinions from the few prominent scientists about The Million Women Study. Here are their opinions, directly as provided via e-mails:

Michael Repacholi, retired Head of the WHO EMF Project, agrees with Geoffrey Kabat that the Million Women Study is a valuable proof of no cancer risk:

“This is a very large, well-conducted cohort study showing no increased incidence of glioma or meningioma with mobile phone use of 10 or more years. However, the study reported a trend of increasing risk of acoustic neuroma. When the results were combined with the Danish cohort study, that had a much larger number of these tumours, no statistical increase was found with mobile phone use of 10 or more years. Aside from the obvious difficulties in accurately assessing people’s exposure to mobile phones, the evidence from well-conducted epidemiological and animal studies is now establishing that mobile phone use does not cause or increase the incidence of head or neck cancers.”

The above opinion of Michael Repacholi should be also viewed in the context of his recent criticism of epidemiology. His opinion was that epidemiology is unable to provide reliable information on causality link between cell phone radiation and brain cancer. As Mr. Repacholi said in his Guest Blog on BRHP: “my concern is that there is an over-reliance on epidemiology studies.”

However, epidemiologists were cautious and did not consider the evidence provided by The Million Women Study to be as great as Kabat and Repacholi thought.

Michael Kundi of the Medical University of Vienna, Austria, considers it a very good idea to use the existing large cohorts to study cell phone radiation and cancer issue. However, he points out that the authors of the Million Women Study did not do a good job:

“It is definitely worthwhile to try and use a large cohort of people that are available for investigations like the cohort of the Million Women Study. This cohort has been used for many important health issues and will continue to be used for a variety of research questions. Having said this, I regret to say that the authors have not put much thought into the issue of mobile phone use and brain tumors. It is almost impossible to study induction of brain tumors because of the short observation period. That is, most if not all of the tumors diagnosed during the follow-up must have already existed at the time of commencing use of a mobile. This leaves us with studying effects on tumor growth rate and/or progression. In the case of glioma the peculiarities of the relationship of incidences with age have to be considered. In this

cohort there are only women and they are in a narrow age range of about 60 years. The consequence of this fact is that if mobile phone use leads to an increased growth rate of the tumor and therefore an earlier diagnosis the risk estimate must be low or even less than one (because at older age the incidence is declining). The situation for acoustic neuroma is different because the age-incidence function differs from that of glioma.”

Bruce Armstrong of the Sydney University, Australia, considers that The Million Women Study is insufficient to think of down-grading the IARC classification of cell phone radiation from the current possible carcinogen category to lower one:

“A total of 1,261 primary intracranial neoplasms were diagnosed during follow-up, which is sufficient to make a potentially worthwhile contribution to literature on mobile phone use and brain tumours. Some 50,000 invasive neoplasms at other sites were also diagnosed, which can also contribute to knowledge about the relationship between other cancers and mobile phone use. Of the intracranial tumours investigated (glioma, meningioma, pituitary tumours and acoustic neuroma) only risk of acoustic neuroma was increased in women who were longer term users of a mobile phone. This result is coherent with results from the most recent case-control studies of mobile phone use and acoustic neuroma but not with the absence of increase in risk of acoustic neuroma reported from the Danish cohort study of mobile phone subscribers. While this study adds to the evidence on the relationship between mobile phone use and intracranial tumours, it does not add sufficiently, in my opinion, to shift in either direction the IARC’s conclusion that there is limited evidence in humans for carcinogenicity of radiofrequency radiation.”

Joel Moskowitz of the University of California at Berkeley has also serious doubts about the design and quality of the outcome of The Million Women Study:

“With regard to investigating the association between cell phone use and subsequent tumor risk (which was not the primary purpose of the “million women” study), this study had several major shortcomings which would undermine its ability to find this association. First, cell phone use was measured only at the beginning of the study, and it was assessed too crudely to expect to find an association with tumor risk. When women enrolled in the study, they were asked how many years they used a cell phone, and if they did, whether they used it daily or less than daily. The researchers had no follow up assessments to determine whether the women continued to use their cell phones over time so they had to assume that cell phone users continued to use their cell phones. More importantly, the researchers could not assess how much time the women spent on a cell phone either before or during the course of the study so women who used a few minutes almost every day at baseline would be lumped together with women who used their phone a half hour or more per day. Second, the study failed to assess cordless phone use which likely exceeded cell phone use among these women due to the high cost of cell phone minutes during this period. Cordless phone use has been found in other research to increase brain tumor risk. Third, brain tumors can take several decades to develop and few women in this study had used their cell phones for ten or more years. Fourth, about 40% of the 1.3 million women who participated in the study were excluded from the cell phone analyses—most because they failed to provide any cell phone information. This large loss of research participants limits how generalizable the study findings are and could have biased the results. Despite these major shortcomings, the study reported a statistically significant doubling of risk of acoustic neuroma, a tumor on the nerve from the ear to the brain, among those who used cell phones for 10 or more years. Moreover, this association was related to the number of years of cell phone use.”

Mark Elwood, of the University of Auckland in New Zealand is not convinced that the provided evidence is sufficiently reliable to convince the scientists and the general public alike:

“These scientists took the opportunity of asking a few questions about cell phone use in the huge British ‘Million Women’ study, where women attending breast cancer screening clinics were invited. Over the next 10 or more years, women (average age 59) who reported the most use of cellphones had the same risk of developing brain cancers than women who did not use cellphones at the time that was asked (and also, the same risk of all cancers, and of 18 major types of cancer). So, another of many studies showing no risk from using cellphones, but like all other studies, it can’t prove that there’s no risk. In the many analyses, there was an increased risk of one rather rare tumor, based on only 8 cases; but that was acoustic neuroma, a tumor of the nerve to the ear, and therefore in the high exposure zone from cellphones. And the study doesn’t cover men, younger people, or risks beyond about 10 years. So the debate will continue.”

Elisabeth Cardis, of CREAL-Centre for Research in Environmental Epidemiology in Spain and formerly Principal Investigator of the Interphone Project, is cautious and considers results of The Million Women Study as too weak:

“Am a bit surprised at the lack of mention of the acoustic neuroma results in the conclusion - particularly since this and glioma are the two tumour types for which there is currently the most evidence from other studies (including Interphone and the Japanese study). It seems that the first questionnaire about mobile phone use was asked over a long time period 1999-2005 but the follow-up is correctly calculated from the time the questionnaire was asked. Of the 1261 intracranial CNS tumours, 754 occurred among those who reported ever use at first questionnaire.

Only 90 of these, however, were among women who reported using the phone every day and 100 among those who reported 10+ years of use. Numbers get even smaller when the first 3 years of follow-up are excluded - 91 with 10+ years. It would be nice to see results by some form of amount of use, but obviously the information collected is very limited - ever use, daily use and number of years - but perhaps looking at categories of daily use in different periods of time since start ... but the numbers would get very small.”

From the above comments of prominent epidemiologists the general conclusion can be drawn that despite the size of The Million Women cohort, the numbers of tumors are small and the information about the cell phone use is nonexistent. Therefore, it is not possible to draw any scientifically reliable conclusions based on the results of The Million Women Study.

Setting up large cohort for epidemiological study is expensive and laborious. That is why it is indeed a very good idea to use the already existing cohorts to examine causality link between cell phone radiation exposures and brain cancer.

However, the radiation exposure information, both the length and the strength/intensity of exposure, must be properly collected. Scientists working on the Danish Cohort and The Million Women Study, failed in the study design. Radiation exposure information collected in both cohorts is shoddy.

It is very disappointing that yet again epidemiologists failed. They used funds to provide us with shoddy studies. What is very worrying is the fact that these studies were published in peer-review journals and are now considered, by some, as “reliable scientific evidence”.

It is simply an embarrassing show of scientific incompetence.

<http://communities.washingtontimes.com/neighborhood/between-rock-and-hard-place/2013/oct/3/million-women-study-another-bad-study-cell-phones/>

Cell Phone Radiation Damages Sperm

Scientists from the Environmental Working Group publish a review of 10 studies that found cell phone radiation damages sperm.

Joel M. Moskowitz, PRLog (Press Release), Jun 28, 2012

Today the Environmental Working Group (EWG) published a review of ten studies that found cell phone radiation damages human sperm.*

"EWG scientists have analyzed 10 scientific studies documenting evidence that cell phone radiation exposure leads to slower, fewer and shorter-lived sperm. The studies raise concerns for men who carry their phones on their belts or in pants pockets."

The EWG asked me to serve as an external reviewer because I disseminated a review paper on this topic published online by the *Journal of Andrology* last July. This paper was recently published in the print version of the Journal.** Although, only two media sources in the U.S. covered this paper last summer, Men's Health and CNET, the CNET article was reprinted on more than 100 news web sites in six other countries.

Unfortunately for public health in the U.S., our news media have been reluctant to report on health risks associated with cell phone use as compared to other countries. I hope our news media do a better job in covering the sperm damage issue now because infertility is a common problem here. Moreover, men just need to take simple precautions to reduce potential harm from cell phone use.

As the EWG notes, there is preliminary evidence of reproductive health effects in children associated with fetal exposure to cell phone radiation so pregnant women as well as teens should take precaution. At a minimum, all should heed the advice buried "in fine print" in one online cell phone user manual ...

"use hands-free operation if it is available and keep the BlackBerry device at least 0.98 in. (25mm) from your body (including the abdomen of pregnant women and the lower abdomen of teenagers) when the BlackBerry device is turned on and connected to the wireless network."
<http://swampland.time.com/2010/10/15/blackberry-keep-our-...>

* Environmental Working Group. Cell Phone Radiation Damages Sperm, Studies Show. Jun 28, 2012; URL: http://www.ewg.org/cellphoneradiation/sperm_damage.

** La Vignera et al. Effects of the exposure to mobile phones on male reproduction: a review of the literature. *Journal of Andrology*. 2012 May/June: 33(3):350-356. URL: <http://www.andrologyjournal.org/cgi/content/full/33/3/350>.

ABSTRACT: The use of mobile phones is now widespread. A great debate exists about the possible damage that the radiofrequency electromagnetic radiation (RF-EMR) emitted by mobile phones exerts on different organs and apparatuses. The aim of this article was to review the existing literature exploring the effects of RF-EMR on the male reproductive function in experimental animals and humans. Studies have been conducted in rats, mice, and rabbits using a similar design based upon mobile phone RF exposure for variable lengths of time. Together, the results of these studies have shown that RF-EMR decreases sperm count and motility and increases oxidative stress. In humans, 2 different experimental approaches have been followed: one has explored the effects of RF-EMR directly on spermatozoa and the other has evaluated the sperm parameters in men using or not using mobile phones. The results

showed that human spermatozoa exposed to RF-EMR have decreased motility, morphometric abnormalities, and increased oxidative stress, whereas men using mobile phones have decreased sperm concentration, decreased motility (particularly rapid progressive motility), normal morphology, and decreased viability. These abnormalities seem to be directly related to the duration of mobile phone use.

Additional Resources

Environmental Health Trust web site:

<http://environmentalhealthtrust.org/men/>

Report: Cell phone use could reduce sperm count

Dong Ngo, CNET, August 18, 2011

http://www.cnet.com/8301-17918_1-20093675-85/report-cell-phone-use-could-reduce-sperm-count/

<http://www.prlog.org/11911996-cell-phone-radiation-damages-sperm.html>

Cell phones may damage sperm, health advocacy group says

Laurie Tarkan, Fox News.com, July 5, 2012

Men who carry their cell phone or Blackberry on their belt loop or in their pocket may be posing a risk to the health of their sperm and their fertility.

A major health advocacy group released a new report on the potentially harmful effects of cell phones on sperm. The Environmental Working Group (EWG) reviewed the scientific literature and reported that 10 studies have found significant changes in sperm exposed to cell phone radiation.

The study reported: In the most striking findings, men who carried their phones in a pocket or on the belt were more likely to have lower sperm counts and/or more inactive or less mobile sperm.

People are so preoccupied with brain tumors that the fertility issue gets very little play, said Louis Slesin, editor of *Microwave News*, a newsletter on electromagnetic radiation.

Exposure to cell phone radiation has also been associated with markers for sperm damage, such as higher levels of reactive oxygen species (chemically reactive molecules containing oxygen), oxidative stress, DNA damage and changes in sperm morphology.

We have enough evidence to issue precautionary health warnings, said Dr. Joel Moskowitz, director of the Center for Family and Community Health in the School of Public Health at the University of California at Berkeley. The evidence for sperm damage is quite consistent across many studies, he added.

The issue is far from settled, yet the proposals put forward by EWG are low-cost precautionary actions, Slesin said.

Another [review article](#) published last year in the *Journal of Andrology* examined the scientific literature on both animals and humans. Those authors came to similar conclusions as the EWG report. But they also cautioned that more studies are necessary to provide stronger evidence that cellular phone use disturbs sperm and testicular function because the existing literature has several limitations.

The EWG highlighted several results from the existing studies:

Men who carried a phone in a hip pocket or on the belt had 11 percent fewer mobile sperm than men who kept a phone elsewhere on the body.

Men who carried a cell phone on the belt and used it intensively during a five-day test period had a 19 percent drop in highly motile sperm from their previous levels.

Men who talked on the phone for more than an hour a day had 17 percent fewer highly motile sperm than men who talked less than 15 minutes a day.

Using a Bluetooth device or other headset may actually make things worse because you're likely to keep your device on your belt or in your pocket while using the phone. This means that although the head is not exposed to radiation when the phone is in use, the sperm are being constantly exposed. According to the EWG report, several studies have found lower sperm count and poorer sperm quality in men who use Bluetooth devices or headsets compared to men who put their phones to their ears.

Men just need to take simple precautions to reduce potential harm from cell phone use, Moskowitz

said. According to EWG:

Men can carry their cell phones in their pockets if they keep them turned off, and turn the phone on periodically to check for messages.

Men should always remove their cell phone from their pockets when making a call using a Bluetooth or headset as most electromagnetic radiation is emitted from the phone when talking on the phone.

Check this list for the cell phones that emit the highest radiation.

Laurie Tarkan is an award-winning health journalist whose work appears in the New York Times, among other national magazines and websites. She has authored several health books, including "Perfect Hormone Balance for Fertility." Follow her on Twitter and Facebook.

<http://www.foxnews.com/health/2012/07/05/cell-phones-may-damage-sperm-health-advocacy-group-says/>

Cell Phone Radiation, Pregnancy, and Sperm

The latest, peer-reviewed science finds that prenatal cellphone radiation exposure damages test mammals' brains and offspring, and cellphone radiation exposure damages sperm in humans.

Joel M. Moskowitz, PRLog (Press Release), Nov 19, 2012

What you don't know, what you need to find out, and what you can do now

National Press Club, Washington, DC, November 12, 2012

Several new, independent studies confirm previous research that pulsed digital signals from cell phones disrupt DNA, impair brain function and damage sperm.

Because fetuses, children and teens are particularly vulnerable, the American Academy of Pediatrics sent a letter to the Federal Communications Commission (FCC) asking for a review of cell phone exposure limits.

Also, the U.S. Government Accountability Office (GAO) issued a report this summer calling on the FCC to update cell phone exposure limits and testing requirements. The report noted that the testing requirements are inadequate as the phones are used closer to the head and body than the test requires. Thus, users' exposure to cell phone radiation may exceed the legal limit.

Six experts summarized the research at the National Press Club:

- Hugh Taylor, MD, PhD, Chairman of Obstetrics and Gynecology, Yale Medical School;
- Ronald B. Herberman, MD, TNI Bio Tech Inc, president of American Association of Cancer Institutes;
- Devra Davis, PhD, President Environmental Health Trust;
- Nesrin Seyhan, PhD, Chairman, Department of Biophysics, Gazi University;
- Suleyman Kaplan, MD, Professor, Embryology, Ondokuz Mayıs University; and
- Igor Belyaev, PhD, Deputy Director, National Cancer Institute of Slovakia and Russian Academy of Sciences.

The conference was sponsored by the Environmental Health Trust, Ondokuz Mayıs University and Gazi University in Turkey, and the National Cancer Institute of Slovakia.

The slides used in these presentations and additional resources are available from the Collaborative on Health and the Environment at: http://www.healthandenvironment.org/partnership_calls/11452?res.

GAO Report: <http://www.gao.gov/products/GAO-12-771>

Environmental Health Trust: <http://ehtrust.org/>

Environmental Working Group review of sperm damage research: <http://www.prlog.org/11911996>

Dr. Dariusz Leszczynski's science blog on mobile phone radiation and health:
<http://betweenrockandhardplace.wordpress.com/>

Video of press conference (1 hour, 58 minutes): <http://www.youtube.com/watch?v=tnn6gNyRU7g>

<http://www.prlog.org/12026867-cell-phone-radiation-pregnancy-and-sperm.html>

Big Week for Cell Phone Radiation Legislation

A "cell phone right to know" bill was just introduced in the Congress, and the City and County of San Francisco will defend its "cell phone right to know" ordinance against a CTIA lawsuit in a federal appeals court.

Joel M. Moskowitz, PRLog (Press Release), Aug 6, 2012

A "cell phone right to know" bill was just introduced in the Congress, and on Thursday, the City and County of San Francisco will defend its "cell phone right to know" ordinance against a CTIA lawsuit in the 9th District Court of Appeals.*

Although the text for the newly proposed federal legislation is not yet available from the Library of Congress,** a press release appears below. I plan to analyze the bill when the text becomes available.

Two years ago, I published an op-ed in the San Francisco Chronicle about cell phones that called for community health education, government-funded research independent of industry to avoid conflicts of interest, and more protective regulatory standards and warning labels. See below for a link to my op-ed and additional concerns I have raised more recently.

The federal legislation appears to address a major concern I raised on June 15 (link below). Namely, that an FCC review of the current inadequate cell phone radiation standards would rubber stamp the 16-year old standards. The proposed legislation would require a different agency with the appropriate expertise to conduct the review—the Environmental Protection Agency.

The only major cell phone radiation health effects research our federal government currently funds is a study of the effects of 2G (GSM and CDMA) on mice and rats by the National Toxicology Program. The preliminary results from this study should be available by 2014. However, 2G technology will likely be obsolete in the US by the end of 2016.*** To date, little research has been conducted on the health effects of 3G, and some research suggests that this carrier technology damages DNA at much lower exposure levels than 2G. No research that I am aware of has been conducted on 4G.

* Thursday, Aug 9, 9:00 a.m. Courtroom 1, 3rd Floor; 11-17707; 11-17773) CTIA - The Wireless Assoc. v. City & County of SF Federal N. Cal.;
<http://www.ca9.uscourts.gov/datastore/calendaring/2012/07...>

** Bill Summary & Status; 112th Congress (2011 - 2012); H.R.6358; <http://thomas.loc.gov/cgi-bin/bdquery/z?d112:h.r.6358>;

*** "AT&T to Shutter 2G Network by Jan. 1, 2017";
<http://www.pcmag.com/article2/0,2817,2408067,00.asp>

<http://prlog.org/11943091>

San Francisco's Cell Phone Fact Sheet is Factual

Contrary to the recent opinion issued by the 9th U.S. Circuit Court of Appeals, the revised fact sheet adopted by San Francisco to implement its cell phone "right to know" ordinance is "factual and uncontroversial."

Joel M. Moskowitz, PRLog (Press Release), Sep 12, 2012

Contrary to the recent, unpublished opinion issued by the 9th U.S. Circuit Court of Appeals, the revised fact sheet adopted by San Francisco to implement its cell phone "right to know" ordinance is "factual and uncontroversial." (1)

This ordinance is the first in the U.S to require cell phone retailers to distribute a fact sheet that informs customers that cell phone use may increase their risk of cancer. Furthermore, it provides important information about how to use cell phones safely to reduce potential health risks.

All but one of the assertions in the fact sheet appear on the FCC and FDA web sites. (2) A statement about children's greater exposure to cell phone radiation has been documented in the peer-reviewed, scientific literature by Professor Om Gandhi and his colleagues. (3)

The FCC and FDA make similar recommendations on their web sites for consumers who are concerned about their exposure to cell phone radiation so the San Francisco fact sheet is no more controversial than the Federal government's advice to consumers who wish to reduce potential health risks.

San Francisco's revised fact sheet incorporates the concerns raised by the CTIA, the wireless industry lobbying group, about the original fact sheet developed by the City. The revised fact sheet was approved by U.S. District Judge William Alsup who heard the lawsuit filed by the CTIA against San Francisco. According to the judge, the CTIA chose not to contest the revised fact sheet but now claims it did not have the opportunity to do so.

Although most manufacturers issue safety warnings, the information is often buried in user manuals and poorly written. In contrast, the Blackberry Torch provides exemplary recommendations that are similar to those found in the San Francisco fact sheet. (4)

Since the original hearing on this case, the U.S. Government Accountability Office issued a report that challenges the FCC's certification of cell phone safety and called on the FCC to revamp its cell phone testing procedures because cell phone users generally keep their phones closer to their body than the test allows. Thus, cell phone users may be exposed to more radiation than the FCC considers to be safe. (5) Also, a bill was introduced in the Congress that would require cell phone warning labels and make the Environmental Protection Agency the lead Federal agency for protecting the public from cell phone radiation health risks. (6)

For more information about the San Francisco cell phone "right to know" ordinance see <http://www.prlog.org/11879000>.

The revised fact sheet and an annotated version of the fact sheet that includes citations from the FCC and FDA web sites is available upon request. (7)

References

(1) Egelko, B. Court blocks S.F. warning on cell phones. San Francisco Chronicle. Sep 10, 2012.

<http://www.sfgate.com/bayarea/article/Court-blocks-S-F-wa...>

(2) Supporting assertions for the fact sheet can be found at the following URL's on the FCC and FDA web sites:

FCC

<http://www.fcc.gov/encyclopedia/faqs-wireless-phones>

<http://www.fcc.gov/guides/wireless-devices-and-health-concerns>

<http://transition.fcc.gov/oet/rfsafety/rf-faqs.html>

<http://transition.fcc.gov/oet/rfsafety/>

FDA

<http://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/HomeBusinessandEntertainment/Cellphones/ucm116335.htm>

<http://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/HomeBusinessandEntertainment/Cellphones/ucm116331.htm>

<http://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/HomeBusinessandEntertainment/Cellphones/ucm116293.htm>

(3) "When electrical properties are considered, a child's head's absorption can be over two times greater, and absorption of the skull's bone marrow can be ten times greater than adults." (Gandhi, Morgan, de Salles, Han, Herberman, Davis. Exposure Limits: The underestimation of absorbed cell phone radiation, especially in children. Electromagn Biol Med 2012; 31(1):34-51. <http://www.ncbi.nlm.nih.gov/pubmed/21999884>)

(4) See page 23 in

http://docs.blackberry.com/en/smartphone_users/deliverables/18620/BlackBerry_Torch_9800_Smartphone-Safety_and_Product_Information-T43156-696706-0806024453-001-US.pdf

(5) "Exposure and Testing Requirements for Mobile Phones Should Be Reassessed." GAO-12-771, Jul 24, 2012. <http://www.gao.gov/products/GAO-12-771>

(6) Tsukayama H. GAO criticizes FCC's standards for cellphone radiation. Washington Post, Aug 7, 2012. http://www.washingtonpost.com/business/economy/gao-criticizes-fccs-standards-for-cellphone-radiation/2012/08/07/08c1e91e-e0c9-11e1-8fc5-a7dcf1fc161d_story.html

(7) For a copy of the revised fact sheet and an annotated version of the fact sheet, email Dr. Joel Moskowitz at jmm@berkeley.edu.

<http://www.prlog.org/11973342>

San Francisco Updates Cell Phone Safety Warnings

San Francisco updated its cell phone safety recommendations following the settlement of a lawsuit that blocked implementation of the city's cell phone "right to know" law.

Joel M. Moskowitz, PRLog (Press Release), June 3, 2013

San Francisco updated its cell phone safety recommendations on the city's web site following the settlement of a lawsuit filed by the CTIA—The Wireless Association that blocked implementation of the cell phone "right to know" law adopted by the city in 2010.

After a three-year battle, the city decided to disband with its cell phone law rather than continue to fight the CTIA and risk having to pay the industry's legal fees. The case was settled "in exchange for a waiver of attorneys' fees" even though the city believes the "Ninth Circuit's opinion is deeply flawed." (1)

Meanwhile, the CTIA has been citing the Ninth Circuit's opinion around the country in an effort to deter state and local policy makers from adopting cell phone "right to know" laws.

However, the city's web site points out that because the court's decision is unpublished, it is only applies to San Francisco. Furthermore, the decision cannot serve as a precedent in any future litigation (1). Thus it is inappropriate for the industry to cite this case as a precedent for other jurisdictions.

The city reminds visitors to its web site that "the World Health Organization classified cell phone radiation as 'possibly carcinogenic to humans (Group 2B)' based on increased risk for glioma, a malignant type of brain cancer, associated with wireless phone use." (1)

In addition to increased risk for glioma, the World Health Organization included increased risk for acoustic neuroma, a tumor on the nerve from the ear to the brain, in its newly published monograph about cell phone radiation and cancer. (2)

San Francisco recommends on its web site the following strategies to reduce exposure to RF energy from cell phones. The goal is to increase the distance between your body and your cell phone whenever using and carrying the device. (3)

- **"Limit cell phone use by children:** Developing brains and thinner skulls lead to higher absorption in children.
- **Use a headset, speakerphone, or text instead:** Exposure decreases rapidly with increasing distance from phone.
- **Use a belt clip or keep your phone in a knapsack, briefcase, or handbag to keep some distance between your phone and body:** Do not carry your phone directly on your body or at least maintain the recommended safe distance specified in your phones' user manual.
- **Avoid using your cell phone in areas with a weak signal (in elevators, on transit, or when indicated by your phone):** Using a cell phone in areas of good reception decreases exposure by allowing the phone to transmit at reduced power.
- **Reduce the number and length of calls.**
- **Turn off your cell phone when not in use."** (3)

References

(1) SF Environment. Using Cell Phones Safely. URL: <http://www.sfenvironment.org/article/safer-practices/using-cell-phones-safely>.

(2) Non-ionizing radiation, Part II: Radiofrequency electromagnetic fields / IARC Working Group on the Evaluation of Carcinogenic Risks to Humans (2011: Lyon, France). Vol. 102 (2013). URL: <http://monographs.iarc.fr/ENG/Monographs/vol102/index.php>.

(3) SF Environment. How can I reduce my exposure to radiofrequency-energy from cell phones? URL: <http://www.sfenvironment.org/solution/how-can-i-reduce-my-exposure-to-radiofrequency-energy-from-cell-phones>.

<http://www.prlog.org/12149797>

San Francisco Updates Cell Phone Safety Warnings

San Francisco updated its cell phone safety recommendations following the settlement of a lawsuit that blocked implementation of the city's cell phone "right to know" law.

Joel M. Moskowitz, PRLog (Press Release) – June 3, 2013

San Francisco updated its cell phone safety recommendations on the city's web site following the settlement of a lawsuit filed by the CTIA—The Wireless Association that blocked implementation of the cell phone "right to know" law adopted by the city in 2010.

After a three-year battle, the city decided to disband with its cell phone law rather than continue to fight the CTIA and risk having to pay the industry's legal fees. The case was settled "in exchange for a waiver of attorneys' fees" even though the city believes the "Ninth Circuit's opinion is deeply flawed." (1)

Meanwhile, the CTIA has been citing the Ninth Circuit's opinion around the country in an effort to deter state and local policy makers from adopting cell phone "right to know" laws.

However, the city's web site points out that because the court's decision is unpublished, it is only applies to San Francisco. Furthermore, the decision cannot serve as a precedent in any future litigation (1). Thus it is inappropriate for the industry to cite this case as a precedent for other jurisdictions.

The city reminds visitors to its web site that "the World Health Organization classified cell phone radiation as 'possibly carcinogenic to humans (Group 2B)' based on increased risk for glioma, a malignant type of brain cancer, associated with wireless phone use." (1)

In addition to increased risk for glioma, the World Health Organization included increased risk for acoustic neuroma, a tumor on the nerve from the ear to the brain, in its newly published monograph about cell phone radiation and cancer. (2)

San Francisco recommends on its web site the following strategies to reduce exposure to RF energy from cell phones. The goal is to increase the distance between your body and your cell phone whenever using and carrying the device. (3)

- **"Limit cell phone use by children:** Developing brains and thinner skulls lead to higher absorption in children.
- **Use a headset, speakerphone, or text instead:** Exposure decreases rapidly with increasing distance from phone.
- **Use a belt clip or keep your phone in a knapsack, briefcase, or handbag to keep some distance between your phone and body:** Do not carry your phone directly on your body or at least maintain the recommended safe distance specified in your phones' user manual.
- **Avoid using your cell phone in areas with a weak signal (in elevators, on transit, or when indicated by your phone):** Using a cell phone in areas of good reception decreases exposure by allowing the phone to transmit at reduced power.
- **Reduce the number and length of calls.**
- **Turn off your cell phone when not in use."** (3)

References

(1) SF Environment. Using Cell Phones Safely. URL: <http://www.sfenvironment.org/article/safer-practices/using-cell-phones-safely>.

(2) Non-ionizing radiation, Part II: Radiofrequency electromagnetic fields / IARC Working Group on the Evaluation of Carcinogenic Risks to Humans (2011: Lyon, France). Vol. 102 (2013). URL: <http://monographs.iarc.fr/ENG/Monographs/vol102/index.php>.

(3) SF Environment. How can I reduce my exposure to radiofrequency-energy from cell phones? URL: <http://www.sfenvironment.org/solution/how-can-i-reduce-my-exposure-to-radiofrequency-energy-from-cell-phones>.

<http://www.prlog.org/12149797>

Florida City Adopts Cell Phone Precautionary Health Warnings

Pembroke Pines in Florida joined a handful of cities when it adopted a resolution on November 20 that warns the public about the health effects of cell phone radiation and precautionary safety measures.

Joel M. Moskowitz, PRLog (Press Release), Nov 27, 2012

The Pembroke Pines cell phone radiation resolution expresses the city's "urgent concerns arising from recent medical science reports which advise of the possible and adverse health effects delivered upon those who use cell phones, including, but not limited to, cancer, as a result of the non-ionized radiation emitted by cell phones."

The city's resolution was adopted a month after Jimmy Gonzalez, an attorney and resident of the city, made a presentation to the City Commission about cell phone safety. He also discussed his own battle with cell phone induced cancer. After ten years of heavy cell phone use, Mr. Gonzalez was diagnosed with glioma, a serious and often fatal form of brain cancer on the side of his head where he used his phone. Moreover, he had a tumor in his chest near the breast pocket where he kept his cell phone, and a tumor on the hand which he used to hold his phone during calls.

The City's resolution (1) contains the following five provisions:

"expresses the City Commission's concern for the amount of radiation that cell phones are emitting into users' bodies in light of the scientific debate that cell phone radiation exposure causes cancer;

"strongly urges everyone to carefully read through their cell phone user manuals and user guides and follow all instructions therein as to how to reduce the amount of radiation that will be emitted into their bodies;

"encourages everyone to take all practical steps to keep themselves and their children well informed on the latest and ongoing scientific reports about the possible effects of cell phone radiation;

"resolves that additional scientific and medical research must be conducted by the public health community about the possible effects of cell phones' radiation upon adults, teenagers, and community about the possible effects of cell phones' radiation upon adults, teenagers, and children; and

"encourages that all local, state, and federal government agencies sworn to defend the public's health & safety take all reasonable steps to vigilantly monitor and report publicly the information disclosed by ongoing scientific and medical research about the possible effects of cell phones' radiation upon adults, teenagers, and children."

The resolution directs the city clerk to forward a copy to the League of Cities and County Board of Commissioners and to each municipality within Broward County.

Twelve nations and the European Union have adopted precautionary health warnings, but progress in the U.S. has been slow due to strong industry opposition.

Although the CTIA-The Wireless Association, based on its First Amendment rights, has challenged in court San Francisco's legislation that requires cell phone stores to distribute a court-approved fact sheet (2-4), no legal obstacles prevent communities from adopting legislation to warn citizens about cell phone radiation using public spaces such as public web sites, buildings, parks or streets.

The CTIA has blocked all state-level legislative efforts to date as well as many community-level efforts (5). The organization even refused to support a California bill that would simply remind people to read the warnings in their user manuals. The CTIA has stated in court and in public hearings that people might panic if they learned about the evidence for increased health risks associated with cell phone use. Although the CTIA attends 500 meetings per year with the Federal Communications Commission (FCC), the agency that regulates cell phone radiation, a CTIA vice president has argued that the organization merely educates policy makers and does not engage in lobbying. Another vice president has stated in a public hearing that the CTIA has never claimed that cell phones do not cause harm.

This summer the U.S. Government Accountability Office called for a review of the FCC's outdated cell phone radiation regulations adopted in 1996. A bill pending in Congress would require the U.S. Environmental Protection Agency to establish evidence-based standards that would replace the industry-set standards the FCC currently enforces.

(1) Pembroke Pines Resolution:

<http://ppines.legistar.com/ViewReport.ashx?M=R&N=Text&GID=38&ID=1288155&GUID=6A101DD1-3817-470E-9479-BF7E1D966654&Title=Legislation+Text>

(2) "Cell phone radiation warning on San Francisco government web site":

<http://www.prlog.org/11879000>

(3) "San Franciscos Cell Phone Fact Sheet is Factual": <http://www.prlog.org/11973342>

(4) "Big Week for Cell Phone Radiation Legislation": <http://www.prlog.org/11943091>

(5) "Cities and states consider cell phone radiation laws" (Kent German, c|net, August 17, 2011):

http://www.cnet.com/8301-17918_1-20058696-85/cities-and-states-consider-cell-phone-radiation-laws/#ixzz2DSPqddqU5

OTHER RESOURCES:

Presentation by Attorney Jimmy Gonzalez at the Pembroke Pines Commission Meeting, Oct 17, 2012:

Pre-2: Pembroke Pines resident Attorney Jimmy Gonzalez gave a presentation about cell phone safety, and described a cell phone use correlation to cancer and to his personal battle with brain cancer. The Commission asked for more information so that they can learn more about this issue.

AGENDA: <http://ppines.legistar.com/LegislationDetail.aspx?ID=1215152&GUID=520E1C3B-2FEF-40D5-9F29-54D27EB4CFED>

VIDEO presentation (see 3:05 - 11:50): <http://vp.telvue.com/player?chapter=35479&id=T01146>

--

Cell phone radiation legislation adopted at the Pembroke Pines Commission Meeting (Item 10), Nov 20, 2012:

AGENDA: <http://ppines.legistar.com/View.ashx?M=A&ID=219325&GUID=022B6A21-FB7A-4B74-8CE0-C8BA4983EAA3>

VIDEO presentation (6:21): <http://www.facebook.com/photo.php?v=4082541416847>

RESOLUTION (No. 2012-R-41) text:

<http://ppines.legistar.com/ViewReport.ashx?M=R&N=Text&GID=38&ID=1288155&GUID=6A101DD1-3817-470E-9479-BF7E1D966654&Title=Legislation+Text>

<http://www.prlog.org/12031899-florida-city-adopts-cell-phone-precautionary-health-warnings.html>

Call for Action to Reduce Harm from Mobile Phone Radiation

The European Environment Agency published a major report today to alert governments about the need to attend to early warning signs about technology health risks, including mobile phones.

Joel M. Moskowitz, PRLog (Press Release), Jan. 23, 2013

The 750-page volume, "Late Lessons from Early Warnings," includes twenty new case studies and has major implications for policy, science and society. Although the report was prepared by the European Environment Agency to provide guidance to the EU nations, its implications are global. (1)

Brain tumor risk associated with cell phone use is addressed in one of the report's chapters. (2) The report highlights the classification of this form of electromagnetic radiation (EMR) as "possibly carcinogenic", or cancer causing, by the World Health Organization's (WHO) International Agency for Research on Cancer (IARC) in 2011.

The research that has found increased brain tumor risk associated with long term mobile phone use is reviewed. The authors note that governments and industry have been slow to respond to the WHO's precautionary warnings and urges policy makers to respond to early warnings more quickly. It argues that industries that cause future harm must pay for the damage and suggests that taking early precautions can stimulate rather than stifle innovation.

The report accuses the mobile phone industry of "inertia in considering the various studies and taking the IARC carcinogenic classification into account," criticizes the media for not "providing the public with robust and consistent information on potential health risks," and attacks governments for shirking "their responsibilities to protect public health from this widespread source of radiation."

Although the report acknowledges the many benefits of mobile phones to society, it recommends the need for precautionary actions to reduce cell phone radiation exposures to minimize the extent and seriousness of the risks to the brain and other organs.

The report makes four specific recommendations about cell phones:

- a. Governments, the mobile phone industry, and the public should take all reasonable measures to reduce EMR exposure, especially from mobile phones, particularly exposure to children and young adults who are likely most at risk for brain and salivary gland tumors. The report recommends texting, use of hands-free sets, and improved design of phones which generate less radiation and make hands-free use more convenient.
- b. Governments should reconsider the scientific basis for the present exposure standards "which have serious limitations such as reliance on the contested thermal effects paradigm; and simplistic assumptions about the complexities of radio frequency exposures."
- c. Mobile phones should be required to have effective labeling and warnings about potential risks for users.
- d. Adequate funding should be provided for the "urgently needed research into the health effects of phones" and base stations. Funding could include industry grants and a small fee on the purchase and/or use of mobile phones.

It is time for the U.S. to end its two decades of denial and assume a leadership role in adopting precautionary measures to reduce the potential harms associated with exposure to mobile phone radiation. Otherwise we may face a steep price in terms of preventable health care costs, lost productivity, and reduced quality of life. A nickel a month collected on each cell phone subscription would generate sufficient funds for the U.S. to undertake the needed training and research to head off this potential epidemic. (3)

For more information about the health risks of cell phone radiation and other forms of EMR see the new BioInitiative Report at <http://www.bioinitiative.org>. and my web site at <http://saferemr.com> .

(1) "The cost of ignoring the warning signs - EEA publishes 'Late Lessons from Early Warnings, volume II' "

New technologies have sometimes had very harmful effects, but in many cases the early warning signs have been suppressed or ignored. The second volume of Late Lessons from Early Warnings investigates specific cases where danger signals have gone unheeded, in some cases leading to deaths, illness and environmental destruction.

News Release, European Environment Agency, Jan 23, 2013. URL:
<http://www.eea.europa.eu/pressroom/newsreleases/the-cost-of-ignoring-the>

(2) Lennart Hardell, Michael Carlberg, and David Gee. "Mobile phone use and brain tumour risk: early warnings, early actions?" Chapter 21 in Part C-Emerging Issues. "Late lessons from early warnings: science, precaution, innovation." European Environment Agency. EEA Report No 1/2013. Pp. 541-561. January 23, 2013. URL:
Part C: <http://www.eea.europa.eu/publications/late-lessons-2/part-c-emerging-issues-1>

The full 750 page report is available at <http://www.eea.europa.eu/publications/late-lessons-2>

(3) Joel M. Moskowitz. "Comments on the 2012 GAO Report: 'Exposure and Testing Requirements for Mobile Phones Should Be Reassessed.'" URL: <http://saferemr.blogspot.com>.

<http://www.prlog.org/12065677-call-for-action-to-reduce-harm-from-mobile-phone-radiation.html>

Belgium Adopts New Regulations to Promote Cell Phone Radiation Safety

Children's mobile phones are banned. The specific absorption rate (SAR) must be listed on every mobile phone at the point of sale and a warning provided to customers to choose a lower SAR phone, use it moderately, and wear an earpiece.

Joel M. Moskowitz, PRLog (Press Release), Oct 24, 2013.

According to the Federal Public Service, beginning in March, 2014, new regulations will apply to the sale of mobile phones in Belgium. Children's mobile phones will be banned. The specific absorption rate (SAR) for every mobile phone must be listed at the point of sale and the following warning must be provided to customers:

"Think about your health – use your mobile phone moderately, make your calls wearing an earpiece and choose a set with a lower SAR value."

The Belgian government's additional recommendations include use of other hands-free methods to keep the phone away from the body such as text messaging, and not making calls when the signal is weak, such as in an elevator or in a moving vehicle.

All cell phones will be labeled with the letter A, B, C, D, or E, corresponding to the phone's specific absorption rating, or SAR, which is a measure of the maximum amount of energy deposited in an adult user's brain during a short phone call.

"A" indicates a SAR less than 0.4 watts/kilogram (w/kg), "B" from 0.4 to less than 0.8 w/kg, "C" from 0.8 to less than 1.2 w/kg, "D" from 1.2 to less than 1.6 w/kg, and "E" more than 1.6 w/kg.

Although phones sold in the U.S. cannot currently exceed 1.6 w/kg and are measured in a different manner than in Europe, the Federal Communications Commission (FCC) is considering weakening the U.S. standard and adopting the European or international standard which was developed by a private organization called ICNIRP. The multinational Telecom Industry has lobbied to weaken our protections in the interest of global "harmonization." This policy change is strongly opposed by numerous consumer groups, environmental groups, medical professionals and health scientists in the U.S. who have advocated for stronger regulations, not weaker ones, to protect public health.

In 2010, the city of San Francisco adopted a cell phone "right to know" law that is similar to the Belgian Government's new regulations, but after a lengthy legal battle in the Federal courts with the Telecom Industry, the city repealed the law earlier this year.

The new regulations by the Belgian government are in response to the International Agency for Research on Cancer's (IARC) declaration that radio frequency radiation is "possibly carcinogenic" based upon research that finds increased risk of brain cancer due to intensive use of a mobile phone.

Since the IARC declared that cell phone radiation is "possibly carcinogenic" in May, 2011, more evidence of brain cancer risk has been published in the peer-reviewed, scientific literature. The latest study by Lennart Hardell and colleagues in Sweden finds a three-fold increased risk of brain cancer after 25 years of cell phone and cordless phone use.

The American public needs to learn about the risks of using wireless devices and how to use them safely; otherwise, we may face a major public health crisis in the ensuing decades with the proliferation of these devices in our society.

The English translation of the Belgian government's press release along with supporting materials are available on my Electromagnetic Radiation Safety web site at:
<http://www.saferemr.com/2013/10/belgium-adopts-new-regulations-to.html> .

The supporting materials include sections covering frequently asked questions, general information about cell phone and other types of electromagnetic radiation, child leukemia, and electromagnetic hypersensitivity. Although some of the information is misleading in my opinion, it is worth examining.

<http://www.prlog.org/12231532>

French Health Agency Recommends Children and Vulnerable Groups Reduce Cell Phone Radiation Exposure

In a major public announcement today, the French Agency for Food, Environmental and Occupational Health warned the public to reduce their exposure to cell phone radiation.

Joel M. Moskowitz, PRLog (Press Release), Oct 15, 2013

The French Agency for Food, Environmental and Occupational Health, ANSES, announced today the results of a two-year review by an expert Working Group of the scientific research on the risks related to exposure to radiofrequency (RF) radiation.

“This update has not brought to light any proven health effect and does not result in any proposed new maximum exposure limits for the population. However, limited levels of evidence do point to different biological effects in humans or animals. In addition, some publications suggest a possible increased risk of brain tumour, over the long term, for heavy users of mobile phones. Given this information, and against a background of rapid development of technologies and practices, ANSES recommends limiting the population’s exposure to radiofrequencies – in particular from mobile phones – especially for children and intensive users, and controlling the overall exposure that results from relay antennas.”

“The findings of this expert appraisal are therefore consistent with the classification of radiofrequencies proposed by the World Health Organization’s International Agency for Research on Cancer (IARC) as “possibly carcinogenic” for heavy users of mobile phones.

In addition, the expert appraisal nevertheless shows, with limited levels of evidence, different biological effects in humans or animals, some of which had already been reported in 2009: these can affect sleep, male fertility or cognitive performance.”

Due to the health concerns raised by the expert Working Group, ANSES made the following recommendations:

"Therefore, to limit exposure to radiofrequencies, especially in the most vulnerable population groups, the Agency recommends:

- for intensive adult mobile phone users (in talk mode): use of hands-free kits and more generally, for all users, favouring the purchase of phones with the lowest SAR values;
- reducing the exposure of children by encouraging only moderate use of mobile phones;
- continuing to improve characterisation of population exposure in outdoor and indoor environments through the use of measurement campaigns;
- that the development of new mobile phone network infrastructures be subject to prior studies concerning the characterisation of exposures, and an in-depth study be conducted of the consequences of possibly multiplying the number of relay antennas in order to reduce levels of environmental exposure;
- documenting the conditions pertaining at those existing installations causing the highest exposure of the public and investigating in what measure these exposures can be reduced by technical means.

- that all common devices emitting electromagnetic fields intended for use near the body (DECT telephones, tablet computers, baby monitors, etc.) display the maximum level of exposure generated (SAR, for example), as is already the case for mobile phones."

The Agency further recommends that children's exposure should be reduced "by encouraging only moderate use of mobile phones, ideally with hands-free kits and mobile terminals with the lowest SAR values."

The full press release and a link to the ANSES press kit is available on my SaferEMR web site at:
<http://www.saferemr.com/2013/10/french-health-agency-recommends.html>

<http://www.prlog.org/12226630>

India Adopts Health Warnings & U.S. Mobile Phone Standards

India adopts the U.S. cell phone radiation standard, issues health warnings and requires safety precautions in user manuals. Local and state governments in the U.S. should issue precautionary health warnings now to protect cell phone users.

Joel M. Moskowitz, PRLog (Press Release), Sep 4, 2012

India Adopts Health Warnings & U.S. Mobile Phone Standards

India just adopted the U.S. cell phone handset radiation standard. The Indian government also issued precautionary health warnings about cell phone use and is requiring manufacturers to include safety precautions in user manuals. (1)

Now more than 1.3 billion cell phone subscribers in seven countries will be covered by the U.S. cell phone radiation standard including the U.S., India, Canada, New Zealand, Bolivia, Taiwan, and South Korea. (2)

Moreover, thirteen nations and the European Union have issued precautionary health warnings about the need to limit exposure to cell phone radiation. The countries include Austria, Britain, Canada, Finland, France, Germany, India, Ireland, Israel, Italy, Russia, Sweden, and Switzerland.

Although the CTIA's (i.e., the wireless industry association) lawsuit over San Francisco's cell phone "right to know" law has not been resolved, the association has stated in public meetings and in courtrooms that it is fine if governments post precautionary health warnings about cell phone radiation on public property or on government web sites. Thus, local and state governments should take immediate action to protect consumers, especially children, from cell phone radiation by issuing health warnings in these public venues.

For more information about the San Francisco ordinance, see <http://www.prlog.org/11879000>.

References

(1) Government of India. Stringent Mobile Radiation Standards Come into Force from tomorrow. Aug 31, 2012. Press release appears below; see "Guidelines for Consumers."

(2) Wikipedia. List of countries by number of mobile phones in use.
[http://en.wikipedia.org/wiki/List_of_countries_by_number ...](http://en.wikipedia.org/wiki/List_of_countries_by_number...)

Stringent Mobile Radiation Standards Come into Force from tomorrow

New Mobile Handsets to comply with SAR Value of 1.6W/KG Penalty, Random Checks Introduced for Enforcement

Press Information Bureau, Ministry of Communications & Information Technology, Government of India, Aug 31, 2012

Beginning tomorrow (1st September 2012) India will be among the select few countries in the world to

have stringent EMF (Electromagnetic Frequency) Radiation Standards, established in the interest of public health, for mobile towers and mobile handsets. Indian standards would now be 10 times more stringent than more than 90% countries in the world.

The following are the highlights of the Standards:

Mobile Towers (EMF Radiation Norms)

- * EMF (Electromagnetic Frequency) exposure limit (Base Station Emissions) has been lowered to 1/10th of the existing ICNIRP exposure level, effective 1st Sept. 2012.
- * Telecom Enforcement Resource & Monitoring (TERM) Cells have been entrusted with the job of conducting audit on the self certification furnished by the Service Providers. TERM Cell will carry out test audit of 10% of the BTS site on random basis and on all cases where there is a public complaint.
- * Telecom Engineering Centre (TEC) has revised the Test Procedure for measurement of EMF for verification of EMF compliance for BTS towers in accordance with new standards.
- * For non-compliance of EMF standards, a penalty of Rs. 5 lakhs is liable to be levied per BTS per Service Provider.
- * The BTS site details i.e. self certification, registration with TERM Cell, test results etc. is proposed to be provided on DoT web site for General Public information.

Mobile Handsets

- * All the new design of mobile handsets shall comply with the Specific Absorption Rate (SAR) values of 1.6 W/kg averaged over 1 gram of human tissue w.e.f. 1st Sept. 2012.
- * The mobile handsets with existing designs which are compliant with 2.0 W/kg averaged over 10 gram of human tissue, will continue to co-exist up to 31st August 2013. From 1st Sept. 2013, only the mobile handsets with revised SAR value of 1.6 W/kg would be permitted to be manufactured or imported in India.
- * SAR value information display on the mobile handsets like IMEI (International Mobile Equipment Identity) display. The information on SAR values to be made available to the consumer at the point of sale.
- * Mobile hand set manufactured and sold in India or imported from other countries shall be checked on random basis for compliance of SAR limit after TEC SAR Laboratory is set up by end of 2012. Test results from international accredited labs will be acceptable in the interim period.
- * The manufacturers in India will provide self declaration of SAR value of the handset.
- * Suitable amendments in the Indian Telegraph Rule under Indian Telegraph Act 1985 are being enacted in support of ensuring compliance of new SAR values for handsets.
- * Manufacturer's mobile handset booklet will contain safety precautions.
- * All cell phone handsets sold in the market in India will comply with relevant standards and shall be available in hand free mode.

SAR Test Laboratory:

* SAR Test Laboratory is being set up in Telecom Engineering Centre for testing of SAR value of mobile handsets imported/ manufactured in India.

New National SAR Standards from Telecom Engineering Centre

* National SAR standards from Telecom Engineering Centre are being finalized.

Measuring Instruments:

* DoT is procuring EMF radiation measuring instruments for TERM cell units.

* Outsourcing for EMF radiation measurement for BTS towers is also being considered.

Expert Group Study:

* A scientific study in India-specific context is being undertaken jointly by Dept. of Telecom and Dept. of Science & Technology in collaboration with ICMR, MOEF & Min of Science & Technology to derive norms based on credible scientific evidence taking into account diversity of Indian social context.

Guidelines to State Government

* Department of Telecommunication has released Guidelines covering BTS Towers so that some consistency gets evolved on setting up of BTS towers. Guidelines have been placed on DoT website.

Guidelines for Consumers

Guidelines for consumers on Mobile handset usage have been issued and hosted on DoT Web site (www.gov.dot.in) for general public awareness.

Some of them are:

1. Keep distance – Hold the cell phone away from body to the extent possible.
2. Use a headset (wired or Bluetooth) to keep the handset away from your head.
3. Do not press the phone handset against your head. Radio Frequency (RF) energy is inversely proportional to the square of the distance from the source -- being very close increases energy absorption much more.
4. Limit the length of mobile calls.
5. Use text as compared to voice wherever possible.
6. Put the cell phone on speaker mode.
7. When your phone is ON, don't carry it in chest/breast or pants pocket. When a mobile phone is ON, it automatically transmits at high power every one or two minutes to check (poll) the network.

Radiation Booklet

* A booklet addressing possible queries from mobile telecom users on radiation-related issues along with other informative inputs is also being placed on DoT website.

TEC Test Procedures Document for Service Providers and Term Cell Units

* TEC has revised the Test Procedure for measurement of EMF elaborating the methodology, calculations, measurements and report formats for verification of EMF compliance for BTS towers in accordance with new standards effective from 1st Sept. 2012. This will be applicable for all Mobile Service Providers and Term Cell Units to verify compliance.

Department of Telecommunications, Ministry of Communications & IT has ensured that the new EMF Radiation standards get implemented through close co-ordination with the industry.

The guidelines underline the Government's efforts at providing the best possible Telecom services across the country without compromising on public safety and human health. (Release ID :87152)

<http://www.prlog.org/11966704>

Russian Cell Phone Standards Offer Better Protection than American Standards

Unlike the U.S. radiofrequency standards that regulate cell phones, the Russian standards are based on the precautionary principle. Moreover, they are designed to protect the public from all risks due to cell phone radiation, not just from heating.

Joel M. Moskowitz, PRLog (Press Release), July 5, 2012

In a review paper just published online in the journal, *Bioelectromagnetics*, Michael Repacholi and his colleagues take issue with the “philosophy” underlying the Russian radiofrequency (RF) standards. Unlike the U.S. and European standards, the Russian standards are based on the precautionary principle and were designed to protect the public from all potential risks from exposure to cell phone radiation, not just heating effects.

The authors of this paper point out that the Russian RF standards were based on studies that demonstrated autoimmune effects of exposure to RF that were not necessarily pathological. In contrast to standards adopted by other governments including the U.S., Russia adopted a precautionary approach in setting the RF standards:

“The general approach to public health protection and setting exposure limits by previous Soviet and current Russian committees is that people should not have to compensate for any effects produced by RF exposure, even though they are not shown to be adverse to health (pathological). In other words, these committees assume there could be long-term health consequences if people have to compensate for RF exposures that produce biological but not pathological effects. Exposure limits are then set that do not cause any possible biological consequence among the population (regardless of age or gender) that could be detected by modern methods during the RF exposure period or long after it has finished. Their approach to protection is that limits of RF exposure should not cause even a temporary initiation of the protective or adaptive compensatory mechanisms over the near or long term. Thus, the final exposure limits are set as a fraction of the minimum RF exposure that is capable of provoking some adaptation-compensatory reactions in people.”

“This is an important difference from the approach used by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), which bases its limits on the lowest RF exposure that causes any established adverse health effect (RFLowest). Limit values in their guidelines are then set by assuming that there is maximum absorption of the RF field by people and then reducing the RFLowest by large safety factors to produce the final limits, normally by a factor of 50 lower than the RFLowest for the general public [ICNIRP, 1998].”

The authors claim that the Russian standards are based on old research that is flawed, but they do not critique this research as the focus of their paper is on the philosophy underlying the standards.

The authors do not discuss the serious limitations of the industry-developed (IEEE and ICNIRP) guidelines that form the basis for the U.S. and European standards. These standards only recognize adverse health effects caused by heating tissue (i.e., thermal effects) and not the various adverse health effects that research has shown to be associated with non-thermal mechanisms.

Unlike the U.S. standards adopted by the F.C.C. in 1996 which treat children like adults, the Russian guidelines for children are more sensible as they take a precautionary approach in protecting children’s health:

“Children are not small adults since they are developing organisms with special sensitivities and might be expected to be more sensitive to EMF than adults [Grigoriev, 2005; Kheifets et al., 2005]. Thus, results of studies conducted on adults might not be validly extrapolated to children; therefore, the RNCNIRP [i.e., the Russian committee] considered that children need special consideration when developing exposure limits. According to the RNCNIRP, the following health hazards are likely to be faced in the near future by children who use mobile phones: disruption of memory, decline in attention, diminished learning and cognitive abilities, increased irritability, sleep problems, increase in sensitivity to stress, and increased epileptic readiness. For these reasons, special recommendations on child safety from mobile phones have been incorporated into the current Russian mobile phone standard [Russian Standard, 2003].”

“Recommends limiting mobile phone call time as much as possible and limiting possibility of use by children age < 18 years, pregnant women and pacemaker wearers” (see 2003 Russian standards in Table 2)

The authors of this paper disparage Russia’s “philosophy of protection”:

“The philosophy of protection of the public- that RF exposure of individuals should not cause any compensatory response-is not used in standards outside of Russia. National authorities in most countries want to know what health effects they are protecting against and not make assumptions about what effects may occur. This is the philosophy of the ICNIRP and IEEE committees.”

If the purpose of a nation’s RF emission standards is to protect population health, doesn’t the precautionary approach seem more prudent? When the F.C.C. conducts the next review of its 16-year old RF standards for cell phone radiation, a precautionary perspective should be applied. The standards should be revised to enable cell phone communications with emissions that are “as low as reasonably achievable” (ALARA), and all non-thermal effects, including auto-immune and reproductive health effects, must be considered.

Source

Michael Repacholi, Yuri Grigoriev, Jochen Buschmann, Claudio Pioli. Scientific basis for the Soviet and Russian radiofrequency standards for the general public. *Bioelectromagnetics*. Published online July 2, 2012.

Abstract

The former Soviet Union (USSR) and the USA were the first countries to introduce standards limiting exposure to radiofrequency (RF) fields. However, the exposure limits in the USSR standards were always much lower than those in the USA and other countries. The objective of this article is to provide a history of the development of the Soviet and Russian RF standards. In addition, we summarize the scientific evidence used to develop the original USSR RF and subsequent Russian public health standards, as well as the mobile telecommunications standard published in 2003, but we do not critique them. We also describe the protective approaches used by the Soviet and Russian scientists for setting their limits. A translation of the papers of the key studies used to develop their standards is available in the online version of this publication.

URL: <http://onlinelibrary.wiley.com/doi/10.1002/bem.21742/abstract>

<http://www.prlog.org/11916029>

Italian Supreme Court Rules Cell Phones Can Cause Cancer

What are the implications of this ruling for the United States?

Joel M. Moskowitz, PRLog (Press Release), Oct 19, 2012

Contrary to the denials of many health agencies in the U.S. and in some other countries, the Italian Supreme Court has recognized a "causal" link between heavy mobile phone use and brain tumor risk in a worker's compensation case.

The Italian courts dismissed research co-financed by the mobile phone industry including the WHO Interphone study due to concerns about conflict of interest.

Instead, the courts relied on independent research conducted by Lennart Hardell and his colleagues in Sweden which showed consistent evidence of increased brain tumor risk associated with long term mobile phone use. Last year, the Hardell research was heavily relied upon by 31 experts convened by the WHO who classified radiofrequency energy, including cell phone radiation, as "possibly carcinogenic" in humans.

In our review of the cell phone use - tumor risk research published in the ***Journal of Clinical Oncology*** in 2009, we found that research co-financed by the Telecom industry was unlikely to report evidence of tumor risk and employed poorer quality research methods than independently-funded research. Moreover, in more recently published research, authors of studies co-financed by the industry dismissed as artifactual the evidence of increased brain tumor risk they found in children as well as adults.

In our paper, we raised concerns that conflicts of interest may have affected the conduct of the research and biased the reporting of it. In our rebuttal to three letters to the editor submitted by individuals with industry affiliations or funding, we called on governments to fund cell phone radiation research that is independent of industry in order to avoid even the appearance of a conflict of interest.

Since there are now more than 330 million cell phone subscribers in the U.S., an annual fee of 50 cents on each cell phone would generate sufficient resources to fund high quality, independent research that could promote safer technology development and fund a community education program about safer cell phone use.

Although 12 nations and the European Union have issued precautionary health warnings regarding mobile phone use, the U.S. has been in denial. The Telecom industry has blocked numerous attempts to pass cell phone warning legislation at the Federal, state, and city level. The industry even refused to support a bill in the California legislature by Senator Mark Leno that would simply remind consumers to read the safety information that is currently printed in their cell phone user manuals.

Only one city has been able to overcome intense lobbying by the Telecom industry. San Francisco adopted cell phone "right to know" legislation two years ago, but the Telecom industry (i.e., CTIA-The Wireless Association) blocked implementation of this law by filing a lawsuit claiming that the court-approved fact sheet violates the industry's First Amendment rights. The CTIA also moved its annual conference from San Francisco to punish the city.

The evidence of harm from cell phone radiation has been increasing so it is only a matter of time before lawsuits filed in U.S. courts by cell phone radiation victims will be successful. The Insurance industry will not provide product liability insurance due to concerns that juries will find that the Telecom industry has

behaved much like the Tobacco and Asbestos industries. So the Telecom industry could be faced with paying huge damages to individuals and governments.

The Telecom industry could become good corporate citizens, reduce potential product liability and protect consumers' health by allowing the FCC to adopt stronger regulations, by promoting precautionary safety warnings and by encouraging government to support independent research to promote safer wireless technologies.

Otherwise taxpayers may be forced to bail out yet another industry too big to fail.

For more information on the Italian Supreme Court ruling see:

<http://www.reuters.com/article/2012/10/19/italy-phones-id...>

<http://www.prlog.org/12004383-italian-supreme-court-rules-cell-phones-can-cause-cancer.html>

Smart Meters: Correcting the Gross Misinformation

La Maison du 21e siecle, Jul 11, 2012

Quebec-based magazine [La Maison du 21e siecle](#) asked physician [David O. Carpenter](#), former founding dean of the University at Albany (NY)'s School of Public Health, to comment on a letter published in the Montreal daily *Le Devoir* last May 24. This letter claimed wireless smart meters pose no risk to public health. Some forty international experts contributed to the following rebuttal.

We, the undersigned are a group of scientists and health professionals who together have coauthored hundreds of peer-reviewed studies on the health effects of electromagnetic fields (EMFs). We wish to correct some of the gross misinformation found in the [letter regarding wireless "smart" meters that was published in the Montreal daily Le Devoir on May 24](#). Submitted by a group [Quebec engineers, physicists and chemists](#), the letter in question reflects an obvious lack of understanding of the science behind the health impacts of the radiofrequency (RF)/microwave EMFs emitted by these meters.

The statement that « Thousands of studies, both epidemiological and experimental in humans, show no increase in cancer cases as a result of exposure to radio waves of low intensity... » is [false \(1\)](#). [In fact, only a few such studies — two dozen case-control studies of mobile phone use](#), certainly not thousands, have reported no elevations of cancer, and most were funded by the wireless industry. In addition, these reassuring studies contained significant experimental design flaws, mainly the fact that the populations followed were too small and were followed for a too short period of time.

Non industry-funded studies have clearly demonstrated a significant increase in cancer cases among individuals who have suffered from prolonged exposure to low-level microwaves, transmitted notably by radio antennas. The effects were best documented in meta-analyses that have been published and that include grouped results from several different studies: [these analyses](#) consistently showed an [increased risk of brain cancer](#) among regular users of a cell phone who have been exposed to microwaves [for at least ten years](#).

Brain Cancer Rates

Furthermore, the argument that brain cancer rates do not indicate an overall increase in incidence is not evidence that cell phones are safe: the latency for brain cancer in adults after environmental exposure can be long, up to 20-30 years. Most North Americans haven't used cell phones extensively for that long. The evidence of the link between long-term cell phone use and brain cancer comes primarily from Northern Europe, where cell phones have been commonly used since the 1990s.

Children are especially at risk. In May 2012, the [U.K.'s Office of National Statistics reported a 50 percent increase in incidence of frontal and temporal lobe tumors in children between 1999 and 2009](#). This statistic is especially disturbing since in May 2011, after reviewing the published scientific literature regarding cancers affecting cell phone users, [the International Agency for Research on Cancer \(IARC\) classified radiofrequency radiation as a 2B, possible human carcinogen](#). Despite the absence of scientific consensus, the evidence is sufficiently compelling for any cautious parent to want to reduce their loved one's exposure to RF/microwave emissions as much as possible, as recommended by [various countries](#) such as Austria, Belgium, [Germany](#), [Russia](#) and the [United Kingdom](#).

Electrosensitivity

Public fears about wireless smart meters are well-founded. They are backed by various medical authorities such as the Public Health Departments of [Santa Cruz County](#) (California) and of Salzburg

State (Austria). These authorities are worried about the growing number of citizens who say they have developed electrohypersensitivity (EHS), especially since for many of them, the symptoms developed after the installation of such meters (it takes some time for most people to link the two events).

Since the turn of the millennium, people are increasingly affected by ambient microwaves due to the growing popularity of wireless devices such as cell phones and Wi-Fi Internet. Therefore, the mass deployment of smart grids could expose large chunks of the general population to alarming risk scenarios without their consent. According to [seven surveys done in six European countries between 2002 and 2004, about 10% of Europeans have become electrosensitive, and experts fear that percentage could reach 50% by 2017](#). The most famous person to [publicly reveal her electrosensitivity is Gro Harlem Brundtland](#), formerly Prime Minister of Norway and retired Director of the World Health Organization (WHO).

[While there is no consensus on the origins and mechanisms of EHS](#), many [physicians and other specialists around the world](#) have become aware that EHS symptoms (neurological dermatological, acoustical, etc.) seem to be triggered by exposure to EMF levels well below current international exposure limits, which are established solely on short-term thermal effects (2). Organizations such as the [Austrian Medical Association](#) and the [American Academy of Environmental Medicine](#) have recognized that the ideal way to treat of EHS is to reduce EMF exposure.

Therefore, caution is warranted because the growing variety of RF/microwave emissions produced by many wireless devices such as smart meters have never been tested for their potential biological effects.

Well-known bioeffects

While the specific pathways to cancer are not fully understood, it is scientifically unacceptable to deny the weight of the evidence regarding the increase in cancer cases in humans that are exposed to high levels of RF/microwave radiation.

The statement that « there is no established mechanism by which a radio wave could induce an adverse effect on human tissue other than by heating » is incorrect, and reflects a lack of awareness and understanding of the scientific literature on the subject. In fact, [more than a thousand studies](#) done on low intensity, high frequency, non-ionizing radiation, going back at least fifty years, show that some biological mechanisms of effect do not involve heat. This radiation sends signals to living tissue that stimulate biochemical changes, which can generate various symptoms and may lead to diseases such as cancer.

Even though RF/microwaves don't have the energy to directly break chemical bonds, unlike ionizing radiation such as X-rays, there is scientific evidence that this energy can cause DNA damage indirectly leading to cancer by a combination of biological effects. [Recent publications](#) have documented the generation of free radicals, [increased permeability of the blood brain barrier](#) allowing potentially toxic chemicals to enter the brain, induction of genes, as well as altered electrical and metabolic activity in human brains upon application of cell phone RF/microwaves similar to those produced by smart meters.

These effects are cumulative and depend on many factors including RF/microwave levels, frequency, waveform, exposure time, biovariability between individuals and combination with other toxic agents. Clear evidence that these microwaves are indeed bioactive has been shown by the fact that low-intensity EMFs have proven clinically useful in some circumstances. Pulsed EMFs have long been used to successfully [treat bone fractures](#) that are resistant to other forms of therapy. More recently, frequency-specific, amplitude-modulated EMFs have been found useful to treat [advanced carcinoma](#) and chronic pain.

High frequency EMFs such as the microwaves used in cell phones, smart meters, Wi-Fi and cordless “DECT” phones, appear to be the most damaging when used commonly. Most of their biological effects, including symptoms of electrohypersensitivity, can be seen in the damage done to cellular membranes by the [loss of structurally-important calcium ions](#). Prolonged exposure to these high frequencies may eventually lead to cellular malfunction and death.

Furthermore, malfunction of the parathyroid gland, located in the neck just inches from where one holds a cell phone, may actually cause electrohypersensitivity in some people by reducing the background level of calcium ions in the blood. RF/microwave radiation is also known to [decrease the production of melatonin](#), which protects against cancer, and to [promote the growth of existing cancer cells](#).

Early warning scientists attacked

In recommending that the Precautionary Principle be applied in EMF matters, the European Environment Agency’s Director [Jacqueline McGlade wrote in 2009](#): “We have noted from previous health hazard histories such as that of lead in petrol, and methyl mercury, that ‘early warning’ scientists frequently suffer from discrimination, from loss of research funds, and from unduly personal attacks on their scientific integrity. It would be surprising if this is not already a feature of the present EMF controversy... » Such unfortunate consequences have indeed occurred.

The statement in the *Le Devoir* letter that « if we consider that a debate should take place, it should focus exclusively on the effects of cell phones on health » is basically an acknowledgement that there is at least some reason to be concerned about cell phones. However, while the immediate exposure from a cell phone is of much greater intensity than the exposure from smart meters, cell phone use is temporary.

Smart meters

Wireless smart meters typically produce atypical, relatively potent and very short pulsed RF/microwaves whose biological effects have never been fully tested. They emit these millisecond-long RF bursts on average 9,600 times a day with a maximum of 190,000 daily transmissions and a peak level emission two and a half times higher than the stated safety signal, as the California utility [Pacific Gas & Electric recognized](#) before that State’s Public Utilities Commission. Thus people in proximity to a smart meter are at risk of significantly greater aggregate exposure than with a cell phone, not to mention the cumulative levels of RF/microwaves that people living near several meters are exposed to.

People are exposed to cell phone microwaves primarily in the head and neck, and only when they use their device. With smart meters, the entire body is exposed to the microwaves, which increases the risk of overexposure to many organs.

In addition to these erratic bursts of modulated microwaves coming from smart meters that are transferring usage data to electric, gas and water utilities, wireless and wired smart (powerline communication) meters are also a major source of “dirty electricity” (electrical interference of high frequency voltage transients typically of kilohertz frequencies). Indeed, some scientists, such as [American epidemiologist Sam Milham](#), believe that many of the health complaints about smart meters may also be caused by dirty electricity generated by the « switching » power supply activating all smart meters. Since the [installation of filters to reduce dirty electricity](#) circulating on house wiring has been found to relieve symptoms of EHS in some people, this method should be considered among the priorities aimed at reducing potential adverse impacts.

Rather be safe than sorry

The apparent adverse health effects noted with smart meter exposure are likely to be further

exacerbated if smart appliances that use wireless communications become the norm and further increase unwarranted exposure.

To date, there have been few independent studies of the health effects of such sources of more continuous but lower intensity microwaves. However, we know after decades of studies of hazardous chemical substances, that chronic exposure to low concentrations of microwaves can cause equal or even greater harm than an acute exposure to high concentrations of the same microwaves.

This is why so many scientists and medical experts urgently recommend that measures following the Precautionary Principle be applied immediately — such as using wired meters — to reduce biologically inappropriate microwave exposure. We are not advocating the abolishment of RF technologies, only the use of common sense and the development and implementation of best practices in using these technologies in order to reduce exposure and risk of health hazards.

[1. Scientific papers on EMF health effects](#)

[2. Explanation and studies on electrosensitivity](#)

[3. Governments and organizations that ban or warn against wireless technology](#)

- [David O. Carpenter](#), MD, Director, Institute for Health & the Environment, University at Albany, USA
- [Jennifer Armstrong](#), MD, Past President, Canadian Society of Environmental Medicine, Founder, Ottawa Environmental Health Clinic, Ontario, Canada
- Pierre L. Auger, M. D., FRCPC, Occupational medicine, Multiclinique des accidentés 1464, Montreal, Quebec, Canada
- [Fiorella Belpoggi](#), Director Cesare Maltoni Cancer Research Center, Ramazzini Institute, Bologna, Italy
- [Martin Blank](#), PhD, former President, Bioelectromagnetics Society, Special Lecturer, Department of Physiology and Cellular Biophysics, Columbia University Medical Center, New York, USA
- [Barry Breger](#), MD, Centre d'intégration somatosopique (orthomolecular medicine), Montreal, Quebec
- [John Cline](#), MD, Professor, Institute for Functional Medicine, Federal Way, WA, USA, Medical Director, Cline Medical Centre, Nanaimo, BC, Canada
- [Alvaro Augusto de Salles](#), PhD, Professor of Electrical Engineering, Federal University of Rio Grande do Sul, Porto Alegre, Brazil
- [Christos Georgiou](#), Prof. Biochemistry, Biology Department, University of Patras, Greece
- [Andrew Goldsworthy](#), PhD, Honorary lecturer in Biology, Imperial College, London, UK
- [Claudio Gómez-Perretta](#), MD, PhD, Director, Centro de Investigación, Hospital Universitario LA Fe, Valencia, Spain
- [Livio Giuliani](#), PhD, Senior Researcher, National Insurance Institute (INAIL), Chief of Radiation and Ultrasounds Research Unit, Rome, Italy
- [Yury Grigoriev](#), PhD, Chair Russian National Committee on Non-Ionizing Radiation Protection, Moscow, Russia
- [Settimio Grimaldi](#), PhD, Director, Institute of Translational Pharmacology (Neurobiology and molecular medicine), National Research Council, Rome, Italy
- [Magda Havas](#), PhD, Centre for Health Studies, Trent University, Canada
- [Lennart Hardell](#), MD, Professor of Oncology, University Hospital, Örebro, Sweden
- [Denis L. Henshaw](#), PhD, Professor of Physics, Head of The Human Radiation Effects Group, University of Bristol, UK
- [Ronald B. Herberman](#), MD, Chairman of Board, Environmental Health Trust, and Founding Director emeritus, University of Pittsburgh Cancer Institute, USA
- [Isaac Jamieson](#), PhD Environmental Science (electromagnetic phenomena in the built environment), independent architect, scientist and environmental consultant, Hertfordshire, UK

- [Olle Johansson](#), PhD, Professor of Neuroscience (Experimental Dermatology Unit), Karolinska Institute, Stockholm, Sweden
- [Yury Kronn](#), PhD, Soviet authority on physics of nonlinear vibrations and high frequency electromagnetic vibrations, founder of Energy Tools International, Oregon, USA
- [Henry Lai](#), PhD, Professor of Bioengineering, University of Washington School of Medicine, Seattle, WA, USA
- [Abraham R. Liboff](#), PhD, Professor Emeritus, Department of Physics, Oakland University, Rochester, Michigan, USA
- [Don Maisch](#), PhD, Researcher on radiation exposure standards for telecommunications frequency, EMFacts Consultancy, Tasmania, Australia
- [Andrew A. Marino](#), MD, PhD, JD, Professor of Neurology, LSU Health Sciences Center, Shreveport, LA, USA
- [Karl Maret](#), MD, M.Eng., President, Dove Health Alliance, Aptos, CA, USA
- [Sam Milham](#), MD, former chief epidemiologist, Washington State Department of Health, USA
- [Joel M. Moskowitz](#), PhD, Director, Center for Family and Community Health, School of Public Health, University of California, Berkeley
- [Gerd Oberfeld](#), MD, Public Health Department, Salzburg State Government, Austria
- [Jerry L. Phillips](#), PhD, Director, Center for Excellence in Science, Department of Chemistry and Biochemistry, University of Colorado, USA
- [William J. Rea](#), MD, thoracic and cardiovascular surgeon, founder of the Environmental Health Center, Dallas, Tx, USA
- [Elihu D. Richter](#), MD, Professor, Hebrew University-Hadassah School of Public Health and Community Medicine, Jerusalem, Israel
- [Cyril W. Smith](#), PhD, lead author of “Electromagnetic Man”, retired from Electronic and Electrical Engineering, University of Salford, UK
- [Morando Soffritti](#), MD, Scientific Director of the European Foundation for Oncology and Environmental Sciences “B. Ramazzini” in Bologna, Italy
- [Antoinette “Toni” Stein](#), PhD, Collaborative on Health and the Environment (CHE-EMF Working Group), Co-Coordinator, Berkeley, CA, USA
- [Stanislaw Szmigielski](#), MD, PhD Professor of Pathophysiology, Consulting Expert, former director of Microwave Safety, Military Institute of Hygiene and Epidemiology, Warsaw, Poland
- [Bradford S. Weeks](#), MD, Director, The Weeks Clinic, Clinton, WA, USA
- [Stelios A. Zinelis](#), MD, Vice-President, Hellenic Cancer Society, Cefallonia, Greece

Coordination: Andre Fauteux, Publisher and Editor in chief, *la Maison du 21e siècle* [magazine](#), Sainte-Adele, Quebec, Canada.

<http://maisonsaine.ca/smart-meters-correcting-the-gross-misinformation/>

Health Experts Caution About Smart Meters

More than 50 scientists and medical professionals from 20 countries call for precaution regarding deployment of wireless “smart meters.”

Joel M. Moskowitz, PRLog Press Release, Sep 19, 2012

Fifty-three experts on the health effects of electromagnetic fields (EMFs) have called for “use of common sense and the development and implementation of best practices in using these technologies in order to reduce exposure and risk of health hazards.”

These scientists and medical professionals who come from twenty countries have published hundreds of peer-reviewed studies on the health effects of EMFs.

Following are excerpts from the open letter they signed, "**Smart Meters: Correcting the Gross Misinformation**":

- “the mass deployment of smart grids could expose large chunks of the general population to alarming risk scenarios without their consent.”
- “many scientists and medical experts urgently recommend that measures following the Precautionary Principle be applied immediately such as using wired meters to reduce biologically inappropriate microwave exposure. We are not advocating the abolishment of RF technologies, only the use of common sense and the development and implementation of best practices in using these technologies in order to reduce exposure and risk of health hazards.”
- “the International Agency for Research on Cancer (IARC) classified radiofrequency radiation as a 2B, possible human carcinogen“
- “Children are especially at risk.”
- “While the specific pathways to cancer are not fully understood, it is scientifically unacceptable to deny the weight of the evidence regarding the increase in cancer cases in humans that are exposed to high levels of RF/microwave radiation”
- “more than 1,000 studies done on low intensity, high frequency, non-ionizing radiation, going back at least fifty years, show that some biological mechanisms of effect do not involve heat. This radiation sends signals to living tissue that stimulate biochemical changes, which can generate various symptoms and may lead to diseases such as cancer.”
- “this energy can cause DNA damage indirectly leading to cancer by a combination of biological effects. Recent publications have documented the generation of free radicals, increased permeability of the blood brain barrier allowing potentially toxic chemicals to enter the brain, induction of genes, as well as altered electrical and metabolic activity in human brains upon application of cell phone RF/microwaves similar to those produced by smart meters.”

- "High frequency EMFs such as the microwaves used in cell phones, smart meters, Wi-Fi and cordless "DECT" phones, appear to be the most damaging when used commonly."
- "authorities are worried about the growing number of citizens who say they have developed electrohypersensitivity (EHS), especially since for many of them, the symptoms developed after the installation of such meters."
- "adverse neurological effects have been reported in people who sustain close proximity to wireless meters, especially under 10 feet"
- "Wireless smart meters typically produce atypical, relatively potent and very short pulsed RF/microwaves whose biological effects have never been fully tested. They emit these millisecond-long RF bursts on average 9,600 times a day with a maximum of 190,000 daily transmissions and a peak level emission two and a half times higher than the stated safety signal"
- "People in proximity to a smart meter are at risk of significantly greater aggregate of RF/microwave exposure than with a cell phone, not to mention the cumulative exposure received by people living near multiple meters mounted together, pole-mounted routers or utility collector meters using a third antenna to relay RF signals from 500 to 5,000 homes."
- "RF levels from various scenarios depicting normal smart meter installation and operation may violate even the out-of-date US public safety standards which only consider acute thermal effects."
- "caution is warranted because the growing variety of RF/microwave emissions produced by many wireless devices such as smart meters have never been tested for their potential biological effects."

Dr. David Carpenter, founder of the University of Albany (NY) School of Public Health, drafted the original letter with input from experts from many countries. The letter was just updated and signed by many additional scientists and medical professionals from all five continents. In the U.S., co-signers include researchers at Columbia University, Michigan State University, the University of California at Berkeley, the University of Colorado, the University of Pittsburgh, and the University of Washington.

In addition to the need to take precaution, we need research to develop safer technologies that will reduce our exposure to electromagnetic radiation from wireless devices including smart meters, Wi-Fi, and cell phones. The Federal government needs to fund a major research initiative that is independent of industry to prevent conflicts of interest. This research could be supported by a small fee of 50 cents per year assessed on each cell phone.

The open letter, a list of the 54 experts who signed it and their affiliations, and links to supplementary resources are available at: <http://maisonsaine.ca/smart-meters-correcting-the-gross-misinformation/>

André Fauteux, Editor, La Maison du 21e siècle magazine, Sainte-Adèle, Quebec info@maisonsaine.ca
450 228-1555

<http://www.prlog.org/11978228.html>

**Adoption of Wi-Fi in Los Angeles USD Classrooms
(Open Letter e-mailed to LAUSD Staff and School Board)**

TO: Los Angeles Unified School District (LAUSD)

FROM: Joel M. Moskowitz, Ph.D.
Director, Center for Family and Community Health
School of Public Health
University of California, Berkeley

RE: Adoption of Wi-Fi in Classrooms

DATE: February 8, 2013

Based upon my review of the research of the health effects associated with exposure to radiofrequency (RF) electromagnetic radiation (EMR), especially microwave radiation, I feel compelled to register my concern that adoption of Wi-Fi in LAUSD classrooms is likely to put at risk the health of many students and employees in the District.

In December, Dr. Gayle Nicoll of URS Corporation asked me to serve as an expert reviewer for a report that URS prepared for the LAUSD regarding the adoption of Wi-Fi in classrooms. Since Ms. Nicoll could not assure me that URS has no conflicts of interest, I turned down her request and sent her references to recent studies about Wi-Fi radiation. I cc:ed Board members and key staff as I was concerned about the health risks of unnecessarily subjecting 660,000 children to 13,000 hours of Wi-Fi microwave radiation during their K-12 school years.

Although I have not seen the URS report, I imagine it is based on the FCC's outmoded 1996 safety standards which only protect the public from the thermal risk of RF EMR exposure (i.e., from heating of tissue). For the past three years, in numerous media interviews I have been calling on the FCC to strengthen its standards and testing procedures to protect the public and workers from the low-intensity, non-thermal risks of RF EMR exposure that have been reported in hundreds, if not thousands, of research studies. These include increased risk of neurological and cardiovascular problems, sperm damage and male infertility, reproductive health risks, and cancer.

The precautionary principle should be applied to this critical policy decision. This principle, developed at a U.N. environmental conference in 1992, states that in the absence of scientific consensus if an action has a suspected risk of causing harm, the burden of proof it is not harmful falls on those taking the action, and all reasonable measures to reduce the risk must be taken.

Internet access can be provided to students through wires or optical fiber without installing Wi-Fi in the classrooms.

For further information, please see my Electromagnetic Radiation Safety web site at <http://saferemr.blogspot.com> where I have archived news releases and links to recent reports by major scientific groups and political agencies.

Sincerely,

Joel M. Moskowitz, Ph.D.

<http://saferemr.blogspot.com/2013/02/adoption-of-wi-fi-in-los-angeles-usd.html>

Wireless Industry's Patented System to Reduce Cancer Risk from Wireless Local Networks Never Adopted

A major telecom company patented a system to reduce "electrosmog" from wireless local networks to reduce cancer risks associated with non-thermal exposures to microwave radiation. The industry has known the risks for many years but has failed to act.

Joel M. Moskowitz, PRLog (Press Release), Mar 11, 2013

Swisscom AG, a major telecommunications provider in Switzerland, filed U.S. and international patent applications for an innovative system to reduce "electrosmog" from wireless local networks (i.e., Wi-Fi) in 2003.

This patent application acknowledged the cancer risk from exposure to wireless radiation eight years before the WHO's International Agency for Research on Cancer declared that radiofrequency energy, including cell phone and Wi-Fi radiation, is a "possible carcinogen" to humans, like DDT and lead.

Furthermore, the application acknowledged that low-intensity, non-thermal exposures to wireless radiation is genotoxic. This is critical because the current U.S. regulatory standard for wireless radiation, established in 1996, does not protect us from non-thermal exposures.

According to this 2003 patent application, the "influence of electrosmog on the human body is a known problem." (1) The application states:

"The health risk from mobile radio transmitters, handys (i.e., cell phones) and DECT (i.e., cordless) telephones has been an explosive subject among the general public at least since the enormous breakthrough in mobile radio technology in the 1990s. To meet the concerns of science from the legislative side, the permissible limit values have thus been lowered several times, and technology has been increasingly focused on this problem. The risk of damage to health through electrosmog has also become better understood as a result of more recent and improved studies. When, for example, human blood cells are irradiated with electromagnetic fields, clear damage to hereditary material has been demonstrated and there have been indications of an increased cancer risk (Mashevich et al., 2003) ... an aneuploidy (=numerical chromosome aberration) - was observed as a function of the SAR, demonstrating that this radiation has a genotoxic effect ... These findings indicate that the genotoxic effect of electromagnetic radiation is elicited via a non-thermal pathway. Moreover aneuploidy is to be considered as a known phenomenon in the increase of cancer risk." (1)

The application further explains:

"Thus it has been possible to show that mobile radio radiation can cause damage to genetic material, in particular in human white blood cells, whereby both the DNA itself is damaged and the number of chromosomes changed. This mutation can consequently lead to increased cancer risk. In particular, it could also be shown that this destruction is not dependent upon temperature increases, i.e. is non-thermal. Based on the scientific studies in the field, and owing to increasing pressure from the public, especially in the industrialized countries, epidemiological studies have been systematized by the World Health Organization (WHO) in the last few years, such as e.g. the currently running WHO Interphone Project, in order to be able to assess more precisely the health risks from electrosmog and work out corresponding guidelines." (1)

The proposed system works as follows. After a specified time without a connecting signal, the base station in this system switches from the normal transmitting/receiving mode to a sleep mode in which no signals are transmitted. When a mobile unit, such as a tablet, laptop or smart phone, requires a network connection, it transmits an alert signal, and the base station switches back to its normal mode.

Ten years after this patent was filed, the system is unavailable. How many other harm reduction technologies have been patented by the Wireless Industry but never used to reduce our risk of cancer and other diseases associated with exposure to wireless radiation?

After its experience with tobacco and asbestos, it's no wonder that the insurance industry will not provide product liability insurance to the Wireless Industry (2). This patent application demonstrates that the Wireless Industry has known for many years the potential health risks from use of its technology. Yet the Industry continues to fight efforts to educate the public about these risks and blocks effective regulation of wireless radiation in the U.S. and in other countries.

Fifteen nations and the European Union have issued precautionary health warnings about cell phone radiation. However, efforts at the Federal, state, and local level in the U.S. have repeatedly been blocked by political and legal opposition from the CTIA, the Wireless Industry's lobbying arm.

Instead, the Industry promotes installation of cell phone towers, Wi-Fi, and wireless Smart Meters everywhere without regard to the population's overall exposure to microwave radiation. Many people are likely to suffer serious health consequences from this massive increase in electrosmog.

Based upon our nation's experience with other industries like tobacco and asbestos, the Wireless Industry will likely procrastinate taking action to reduce harm until it is faced with huge product liability settlements. Unfortunately, it may take awhile before such lawsuits are successful since the Industry has co-opted many scientists, and the scientific literature has mixed findings that enable industry experts to confuse juries.

Based upon the precautionary principle, policy makers should adopt effective regulation now to protect us from this emerging threat to public health. Strong public support is needed to overcome the Industry's political power.

For more information about wireless radiation health effects and health policy, see my Electromagnetic Radiation Safety web site at <http://saferemr.com> and my saferemr Facebook page which has links to the BioInitiative 2012 Report and the new European Environment Agency report. For regular updates on this and other health promotion issues, subscribe to my Twitter account @berkeleyprc.

References

(1) "Reduction of Electrosmog in Wireless Local Networks." WIPO: Patentscope. International Patent Application No. PCT/CH2003/000138. URL: <http://patentscope.wipo.int/search/en/detail.jsf?docId=WO2004075583>

(2) Lloyd's Emerging Risks Team Report (version 2.0). "Electro-magnetic Fields from Mobile Phones: Recent Developments." Nov. 2010. URL: <http://www.lloyds.com/The-Market/Tools-and-Resources/Research/Exposure-Management/Emerging-risks/Emerging-Risk-Reports/Health/EMF>

<http://www.prlog.org/12094566-wireless-industrys-patented-system-to-reduce-cancer-risk-from-wireless-local-networks-never-adopted.html>

Boeing Tests In-Flight Wireless on Potatoes, Not People

Should we allow airlines to adopt wi-fi and cellular systems on airplanes? Given the latest health research and our outmoded FCC wireless regulations, is this safe for humans, especially for pregnant women and children?

Joel M. Moskowitz, PRLog (Press Release), Dec. 19, 2012

A CNN headline today reads, "Boeing uses potatoes for in-flight wireless test" (Aaron Cooper, CNN, December 19, 2012: <http://www.cnn.com/2012/12/19/travel/potatoes-wireless/> .

Perhaps wi-fi radiation does not affect potatoes, but what about human health effects?

Given the latest research on secondhand exposure to microwave radiation, how confident can a bunch of engineers be that there are no health effects, especially for pregnant women and children, due to exposure to wi-fi in an airplane cabin that functions like a Faraday cage (1)?

Just because wi-fi on planes may comply with outmoded FCC standards does not make it safe for humans (2).

What about the growing number of people who suffer from electromagnetic hypersensitivity -- are they supposed to stop flying?

With a few exceptions, policy makers in the U.S. have largely ignored warnings from American health scientists like Devra Davis, David Carpenter, Hugh Taylor, Jonathan Samet, and myself about the long-term health effects associated with exposure to wireless microwave radiation. Meanwhile a dozen other nations have issued precautionary health warnings, and some have increased restrictions on use of wi-fi and cell phones especially among children.

(1) Secondhand Exposure to Cell Phone Radiation: An Emerging Public Health Problem?
<http://www.prlog.org/12010018>

(2) Does The FCC Plan To Rubber Stamp Outdated Cell Phone Radiation Standards?
<http://www.prlog.org/11901340>

For more information about the health effects associated with exposure to electromagnetic radiation, see ...

<http://ehtrust.org>

<http://electromagnetichealth.org>

<http://www.ewg.org/cellphone-radiation>

<http://www.microwavenews.com>

Cell Phones: Assessing and Preventing Risks, a Q&A I did with Dr. David Katz

http://www.huffingtonpost.com/david-katz-md/cell-phone-health-risks_b_869241.html

<http://www.prlog.org/12046596-boeing-tests-in-flight-wireless-on-potatoes-not-people.html>

Children's Cell Phone Use May Increase Their Risk of ADHD

A new study finds that children who use cell phones who are exposed to lead are at greater risk of developing Attention Deficit Hyperactivity Disorder (ADHD) than lead-exposed children who do not use cell phones much or at all.

Joel M. Moskowitz, PRLog Press Release, Apr 27, 2013

Eleven percent of American children have been diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) including nearly one in five high school age boys according to a recent report by the Centers for Disease Control and Prevention. (1)

Although we may be over-diagnosing ADHD and over-medicating children for this disorder, the 53 percent increase in ADHD diagnoses during the past decade may be attributable in part to increased exposure to environmental toxins in conjunction with exposure to microwave radiation from cell phones.

A research study published last week in ***PLoS One*** found that children exposed to lead who made more voice calls on their cell phone were at significantly greater risk of developing ADHD symptoms. Moreover, a significant dose-response relationship was observed between the number and duration of voice calls made on cell phones and ADHD risk among children exposed to lead in their environment. (2)

In this longitudinal study, 2,422 children at 27 elementary schools from 10 cities in South Korea were examined and followed up two years later. One fourth of the students were considered "lead-exposed," defined as having a blood lead level of at least 2.35 micrograms per deciliter. (2) In the U.S., about 5% of children ages 6-11 have blood lead levels of 2.5 or higher. (3) Since there are currently 25.2 million children in this age group (4), about 1.3 million American children could be at risk of ADHD if they are heavier cell phone users.

In the current study, heavier cell phone users either made 3 or more outgoing voice calls a day on average, spent a minute or more on calls, or logged 70 or more hours of calls in their lifetime. These children had 2-3 times the odds of developing ADHD symptoms as compared to other "lead-exposed" children who had minimal or no cell phone use.

The paper reviewed prior research which has shown (a) that exposure to radiofrequency electromagnetic fields can increase cognitive impairment and behavioral disorders including hyperactivity; (b) that lead is a neurotoxin which can cause ADHD and other cognitive problems; and (c) that exposure to electromagnetic fields increases the permeability of the blood-brain barrier. Thus, combining these two exposures, lead and cell phone radiation, could be a particularly toxic combination.

Prior studies conducted by researchers in Los Angeles have found increased behavioral problems reported by mothers of children in Denmark who were exposed to cell phone radiation pre- and post-natally. (5, 6)

A recent experimental study conducted by researchers at Yale University found that mice exposed prenatally to cell phone radiation later exhibited ADHD-like symptoms, and the degree of impairment was related to the number of hours of prenatal cell phone exposure. (7)

In the U.S., exposure to lead is quite common as it can be found in a variety of sources including paint in homes built before 1978; water pumped through leaded pipes; imported items like clay pots; certain consumer products (e.g., candies, makeup and jewelry); and certain imported home remedies.

Although the current longitudinal study has some limitations, the authors made the following recommendation:

“preventing the use of mobile phones in children may be one measure to keep children from developing ADHD symptoms regardless of the possible roles of mobile phone use in ADHD symptoms, i.e., whether potentiating the effect of lead exposure due to RF exposure and voice calls or behavioral aggravation due to high rates of playing games on a mobile phone.”

References

(1) Alan Schwarz and Sarah Cohen, New York Times, “A.D.H.D. seen in 11% of U.S. children as diagnoses rise.” March 31, 2012.

(2) Byun Y-H, Ha M, Kwon H-J, Hong Y-C, Leem J-H, et al. (2013) Mobile Phone Use, Blood Lead Levels, and Attention Deficit Hyperactivity Symptoms in Children: A Longitudinal Study. PLoS ONE 8(3): e59742. doi:10.1371/journal.pone.0059742.

Abstract

Background Concerns have developed for the possible negative health effects of radiofrequency electromagnetic field (RF-EMF) exposure to children’s brains. The purpose of this longitudinal study was to investigate the association between mobile phone use and symptoms of Attention Deficit Hyperactivity Disorder (ADHD) considering the modifying effect of lead exposure.

Methods A total of 2,422 children at 27 elementary schools in 10 Korean cities were examined and followed up 2 years later. Parents or guardians were administered a questionnaire including the Korean version of the ADHD rating scale and questions about mobile phone use, as well as socio-demographic factors. The ADHD symptom risk for mobile phone use was estimated at two time points using logistic regression and combined over 2 years using the generalized estimating equation model with repeatedly measured variables of mobile phone use, blood lead, and ADHD symptoms, adjusted for covariates.

Results The ADHD symptom risk associated with mobile phone use for voice calls but the association was limited to children exposed to relatively high lead.

Conclusions The results suggest that simultaneous exposure to lead and RF from mobile phone use was associated with increased ADHD symptom risk, although possible reverse causality could not be ruled out.

<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0059742>

(3) Exhibit 5-2. Blood lead concentrations for the U.S. population age 1 year and older by selected demographic groups. Environmental Protection Agency. URL:

<http://cfpub.epa.gov/eroe/index.cfm?fuseaction=detail.viewInd&lv=list.listbyalpha&r=224030&subtop=208>

(4) POP1 Child population: Number of children (in millions) ages 0–17 in the United States by age, 1950–2011 and projected 2012–2050. Forum on Child and Family Statistics: ChildStats.gov. URL:

<http://www.childstats.gov/americaschildren/tables/pop1.asp>

(5) Divan HA, Kheifets L, Obel C, Olsen J. Cell phone use and behavioural problems in young children. J Epidemiol Community Health. 2010 Dec 7. [Epub ahead of print]

<http://www.ncbi.nlm.nih.gov/pubmed/21138897>

(6) Divan HA, Kheifets L, Obel C, Olsen J. Prenatal and postnatal exposure to cell phone use and behavioral problems in children. *Epidemiology*. 2008 Jul;19(4):523-9.
<http://www.ncbi.nlm.nih.gov/pubmed/18467962>

(7) Tamir S. Aldad, Geliang Gan, Xiao-Bing Gao & Hugh S. Taylor. Fetal radiofrequency radiation exposure from 800-1900 Mhz-rated cellular telephones affects neurodevelopment and behavior in mice. *Scientific Reports*. Published online March 15, 2012. Corrected February 18, 2013.

<http://www.nature.com/srep/2012/120315/srep00312/full/srep00312.html>

<http://www.prlog.org/12110138>

Secondhand Exposure to Cell Phone Radiation: An Emerging Public Health Problem?

Exposure to other people's cell phone radiation on buses and trains can be considerable according to a newly published study.

Joel M. Moskowitz, PRLog (Press Release), Oct 29, 2012

Many people are unaware that they are exposed to cell phone radiation when their cell phones are in standby mode. This occurs because their cell phone contacts the nearest cell tower periodically to update its location.

In a moving vehicle, cell phones in standby mode contact cell towers more frequently. Thus, exposure to cell phone radiation from one's cell phone is greater in transit.

Two Swiss researchers, Damiano Urbinello and Martin Roosli, set out to measure personal cell phone radiation exposure during car, bus and train trips when one's own phone was in standby mode.

Their study just published in the ***Journal of Exposure Science and Environmental Epidemiology*** identified a source of cell phone radiation that may constitute a public health problem. Namely, secondhand exposure to cell phone radiation from other people's cell phones can be considerable while traveling on buses and trains (1).

During bus or train trips, individuals may be exposed to considerable amounts of cell phone radiation from other people's cell phones. Buses and railroad cars act like "Faraday cages" that reflect much of the electromagnetic radiation emitted by cell phones throughout the vehicles' interiors. Thus, all passengers, including infants and pregnant women as well as those without cell phones, may be exposed to considerable levels of cell phone radiation emitted by others' phones.

As for **car trips**, the results of the study suggest that exposure to cell phone radiation from one's own phone in standby mode is relatively low compared to overall exposures during public transit. Nonetheless, those who are concerned about their exposure to cell phone radiation should turn off their phones during car trips, or at the very least, avoid using their phones for calls.

- "The study indicates that own uplink exposure during car driving can be considerably reduced (about a fraction of 100) when turning off ones own mobile phone in order to prevent it from location updates." (1)

The researchers found that GSM, the 2G carrier system in Europe which is used in the U.S. for voice communication by AT&T and T-Mobile, is particularly problematic compared to UMTS, a 3G carrier system used for data transmission. The researchers did not test CDMA which in the U.S. is used by Verizon and Sprint for voice calls. Other research has found that GSM emits 13 to 28 times more radiation on average than CDMA during phone calls. No published studies have examined exposures from LTE, the 4G carrier system now in widespread use in this country.

- "GSM levels in the reference scenario during bus and train rides were about 100 times higher than those during car rides. As a consequence of this high background exposure in trains, due to the use of other people's mobile phone in a closed area intensified by the Faraday cage effect, the relative contribution of the location update from ones own mobile phone is small" (1)

The study also reported that smart phones, including the iPhone 4 and the Blackberry Bold 8800, which can operate on four radiofrequency bands emit more radiation during standby mode than classic phones,

like the Nokia 2600, which operate on two bands.

Earlier this year, a study was published that examined cell phones in standby mode while stationary. Kjell Mild and his colleagues from Sweden found that under these conditions cell phones contacted the cell towers only once every two to five hours. They concluded that exposure to cell phone radiation in this situation "can be considered negligible." (2)

These studies should be replicated in the U.S. as well as in other countries since every cell phone carrier system operates differently.

In the meantime it is advisable to keep cell phone use in moving vehicles to a minimum as low level exposures to cell phone radiation have been associated with deleterious effects in humans.

To protect us from the health risks associated with cell phones and related devices (e.g., cordless phones, Wi-Fi, wireless Smart Meters and security systems, and cell towers), we need research independent of industry to develop biologically-based standards and safer technologies. **A nickel a month from each cell phone subscription would suffice to fund a comprehensive program of research.** Since the average cell phone subscription costs more than \$47.00 per month, this tiny fee constitutes a prudent investment in our health and our children's health.

References

1) Urbinello D, Roosli M. Impact of one's own mobile phone in stand-by mode on personal radiofrequency electromagnetic field exposure. *Journal of Exposure Science and Environmental Epidemiology* advance online publication, Oct 24, 2012.

Source Department of Epidemiology and Public Health, Swiss Tropical and Public Health Institute, Basel, Switzerland and the University of Basel, Basel, Switzerland.

Abstract

When moving around, mobile phones in stand-by mode periodically send data about their positions. The aim of this paper is to evaluate how personal radiofrequency electromagnetic field (RF-EMF) measurements are affected by such location updates. Exposure from a mobile phone handset (uplink) was measured during commuting by using a randomized cross-over study with three different scenarios: disabled mobile phone (reference), an activated dual-band phone and a quad-band phone. In the reference scenario, uplink exposure was highest during train rides (1.19 mW/m²) and lowest during car rides in rural areas (0.001 mW/m²). In public transports, the impact of one's own mobile phone on personal RF-EMF measurements was not observable because of high background uplink radiation from other people's mobile phone. In a car, uplink exposure with an activated phone was orders of magnitude higher compared with the reference scenario. This study demonstrates that personal RF-EMF exposure is affected by one's own mobile phone in stand-by mode because of its regular location update. Further dosimetric studies should quantify the contribution of location updates to the total RF-EMF exposure in order to clarify whether the duration of mobile phone use, the most common exposure surrogate in the epidemiological RF-EMF research, is actually an adequate exposure proxy.

<http://www.ncbi.nlm.nih.gov/pubmed?term=23093102>

2) Mild KH, Andersen JB, Pedersen GF. Is there any exposure from a mobile phone in stand-by mode? *Electromagnetic Biology and Medicine*. 2012 Mar;31(1):52-6.

Source Department of Radiation Sciences, Ume niversity, Ume Sweden.
kjell.hansson.mild@radfys.umu.se

Abstract

Several studies have been using a GSM mobile phone in stand-by mode as the source for exposure, and they claimed that this caused effects on for instance sleep and testicular function. In stand-by mode the phone is only active in periodic location updates, and this occurs with a frequency set by the net operator. Typical updates occur with 2-5 h in between, and between these updates the phone is to be considered as a passive radio receiver with no microwave emission. Thus, the exposure in stand-by mode can be considered negligible.

<http://informahealthcare.com/doi/abs/10.3109/15368378.2011.624232>

<http://www.prlog.org/12010018-secondhand-exposure-to-cell-phone-radiation-an-emerging-public-health-problem.html>

LTE Cell Phone Radiation Affects Brain Activity in Cell Phone Users

New peer-reviewed research finds that 30 minutes' exposure to LTE cellphone radiation affects brain activity on both sides of the brain.

Joel M. Moskowitz, PRLog (Press Release), Sep 23, 2013

The first study on the short-term effects of Long Term Evolution (LTE), the fourth generation cell phone technology, has been published online in the peer-reviewed journal, ***Clinical Neurophysiology***. (1)

In a controlled experiment, researchers exposed the right ear of 18 participants to LTE cellphone radiation for 30 minutes. The source of the radiation was 1 centimeter from the ear, and the absorbed amount of radiation in the brain was well within international (ICNIRP) cell phone legal limits. The researchers employed a double-blind, crossover, randomized and counter-balanced design to eliminate any possible study biases.

The resting state brain activity of each participant was measured by magnetic resonance imaging (fMRI) at two times -- after exposure to LTE microwave radiation, and after a sham exposure.

The results demonstrated that LTE exposure affected brain neural activity not only in the closer brain region but also in the remote region, including the left hemisphere of the brain. The study helps explain the underlying neural mechanism for the remote effects of microwave radiation in the brain.

In 2011, Dr. Nora Volkow, Director of the National Institute on Drug Abuse, published a similar study in the ***Journal of the American Medical Association*** that received worldwide news coverage. Dr. Volkow reported that a 50 minute exposure to CDMA, a second generation cell phone technology, increased brain activity in the region of the brain closest to the cell phone. (2)

The current study establishes that short-term exposure to LTE microwave radiation affects the users' brain activity. Although LTE is too new for the long-term health consequences to have been studied, we have considerable evidence that long-term cell phone use is associated with various health risks including increased risk of head and neck cancers, sperm damage, and reproductive health consequences for offspring (i.e., ADHD).

Cell phone users, especially pregnant women and children, should limit their cell phone use. Moreover, cell phone users should not keep their phones near their head, breasts or reproductive organs when using the phone or whenever the phone is turned on unless it is in airplane mode.

References

(1) Bin Lv, Zhiye Chen, Tongning Wu, Qing Shao, Duo Yan, Lin Ma, Ke Lu, Yi Xie. The alteration of spontaneous low frequency oscillations caused by acute electromagnetic fields exposure. ***Clinical Neurophysiology***. Published online 4 September 2013.

Abstract

Objective The motivation of this study is to evaluate the possible alteration of regional resting state brain activity induced by the acute radiofrequency electromagnetic field (RF-EMF) exposure (30 min) of Long Term Evolution (LTE) signal.

Methods We designed a controllable near-field LTE RF-EMF exposure environment. Eighteen subjects

participated in a double-blind, crossover, randomized and counterbalanced experiment including two sessions (real and sham exposure). The radiation source was close to the right ear. Then the resting state fMRI signals of human brain were collected before and after the exposure in both sessions. We measured the amplitude of low frequency fluctuation (ALFF) and fractional ALFF (fALFF) to characterize the spontaneous brain activity.

Results We found the decreased ALFF value around in left superior temporal gyrus, left middle temporal gyrus, right superior temporal gyrus, right medial frontal gyrus and right paracentral lobule after the real exposure. And the decreased fALFF value was also detected in right medial frontal gyrus and right paracentral lobule.

Conclusions The study provided the evidences that 30 min LTE RF-EMF exposure modulated the spontaneous low frequency fluctuations in some brain regions.

Significance With resting state fMRI, we found the alteration of spontaneous low frequency fluctuations induced by the acute LTE RF-EMF exposure.

<http://www.ncbi.nlm.nih.gov/pubmed/24012322>

(2) Volkow ND, Tomasi D, Wang GJ, Vaska P, Fowler JS, Telang F, Alexoff D, Logan J, Wong C. Effects of cell phone radiofrequency signal exposure on brain glucose metabolism. *JAMA*. 2011 Feb 23;305(8):808-13. doi: 10.1001/jama.2011.186.

Abstract

CONTEXT: The dramatic increase in use of cellular telephones has generated concern about possible negative effects of radiofrequency signals delivered to the brain. However, whether acute cell phone exposure affects the human brain is unclear.

OBJECTIVE: To evaluate if acute cell phone exposure affects brain glucose metabolism, a marker of brain activity.

DESIGN, SETTING, AND PARTICIPANTS: Randomized crossover study conducted between January 1 and December 31, 2009, at a single US laboratory among 47 healthy participants recruited from the community. Cell phones were placed on the left and right ears and positron emission tomography with ((18)F) fluorodeoxyglucose injection was used to measure brain glucose metabolism twice, once with the right cell phone activated (sound muted) for 50 minutes ("on" condition) and once with both cell phones deactivated ("off" condition). Statistical parametric mapping was used to compare metabolism between on and off conditions using paired t tests, and Pearson linear correlations were used to verify the association of metabolism and estimated amplitude of radiofrequency-modulated electromagnetic waves emitted by the cell phone. Clusters with at least 1000 voxels (volume >8 cm³) and P < .05 (corrected for multiple comparisons) were considered significant.

MAIN OUTCOME MEASURE: Brain glucose metabolism computed as absolute metabolism ($\mu\text{mol}/100$ g per minute) and as normalized metabolism (region/whole brain).

RESULTS: Whole-brain metabolism did not differ between on and off conditions. In contrast, metabolism in the region closest to the antenna (orbitofrontal cortex and temporal pole) was significantly higher for on than off conditions (35.7 vs 33.3 $\mu\text{mol}/100$ g per minute; mean difference, 2.4 [95% confidence interval, 0.67-4.2]; P = .004). The increases were significantly correlated with the estimated electromagnetic field amplitudes both for absolute metabolism (R = 0.95, P < .001) and normalized metabolism (R = 0.89; P

< .001).

CONCLUSIONS: In healthy participants and compared with no exposure, 50-minute cell phone exposure was associated with increased brain glucose metabolism in the region closest to the antenna. This finding is of unknown clinical significance.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3184892/>

<http://www.prlog.org/12215083-lte-cell-phone-radiation-affects-brain-activity-in-cell-phone-users.html>

Samsung Scores with Lowest Radiation Cell Phones: Why Samsung Phones are a "Win-Win"

Samsung adopted an enhanced antenna system in 2006 to "enhance handset safety by radiating most of the transmitted RF energy away from the handset user" and improve radio frequency performance. Why haven't more manufacturers followed suit?

Joel M. Moskowitz, PRLog (Press Release), Aug 29, 2012

Samsung adopted an enhanced antenna system in 2006 to "enhance handset safety by radiating most of the transmitted RF energy away from the handset user" and "improve RF (radio frequency) performance". (1) Why haven't more manufacturers adopted modern antenna technology that both improves user safety and enhances cell phone performance?

Cell phones sold in the US vary in terms of their Specific Absorption Rate or SAR, the Federal government's measure of the maximum amount of microwave radiation absorbed by the head or body. A cell phone's SAR is assessed using an artificial laboratory model of a very large adult male. In the U.S., the SAR is measured in watts per kilogram averaged over one gram of tissue. (2) The lower the SAR, the less the user is exposed to microwave radiation.

Users of the 20 highest SAR cell phones sold in the US can absorb up to four times as much radiation in their heads as users of the 20 lowest SAR phones. (3)

Samsung sells twelve of the twenty lowest SAR phones available in the U.S. None of the lowest SAR phones are made by the leading U.S. companies, Apple, Motorola, or RIM Blackberry. (4)

In contrast, thirteen of the twenty highest SAR phones are sold by U.S. companies (eight Motorola and five RIM Blackberry), and none are sold by Samsung. (5)

The new Samsung Galaxy SIII smartphone has a maximum SAR of 0.48 watts per kilogram. (2) In comparison, the SAR for the Apple iPhone 4S is 1.11, and for the Motorola Droid Razr Maxx, it is 1.45. (2)

Among cell phones sold in the U.S., why are those produced by U.S. companies among the highest in user exposure to microwave radiation? It's time for U.S. companies to compete in terms of improving user safety. Moreover, Samsung has demonstrated that enhanced antenna technology can improve cell phone performance while it reduces microwave radiation absorption in the user's head and body. So adoption of this technology is a "win-win" for both the industry and the consumer.

All cell phones sold in the US must have a maximum SAR of 1.6 watts per kilogram averaged over one gram of tissue. Six countries have adopted the U.S. standard including Canada, Taiwan, New Zealand, South Korea, Bolivia, and recently, India. The cell phone industry, however, has been lobbying to weaken the U.S. standard because the ICNIRP or international standard allows up to 2.0 watts per kilogram averaged over ten grams of tissue. Although this may sound like a trivial difference, it is not because measuring radiation absorption over a larger volume of tissue averages out the "hot spots." Adoption of the ICNIRP standard in the U.S. could triple the amount of cell phone radiation absorbed by Americans. (6)

Although many researchers have questioned the utility of assessing only a cell phone's SAR, this is all that governments currently regulate. Throughout the world, governments want the public to believe that all legally marketed cell phones are safe, and that a cell phone's SAR doesn't matter as long as it meets

their certification test. The SAR standards, however, were developed decades ago to protect users only from the acute effects of the heat generated by microwave radiation, and do not protect users from non-thermal effects of cell phone radiation which may cause harm from long term exposure including increased cancer risk and sperm damage. (e.g., 7, 8)

For further discussion of why the SAR is inadequate for protecting your health and steps one can take to reduce risk, see the web sites for the Environmental Working Group and the Environmental Health Trust and prior news releases from the UC Berkeley Center for Family and Community Health. (9)

Note (9/4/2012 update): The SARs on the c|net website only pertain to the head SAR. The partial body SAR may be less than or greater than the head SAR. The Samsung Galaxy S3 in our example has a partial body SAR of 1.49 watts per kilogram.

(1) Valentine M. "Embedded antennas reduce handset radiation exposure" Mobile Dev&Design Dec 7, 2006; http://mobiledevdesign.com/hardware_news/imd-antennas-eth...

(2) c|net. Cell phone radiation levels. <http://reviews.cnet.com/cell-phone-radiation-levels/>

(3) Average of 20 highest SAR phones is 1.48 watts/kilogram vs. 0.36 watts/kilogram for the 20 lowest SAR phones (see (4) and (5) for data).

(4) c|net. 20 lowest-radiation cell phones (United States). http://reviews.cnet.com/2719-6602_7-291-3.html. Accessed 8/27/2012. Note that the T-Mobile Sidekick 2 is made by Samsung.

(5) c|net. 20 highest-radiation cell phones (United States). http://reviews.cnet.com/2719-6602_7-291-2.html. Accessed 8/27/2012.

(6) "A mobile phone compliant with the ICNIRP standard of 2.0 W/kg SAR in 10 g of tissue may lead to a 2.5 to 3 times excess above the FCC standard of 1.6 W/kg in 1 g of tissue (i.e., 4-5 W/kg in a cube of 1 g of tissue)" (Gandhi and Kang, 2002)." (cited in Gandhi et al. Exposure limits: the underestimation of absorbed cell phone radiation, especially in children. Electromagnetic Biology and Medicine. 2012. 31(1):34-51. <http://www.ncbi.nlm.nih.gov/pubmed/21999884>)

"James Lin of the University of Illinois, Chicago, who was recently appointed a member of ICNIRP, has called this proposal to increase the averaging volume from 1g to 10g 'scientifically indefensible' (see MWN, J/A00 and N/D00). According to Lin, a limit of 2.0 W/Kg averaged over 10g would be approximately equivalent to an SAR of 4-6 W/Kg, averaged over 1g (see MWN, S/O01 and M/J03). Or to put it more simply, ICES wants to triple the amount of radiation you could get from a cell phone." (Slesin, 2005. Microwave News. January 14, 2005. <http://microwavenews.com/january-14-2005>)

(7) Giuliani L. Soffritti M. Non-thermal effects and mechanisms of interaction between electromagnetic fields and living matter. ICEMS Monograph. Bologna, Italy: National Institute for the Study and Control of Cancer. 2010. <http://www.icems.eu/papers.htm>

(8) Wolchover N. Radiation Risk: Are Some Cellphones More Dangerous Than Others? Life's Little Mysteries. June 23, 2011. <http://www.lifeslittlemysteries.com/1550-radiation-risk-some-cell-phones-more-dangerous-than-others.html>

(9) Environmental Working Group. Where is EWG's cell phone database? http://www.ewg.org/cellphoneradiation/where_database

Environmental Health Trust: <http://www.saferphonezone.com>

UC Berkeley Center for Family and Community Health news releases:
<http://pressroom.prlog.org/jmm716>

<http://www.prlog.org/11962089>

**Comments on the 2012 GAO Report:
“Exposure and Testing Requirements for Mobile Phones Should Be Reassessed”**

Joel M. Moskowitz, Ph.D.
Director, Center for Family and Community Health
School of Public Health
University of California, Berkeley

August 15, 2012 (Aug. 24, 2012 revision)

**Comments on the 2012 GAO Report:
“Exposure and Testing Requirements for Mobile Phones Should Be Reassessed”**

Joel M. Moskowitz, Ph.D.
Director, Center for Family and Community Health
School of Public Health
University of California, Berkeley

August 15, 2012 (Aug. 24 revision)

U.S. General Accountability Office (GAO). *Exposure and Testing Requirements for Mobile Phones Should Be Reassessed*. GAO-12-771. Washington, DC: General Accountability Office. <http://www.gao.gov/products/GAO-12-771> (accessed August 7, 2012)

Overview and General Comments

The GAO Report selectively reviewed scientific literature that supports the FCC’s claim that cell phones which comply with the federal standards are safe. The GAO did not consider the methodologic limitations of this research or the alternative interpretations of the results from these studies. The GAO Report did not review the scientific evidence that strongly suggests the FCC standards which control only for thermal effects do not adequately protect the public from harm due to non-thermal effects of long-term exposure to cell phone radiation.

Although we do not have conclusive proof that cell phone radiation is harmful to humans, the FCC certainly cannot prove its claim that cell phones that comply with current federal standards are safe. The claim relies on many assumptions about the science. A critical review of the science—as opposed to simply “weighting the evidence”—reveals that these assumptions have dubious validity.

Evidence of harm from cell phone radiation

The opening statement of the GAO Report is factually incorrect:

"Scientific research has not demonstrated adverse human health effects of exposure to radio-frequency (RF) energy from mobile phone use, but research is ongoing that may increase understanding of any possible effects." (GAO Report, p. 1)

Numerous studies have demonstrated adverse health effects on humans associated with mobile phone use. Case-control research has found evidence for brain tumors (i.e., glioma, meningioma, and acoustic neuroma), and tumors of the parotid gland (Myung et al. 2009; Khurana et al., 2009). Considerable evidence exists for sperm damage caused by exposure to cell phone radiation, and increased male infertility associated with cell phone use (La Vignera et al, 2012). Preliminary evidence exists for reproductive health effects in children following *in utero* exposure to mobile phone radiation (Divan et al., 2008, 2012).

Many researchers with conflicts of interest reject this peer-reviewed research. They even dismiss their own data when the results provide evidence of adverse effects on human health. These researchers often argue that the trends in brain tumor incidence over time have been flat therefore the evidence of harm in these studies must be artifactual. However, many countries are witnessing increased incidence of specific tumors in population subgroups, if not in the overall population, associated with increased exposure over time to microwave radiation from cordless phones in addition to cell phones.

Alternatively, researchers with conflicts of interest typically argue there is no possible biologic mechanism; thus, the adverse health effects observed in their data should be dismissed. This ignores the fact that science commonly discovers causal effects before underlying mechanisms are understood. Nonetheless, numerous experimental studies have demonstrated potential mechanisms in animal models and cellular

studies caused by acute, non-thermal exposures to microwave radiation. The evidence includes penetration of the blood-brain barrier, generation of free radicals and heat shock proteins, single- and double-strand DNA damage, as well as sperm damage. Multiple peer-reviewed laboratory studies demonstrate each of these adverse effects (e.g., Behari, 2010). Recently, Volkow et al. (2011) demonstrated increased glucose metabolism in human brains after a brief (non-thermal) exposure to cell phone radiation.

The little research conducted on children and pregnant women suggests these two populations are at greatest risk of harm from cell phone radiation. The GAO report does not cite the work of Om Gandhi which finds that the child's brain absorbs much more microwave radiation than the adult's brain (Gandhi et al., 2012). According to Reardon (2011) "Several countries, including Russia, Germany, France, Israel, Finland, and the United Kingdom, have issued warnings against children using cell phones." Yet, the GAO Report does not discuss children's safety from cell phone radiation even though most children in the U.S. currently have cell phones.

FCC cell phone radiation standards

The history of cell phone radiation standard setting in the U.S. reveals the FCC's inability to oversee a process that ensures decision making free of conflict of interest. The FCC does not have the expertise to oversee the research needed to develop prudent standards.

In 1978, the U.S. Comptroller General (1978) issued a report to the Congress which recommended the potential need to regulate non-thermal effects of microwave radiation based upon a review of the research conducted by the FDA. However, 18 years later in 1996, when the FCC adopted the federal cell phone radiation standards, the Commission enacted standards that controlled only for the thermal effects of the microwave radiation emitted by mobile phones. The FCC adopted standards developed by two industry groups, first by IEEE in 1991 and subsequently by ANSI. These standard setting meetings were heavily dominated by engineers and physical scientists, not health scientists. At the time, the EPA was conducting research on microwave radiation and had found evidence of non-thermal effects; however, in early 1996, their funding for this research was terminated by the Congress. In 2004, the FCC issued a public request for input on some cell phone regulatory standards; however, eight years later the agency has yet to act upon this. Hence, the FCC still employs the standards developed 21 years ago when hardly anyone used cell phones even though almost all adults and most children now use this technology.

The Radiofrequency Interagency Working Group that advises the FCC on radiation-emitting consumer products including cell phones has been a failure. This arrangement diffuses responsibility which enables the participating agencies to point fingers at each other leading to inaction according to the GAO Report:

"According to senior FCC officials, the agency has not adopted any newer limit because federal health and safety agencies have not advised them to do so. FCC officials told us that they rely heavily on the guidance and recommendations of federal health and safety agencies when determining the appropriate RF energy exposure limit and that, to date, none of these agencies have advised FCC that its current RF energy limit needs to be revised. Officials from FDA and EPA told us that FCC has not formally asked either agency for an opinion on the RF energy limit. FDA officials noted, though, that if they had a concern with the current RF energy exposure limit, then they would bring it to the attention of FCC." (GAO Report, p. 18)

Given these historic failures, the FCC should not be trusted to oversee another review of the cell phone radiation standards. Most industry-funded scientists, as well as some government scientists, deny there is any risk from chronic non-thermal exposures to cell phone radiation. If the FCC oversees a review of the standards, the agency is likely to rely heavily on the IEEE once again and adopt regulations based only on thermal effects. Moreover, since 2006, the IEEE has been advocating that the U.S. adopt standards set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). The GAO Report notes that more than 40 countries have adopted the weaker ICNIRP Specific Absorption Rate (SAR) standard, a measure of the amount of energy absorbed from a cell phone in a simulated head. The Report does not mention that six countries have adopted the U.S. SAR standard (Australia, Bolivia, Canada, New Zealand, South Korea, and recently, India). Nor does the Report mention that Russia, a

country that has conducted much of the health effects research on exposure to non-thermal levels of microwave radiation, has more stringent cell phone emission standards than the U.S.

Although the ICNIRP maximum specific absorption rate (SAR) of 2.0 watts per kilogram averaged over 10 grams of tissue does not sound very different from the U.S. maximum SAR of 1.6 watts per kilogram averaged over 1 gram of tissue, it actually represents a substantial difference because averaging heat absorption over a larger volume of tissue averages out the "hot spots":

"A mobile phone compliant with the ICNIRP standard of 2.0 W/kg SAR in 10 g of tissue may lead to a 2.5 to 3 times excess above the FCC standard of 1.6 W/kg in 1 g of tissue (i.e., 4–5 W/kg in a cube of 1 g of tissue) (Gandhi and Kang, 2002)." (cited in Gandhi et al, 2012)

"James Lin of the University of Illinois, Chicago, who was recently appointed a member of ICNIRP, has called this proposal to increase the averaging volume from 1g to 10g 'scientifically indefensible' (see MWLN, J/A00 and N/D00). According to Lin, a limit of 2.0 W/Kg averaged over 10g would be approximately equivalent to an SAR of 4-6 W/Kg, averaged over 1g (see MWLN, S/O01 and M/J03). Or to put it more simply, ICES wants to triple the amount of radiation you could get from a cell phone." (Slesin, 2005)

Federal government negligent in funding cell phone radiation research

Although more research is needed to determine the long-term health consequences from continued exposure to non-thermal levels of cell phone radiation, little of this research is being conducted in the U.S. Nor are we conducting the research needed to develop safer standards and safer cell phone technology.

For the past 16 years, our federal health agencies have been negligent in funding research on the health effects of exposure to microwave radiation. The U.S. has also failed to participate in major international studies (e.g., Interphone, CEFALO, MOBI-KIDS, and COSMOS). The federal government has largely relied on industry to fund and conduct the research. From 1994-1999, the CTIA, the major wireless industry association, funded the Wireless Technology Research (WTR) Program, a \$25 million research initiative. In 2000, the CTIA funded a new research initiative, CRADA that was supposed to include FDA participation but did not. The intent of this initiative was to follow up on two studies that found harmful effects from low levels of cell phone radiation in the WTR program. Little research was published in the peer-reviewed literature from either of these industry-sponsored research programs.

The largest ongoing federally-funded study of exposure to cell phone radiation examines the health effects of 2G (i.e., second generation) cell phone technologies (GSM, CDMA) on mice and rats. The findings will be obsolete soon after the study is completed in 2015 because the industry is phasing out 2G. We should be conducting research on the health effects of 3G and 4G at this time. Some research suggests that DNA damage occurs at much lower exposures to 3G radiation than 2G. No health effects research has been published on 4G to date.

"According to representatives from the Mobile Manufacturers Forum, the association has provided about \$46 million for RF energy research since 2000 and is currently providing support for epidemiological and laboratory studies." (GAO Report, p. 16)

A major reason for the conflicting evidence about the health effects of cell phone radiation after more than two decades of research is because governments and the W.H.O. have relied on industry to fund all or part of the research. *Microwave News* has documented several incidents where industry-funded researchers lost their funding after reporting evidence of biologic activity in laboratory studies or harmful effects in humans. The corrupting influence of industry on the scientific community and on the health effects and biologic research has been chronicled for several decades by Louis Slesin in his newsletter, *Microwave News* (<http://microwavenews.com>), and was summarized by Devra Davis in her recent book, *Disconnect* (Davis, 2010).

If we hope to develop a body of high quality research that policy makers can rely upon, we must cultivate a scientific community that is independent of industry. A fee of fifty cents per year, or a penny per week,

assessed on each cell phone in the U.S. could generate \$150 million annually for research and education about cell phones and other forms of electromagnetic radiation.

GAO Report recommendations

The GAO Report makes two recommendations:

“We recommend that the Chairman of the FCC take the following two actions:

- Formally reassess the current RF energy exposure limit, including its effects on human health, the costs and benefits associated with keeping the current limit, and the opinions of relevant health and safety agencies, and change the limit if determined appropriate.
- Reassess whether mobile phone testing requirements result in the identification of maximum RF energy exposure in likely usage configurations, particularly when mobile phones are held against the body, and update testing requirements as appropriate.” (GAO Report, p. 28)

The GAO Report indicates that the industry and its affiliated organizations want the FCC to weaken the current standards by adopting the more permissive ICNIRP standards. In contrast, national environmental health organizations, which the Report refers to as “consumer groups,” demand that the FCC standards be strengthened, and the testing conditions be re-designed to better simulate real-world use of cell phones to ensure public safety.

Some environmental health groups and many scientists want supplemental standards developed to control for additional characteristics of cell phone radiation besides energy absorption (as measured by the SAR). These signal characteristics (frequency, modulation, etc.) are biologically active through non-thermal mechanisms. Considerable evidence exists that these non-thermal effects cause harm to human health as well as the health of other species (Fragopoulou et al., 2010; Juutilainen et al., 2011; Gandhi et al., 2012; Blank and Goodman, 2012). Cell phone regulatory standards should be designed to minimize these deleterious effects.

Based upon the FCC’s track record over the past several decades, the Congress should seriously consider assigning these tasks to a health agency with the requisite expertise and fund that agency to oversee the research and development of safety standards that ensure the protection of population health from **non-thermal** in addition to thermal risks associated with exposure to cell phone radiation.

The GAO Report’s second recommendation addresses a major deficiency in the FCC guidelines with regard to certification of cell phone safety. The FCC has failed to enforce its guideline that requires testing of cell phones in the manner in which they are used, namely, “against the ear and against the body.” Because the FCC allows cell phones to be tested from 1.5 to 2.5 cm (5/8 – 1 inch) away from the body and most users do not keep their phones this distance from their bodies, cell phones are being used unsafely much of the time based on the FCC’s safety definition. More importantly, users increase their risk of harm from microwave radiation by not using their phones the way they were tested.

The Report should also recommend to the FCC that its cell phone certification process employ artificial models, known as specific anthropomorphic mannequins, that resemble today’s cell phone users. The head of the mannequin in current use is modeled after an adult male in the 90th percentile of the military. People with smaller heads than the mannequin which includes most of the population absorb more radiation than the current test measures. Thus, most people are exposed to more microwave radiation from their cell phone than the FCC deems safe based on the current SAR standard.

The cell phone certification process should simulate who uses cell phones today including children, teenagers, pregnant women, males and females of reproductive age, seniors, and individuals with compromised immune systems and those who wear metal eyeglass frames or have metal fillings or braces on their teeth. The process should also simulate how cell phones are commonly used (e.g., directly against the head and body, in moving vehicles and in elevators).

Specific Comments

GAO Report:

“this report addresses (1) what is known about the health effects of RF energy from mobile phones and what are current research activities, (2) how FCC set the RF energy exposure limit for mobile phones, and (3) federal agency and industry actions to inform the public about health issues related to mobile phones, among other things.”

“FDA stated that while the overall body of research has not demonstrated adverse health effects, some individual studies suggest possible effects. Officials from NIH, experts we interviewed, and a working group commissioned by IARC—the World Health Organization’s agency that promotes international collaboration in cancer research—have reached similar conclusions. For example, in May 2011 IARC classified RF energy as “possibly IARC determined that the evidence from the scientific research for gliomas, a type of cancerous brain tumor, was limited—meaning that an association has been observed between RF energy exposure and cancer for which a causal relationship is considered to be credible, but chance, bias, or confounding factors could not be ruled out with reasonable confidence.” (GAO Report, pp. 6-7)

“Studies we reviewed suggested and experts we interviewed stated that epidemiological research has not demonstrated adverse health effects from RF energy exposure from mobile phone use, but the research is not conclusive because findings from some studies have suggested a possible association with certain types of tumors, including cancerous tumors.” (GAO Report, p. 8)

Comment: Our research group published a review of the case-control research on mobile phone use and tumor risk in humans in the *Journal of Clinical Oncology* in 2009 that received worldwide attention (Myung et al, 2009a). **Our primary conclusion was that it is misleading to examine the overall weight of the evidence. Rather one must sort the studies based on research quality to see the true picture.**

Case-control studies that employed high quality research methods demonstrated a significant positive association between mobile phone use and tumor risk (i.e., increased risk). This association was stronger for brain tumors among those who used cell phones for 10 or more years, especially on the side of the head where the phone was held. In contrast, low quality studies displayed a significant negative association between mobile phone use and tumor risk (i.e., reduced risk or a protective effect from using cell phones). Thus, when we combined the estimates of tumor risk from the high and low quality studies, we found no overall risk. Many scientists in academia and government have focused on the overall weight of the evidence and have ignored the quality of the research. This is how they conclude we do not have adequate evidence. We also found that low quality studies tended to be funded all or in part by industry. Even the W.H.O. Interphone Study received one-fourth of its funding from industry. In contrast, high quality studies were more likely to be funded by government health agencies. Thus, conflicts of interest may have played a key role in the conduct and reporting of the research (Myung et al., 2009b). These conclusions are reinforced by studies that were completed since our review paper was published.

“we recommend that research on the topic of mobile phone use and health should not be funded by the industry because funding sources can influence research in subtle ways, and to preserve the credibility of the research it is important to avoid even the appearance of a conflict of interest.” (Myung et al, 2009b)

GAO Report:

“findings from a nationwide cohort study conducted in Denmark that originally followed 420,095 individuals did not show an association between increased risk for certain types of tumors, including cancerous tumors, and mobile phone use. Additionally, findings from a subset of the cohort—56,648 individuals with 10 or more years since their first mobile phone subscription—did not show an increased risk for brain and nervous system tumors. Further, these findings did not

change for individuals in the cohort with 13 or more years since their first mobile phone subscription. (GAO Report, pp.8-9)

Comment: In our review of the literature, we dismissed the results of the Danish Cohort study because we believed that serious methodologic problems rendered the results uninterpretable (Myung et al, 2009a). The study has been criticized because it was biased against finding increased tumor risk. Many of its results found what appeared to be reduced risk (i.e., a protective effect from using cell phones). That most of the heaviest cell phone users whose phones belonged to their businesses were classified as non-cell phone users biased the results against finding increased risk (Slesin, 2011).

“The Danish study has another, perhaps even more potentially fatal source of bias. The user population includes only those who had a cell phone in 1995—that was about 20% of the population. The Danish Cancer Society treats everyone who took up cell phones after 1995 as if they had never used one. They too are in the control group. That’s hard to believe but true. Here’s a direct quote from the BMJ paper: ‘individuals with a subscription in 1996 or later were classified as non-users.’” (Slesin, 2011).

GAO Report:

“Also, the CEFALO study—an international case-control study that compared children aged 7 to 19 diagnosed with certain types of brain tumors, including brain cancers, to similar children who were not diagnosed with brain tumors—found no relationship between mobile phone use and risk for brain tumors.” (GAO Report, p. 9)

Comment: Contrary to the study authors’ conclusions and the GAO’s summary, the CEFALO study reported significantly increased brain tumor risk among children who used cell phones in several analyses despite small amounts of cell phone use and short duration of use. See the Soderqvist et al (2011) for a full critique of this study and alternative interpretations of the results.

GAO Report:

“Findings from another study, which was conducted by NIH and examined trends in brain cancer incidence rates in the United States using national cancer registry data collected from 1992 to 2006, did not find an increase in new cases of brain cancer, despite a dramatic increase in mobile phone use during this time period.” (GAO Report, p. 9)

Comment:

Although this study did not find an overall increase in brain cancer incidence, it did report an increase for young adults 20-29 years of age (Inskip et al., 2010). Young adults are likely to be more vulnerable to microwave radiation because their brains are not fully developed. The authors of the study dismissed this result because the tumors were located in the frontal lobe, and because the increased cancer incidence in men started before cell phones were popular in the U.S. However, absorption of microwave radiation is substantial in this lobe, and frontal lobe tumors have been associated with mobile phone use in case-control studies. Also, cordless phones which were popular before cell phones emit microwave radiation so these phones may have contributed to the increased tumor incidence observed in young adults.

GAO Report:

“Studies we reviewed suggested and experts we interviewed stated that laboratory research has not demonstrated adverse human health effects from RF energy exposure from mobile phone use, but the research is not conclusive because findings from some studies have observed

effects on test subjects.... According to some studies we reviewed, while some of these studies have observed changes in behavior and cognitive function, overall, these studies have not consistently found adverse effects from RF energy levels emitted from mobile phones.” (GAO Report, p. 10)

Comment: Just as we found evidence for conflict of interest affecting the epidemiologic research, Dr. Henry Lai has reported possible evidence of conflict of interest with the toxicology research:

“Henry Lai, a research professor in the bioengineering department at the University of Washington, began laboratory radiation studies in 1980 and found that rats exposed to radiofrequency radiation had damaged brain DNA. He maintains a database that holds 400 scientific papers on possible biological effects of radiation from wireless communication. He found that 28 percent of studies with cellphone industry funding showed some sort of effect, while 67 percent of studies without such funding did so. “That’s not trivial,” he said.” (Randall Stross. Should you be snuggling with your cellphone? New York Times, Nov 13, 2010. URL: <http://www.nytimes.com/2010/11/14/business/14digi.html>)

An in-depth discussion of conflict of interest associated with research funding from the mobile phone industry and the U.S. Air Force can be found in Microwave News (Slesin, 2006).

GAO Report:

“Studies we reviewed and experts we interviewed identified key areas for additional epidemiological and laboratory studies, and according to experts, additional research may increase understanding of any possible effects. For example, additional epidemiological studies, particularly large long-term prospective cohort studies and case-control studies on children, could increase knowledge on potential risks of cancer from mobile phone use.” (GAO Report, p. 12)

Comment: In our review paper, we recommended long-term prospective cohort studies as this research could yield stronger empirical evidence than case-control study research (Myung et al., 2009a). However, we no longer recommend this for the following reasons: (1) Given the widespread adoption and use of cell phones it would be difficult to recruit enough individuals for the cohort who are not exposed to cell phone, cordless phone or Wi-Fi radiation, and variation over time in microwave radiation exposure levels are necessary to detect effects on tumor risk; (2) the research would be very costly and difficult to conduct as extremely large samples of participants would be needed due to the low incidence of brain tumors; and (3) the results would not be available for 20-30 years since the latency between exposure to cell phone radiation and tumor detection can be up to four decades; meanwhile, cell phone technology keeps changing so the results may have limited value when they are published.

GAO Report:

“additional studies on laboratory animals as well as human and animal cells examining the possible toxic or harmful effects of RF energy exposure could increase knowledge on potential biological and health effects of RF energy. Further, additional laboratory studies on human and animal cells to examine non-thermal effects of RF energy could increase knowledge of how, if at all, RF energy interacts with biological systems. However, some experts we spoke to noted that, absent clear evidence for adverse health effects, it is difficult to justify investing significant resources in research examining non-thermal effects of RF energy from mobile phone use.” (GAO Report, p. 12)

Comment: Although results are not consistent, numerous peer-reviewed toxicology studies demonstrate evidence for non-thermal effects of RF energy from mobile phone use, especially for GSM and UMTS mobile phone carrier systems (Juutilainen et al., 2011; Wolchover, 2011). Fewer studies have been conducted on CDMA and W-CDMA mobile carrier systems, and there is less evidence for biologic activity for these technologies. The lack of research on CDMA and W-CDMA can be explained by two factors: (1)

Most research on the health effects of cell phone radiation has been conducted outside of the U.S. because our federal government has neglected to fund this research with minor exceptions; and (2) few countries other than the U.S. employ CDMA and W-CDMA (currently used by half of the U.S. population who have Verizon and Sprint as their cell phone providers); hence, few countries fund research on these two technologies.

The U.S. has one major study in progress that contrasts the effects of GSM and CDMA in mice and rats conducted by the National Toxicology Program. Results from this study should be available by 2015. However, these 2G (second generation) technologies are likely to be obsolete in the U.S. by 2016. We need a major research funding initiative now to evaluate the effects of 3G (UMTS, W-CDMA) and 4G (LTE, WiMax) technologies and to enable us to set appropriate regulatory standards for these forms of microwave radiation to protect population health.

GAO Report:

“The Danish National Birth Cohort consists of over 100,000 Danish children who were born from 1996 to 2002. Data on lifestyle factors, dietary habits, and environmental exposures have been collected on these children, and data on current mobile phone use by children have been collected since these children reached the age of seven.” (GAO Report, Footnote b, p. 14)

Comment: The only mention of this study in the Report appears in a footnote even though Dr. Leeka Kheifets at UCLA was one of the experts the GAO consulted. Moreover, her study is one of a few cell phone radiation health effect studies that the federal government has funded. Dr. Kheifets has published two peer-reviewed papers that reported behavioral problems in children exposed *in utero* to cell phone radiation (Divan et al., 2008, 2012). These children were more likely to display symptoms that resemble attention deficit disorder. If these reproductive health effects are replicable, they have profound implications for public health. Recently, Dr. Hugh Taylor at Yale replicated these behavioral effects in an experimental study conducted with rats exposed to cell phone radiation *in utero* (Aldad et al., 2012).

GAO Report:

“In 1996, FCC adopted the RF energy exposure limit for mobile phones of 1.6 watts per kilogram, averaged over one gram of tissue, a measurement of the amount of RF energy absorbed into the body.²⁸ FCC developed its limit based on input from federal health and safety agencies as well as the 1991 recommendation by the Institute of Electrical and Electronics Engineers (IEEE) that was subsequently approved and issued in 1992 by the American National Standards Institute (ANSI). This recommended limit was based on evidence related to the thermal effects—the only proven health effects of RF energy exposure—and was set at a level well below the threshold for such effects. FCC noted that the limit provided a proper balance between protecting the public from exposure to potentially harmful RF energy and allowing industry to provide telecommunications services to the public in the most efficient and practical manner possible.” (GAO Report, pp. 16-17)

Comment: In 1996, the FCC based its cell phone radiation standard on a set of recommendations made by two industry groups composed largely of engineers. The exposure limit protects the user from the acute effects from heating of body tissue but not from the non-thermal effects of microwave radiation. The FCC claimed that the SAR limit it adopted was based on input from federal health and safety agencies yet it ignored the EPA’s recommendation at the time that the SAR be limited to 1.0 watts per kilogram instead of 1.6 watts per kilogram. Instead, the FCC traded public safety for the industry’s recommendation to achieve what it considered “a proper balance.”

“The EPA and NIOSH, two health agencies that have studied the RF/MW health data for decades, have each advocated pegging the threshold to 1 W/Kg for the public and to 2 W/Kg for workers, respectively.” (Slesin, 19966)

GAO Report:

"FCC has implemented standardized testing procedures requiring mobile phones to be tested for compliance with the RF energy exposure limit when in use against the ear and against the body while in body-worn accessories, such as holsters, but these requirements may not identify the maximum exposure under other conditions. The specific minimum separation distance from the body is determined by the manufacturer (never to exceed 2.5 centimeters), based on the way in which the mobile phone is designed to be used. FCC has not reassessed its testing requirements to ensure that testing identifies the maximum RF energy exposure for the other usage conditions a user could experience when mobile phones are in use without body-worn accessories or as advised by the manufacturer's instructions, rather than the head." (GAO Report, pp. 22-23)

Comment: The FCC should not have allowed manufacturers the latitude to decide whether to test the phone from 1.5 to 2.5 centimeters from the body in the "against the body" test. Because these distances are in the "near-field" of the antenna each additional millimeter corresponds to a 15% reduction in emissions. A phone tested at 2.5 cm can produce up to 5 times the microwave radiation as a phone tested at 1.5 cm and still be legal. Furthermore, the "against the body" SARs are not comparable for two phones tested at different distances from the body.

According to the FCC 2001 guidelines, the manufacturer can use warning labels to ensure that the user maintains a minimum distance between his body and the phone that corresponds to the distance used in the SAR test procedure. However, if the manufacturer, cannot ensure that the user will comply with this instruction, then the SAR test must be conducted "at its closest range to persons under normal operating conditions."

"When applicable, operation instructions and prominent warning labels may be used to alert the exposed persons to maintain a specified distance from the transmitter or to limit their exposure durations and usage conditions to ensure compliance. If the use of warning labels on a transmitter is not effective or desirable, the alternative of performing SAR evaluation with the device at its closest range to persons under normal operating conditions may be used." (FCC, 2001, p. 8)

GAO Report:

"Representatives from some consumer groups and experts we spoke with raised concerns that the information on federal agency websites about mobile phone health effects is not precautionary enough, among other things. In particular, these representatives and experts said that federal agencies should include stronger precautionary information about mobile phones because of the uncertain state of scientific research on mobile phone health effects as well as the fact that current testing requirements may not identify the maximum possible RF energy exposure." (GAO Report, p. 25)

Comment: Information on federal agency websites about mobile phones is at best confusing, and often misleading. Coverage of the health effects research has often been biased. For example, news coverage of the major Interphone Study paper reported "no evidence" of increased tumor risk on both the FDA and the NCI web sites (e.g., "No Evidence Linking Cell Phone Use to Risk of Brain Tumors," FDA Consumer Health Information; May 17, 2010). This was completely false as a significant 40% increased glioma risk was found for the heaviest cell phone users (which corresponded to about 30 minutes per day over 10 years) (Interphone Study Group, 2010a). Appendix 2 of this paper presented results from analyses that corrected for selection bias in the study (Interphone Study Group, 2010b). In the appendix, the heaviest cell phone users had 82% increased risk of glioma as compared to those who used cell phones less than 5 hours in their lifetime. Moreover, a significant dose-response relationship for number of years of cell phone use and glioma risk was reported. Based upon the results of this study, two of the investigators including the lead investigator have called for precautionary health warnings to "reduce exposure to the brain from mobile phones...particularly among young people" (Cardis and Sadetzki, 2011).

References

Aldad TS, Gan G, Gao X-B, Taylor HS. Fetal radiofrequency radiation exposure from 800-1900 Mhz-rated cellular telephones affects neurodevelopment and behavior in mice. *Scientific Reports*. Published online March 15, 2012. URL: <http://www.nature.com/srep/2012/120315/srep00312/full/srep00312.html>

Behari J. Biological responses of mobile phone frequency exposure. *Indian Journal of Experimental Biology*. 2010 Oct;48(10):959-81. URL: <http://nopr.niscair.res.in/handle/123456789/10341>

Blank M, Goodman RM. Electromagnetic fields and health: DNA-based dosimetry. *Electromagnetic Biology and Medicine*. Published online before print June 7, 2012. URL: <http://informahealthcare.com/doi/abs/10.3109/15368378.2011.624662>

Cardis E., Sadetzki S. Indications of possible brain-tumour risk in mobile-phone studies: should we be concerned? *Occupational and Environmental Medicine* 2011. 68:169-171. URL: <http://oem.bmj.com/content/68/3/169>

Davis D. *Disconnect: The truth about cell phone radiation, what the industry has done to hide it, and how to protect your family*. New York: Dutton. 2010.

Divan HA, Kheifets L, Obel C, Olsen J. Prenatal and postnatal exposure to cell phone use and behavioral problems in children. *Epidemiology* 2008.19(4):523-9. URL: <http://www.ncbi.nlm.nih.gov/pubmed/18467962?dopt=Abstract>

Divan HA, Kheifets L, Obel C, Olsen J. Cell phone use and behavioural problems in young children. *Journal of Epidemiology and Community Health*. 2012; 66:524-529. URL: <http://jech.bmj.com/content/66/6/524.long>

Federal Communications Commission (FCC). *Evaluating compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields*. OET Bulletin 65. Supplement C. Edition 01-01. Washington, DC: Office of Engineering Technology, FCC. 2001. URL: http://www.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65c.pdf

Fragopoulou A, Grigoriev Y, Johansson O, Margaritis LH, Morgan L, Richter E, Sage C. Scientific panel on electromagnetic field health risks: consensus points, recommendations, and rationales. *Review of Environmental Health* 2010. 25(4):307-17. URL: <http://www.ncbi.nlm.nih.gov/pubmed/21268443>

Gandhi OP, Morgan LL, de Salles AA, Han YY, Herberman RB, Davis DL. Exposure limits: the underestimation of absorbed cell phone radiation, especially in children. *Electromagnetic Biology and Medicine*. 2012. 31(1):34-51. URL: <http://www.ncbi.nlm.nih.gov/pubmed/21999884>

Interphone Study Group. Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. *International Journal of Epidemiology*. 2010a. 39(3):675-94. URL: <http://ije.oxfordjournals.org/content/39/3/675>

Interphone Study Group. Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. Appendix 2. *International Journal of Epidemiology*. 2010b. 39(3):675-94. URL: http://ije.oxfordjournals.org/content/suppl/2010/05/06/dyq079.DC1/Interphone_Appendix2.pdf

Inskip PD, Hoover RN, Devesa SS. Brain cancer incidence trends in relation to cellular telephone use in the United States. *Neuro-Oncology* 2010.12(11):1147-1151. URL: <http://neuro-oncology.oxfordjournals.org/content/12/11/1147>

Juutilainen J, Höytö A, Kumlin T, Naarala J. Review of possible modulation-dependent biological effects of radiofrequency fields. *Bioelectromagnetics* 2011. 32(7):511-534. URL: <http://onlinelibrary.wiley.com/doi/10.1002/bem.20652/full>

Khurana VG, Teo C, Kundi M, Hardell L, Carlberg M. Cell phones and brain tumors: a review including the long-term epidemiologic data. *Surgical Neurology* 2009. 72(3):205-14; discussion 214-5. URL: <http://www.sciencedirect.com/science/article/pii/S0090301909001451>

La Vignera S, Condorelli RA, Vicari E, D'Agata R, Calogero AE. Effects of the exposure to mobile phones on male reproduction: a review of the literature. *Journal of Andrology* 2012. 33(3):350-356. URL: <http://www.andrologyjournal.org/cgi/content/full/33/3/350>

Myung S-J, Ju W, McDonnell DD, Lee YH, Kazinets G, Cheng C-T, Moskowitz JM. Mobile phone use and risk of tumors: A meta-analysis. *Journal of Clinical Oncology* 2009a. 27(33):5565-5572. URL: <http://jco.ascopubs.org/content/27/33/5565.abstract>

Myung S-J, Ju W, McDonnell DD, Lee YH, Kazinets G, Cheng C-T, Moskowitz JM. Reply to A. Stang et al, J.T. Rowley et al, and F. Samkange-Zeeb et al. *Journal of Clinical Oncology* 2009b. 28(7):e124-e125. URL: <http://jco.ascopubs.org/content/28/7/e124.full>

Reardon, M. Cell phone radiation: A self-defense guide (FAQ). CNET. June 6, 2011. URL: http://news.cnet.com/8301-30686_3-20068419-266/cell-phone-radiation-a-self-defense-guide-faq/

Slesin L. ANSI/IEEE v. NCRP: Battle for Control of RF/MW Standards. March/April 1996. *Microwave News*. 16(2):12. URL: <http://microwavenews.com/sites/default/files/sites/default/files/backissues/m-a96issue.pdf>

Slesin L. The Danish Cohort Study: The politics and economics of bias. *Microwave News*. November 3, 2011. URL: <http://microwavenews.com/DanishCohort.html>

Slesin L. *Microwave News*. January 14, 2005. URL: <http://microwavenews.com/january-14-2005>

Slesin L. "Radiation Research" and the cult of negative results. *Microwave News*. July 2006. 26(4):1-5. URL: <http://microwavenews.com/sites/default/files/docs/mwn.7-06.RR.pdf>

Soderqvist F, Carlberg M, Mild KH, Hardell L. Childhood brain tumour risk and its association with wireless phones: a commentary. *Environmental Health* 2011.10(1):106. URL: <http://www.ehjournal.net/content/10/1/106>

U.S. Comptroller General. More protection from microwave radiation hazards needed. Report by the Comptroller General of the United States to the House Committee on Interstate and Foreign Commerce, Oversight and Investigations Subcommittee. HRD-79-7; B-164031(2). Washington, DC: Comptroller General's Office. November 30, 1978. URL: <http://www.gao.gov/assets/130/124884.pdf>

Volkow ND, Tomasi D, Wang GJ, Vaska P, Fowler JS, Telang F, Alexoff D, Logan J, Wong C. Effects of cell phone radiofrequency signal exposure on brain glucose metabolism. *Journal of the American Medical Association* 2011 Feb 23;305(8):808-13. URL:<http://jama.jamanetwork.com/article.aspx?articleid=645813>

Wolchover N. Radiation risk: Are some cellphones more dangerous than others? *Life's Little Mysteries*. June 23, 2011. URL: <http://www.lifslittlemysteries.com/1550-radiation-risk-some-cell-phones-more-dangerous-than-others.html>