Testimony to the Maryland State Board of Education

Theodora Scarato

August 23, 2016

Note: This testimony and information serves as notice that the State Board of Education has been given information on the health risks of wireless, the FCC instructions, the violations of these instructions in schools and the false statements made by MCPS on the issue (see final document).

Testimony to the Maryland State Board of Education

All wireless devices emit radio frequency radiation which is absorbed into the body of the user. Thus, all wireless devices have fine print warnings in the manual so that the user does not absorb excessive amounts of this radiation. These fine print warnings are different for various devices.

The manual of *m*y laptop states:

"To comply with FCC RF exposure requirements a separation distance of at least 20 cm 8 inches must be maintained between the wireless antennae and all persons. "

Children are bringing laptops into schools as part of a Bring Your Own Device Policy. It took me no time to go online and find pictures from Prince George, Baltimore, Howard County classrooms of students with laptops on laps and kids lying on the floor with their face inches from the screen.

Students are not following the directions in the device manual. They have no idea they could be violating US federal radiation limits because no one has informed them of the FCC instructions in the manual.


Sections
The Washington Post

Education

Schools move toward 'Bring Your Own Device' policies to boost student tech use

Katie Martinez, left, and Genesis Delcid talk with their teacher, Ginger Berry, about their project which requires them to use their personal smartphone cameras during Project Success class at Argyle Middle School. (Kate Patterson/For The Washington

Students are being asked to bring cell phones to class for various projects.

The manual of my cell phone states:
"To comply with FCC RF exposure requirements a minimum of 79 inches must be maintained between the body and phone."

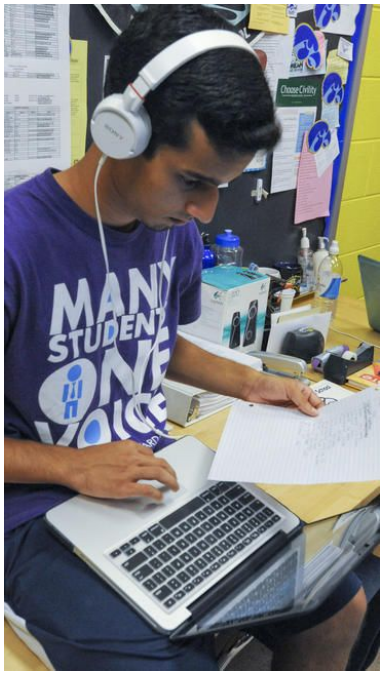
Children are bringing their own cell phones into

classes and each has a different FCC instruction they are 100% unaware of.

School District pictures I easily found online shows kids resting phones and laptops on their abdomen while they stream video and music **using school wifi network.**

Images From The Baltimore Sun article

Howard middle school students to join bring-your-device policy




Children, parents teachers and staff need to be fully informed by schools that these classroom tools emit RF radiation. and that violating these instructions as they are unknowingly doing, could result in radiation absorption that exceeds FCC radiation limits.

As I understand it, the liability rests not just with the State Dept of Education or District Boards but also with each policymaker personally, because you have been informed of these violations and have a duty of care and are entrusted to oversee a safe environment.

Please see the following sampling of FCC fine print instructions:

Samsung 3G Laptop: “Usage precautions during 3G connection : Keep safe distance from pregnant women’s stomach or from lower stomach of teenagers. Body worn operation: Important safety information regarding radiofrequency radiation (RF) exposure.To ensure compliance with RF exposure guidelines the Notebook PC must be used with a minimum of 20.8 cm antenna separation from the body.”

Blackberry Bold 9930: “Keep the BlackBerry device at least 0.59 in. (15 mm) 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.”

iPhone 4: " To be sure that human exposure does not exceed the FCC guidelines, always follow these instructions... keep iPhone at least 15 mm (5/8 inch) away from the body, and only use carrying cases, belt clips, or holders that do not have metal parts and that maintain at least 15 mm (5/8) inch separation between the iPhone and the body." To view the information on your iPhone go to Settings > General > About > Legal > RF Exposure.

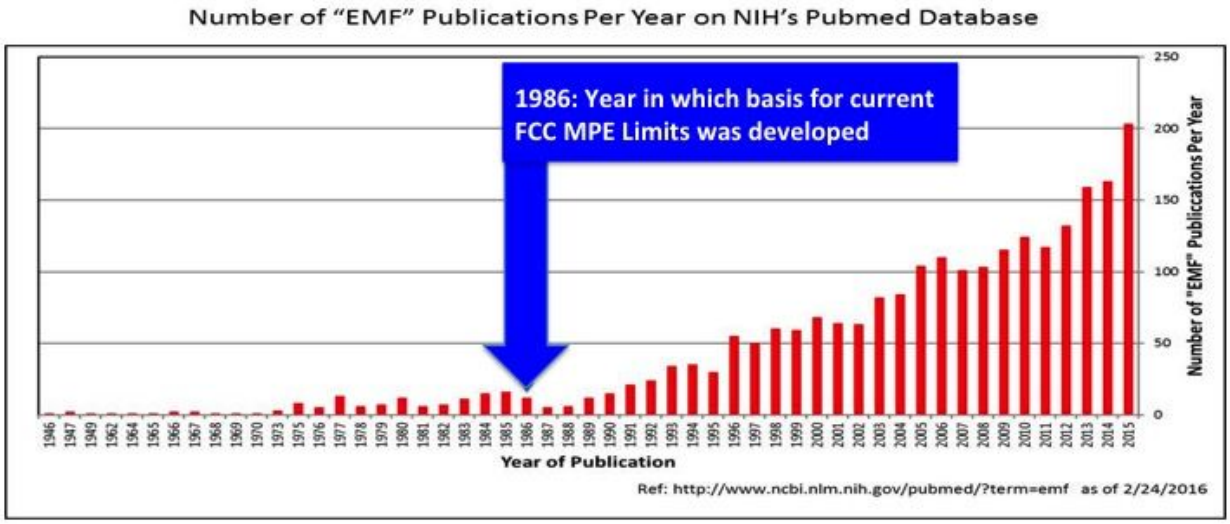
HP Chromebook 14 G4
“WARNING! Exposure to Radio Frequency Radiation: The radiated output power of this device is below the FCC radio frequency exposure limits. Nevertheless, the device should be used in such a manner that the potential for human contact is minimized during normal operation of tablet PCs and notebook computers...To avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antennas should not be less than 20cm.

“...Mobile devices are transmitters designed to be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.” FCC, BULLETIN 65, 1997

Environmental Health Trust has many more examples of FCC instructions at the EHT Fine Print website Page.

These outdated FCC regulations, even if you were to follow the instructions, don't protect children or pregnant women. Children and pregnant women are more vulnerable according to the American Academy of Pediatrics.

FCC RF Human Exposure Levels are Outdated/Based on 1986 Research



FCC exposure limits are primarily based on 1986 National Council on Radiation Protection and Measurement (NCRP) Report No. 86 "Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields" available at http://www.ncrppublications.org/Reports/086.

In 2012, the Government Accountability Office (GAO) published their report "Exposure and Testing Requirements for Mobile Phones Should Be Reassessed" that calls on the FCC to "*formally reassess and, if appropriate, change its current RF energy (microwave) exposure limit*," and *"The Federal Communications Commission's (FCC) RF energy exposure limit may not reflect the latest research, and testing requirements may not identify maximum exposure in all possible usage conditions.*"

In June- the US National Toxicology Program released the results of their 25 million dollar study and they found that long term full body exposure to low level radio frequency wireless radiation significantly increased brain cancer, schwann cell tumors. Results found increased DNA damage and increased incidence of right heart ventricle degeneration. NIH scientists stated this is important because the increased cancers found in the rats are the same types of tumors found to be increased in human cellphone users.

NIH scientist Dr. Melnick who lead the study design states the study was meant to test the assumption that FCC limits are based on- *that low level non thermal radiofrequency could not cause health effects.* Dr. Melnick explains that "they tested the null hypothesis". Dr. Melnick states (and I quote) "the hypothesis has now been

disproved." He state that "Based on this new information, regulatory agencies should make strong recommendations for consumers to take precautionary measures...And a pediatrician would be acting irresponsibly if they understood the implications of this research and did not offer precautionary advice."

[Read Scientific American Article Here.](#)

[Read Consumer Reports Article Here.](#)

wtop | WASHINGTON'S TOP NEWS

Cell Phone Cancer Study Results
Radio Interview 5/30/2016

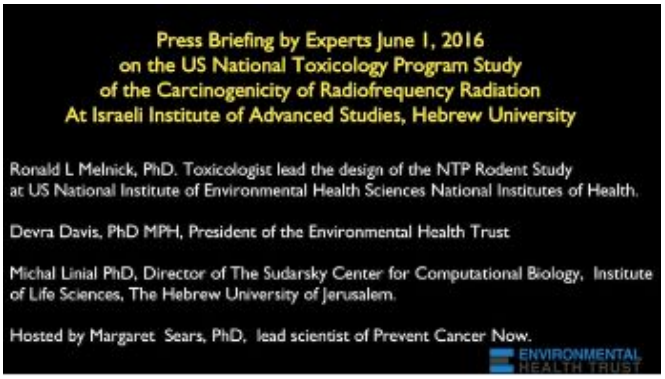
Ronald L Melnick, PhD, Senior Toxicologist
He designed the $25 Million Rat Study
at US NIEHS National Toxicology Program

[Watch a Wall Street Journal Interview on the NTP Cell Phone Cancer Research Study here](#)

[Read the NPR News Story Here.](#)

[Listen to the NPR News Story](#) Here.

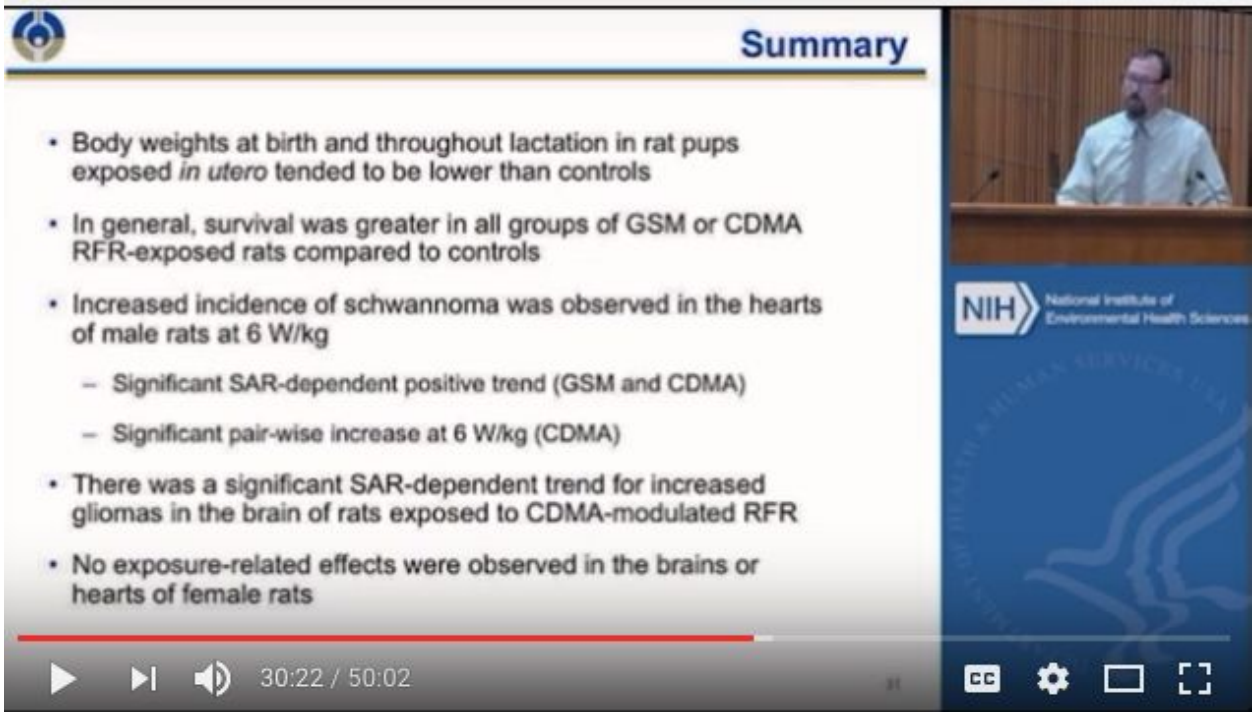
[Read all about the NTP Study Here](#) FAQS



[Watch a WTOP radio interview with Dr. Melnick here.](#)

[Read the American Cancer Society Press Release](#)

[United States National Toxicology Program Video Presentation on the Results of Toxicology and Carcinogenicity of Radiofrequency Radiation Studies at the National Institute of Environmental Health Sciences, June 2016.](#)



Last month, the Mayor of Turin Italy announced plans "To Cut Back on Wi-Fi" in Schools and Government Buildings because the "radiation might damage people's health" adding to the long list of policymakers taking responsible action as schools have a duty of care and need to provide a safe environment.

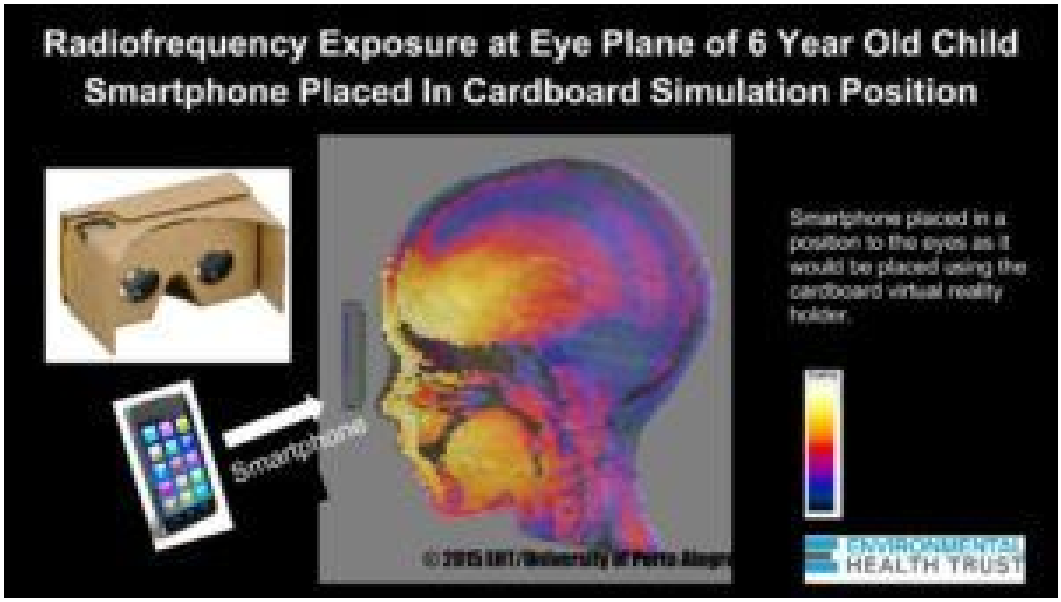
Read about the over 20 countries and governments taking action on radiofrequency here.

I ask that the State Board of Education take immediate action to inform students, parents and staff about RF radiation FCC fine print warnings/instructions AND remove Wi-Fi network and replace them with hardwired safe technology.

School Best Practices Resources:

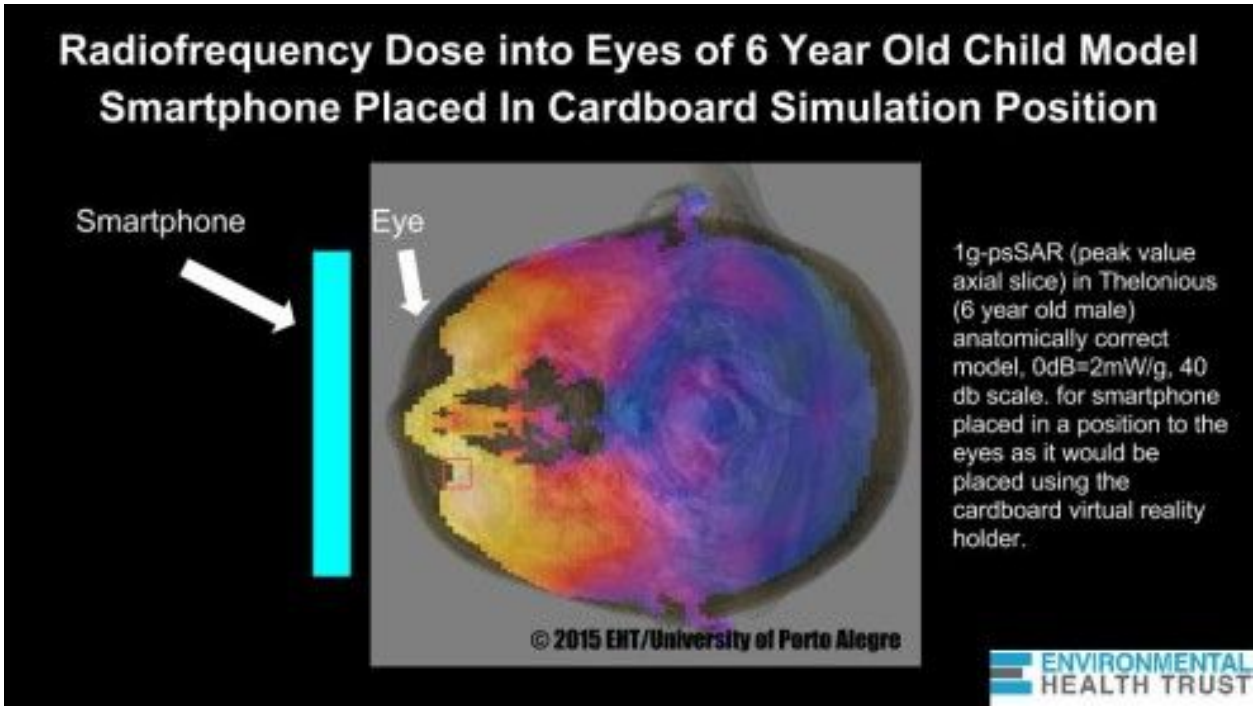
Collaborative For High Performance Schools Low-EMF Best Practices Criteria
Best Technology Practices Example: Upper Sturt Wireless Policy
Guidelines for Safer Use of Technology for Schools developed by Grassroots Environmental Education for the New York State Teachers Union

Additional concerns requiring immediate attention.



Virtual reality systems using smart phones are being brought in classes and parents need to be informed this exposes children's eyes and the frontal lobe of their brain to unprecedented amounts of radiofrequency radiation.

I've watched videos of virtual reality being used in class where the wireless radiation router is placed on a child's desk - in front of a child- and that router has an FCC instruction of 8 inches. This virtual reality exposure is not safe for children and requires the Board to take action to stop these new eye exposures.



IMAGING OF CELL PHONES SIMULATING THESE POSITIONS SHOWS RADIATION DOSES: Preliminary imaging with the cellphone close to the eye and brain of a child shows that such positions result in higher microwave radiation exposures to the eyes. This imaging also shows radiation dose into the brain. These simulations employed an anatomically based model of a six year old and generated estimates of how the young brain absorbs cell phone radiation. Researchers are using this state of the art research to understand the radiofrequency dose in children as shown in this recent IEEE Access publication on children's higher absorption.

Click here to see a full powerpoint presentation on these exposures.

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CNN: Sanjay Gupta discusses the Fine Print Safety Instructions

https://www.youtube.com/watch?v=HF6O8NDaQXY

Consumer Reports November 2015 recommends that consumers be aware of instructions
http://www.consumerreports.org/cro/smartphones/cell-phone-radiation

The Today Show November 2015: Pediatricians on cell phone FCC distances
http://www.today.com/health/pediatricians-new-warning-limit-childrens-exposure-cellphones-t53541

The American Academy of Pediatrics Supports the Right To Know About These Safety Instructions and specifically details these concerns to Congress in 2012 and again to the Federal Communications Commission in 2013 as seen in the attached letters.

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

August 29, 2013

The Honorable Mignon L. Clyburn
Acting Commissioner Federal Communications Commission
445 12th Street SW
Washington, DC 20054

The Honorable Dr. Margaret A. Hamburg Commissioner
U.S. Food and Drug Administration
10903 New Hampshire Avenue Silver Spring,
MD 20993

Dear Acting Chairwoman Clyburn and Commissioner Hamburg:

The American Academy of Pediatrics (AAP), a non-profit professional organization of 60,000 primary care pediatricians, pediatric medical subspecialists, and pediatric surgical specialists dedicated to the health, safety and well-being of infants, children, adolescents, and young adults appreciates this opportunity to comment on the Proposed Rule "Reassessment of Exposure to Radiofrequency Electromagnetic Fields Limits and Policies" published in the Federal Register on June 4, 2013.

In the past few years, a number of American and international health and scientific bodies have contributed to the debate over cell phone radiation and its possible link to cancer. The International Agency for Research on Cancer (IARC), part of the United Nations' World Health Organization, said in June 2011 that a family of frequencies that includes mobile-phone emissions is "possibly carcinogenic to humans." The National Cancer Institute has stated that although studies have not demonstrated that RF energy from cell phones definitively causes cancer, more research is needed because cell phone technology and cell phone use are changing rapidly. These studies and others clearly demonstrate the need for further research into this area and highlight the importance of reassessing current policy to determine if it is adequately protective of human health.

As radiation standards are assessed, the AAP urges the FCC to adopt radiation standards that:

- Protect children's health and well-being. Children are not little adults and are disproportionately impacted by all environmental exposures, including cell phone radiation. Current FCC standards do not account for the unique vulnerability and use patterns specific to pregnant women and children. It is essential that any new standard for cell phones or other wireless devices be based on protecting the youngest and most vulnerable populations to ensure they are safeguarded throughout their lifetimes.
- Reflect current use patterns. The FCC has not assessed the standard for cell phone radiation since 1996. Approximately 44 million people had mobile phones when the standard was set; today, there are more than 300 million mobile phones in use in the United States. While the prevalence of wireless phones and other devices has skyrocketed, the behaviors around cell phone uses have changed as well. The number of mobile phone calls per day, the length of each call, and the amount of time people use mobile phones has increased, while cell phone and wireless technology has undergone substantial changes. Many children, adolescents and young adults, now use cell phones as their only phone line and they begin using wireless phones at much younger ages. Pregnant women may carry their phones for many hours per day in a pocket that keeps the phone close to their uterus. Children born today will experience a longer period of exposure to radio-frequency fields from cellular phone use than will adults, because they start using cellular phones at earlier ages and will have longer lifetime exposures. FCC regulations should reflect how people are using their phones today.
- Provide meaningful consumer disclosure. The FCC has noted that it does not provide consumers with sufficient information about the RF exposure profile of individual phones to allow consumers to make informed purchasing decisions. The current metric of RF exposure available to consumers, the Specific Absorption Rate, is not an accurate predictor of actual exposure. AAP is supportive of FCC developing standards that provide consumers with the information they need to make informed choices in selecting mobile phone purchases, and to help parents to better understand any potential risks for their children. To that end, we support the use of metrics that are specific to the exposure children will experience.

The AAP supports the reassessment of radiation standards for cell phones and other wireless products and the adoption of standards that are protective of children and reflect current use patterns. If you have questions, please contact Clara Filice in the AAP's Washington Office at 202/347-8600.

Sincerely,

Thomas K. McInerny, MD FAAP
President

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

December 12, 2012

The Honorable Dennis Kucinich
2445 Rayburn House Office Building
Washington,
DC 20515

Dear Representative Kucinich:

On behalf of the American Academy of Pediatrics (AAP), a non-profit professional organization of 60,000 primary care pediatricians, pediatric medical subspecialists, and pediatric surgical specialists dedicated to the health, safety and well-being of infants, children, adolescents, and young adults, I would like to share our support of H.R. 6358, the Cell Phone Right to Know Act.

The AAP strongly supports H.R. 6358's emphasis on examining the effects of radiofrequency (RF) energy on vulnerable populations, including children and pregnant women. In addition, we are pleased that the bill would require the consideration of those effects when developing maximum exposure standards. Children are disproportionately affected by environmental exposures, including cell phone radiation. The differences in bone density and the amount of fluid in a child's brain compared to an adult's brain could allow children to absorb greater quantities of RF energy deeper into their brains than adults. It is essential that any new standards for cell phones or other wireless devices be based on protecting the youngest and most vulnerable populations to ensure they are safeguarded through their lifetimes.

In addition, the AAP supports the product labeling requirements in H.R. 6358. These standards will ensure consumers can make informed choices in selecting mobile phone purchases. They will also enable parents to better understand the potential dangers of RF energy exposure and protect their children.

On July 24, the U.S. Government Accountability Office (GAO) published a report on federal cell phone radiation exposure limits and testing requirements. The GAO noted that the Federal Communications Commission's (FCC) most recent data indicates that the number of estimated mobile phone subscribers has grown from approximately 3.5 million in 1989 to approximately 289 million at the end of 2009. Cell phone use behaviors have also changed during that time. The quantity and duration of cell phone calls has increased, as has the amount of time people use mobile phones, while cell phone and wireless technology has undergone substantial changes. Many more people, especially adolescents and young adults, now use cell phones as their only phone line, and they begin using wireless phones at much younger ages.

Despite these dramatic changes in mobile phone technology and behavior, the FCC has not revisited the standard for cell phone radiation exposure since 1996. The current FCC standard for maximum radiation exposure levels is based on the heat emitted by mobile phones. These guidelines specify exposure limits for hand-held wireless devices in terms of the Specific Absorption Rate (SAR), which measures the rate the body absorbs radiofrequency (RF). The current allowable SAR limit is 1.6 watts per kilogram (W/kg), as averaged over one gram of tissue. Although wireless devices sold in the United States must ensure that they do not exceed the maximum allowable SAR limit when operating at the device's highest possible power level, concerns have been raised that long-term RF energy exposure at this level affects the brain and other tissues and may be connected to types of brain cancer, including glioma and meningioma.

In May 2011, the International Agency for Research on Cancer (IARC), the United Nations' World Health Organization's (WHO) agency promoting international cancer research collaboration, classified RF energy as "possibly carcinogenic to humans." In addition, the National Cancer Institute has stated that although studies have not definitively linked RF energy exposure from cell phones to cancer, more research is required to address rapidly changing cell phone technology and use patterns.

This and other research identified by the GAO demonstrates the need for further research on this issue, and makes clear that exposure standards should be reexamined. The GAO concluded that the current exposure limits may not reflect the latest research on RF energy, and that current mobile phone testing requirements may not identify maximum RF energy exposure. The GAO proposed that the FCC formally reassess its limit and testing requirements to determine whether they are effective. The AAP commends the activities proposed under H.R. 6358, as they would address this research gap and improve consumer knowledge and safety. Establishing an expanded federal research program as the basis for exposure standards will ensure that consumer protections incorporate the latest research. Currently, the National Institute of Health (NIH), the only federal agency the GAO identified as directly funding research on this topic,

provided approximately $35 million from 2001 to 2011. Given this previous funding level, the AAP supports the $50 million per fiscal year for seven years that H.R. 6358 would authorize.

The AAP appreciates your recognition of the need for new research and standards for mobile phone radiation, and is pleased to support H.R. 6358.

For further assistance, please do not hesitate to contact Sonya Clay, Assistant Director, Department of Federal Affairs, at 202-347- 8600 or sclay@aap.org.

Sincerely,

Thomas K. McInerny, MD, FAAP

President

These letters can be accessed online:

American Academy of Pediatrics Letter to the FCC
http://apps.fcc.gov/ecfs/document/view?id=7520941318

American Academy of Pediatrics Letter to Congress
http://nebula.wsimg.com/b625b7cc6847a58ab1b7f25d326802d2?AccessKeyId=045114F8E0676B9465FB&disposition=0&alloworigin=1

What health outcomes are linked to radiofrequency exposure?

Scientists are in agreement that radiofrequency radiation (non-ionizing radiation) at high levels can have a heating effect which is damaging to health because the heat damages tissue, causing blindness sterility and other health issues. Current government FCC exposure limits are set to protect against this effect only despite research showing a myriad of other serious adverse effects from low *non-heating* levels of radiofrequency radiation.

> *"Whereas peer reviewed research has demonstrated adverse biological effects of wireless EMF including single and double stranded DNA breaks, creation of reactive oxygen species, immune dysfunction, cognitive processing effects, stress protein synthesis in the brain, altered brain development, sleep and memory disturbances, ADHD, abnormal behavior, sperm dysfunction, and brain tumors;"- California Medical Association Wireless Resolution 2014*

Several agencies and health organizations have criticized FCC limits.

- T**he Department of the Interior states** that *"The electromagnetic radiation standards used by the Federal Communications Commission (FCC) continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today."* Read The 2014 Letter.
- **The 2008 National Academy of Sciences (NAS) Report**, Identification of Research Needs Relating to Adverse Health Effects of Wireless Communication, was tasked to identify any inadequacies in the research upon which the current US Radiofrequency radiation (RF) safety guidelines are based. The NAS Report found numerous inadequacies in that research record. The report found significant research gaps in regards to children and identified a priority research area to be to "characterize exposure of juveniles, children, pregnant women, and fetuses, both for personal wireless devices (e.g., cell phones, wireless personal computers, [PCs] and for RF fields from base station antennas including gradients and variability of exposures, the environment in which devices are used, and exposures from other sources, multilateral exposures, and multiple frequencies."

- **The American Academy of Pediatrics** has repeatedly called on the government to update its regulations stating that "Current FCC standards do not account for the unique vulnerability and use patterns specific to pregnant women and children." Read their letter to the FCC in 2013 here.
- **The California Medical Association** passed a Wireless Resolution that states :

  Whereas scientists are increasingly identifying EMF from wireless devices as a new form of environmental pollution with a growing body of peer reviewed scientific evidence finding significant adverse health and biologic effects on living organisms with exposure to low levels of non-ionizing microwaves currently approved and used in wireless communication, and

  Whereas peer reviewed research has demonstrated adverse biological effects of wireless EMF including single and double stranded DNA breaks, creation of reactive oxygen species, immune dysfunction, cognitive processing effects, stress protein synthesis in the brain, altered brain development, sleep and memory disturbances, ADHD, abnormal behavior, sperm dysfunction, and brain tumors; and...Resolved, That CMA support efforts to implement new safety exposure limits for wireless devices to levels that do not cause human or environmental harm based on scientific research. Read it here . Read a magazine article on their resolution here.
- **In May 2015, over 200 scientists from 39 nations** who have authored more than 2,000 articles on this topic appealed to the United Nations to address "the emerging public health crisis" related to cell phones and other wireless devices. These scientists state that "the ICNIRP guidelines do not cover long-term exposure and low-intensity effects, and are " insufficient to protect public health." They also state that "the various agencies setting safety standards have failed to impose sufficient guidelines to protect the general public, particularly children who are more vulnerable to the effects of EMF." See the International EMF Scientist Appeal at https://emfscientist.org.
- **The LA School District Uses a RF-EMF Exposure Threshold 10,000 Less Than the FCC Limits:** The OEHS supported a precautionary threshold level that is 10,000 times lower than the current Federal Communications Commission standard. Read the RF Report the LA School District Used to recommend a cautionary exposure level. If the FCC limits are "not outdated" then why would they do this? RADIOFREQUENCY (RF) EVALUATION REPORT Use of Wireless Devices in Educational Settings

Dr. De Kun Li sums up the problem with FCC regulations:
"In summary, we do not currently have scientific data to determine where the safe RF exposure level is regarding the non thermal effects. Therefore, it should be recognized that we are dealing with uncertainty now and most likely for the foreseeable future. The question for government agencies especially those concerned with public health and safety, is, given the uncertainty, should we err on the side of safety and take precautionary measures avoidance measures? *Unknown does not mean safe. "*
Letter from Dr. De-Kun Li, MD, PhD, MPH to the FCC

> "The FCC is not a health and safety agency, we defer to other organizations and agencies with respect to interpreting the biological research necessary to determine what levels are safe."
> -The Federal Communications Commission in 2013

ENVIRONMENTAL HEALTH TRUST
P.O. Box 58
Teton Village, WY 83025
www.ehtrust.org

Montgomery County Board of Education
Montgomery County Schools
Carver Educational Services Center
850 Hungerford Drive
Rockville, MD 20850

January 20, 2016

Dear Montgomery County Board of Education,

Concerned parents in your school district have asked me to write to you regarding the health risks of wireless radiofrequency radiation exposure in the classroom. Based on what I have been told, I want to urge you to halt programs that currently have students use their own phones in ways that expose their eyes and brains to levels of radiation that have never been tested for safety.

I was Founding Director of the Board on Environmental Studies and Toxicology of the U.S. National Research Council, and Founding Director of the Center for Environmental Oncology at the University of Pittsburgh Cancer Institute. President Clinton appointed me to the Chemical Safety and Hazard Investigation Board, and I am former Senior Advisor to the Assistant Secretary for Health in the Department of Health and Human Services. I founded the non-profit Environmental Health Trust in 2007 to provide basic research and education about environmental health hazards. Our scientific team is currently focusing on the health risks of radiofrequency radiation as an important public health issue.

Many people are unaware that cell phones and wireless laptops and tablets function as two-way microwave radios. A typical classroom might have the following scenario: every student has a laptop--which is typically tested for use 8 inches from an adult male body--a cell phone in the pocket--which is also tested at a minimum distance from an adult male body-- and a network transmitter on the ceiling and possibly a cell tower outside next to the sports field. All these devices emit microwave radiation which can be readily absorbed into children's bodies and brains.

Manufacturers specifically recommend that cell phones be used "as tested"—at this little-known minimum distance from the body. Recently, *Consumer Reports* in November advised that people should not keep phones in the pocket—advice that few children or adults appreciate. *These devices have never been tested for safety with children.* Accumulating research indicates that long-term exposure to low levels over long lifetimes could pose a serious risk to our health.

Regarding tested distances for using laptops, the Federal Communications Commission (FCC) states that laptops and computers are "mobile devices are transmitters designed to be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons." The body in this instance refers to a large male weighing more than 200 pounds and standing six feet tall.

As the county is preparing to increase student use of Chromebooks, please be aware that the Samsung Chromebook manual states:
"United States of America USA and Canada Safety Requirements and Notices

- Do not touch or move antenna while the unit is transmitting or receiving.
- Do not hold any component containing the radio such that the antenna is very close or touching any exposed parts of the body, especially the face or eyes, while transmitting.
- Regardless of the power levels, care should be taken to minimize human contact during normal operation.
- FCC Statement for Wireless LAN use: *"While installing and operating this transmitter and antenna combination the radio frequency exposure limit of 1mW/cm2 may be exceeded at distances close to the antenna installed. Therefore, the user must maintain a minimum distance of 20cm from the antenna at all times."*

As one of the leaders in educational policy of this nation, your school district has an opportunity to set an example for school districts nationwide by installing safer technology in classrooms and educating students, teachers and staff about tested distances that devices should be used to reduce radiation. A number of public and private schools have already implemented such policies. Just as we provide children with seat belts and bike helmets, a precautionary approach to wireless is recommended by many scientists and governments worldwide.

For more information about all of these issues, please read cell phone instructions for various models at http://showthefineprint.org. Our newly posted Ebook also details fine print safety instructions in wireless device user manuals.

When children use these devices close to their bodies, they are exceeding these safety instructions, and exposing themselves to radiofrequency (RF) radiation levels which can exceed our government FCC RF radiation exposure limits. The FCC RF exposure limit was designed to protect the public from the thermal (heating) effects of acute exposure to RF energy. The FCC states, "Tissue damage in humans could occur during exposure to high RF levels because of the body's inability to cope with or dissipate the excessive heat that could be generated. Two areas of the body, the eyes and the testes, are particularly vulnerable to RF heating because of the relative lack of available blood flow to dissipate the excess heat load."

CHILDREN ABSORB MORE RADIATION THAN ADULTS

Our recently published research in the IEEE *Spectrum* with investigators at the Federal Universities of Brazil provides new state-of-the-art radiation exposure brain modeling which confirms that substantially higher radiofrequency radiation doses occur in younger children as compared to adults even where products comply with tested guidelines developed for adults.

FCC REGULATIONS ARE OUTDATED

FCC exposure limits were set more than 19 years ago and were based on decades-old research. The Government Accountability Office published a 2012 Report that calls on the FCC to formally reassess their current RF energy (microwave) exposure limits, stating that the "FCC RF energy exposure limit *may not* reflect the latest research." I encourage you to read scientific submissions to FCC Proceeding Number 13-84 at http://bit.ly/1aGxQiq. It is unknown when the FCC will make a ruling, however, *until that time* the current outdated FCC limits are *not reflective* of the current state of science.

FCC REGULATIONS DO NOT PROTECT THE PUBLIC FROM BIOLOGICAL EFFECTS

As the California Medical Association states in their 2014 Resolution calling for updated FCC Regulations, "peer reviewed research has demonstrated adverse biological effects of wireless EMF [electromagnetic fields] including single and double stranded DNA breaks, creation of reactive oxygen species, immune dysfunction, cognitive processing effects, stress protein synthesis in the brain, altered brain development, sleep and memory disturbances, ADHD, abnormal behavior, sperm dysfunction, and brain tumors."

In May 2015, over 200 scientists who have authored more than 2,000 articles on this topic appealed to the United Nations to address "the emerging public health crisis" related to cellphones and other wireless devices, urging that the United Nations Environmental Programme (UNEP) initiate an assessment of alternatives to current exposure standards and practices that could substantially lower human exposures to non-ionizing radiation. These scientists state that "the ICNIRP guidelines do not cover long-term exposure and low-intensity effects, " and are " insufficient to protect public health." They also state that "the various agencies setting safety standards have failed to impose sufficient guidelines to protect the general public, particularly children who are more vulnerable to the effects of EMF." Please see their website at https://emfscientist.org.

INCREASED CANCER RISK

Wireless radiofrequency radiation was classified as a Class 2B "Possible Human Carcinogen" by the World Health Organization's International Agency for Research on Cancer in 2011. According to many scientists, evidence *has increased* since 2011, indicating that cell phone and wireless radiation should be classified as a "probable carcinogen." Those exposed at younger ages show four to eight times increased cancer risk. Replicated research just published in Biochemical and Biophysical Research Communications indicates that radiofrequency acts as a *tumor promoter* at low to moderate levels.

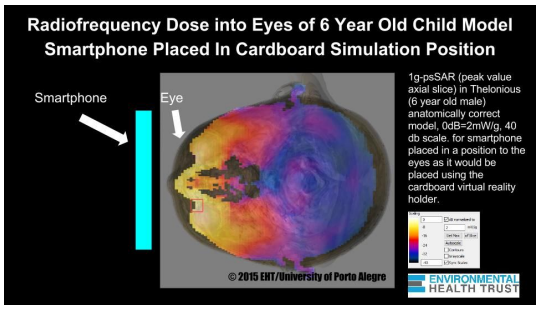
CONCERN FOR PREGNANT STUDENTS AND STAFF

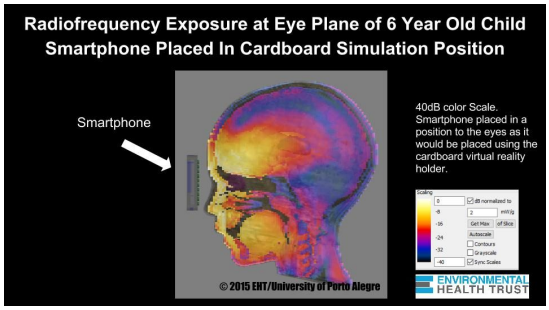
Pregnant students and staff are especially at risk from wireless because the fetus is the most vulnerable to toxic exposures. Several experimental studies are showing irreversible changes after prenatal exposure to cell phone and wireless radiation such as altered brain functioning, decreased brain cells and altered reproductive organ development. More than 100 physicians, scientists and public health professionals joined together to express their concern about the risk that wireless radiation poses to pregnancy and now *urge pregnant women to limit their exposures*. Please read these scientists BabySafe Joint Statement

VIRTUAL TECHNOLOGY RESULTS IN HIGHER EXPOSURES TO THE EYE AND BRAIN

Most recently, I was contacted by a parent in your district about the virtual reality devices now used in MCPS classrooms to go on a virtual "field trip." As indicated by online instructions, this experience involves using smartphones placed directly in front of the child's eyes so that they can directly watch a fascinating video of faraway lands. The smartphone is streaming radiation throughout the classroom from the teacher's iPad for the entire "field trip."

Please be aware that FCC regulations set decades ago did not utilize science that looks at the effects from cell phones on different body tissues such as the eyes. Upon hearing about this issue, I contacted EHT-associated scientists at federal universities of Brazil who do state-of-the-art computer modeling. I asked them to position the phone as it would be in the virtual reality cardboard for use in front of the child's eyes and assess the microwave radiation. The yellow and orange color show the highest exposures.





My colleagues and I are sharing this work with you today because we believe you should have more information about microwave radiation exposures that will take place through this system.

This research image above utilizes a sophisticated computer system that the U.S. Food and Drug Administration (FDA) currently applies to evaluate medical devices. It simulates the radiation absorption into *anatomically correct models*--something that currently used systems for testing phones and devices

cannot do. In a study from Memorial Sloan-Kettering Cancer Center, radiation physicist David Gultekin, working with Bell Labs electrical engineer Lothar Moeller, reported that normal working cell phones can create tiny hotspots within brain tissue. Unlike other organs, eyes do not have circulation to effectively carry away heat.

In addition to the impact from the microwave radiation, there could also be impacts to a child's retina from the blue light emitted by the screen. Youths under the age of 20, and especially very young children, have little or no yellowing of the lens (which helps protect the adult eye). Therefore, blue light (or UV) which enters the eye is unfiltered in children and strikes the retina at full-strength exposing not only the retina, but the lens to possible damage over the long time. Such injury may not be evident until later in time.

In 2010, Andreas Christ and team reported that children's hippocampus and hypothalamus absorbs 1.6–3.1 times higher and the cerebellum absorbs 2.5 times higher microwave radiation compared to adults; children's bone marrow of the skull absorbs 10 times higher microwave radiation than in adults, *and children's eyes absorb much higher microwave radiation than adults*. A recent Deans' Lecture I delivered to University of Melbourne provides an overview on this research.

SIMPLE STEPS WILL PROTECT CHILDREN

Compelling research raises the possibility of very serious harm to children from radiofrequency radiation exposures well below "FCC compliant" levels. Legal does not mean safe. Based on the preliminary work that I share with you here, I urge you to forgo the use of such devices such as virtual reality cardboard as there is no research that has considered their impact on children's eyes. At this time, the smart choice for school decision makers is to act now and reduce radiofrequency wireless exposures. In fact, many countries (over 20) and health authorities worldwide recommend reducing radiofrequency radiation to children.

More recently, the Cyprus Government's National Committee on Environment and Children's Health released a video about reducing wireless and I invite you to watch this excellent example of responsible action at this link https://www.youtube.com/watch?v=H43IKNjTvRM .

I understand that your county has a Bring Your Own Device policy whereby cell phones are not only allowed *in* the classroom but are actively used in the curriculum. As I have been told, students in film class might use their cell phones to take footage to create a movie, and in some math classes they use their cell phones as a calculator. Advice should be routinely provided to any student using a wireless device at school about *how to reduce exposures*. For example, if phones are used on airplane mode, and wireless is turned off on computers then these devices will neither send nor receive microwave radiation.

When powered on, phones undergo short bursts of microwave radiation up to 900 times per minute, *whether or not the phone is being used for talking.* Once teachers and students are educated on how they can simply turn their phone onto airplane mode, then they can use the phone in the classroom *without* being exposed to unnecessary radiofrequency radiation.

Likewise, laptops such as Chromebooks are also emitting constant radiation and at much higher levels when a student is streaming video or using cloud based applications. Laptops can easily be hardwired to ethernet so that students can safely use the internet without radiation emissions. Please review the Best Practices for Low EMF in Schools developed by the Northeast Collaborative For High Performing Schools which details how schools can reduce exposure to radiofrequency fields and still have full internet connectivity.

Along with the recommendation of over 200 scientists (see https://emfscientist.org) and health authorities worldwide, I recommend that the best course of action is to take simple precautions—as many nations already currently advise. *Children's exposures to wireless radiation should be reduced as much as possible.* We have a responsibility to act now to reduce children's exposure to radiofrequency radiation. Children's nervous, immune and reproductive systems are rapidly developing and, along with pregnant women, children deserve an abundance of caution.

As several colleagues and I wrote in a letter to the U.S. Secretary of Education just a few months ago, we recommend your school district do the following:

1. **Raise school community awareness through new educational curriculum:** Students, teachers and their families should be given information on wireless health risks and simple precautionary steps they can take to protect their health. It is important to teach children how to use technology both safely and more responsibly in order to protect their health and wellbeing.

2. **Install a safe communication and information technology infrastructure in schools to meet educational needs:** Solutions exist to reduce exposures to wireless emissions and mitigate the health risk. Low-EMF Best Practices have been developed, allowing educational needs to be met with safer, hard-wired Internet connections, which are also faster and more secure.

Low-EMF Best Practices are the solution that allows for full communication, information access and learning tools use in the classroom while minimizing unnecessary health risks. Your district can thoughtfully integrate safe technology into every classroom while responsibly safeguarding the health of every generation.

I fully understand that this information has not been widely understood. I would be happy to provide or develop an online technical briefing to your senior staff to assist you as you make decisions today that will affect the health of students for the rest of their lives.

Yours respectfully,

Devra Davis, PhD MPH
President and Founder

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Carver Educational Services Center
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January 3, 2016

Dear Montgomery County COO Dr. Andrew Zuckerman, Interim Superintendent Larry Bowers, Board of Education and Office of Technology;

I have been asked to comment on the MCPS Statement Concerning Deployment of Wireless Computing Technologies. I am happy to do so.

The first paragraph in that statement is not relevant to the issue at hand because it is perfectly possible to use wired communication for such education. This document is being produced on a computer on which I only use wired communication, connecting to the internet, connecting to my printer and for other purposes, as well.

The 2nd and 3rd paragraphs of your statement may well be technically correct. However these give us no assurance whatsoever of safety of Wi-Fi fields. The FCC guidelines as are many other such guidelines, are based on the assumption that only heating effects of microwave/lower frequency EMFs can have biological effects. However that assumption has been falsified by thousands of studies published from the 1950s to the present, each showing

that non-thermal levels of exposure often produce biological effects. For example, in 1971, the U.S. Office of Naval Medical Research produced a document reporting over 100 different non-thermal effects [1], listing 40 apparent neuropsychiatric changes produced by non-thermal microwave frequency exposures, including 5 central/peripheral nervous system (NS) changes, 9 central NS effects, 4 autonomic system effects, 17 psychological disorders, 4 behavioral changes and 2 misc. effects [1]. It also listed cardiac effects including ECG changes and cardiac necrosis as well as both hypotension and hypertension, and also 8 different endocrine effects. Changes affecting fertility included tubular degeneration in the testis, decreased spermatogenesis, altered sex ratio, altered menstrual activity, altered fetal development, programmed cell death (what is now known as apoptosis) and decreased lactation. Many other non-thermal changes were also listed for a total of over 100 non-thermal effects. They also provided [1] approximately 2000 citations documenting these various health effects. That was almost 45 years ago and is only the beginning of the evidence for the existence of non-thermal effects. My own recent paper [2] shows that widespread neuropsychiatric effects are caused by non-thermal exposures to many different microwave frequency electromagnetic fields (EMFs).

Tolgskaya and Gordon [3] in 1973 published a long and detailed review of effects of microwave and lower frequency EMFs on experimental animals, mostly rodents. They report that non-thermal exposures impact many tissues, with the nervous system being the most sensitive organ in the body, based on histological studies, followed by the heart and the testis. They also report effects of non-thermal exposures on liver, kidney, endocrine and many other organs. The nervous system effects are very extensive and include changes many changes in cell structure, disfunction of synaptic connections between neurons and programmed cell death and are discussed in Refs. [2,3] and more modern studies reporting extensive effects of such non-thermal EMF exposures on the brain are also cited in [2]. There are also many modern studies showing effects of non-thermal exposures on fertility in animals.

The Raines 1981 National Aeronautics and Space Administration (NASA) report [4] reviewed an extensive literature based on occupational exposures to non-thermal microwave EMFs. Based on multiple studies, Raines [4] reports that 19 neuropsychiatric effects are associated with occupational microwave/ radiofrequency EMFs, as well as cardiac effects, endocrine including neuroendocrine effects and several other effects.

I reviewed many other scientific reviews on this topic, each of which clearly supports the view that there are various non-thermal health impacts of these EMFs [5]. In 2015, 206 international scientists signed a statement sent to the United Nations Secretary General and to member states, stating that international safety guidelines and standards are inadequate to protect human health [6]. Each of these 206 scientists from 40 countries had scientific publications on biological effects of such EMFs and therefore each is well qualified to judge this. ***It can be seen from this statement to the UN, that there is a strong scientific consensus that current safety guidelines and standards are inadequate because they do not take into consideration all of the non-thermal health effects produced by various EMF exposures.***

That scientific consensus also rejects, therefore, the FCC EMF guidelines, guidelines that cannot be defended despite your own attempt to do so in MCPS Statement Concerning Deployment of Wireless Computing Technologies.

It can be seen from the previous paragraphs, that the following non-thermal effects of EMF exposures are well documented:

- Widespread neuropsychiatric effects
- Several types of endocrine (that is hormonal) effects
- Cardiac effects impacting the electrocardiogram (Note: these are often associated with occurrence of sudden cardiac death)
- Male infertility
- However, there are many additional types of biological changes produced by non-thermal EMF exposures (reviewed in 5,7] including:
- Oxidative stress
- Changes in calcium fluxes and calcium signaling
- Several types of DNA damage to the cells of the body, including single strand and double strand DNA breaks and 8-OH-guanine in DNA
- Cancer (which is undoubtedly caused, in part, by such DNA damage)
- Female infertility
- Lowered melatonin; sleep disruption
- Therapeutic effects of EMFs when they are highly controlled and focused on a specific part of the body

It can be seen from the above, that each of the things that we most value as individuals and as a species are being attacked by non-thermal microwave frequency EMFs [5.7]:

- **Our Health**
- **Our brain function**
- **The integrity of our genomes**
- **Our ability to produce healthy offspring**

I want to emphasize that the specific health effects listed above are **not** the only things that are likely to be impacted by non-thermal EMF exposures, they are however the best documented such effects.

While it has been clear for many years that there are many non-thermal health effects of microwave frequency EMFs, it has not been clear until about 2 ½ years ago, how these effects are produced by such exposures. I stumbled onto the mechanism in 2012 and published on it in mid-2013. This 2013 paper [8] was honored by being placed on the Global Medical Discovery web site as one of the most important medical papers of 2013. At this writing, it has been cited 61 times according to the Google Scholar database, with over 2/3rds of those citations during 2015. So clearly it is having a substantial and rapidly increasing impact on the scientific literature. I have given 26 professional talks, in part or in whole on EMF effects in 10 different

countries over the last 2 1/4 years. So it is clear that there has been a tremendous amount of interest in this research.

What the 2013 study showed [8], was that in 24 different studies (and there are now 2 more that can now be added [2]), effects of low-intensity EMFs, both microwave frequency and lower frequency EMFs could be blocked by calcium channel blockers, drugs that block what are called voltage-gated calcium channels (VGCCs). There were a total of 5 different types of calcium channel blocker drugs used in these studies, with each type acting on a different site on the VGCCs and each thought to be highly specific for blocking VGCCs. What these studies tell us is that these EMFs act to produce non-thermal effects by activating the VGCCs. Where several effects were studied, when one of them was blocked or greatly lowered, each other effect studied was also blocked or greatly lowered. This tells us that the role of VGCC activation is quite wide – many effects go through that mechanism, possibly even all non-thermal effects in mammals. There are a number of other types of evidence confirming this mechanism of action of microwave frequency EMFs [2,]. Each of the 11 health impacts caused by non-thermal EMF exposures can be explained as being produced by indirect effects of VGCC activation [5,7].

It is now apparent [7] that these EMFs act directly on the voltage sensor of the VGCCs, the part of the VGCC protein that detects electrical changes and can open the channel in response to electrical changes. The voltage sensor (and this is shown on pp. 102-104 in [7]) is predicted, because of its structure and its location in the plasma membrane of the cell, to be extraordinarily sensitive to activation by these EMFs, about 7.2 million times more sensitive than are single charged groups elsewhere in the cell. What this means is that arguments that EMFs produced by particular devices are too weak to produce biological effects, are immediately highly suspect because the actual target, the voltage sensor of the VGCCs is extremely sensitive to these EMFs. **Because heating is mostly produced by forces on these singly charged groups elsewhere in the cell, limiting safety guidelines to heating effects means that these guideline allow exposures that are something like 7.2 million times too high**.

Why then does the FCC stick with these totally unscientific safety guidelines? That is the 64 billion dollar question. The FCC has been shown, in a long detailed document published by Harvard University Center for Ethics, to be a “captured agency”, that is captured by the telecommunications industry that the FCC is supposed to be regulating [9; can be obtained full text from web site listed in 9]. So perhaps the failure of the FCC to follow the extensive science in this important area, can be understood. Of course, what that means is that the FCC is completely failing in its role of protecting the public and it is a major blunder, therefore for either you or any other organization to depend on the FCC guideline as a reliable predictor of impacts of EMFs in humans.

So what is known about health impacts of Wi-Fi EMFs?

Table 1. The following Table summarizes various health impacts of Wi-Fi EMF exposures:

Citation(s)	Health Effects
[10,11,12,13,14,15,16]	Sperm/testicular damage, male infertility
[10,15,17,18,19,20]	Oxidative stress
[20]	Calcium overload
[11,12,20]	Apoptosis (programmed cell death)
[17]	Melatonin lowering; sleep disruption
[10,13]	Cellular DNA damage
[21]	MicroRNA expression (brain)
[18]	Disrupts development of teeth
[22]	Cardiac changes, blood pressure disruption; erythrocyte damage; catecholamine elevation
[23,24]	Neuropsych changes including EEG
[25]	Growth stimulation of adipose stem cells (role in obesity?)

Each of the effects reported above in 2 to 7 studies have an extensive literature for their occurring in response to various other microwave frequency EMFs so it should be clear that these observations on Wi-Fi exposures are highly probable to be correct. These include (see Table 1) findings that Wi-Fi exposures produce impacts on the testes leading to lowered male fertility; oxidative stress; intracellular calcium overload; apoptosis (a process that has an important causal role in neurodegenerative diseases); cellular DNA damage; neuropsychiatric changes including EEG changes. Each of these are very serious and oxidative stress has causal roles in many different human diseases; intracellular calcium overload has many different consequences – for example, it has a central role in causing neurodegenerative diseases; cellular DNA damage can cause cancer and produce mutations that impact future generations (if there are any). Other Wi-Fi effects each only documented by a single study are also effects where a variety of other non-thermal microwave EMFs also cause these, as shown by extensive literature on each of them. These include: melatonin lowering and sleep disruption; and the effects reported by Saili et al [22] cardiac changes, blood pressure disruption; erythrocyte damage; catecholamine elevation. So these may well be correct observations as well despite having only a single Wi-Fi specific study for each.

Summary:

1. The EMF safety guidelines supported by the FCC and others assume that only heating effects need be of concern. These assumptions have been known to be false for at least 45

years and there is a scientific consensus on this, that has lead to the petition by 206 highly qualified international scientists to the UN stating that current safety guidelines are inadequate.
2. We now know that low intensity non-thermal exposures work via VGCC activation and that indirect effects of such VGCC activation can produce each of the health effects that have been widely reported to occur in response to such EMF exposures for something like 60 years. These attack:
    a. **Our health**
    b. **Our brain function**
    c. **The integrity of our genomes**
    d. **Our ability to produce healthy offspring**
3. The voltage sensor of the VGCCs is stunningly sensitive to such low intensity EMFs, about 7.2 million times more sensitive than are singly charge groups elsewhere in our cells. The consequence of this is that safety guidelines allow exposures that are very roughly 7.2 million times too high.
4. The FCC has been shown, in a detailed Harvard University study, to be a Captured Agency, captured by the industry that it is supposed to be regulating. This provides an additional reason to be very highly skeptical about all FCC safety guidelines.
5. 15 studies have each shown health effects of Wi-Fi, most of which have also been shown to occur in response to low intensity exposures to other types of microwave frequency EMFs. These are likely to have massive health effects by producing male infertility (female infertility has not been studied in response to Wi-Fi), oxidative stress (involved in dozens of human diseases), cellular DNA damage (possibly leading to both cancer and mutations in future generations), life threatening cardiac effects, cellular apoptosis and also intracellular calcium overload (with both of these possibly leading to neurodegenerative diseases), various neuropsychiatric changes and many others.

It is my view that it is sheer insanity to fail to see the threat to our and to all human civilization by continuing to ignore the threats from such EMFs, starting with Wi-Fi.

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Literature cited:

[1] Naval Medical Research Institute Research Report, June 1971. Bibliography of Reported Biological Phenomena (“Effects”) and Clinical Manifestations Attributed to Microwave and Radio-Frequency Radiation. Report No. 2 Revised.
[2] Pall ML. 2015. Microwave frequency electromagnetic fields (EMFs) produce widespread neuropsychiatric effects including depression. J. Chem. Neuroanat. 2015 Aug 20. pii: S0891-0618(15)00059-9.doi: 10.1016/j.jchemneu.2015.08.001. [Epub ahead of print] Review.

[3] Tolgskaya MS, Gordon ZV. 1973. Pathological Effects of Radio Waves, Translated from Russian by B Haigh. Consultants Bureau, New York/London, 146 pages.
[4] Raines JK. 1981. Electromagnetic Field Interactions with the Human Body: Observed Effects and Theories. Greenbelt, Maryland: National Aeronautics and Space Administration 1981; 116 p.
[5] Pall ML. 2015. How to approach the challenge of minimizing non-thermal health effects of microwave radiation from electrical devices. Int J Innovative Research Engineering Management (IJIREM) ISSN: 2350-0557, Volume-2, Issue -5, September 2015; 71-76.
[6] https://emfscientist.org/index.php/emf-scientist-appeal
[7] Pall ML. 2015 Scientific evidence contradicts findings and assumptions of Canadian Safety Panel 6: microwaves act through voltage-gated calcium channel activation to induce biological impacts at non-thermal levels, supporting a paradigm shift for microwave/lower frequency electromagnetic field action. Rev Environ Health 30:99-116.
[8] Pall ML. 2013 Electromagnetic fields act via activation of voltage-gated calcium channels to produce beneficial or adverse effects. J Cell Mol Med 17:958-65.
[9] Alster N. 2015 Captured Agency: How the Federal Communications Commission Is Dominated by the Industries It Presumably Regulates. Edmond J. Safra Center for Ethics Harvard University 124 Mount Auburn Street, Suite 520N Cambridge, MA 02138 USAhttp://www.ethics.harvard.edu/http://www.ethics.harvard.edu/files/center-for-ethics/files/capturedagency_alster.pdf
[10] Atasoy HI, Gunal MY, Atasoy P, Elgund S, Bugdayci G. 2013 Immunopathologic demonstration of deleterious effects on growing rat testes of radiofrequency waves emitted from conventional Wi-Fi devices. J Pediatr Urol 9:223-229.
[11] Shokri S, Soltani A, Kazemi M, Sardari D, Mofrad FB. 2015 Effects of Wi-Fi (2.45 GHz) exposure on apopotosis, sperm parameters and testicular histomorphology in rats: a time course study. Cell J 17:322-31.
[12] Dasdag S, Tas M, Akdag MZ, Yegin K. 2015 Effect of long-term exposure of 2.4 GHz radiofrequncy radiation emitted from Wi-Fi equipment on testes functions. Electromagn Biol Med 34:37-42.
[13] Avendaño C, Mata A, Sanchez Sarmiento CA, Doncel GF. 2012 Use of laptop computers connected to the internet through Wi-Fi decreases human sperm motility and increases sperm DNA fragmentation. Fertil Steril 97:39-45.
[14] Yildiring ME, Kaynar M, Badem H, Cavis M, Karatus OF, Cimentepe E. 2015 What is harmful for male fertility: Cell phone or wireless internet? Kaosiung J Med Sci 31:480-4.
[15] Özorak A1, Nazıroğlu M, Çelik Ö, Yüksel M, Özçelik D, Özkaya MO, Çetin H, Kahya MC, Kose SA. 2013 Wi-Fi (2.45 GHz)- and mobile phone (900 and 1800 MHz)-induced risks on oxidative stress and elements in kidney and testis of rats during pregnancy and the development of offspring. Biol Trace Elem Res 156:221-9.
[16] Oni OM, Amuda DB, Gilbert CE. 2011 Effects of radiofrequency radiation from WiFi devices on human ejaculated sperm. Int J Res Reve Appl Sci 9: Article 13; 2011.
[17] Aynali G, Nazıroğlu M, Çelik Ö, Doğan M, Yarıktaş M, Yasan H. 2013 Modulation of wireless (2.45 GHz)-induced oxidative toxicity in laryngotracheal mucosa of rat by melatonin. Eur Arch Otorhinolaryngol 2013;270:1695-700.

[18] Çiftçi ZZ, Kırzıoğlu Z, Nazıroğlu M, Özmen Ö. 2015 Effects of prenatal and postnatal exposure of Wi-Fi on development of teeth and changes in teeth element concentration in rats. [corrected]. Biol Trace Elem Res 163:193-201
[19] Tök L, Nazıroğlu M1, Doğan S, Kahya MC, Tök O. 2014 Effects of melatonin on Wi-Fi-induced oxidative stress in lens of rats. Indian J Ophthalmol 62:12-5.
[20] Çiğ B, Nazıroğlu M. 2015 Investigation of the effects of distance from sources on apoptosis, oxidative stress and cytosolic calcium accumulation via TRPV1 channels induced by mobile phones and Wi-Fi in breast cancer cells. Biochim Biophys Acta 1848(10 Pt B):2756-65.
[21] Dasdag S, Akdag MZ, Erdal ME, Ay O, Ay ME, Yilmaz SG, Tasdelen B, Yegin K. 2015 Effects of 2.3 GHz radiofrequency radiation emitted from Wi-Fi equipment on microRNA expression in brain tissue. Int J Radiat Biol 91:555-61.
[22] Saili L, Hanini A, Smirani C, Azzouz I, Azzouz A, Sakly M, Abdelmelek H, Bouslama Z. 2015 Effects of acute WiFi signals (2.45 GHz) on heart variability and blood pressure in albino rabbits. Environ Toxicol Pharmacol 40:600-5.
[23] Papageorgiou CC, Hountala CD, Maganioti AE, Kiprianou MA, Rabavilas ASD, Papademitriou GN, Capalis CN. 2011 Effects of Wi-Fi signals on the P300 component or event-related potentials during an auditory hayling task. J Integr Neurosci 10:189-202.
[24] Maganioti AE, Papageorgiou CC, Hountala CD, Kiprianou MA, Rabavilas AD, Papademitriou GN, Capalis CN 2010 Wi-Fi electromagnetic fields exert gender related alterations on EEG. 6th International Workshop on Biological Effects of Electromagnetic Fields. https://www.researchgate.net/profile/Miltiades_Kyprianou3/publication/267816859_WI-FI_ELECTROMAGNETIC_FIELDS_EXERT_GENDER_RELATED_ALTERATIONS_ON_EEG/links/550ab8670cf265693ced8e9c.pdf
[25] Lee SS, Kim HR, Kim MS, Park SH, Kim DW. 2014 Influence of smart phone Wi-Fi signals on adipose-derived stem cells. Ja J Cranofac Surg 25:1902-7.

Summary of International Policy Actions On Reducing Wireless Exposures to Children
France:
2016 The French National Agency of Health Security of Food, Environment and Labour Report recommends regulatory changes to ensure "sufficiently large safety margins" to protect the health of young children. "ALL wireless devices, including tablets, cordless phones, remote controlled toys, wireless toys, baby monitors and surveillance bracelets, should be subjected to the same regulatory obligations as cell phones."

National Legislation “Law on sobriety, transparency, information and consultation for exposure to electromagnetic waves” passed in 2015. WiFi Banned in Nursery Schools: WIFI and Wireless devices will be banned in “the spaces dedicated to home, to rest and activities of children under 3 years”. WiFi on “OFF” as Default to Minimize Exposures in Schools: In elementary schools, WIFI routers should be turned off when not in use. Schools Will be Informed: The school board should be informed when new tech equipment is being installed.

Belgium

Cell phones and cell phone ads are banned for young children and SAR labeling on phones is mandatory. Official government recommendations to reduce exposures are on the government website. Some municipalities have banned wifi in school for young children.

Spain
Several municipalities have passed resolutions urging the removal of wireless networks in schools and public places and recommending a precautionary approach with children and information campaigns to educate the public.

Canada
The health agency offers"practical advice" to reduce exposure to children. The Parliament issued a Radiofrequency Report recommending action to protect public health. Canadian Parliament Standing Committee on Health of the House of Commons issued a report "Radio Frequency Electromagnetic Radiation and the Health of Canadians"

Australia
The Australian Radiation Protection and Nuclear Safety Agency has issued a 2015 Fact Sheet titled How to Reduce exposure from mobile phones and other wireless devices. ARPANSA recommends that parents encourage their children to limit their exposure stating that "It is recommended that, due to the lack of sufficient data relating to children and their long term use of mobile phones, parents encourage their children to limit their exposure by reducing call time, by making calls where reception is good, by using hands-free devices or speaker options, or by texting." Read it HERE.

Italy
In 2015, the Italian State Parliament of South Tyrol voted to allow the application of the precautionary principle mandating the state government to: To replace existing wireless networks whenever possible with networks that emit less radiation at schools, preschools, hospitals, nursing homes, and other public facilities. The Supreme Court ruled a man's brain tumor was caused by his cell phone use.

Israel
The Ministry of Health states "Precautions should be strictly enforced with regard to children, who are more sensitive to developing cancer. The Israeli Government created the public education webpage National Information Ctr for Non-Ionizing Radiation. The Israeli Ministry Of Education has issued guidelines limiting WiFi and cell phone use in schools and officially recommends wired networks in schools. The Ministry of Health published Environmental Health in Israel 2014 which states that "Precautions should be strictly enforced with regard to children, who are more sensitive to developing cancer." and that "wireless communication networks in schools be reduced." The Health Ministry recommends "sensible use of cellular and wireless technology, including: considering alternatives like landline telephones, use of a speaker while talking on a cellphone, and refraining from installing the base of wireless phones in a bedroom, work room, or children's room." The Report states that "Findings in Israel clearly indicated a link

between cellphone use for more than 10 years and the development of tumors in the salivary glands, particularly among people who held the telephone on the same side where the tumor developed and individuals in the highest category of exposure (heavy use in rural areas)."
Linda S. Birnbaum, Director, USA National Institute of Environmental Health Sciences and National Toxicology Program wrote in the Israeli Report final chapter that, " If some of the studies turn out to be harbingers of things to come, we may have major health consequences from the nearly ubiquitous presence of wireless equipment."
Haifa (Israel's third largest city) removes Wi-fi from all schools. Haifa Mayor Yona Yahav said that the city would replace the wireless network with a wired connection that will provide safer options to students." Read the news article here. This action occurred after this news report aired.

Switzerland

The Switzerland Federal Office for the Environment has issued specific guidelines to reduce exposure and has created factsheets for the public. The Governing Council of Thurgau Canton recommends for schools" to forgo the use of wireless networks when the structural makeup of a given school building allows for a wired network." The Switzerland Federal Office for the Environment FOEN has a webpage on Wi-Fi which states "caution should be exercised primarily when using devices held close to the body, such as laptops, PDAs and Internet telephones.." and gives recommendations on how to reduce exposure including turning the Wi-Fi off when not in use, installing the access point one metre away from places where you work, sit or rest for long periods of time and keeping laptops off laps.
The Switzerland Federal Office for the Environment FOEN has a webpage on Cell Phones which details ways to reduce mobile phone radiation. FOEN also has additional EMF factsheets on various EMF sources including on baby monitors where they state that "it is advisable to reduce the infant's exposure to emissions as far as possible."

Germany

The Federal Office for Radiation Protection provides tips for reducing radiation exposure to smartphones, tablets and wireless devices and several states recommend wired rather than wireless installations in schools. "Since long term effects could not be sufficiently examined up to now the Federal Office for Radiation Protection (BfS) recommends to keep exposures to these fields as low as reasonably achievable." Read the precautionary advice here. The FORP recommends landline phone instead of mobile phone base stations and that schools should not connect wirelessly to the internet. Read a 2015 statement here.

Austria

The Public Health Department of Salzburg Region recommends against wireless in schools. No Wi-Fi in Salzberg Schools and many schools are Wi-Fi free. The Austrian Medical Society has issued cell phone safety guidelines. Austria's" Highest Health Council of the Ministry of Health" has a brochure with advice to reduce exposure to cell phone radiation. It states that since the long term research is still not completed, it is advisable to take simple precautions to reduce exposure.

India

2012 The Ministry of Communications and Information Technology issued new EMF guidelines with new Exposure Limits lowered to 1/10 of the ICNIRP level, and SAR labeling on phones. Official cell phone radiation guidelines Precautionary Guidelines for mobile users. Municipal Corporation of Greater Mumbai, the civic body that governs the capital city of Mumbai in Maharashtra (India's richest municipal organization) in 2016 in its new policy on mobile towers, no longer allows cell towers on playgrounds, recreational grounds, gardens and parks. Read news article. 2013: Supreme Court of India upheld the High Court of the State of Rajasthan decision to remove all cell towers from the vicinity of schools, hospitals and playgrounds because of radiation "hazardous to life." Two hundred and four mobile towers installed on the school premises of Rajasthan have been removed in compliance. Read a Document prepared by Dr. Sharma, Sr. Deputy Director of the Indian Council of Medical Research on Indian Research Studies.

Russia

The Russian National Committee on Non-Ionizing Radiation Protection has issued strong recommendations to reduce exposure to children and issued several reports. The Russian National Committee on Non-Ionizing Radiation Protection in ELECTROMAGNETIC FIELDS FROM MOBILE PHONES: HEALTH EFFECT ON CHILDREN AND TEENAGERS has repeatedly warned about electromagnetic radiation impacts on children and recommended WiFi not be used in schools.

United Kingdom

The UK National Health Service has changed its advice. In 2011 it offered specific Recommendations to reduce cell phone radiation exposure to children. Read the 2011 recommendations which stated, "Children are thought to be at higher risk of health implications from the use of mobile phones. This is because their skulls and cells are still growing and tend to absorb radiation more easily. It is recommended that children use mobile phones only if absolutely necessary." Then, the National Health service changed the public advice text. Now they state: "If there are any health risks from the use of mobile phones, children might be more vulnerable because their bodies and nervous systems are still developing. Research carried out to date hasn't supported a link between mobile phone use and childhood cancers such as leukaemia. However, if you have any concerns, you can lower your child's exposure to radio waves by only allowing them to use mobile phones for essential purposes and keeping calls short." Read the new text here.

Cyprus

"Be Precautionary and reduce exposure to phones, Wi-Fi and other wireless devices," states the Cyprus Government's National Committee on Environment and Child Health (ECH). See the Commission's EMF brochure on reducing the risks to children from exposure to the Non Ionizing Radiation (mobile phones, Wi-Fi, tablets, etc.) which specifically addresses not just cell phones but all wireless devices. The Cyprus National Committee on Environment and Child Health

created a short PSA for citizens about children and wireless radiation. Watch the video translated into english here https://www.youtube.com/watch?v=996vzcCYCnE

Finland
The Radiation and Nuclear Safety Authority officially recommends reduced radio frequency exposure for children (since 2009) and details advice to reduce exposure to the public. “In particular, children’s unnecessary exposure should be avoided as their life-long exposure will be longer than that of those who begin using mobile phone as adults and as only scant research exists on health effects to children.”

Singapore
Singapore’s National Environmental Agency specifically advises precautions for the public to reduce exposure while furthur researh is being carried out. Below is the exact text found on the Frequently asked Questions About Radiation Protection.

Taiwan
In 2015 the government Updated their Protection of Children and Youths Welfare and Rights Act to ban cell phones for young children: Complete ban on children under the age of two from using electronic devices such as iPads, televisions and smartphones. Parents can be fined NT$50,000 (about $1600 US Dollars)

Namibia
Namibia's atomic energy review report states that current so called "safety" standards DO NOT protect citizens from long term health effects.

- “ICNIRP guidelines do not guarantee adequate protection against the long term effects of exposure, such as increased risk of cancer. “ -Republic of Namibia:Atomic Energy Board: The Atomic Energy Review

Turkey
The Ministry of Health has issued public information brochures that recommend limiting exposure especially for pregnant women and children (Pregnant women and children (under 16) are more vulnerable and they should use the phone only when necessary, Prefer speaker or headset, Decrease time on phones, Use low SAR phone, Keep phone away from the body, Keep phones out of baby and children’s bedroom,Turn phone off when you sleep or keep it one meter away from bedside.) In addition the Ministry is developing regulation on prohibiting phone use for children. The EMF in schools is monitored and the public can get measurements on EMF levels from cell towers and schools at a national site. A Project funded by Ministry of Internal Affairs, accomplished by Temkoder (Prevention, Measurement of Electromagnetic Pollution and Training Organization) resulted in secondary school student training in the safer usage of cellular phones.

Greece

The Greek government website materials recommend reducing cell phone radiation to children under 16 and they inform citizens of non-ionizing radiation power levels in their community. The Q and A on RF radiation states the following text about children. Read it here on page 32 and 33

Even though it hasn't been proven conclusively that children are more sensitive/reactive than adults to exposure to radiation, nevertheless, the direct/pointed recommendation of international organizations is that children be discouraged from [literally translated, learn not to trust] using cell phones. The above statement is supported by the following:

1. Up to about the age of 16, the nervous system of the human body is in the process of development. Consequently, it's totally possible (although not conclusively proven by relevant scientific research) that up until this age, human being are more sensitive to any number of factors/elements/determinants.
2. Younger people have more years ahead of them than older persons during which the long –term effects of mobile phones can be manifested.
3. Environmental factors/elements have a greater general impact on the health of children than on the health of adults.

United States
Legislation has been introduced at the state and national level. Some Communities have issued proclamations, resolutions and and started initiatives to inform the public of wireless health issues.

2014: The Connecticut Department of Public Health has issued specific recommendations to reduce exposure to cellphone radiation. It is notable that the Department has provided information more in depth than the CDC, EPA and FDA in detailing 7 steps on how people can reduce exposure. Furthermore, the Department states "It is wise to reduce your exposure to radiofrequency energy from cell phones whenever possible." Read the Connecticut Department of Public Health Cell Phone Q and A about Cell phones here.

2016: Onteora School District in New York State USA: District adopts "Best Practices with Wi-Fi Read the April 20, 2016 Meeting Minutes Page 2. "Turn off the device when not in use and at the end of each day. If device is to stay on, turn Wi-Fi off when not in use. Always place device on a solid surface. Viewing distance should be a minimum of 12 inches from the screen. Staff was asked by the Principals to post this in areas that contain computers and devices. They are reminding staff to follow it."

2015: Ashland Public Schools, Mass (USA): The District has passed"Best Practices" to turn the WiFi off when not in use and keep devices away from the body Download Slides . Video of

parent who initiated this. Video of school board member discussing the process. Read Magazine article on Ashland's Decision Here.

2014 California, Berkeley: May 12, 2015 Berkeley Adopted the Cell Phone "Right to Know" Ordinance on a Unanimous Vote. Berkeley is the first city in the nation to require cell phone retailers to provide those who purchase a new phone an informational fact sheet which informs buyers to read the user manual to learn the cell phone's minimum separation distance from the body. The text states:
"The City of Berkeley requires that you be provided the following notice:
To assure safety, the Federal Government requires that cell phones meet radio frequency (RF) exposure guidelines. If you carry or use your phone in a pants or shirt pocket or tucked into a bra when the phone is ON and connected to a wireless network, you may exceed the federal guidelines for exposure to RF radiation. Refer to the instructions in your phone or user manual for information about how to use your phone safely." Full text here.

2014 New York: Wireless Router Labeling in all Suffolk Public buildings: 12/2014 The Suffolk County Legislature passed legislation to require all county buildings to post notices that wireless routers are in use such as, "Notice: Wireless technology in use." The resolution, sponsored by Legis. William Spencer (a physician), warns that every wireless device emits radio frequency radiation or microwave radiation. It notes that studies "that have looked at the effects of low-level RFR radiation on human cells and DNA have been inconclusive." Read Press Release.

2014 Maryland, Greenbelt: The Greenbelt Maryland City Council voted unanimously on November 24, 2014 to do the following:
1. Alert citizens about the fine print warnings and possible health risks of cell phones and wireless devices By sharing the Environmental Health Trusts 10 Steps to Safe Tech and Doctors Advice on Cell Phones Brochure in City health fairs and city centers.
2. To send the FCC Chairman a letter urging the adoption of "radiation standards that will protect human health and safety."
3. To oppose cell towers on school grounds and write a letter to the local school board and County Executive.

2012 Wyoming: Jackson Hole issued a Proclamation of Cell Phone Awareness
2012 Florida: Pembroke Pines, passed Resolution 3362 expressing the City's "Urgent Concerns" about Wireless Radiation and Health and which encourages citizens to read their manuals and presents information on how to reduce exposure by using a headset or speakerphone. Jimmy Gonzalez, an attorney who had developed brain cancer after heavy cell use, initially petitioned the Commission. Watch the Video of his powerful testimony here.

2010 California, San Francisco: Cell Phone Radiation (How to Reduce Exposures) Webpage launched. Answers on how to reduce exposures to cell phone radiation. The City developed a poster, factsheets and display stickers with public health information.

2010 California: Burlingame California City has cell phone safety guidelines .
2010 Maine, Portland: October declared "Cell Phone Awareness Month"

Testimony to State Board of Education May 24, 2016 by Theodora Scarato

Please read the following letter. The State Board is responsible for oversight to the county Boards and MCPS has false information up on their website and has not corrected their false statements.
It is the State Board's responsibility to ensure these false statements are corrected.
See the letter below.
Theodora Scarato

February 15, 2016

Dear Montgomery County Board of Education Members,

I would like to bring to your attention the following- The MCPS Statement Concerning Deployment of Wireless Computing Technologies and Radiofrequency Monitoring Summary Report contains:

1. False Statements: This document details the over 32 false statements on the MCPS RF webpage and provides documentation to each erroneous statement. I personally made inquiries as to the factual nature of MCPS statements from agencies such as the FCC, FDA, NCI and the American Cancer Society. *These agencies all confirmed certain statements to be 100% inaccurate.*
2.Outdated Statements: Why is MCPS using decade old scientific reviews as "proof"? Each outdated document is cited. The MCPS community deserves best available science, not outdated reviews.
3.Wireless Funded Statements: MCPS copiously cites sources that are either directly *fully funded* by the wireless industry itself and/or by persons whose jobs involve consulting for the wireless industry or making money by designing products for the wireless industry. The funding source of such statements should at least be noted *if not removed*.
4. Misleading Statements: Statements are made that validate the opinion of MCPS but are not a true representation of the body of science nor the organization MCPS references. MCPS seems to be cherry-picking in that MCPS puts forth"quotes" which are missing *the rest of the statement the cited organization made.* Such selective information presentation is misleading to families and staff who should be given *all information in a transparent fashion.*
5.No Proof of Safety For Students and Staff: Multiple experts have written to MCPS detailing problems with the 14,000 dollar measurement report citing inadequate instrumentation, inprecise measurements and a lack of adequate documentation on exposure scenarios. There is a sufficient number

of concerns that it seems this Measurement Report *cannot* be used to verify whether the radiation levels are safe for students and staff. The parents, teachers and staff of Montgomery County Schools deserve accurate responsible information on the radiation levels in MCPS schools.

For MCPS to put forth information such as is on their website as proof of safety is an egregious error. Comparing MCPS's measurements to FCC standards is meaningless as FCC limits are known to be hundreds of thousands times too high to protect public health.

A total of 15 experts have written MCPS about the health risks of wireless school networks and their concerns with the radiofrequency webpage and measurement report. They all recommend the schools use safe technology. Why are these expert letters not posted? Why is their information not integrated into the webpage for the public? Why isn't MCPS responding to the concerns they are raising?

> Dr. Martha Herbert's Letter, Dr. Anthony Miller's Letter, Dr. Lennart Hardell's Letter ., Dr. Carpenters Letter Dr. Olle Johansson's Letter., Dr. Devra Davis' Letter , Cris Rowan, occupational therapist Letter Here, Dr. Martin Pall's letter Katie Singer's Letter ., Cindy Sage and Trevor Marshal Letter, Ellie Marks Letter , Arthur Firstenberg Letter., Mikko Ahonen PhD, Lena Hedendahl MD and Tarmo Koppel MSc PhDs Letter, Cece Doucette's Letter, Alisdair Philips Letter, Lloyd Morgan's Letter

The MCPS site was already changed twice after we repeatedly wrote MCPS to remove the unfactual statements. Only two statements were removed. The MCPS Statement *still contains an abundance of false and misleading statements- over 30 false statements in fact.* Once all of these false, misleading, and wireless funded statements are removed, MCPS *would have little text left on the webpage.*

MCPS did get one thing right. The webpage states *"It is not ethical to test a substance by exposing people to it and seeing if they get cancer from it.*" Right now MCPS students are the equivalent of guinea pigs and are being exposed to unprecedented levels of radiofrequency radiation without their knowledge or consent. We adults were not exposed to such levels as children.

Appendix V in this letter contains information on the mice and rat studies underway at the National Institute of Health Science (NIEHS) National Toxicology Program (NTP) where rats are being exposed to low level (FCC compliant levels just like MCPS) radio-frequencies at very low levels for hours a day *just like our children in schools.*

Wouldn't it be ethical *to wait* until the NTP research results are available before the school system is de-facto performing what is basically the same study but instead of rats *it is on children and teachers and staff.* The rats, the mice *and MCPS children are being exposed to* what the National Toxicology Program calls "chronic exposure to modulated radiofrequency radiation".

Our children are not lab rats. Yet, just like the NTP rats, today's schoolchildren will be "the statistics". I imagine that a decade from now, researchers will count up the numbers of young adults with cancer, neurological disease and infertility and look at the connection with lifetime wireless exposures.

It is unethical to knowingly post false information and not to act to protect children when such a serious matter is brought to your attention. You have a duty of care to every student and your job is to ensure their safety. Wireless is not safe and MCPS has yet to provide any documentation of safety.

Please remove the false and misleading information on the MCPS webpage. I ask that MCPS take **immediate action** to minimize radio-frequency exposures in classrooms. Please hardwire the chromebooks and tablets, install safe technology communication networks and teach students and staff how to minimize exposures to cell phone and wireless radiation to protect their health and future.

Sincerely,
Theodora Scarato LCSW-C

APPENDIX 1: False Statements Itemized with documentation
APPENDIX II: Outdated References
APPENDIX III Wireless Funded Research and Statements
APPENDIX IV: Misleading Statements including Details on Why the RF Measurement Report is Inadequate to Assess Student Safety

APPENDIX V: **The National Toxicology (NTP) Study on Rodents and Radio-Frequency**

APPENDIX 1 FALSE STATEMENTS
FALSE STATEMENT 1

On the Radiofrequency FAQ's MCPS states, "The FCC guidelines are not outdated."

MCPS's statement that the FCC regulations are 'not outdated" contradicts what the United States Government states about the over *twenty years old* regulations:

- T**he Department of the Interior states** that *"The electromagnetic radiation standards used by the Federal Communications Commission (FCC) continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today."* Read The 2014 Letter.
- **In 2012, the Government Accountability Office (GAO)** published a 2012 Report that states, "The Federal Communications Commission's (FCC) RF energy exposure limit *may not reflect the latest research"* and the report officially recommended that the FCC "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."
- **The FCC is formally in review of these 20 year old standards** and has stated it is not a health and safety organization and has called for expert comments. The FCC has so far received over 900 comments and they can be accessed at the FCC here: go to the FCC's web site for Proceeding Number 13-84: http://bit.ly/1aGxQiq.
- **The 2008 National Academy of Sciences (NAS) Report**, Identification of Research Needs Relating to Adverse Health Effects of Wireless Communication, was tasked to identify any

inadequacies in the research upon which the current US Radiofrequency radiation (RF) safety guidelines are based. The NAS Report found numerous inadequacies in that research record. An inadequate research record results in safety regulations that fail to address all exposures encountered by the public. Based on the 2008 NAS findings it cannot be asserted that US RF safety policy protects all members of the public from all mechanisms of harm in all exposure scenarios.

- **The American Academy of Pediatrics** has repeatedly called on the government to update its regulations stating that "Current FCC standards do not account for the unique vulnerability and use patterns specific to pregnant women and children." Read it here.
- **The California Medical Association** passed a Wireless Resolution that states :

  Whereas scientists are increasingly identifying EMF from wireless devices as a new form of environmental pollution with a growing body of peer reviewed scientific evidence finding significant adverse health and biologic effects on living organisms with exposure to low levels of non-ionizing microwaves currently approved and used in wireless communication, and

  Whereas peer reviewed research has demonstrated adverse biological effects of wireless EMF including single and double stranded DNA breaks, creation of reactive oxygen species, immune dysfunction, cognitive processing effects, stress protein synthesis in the brain, altered brain development, sleep and memory disturbances, ADHD, abnormal behavior, sperm dysfunction, and brain tumors; and...Resolved, That CMA support efforts to implement new safety exposure limits for wireless devices to levels that do not cause human or environmental harm based on scientific research. Read it here . Read a magazine article on their resolution here.
- **In May 2015, over 200 scientists from 39 nations** who have authored more than 2,000 articles on this topic appealed to the United Nations to address "the emerging public health crisis" related to cell phones and other wireless devices. These scientists state that "the ICNIRP guidelines do not cover long-term exposure and low-intensity effects, and are " insufficient to protect public health." They also state that "the various agencies setting safety standards have failed to impose sufficient guidelines to protect the general public, particularly children who are more vulnerable to the effects of EMF." See the International EMF Scientist Appeal at https://emfscientist.org.
- **The LA School District Uses a RF-EMF Exposure Threshold 10,000 Less Than the FCC Limits:** The OEHS supported a precautionary threshold level that is 10,000 times lower than the current Federal Communications Commission standard. Read the RF Report the LA School District Used to recommend a cautionary exposure level. If the FCC limits are "not outdated" then why would they do this? RADIOFREQUENCY (RF) EVALUATION REPORT Use of Wireless Devices in Educational Settings

Dr. De Kun Li sums up the problem with FCC regulations:

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

Letter from Dr. De-Kun Li, MD, PhD, MPH to the FCC

It is erroneous for MCPS to assert that FCC levels are "not outdated" when the US government and health authorities state otherwise. What scientific expertise does MCPS have in this area to make such a statement that contradicts the US government?

FALSE STATEMENT 2

MCPS states that, "Using the Group 2B classification of the entire spectrum of radiofrequencies as an indication that Wi-Fi is harmful when the classification came about due to extremely heavy cell phone use and not Wi-Fi does not accurately represent the intention of the classification."

What MCPS should be saying: The World Health Organization specifically and repeatedly has stated the carcinogenic classification is for radiofrequency radiation *from any source.* Note this documentation:

- Wireless *radiofrequency* radiation is classified as a "Possible Human Carcinogen" by the International Agency for Research on Cancer (IARC) of the World Health Organization(WHO) Read The Lancet's published statement by the IARC from 2011 on cancer risk of wireless radiation.
- The Class 2B classification includes wireless radiation from *any transmitting source* such as "cellphones, baby monitors, tablets, cell towers, radar, other wifi, etc". It applies to RF-EMF in the range of 30 KHz to 300 GHz *emitted from any device.* These statements are detailed in *The Lancet* article and in the related WHO IARC press release in 2011. All wireless electronic devices emit RF-EMF (wireless radiation). It *does not matter* what type of device is the source.
- Dr. Robert Bann, the World Health Organization International Agency for Research on Cancer Secretary has stated (on several occasions) how the WHO experts *specifically intended this classification to apply to the full range of radio frequency radiation which includes wifi as well as cell tower radiation.* Here Dr. Bann spell this out in his detailed lecture in 2011 found here and in his writing found here.

  > *"It should be noted that the working group in the overall evaluation decided to make a generic evaluation of radio frequency fields and did not want to limit it to mobile telephone use and all other exposures .. that was based on the diversity of the exposures in the animal cancer studies where different types of radiation with different frequencies across the radio frequency part of the emf spectrum were noted and the radiation from the environmental sources.(i.e Wi-Fi, Cell Towers etc) . and from the mobile telephones is basically and physically speaking the same type of agent ."*

I decided to write the World Health Organization's Head of the IARC Monographs Programme Dr. Kurt Straif *myself* last month about this. I asked him if the classification applies to Wi-Fi. I was told the following:

> *"IARC's evaluation of the cancer hazards from exposure to Radiofrequency Electromagnetic Fields covers all sources of RF-radiation." and "IARC classified radiofrequency*

electromagnetic fields (including Wi-Fi signals and mobile phone signals) as possibly carcinogenic to humans (Group 2B) "

Read the Email exchange here.

FALSE STATEMENT 3 through 6

MCPS states that "The FCC, the American Cancer Society (ACS), the Food and Drug Administration (FDA), and the National Cancer Institute (NCI) all have conducted reviews as recently as 2013 and found that there is no basis to establish a different safety threshold."

This is false. I wrote the FCC, American Cancer Society, and the National Cancer Institute *and they all came back with the same response*. MCPS statement is false and and inaccurate. None of these institutions have done such a review nor do they have the mandate to speak to the issue of safety thresholds *just the FCC,* and that review was initiated because of the GAO report stating the "thresholds may not reflect latest research". The review has not been completed and at this time it is unknown if there has been acy action on the over 900 submissions by experts calling for more stringent regulations.

Here are the responses I got when I inquired into MCPS's statement asking if it was accurate that they had done a review that "**found that there is no basis to establish a different safety threshold."**

American Cancer Society

"I know of no ACS finding or statement regarding safety thresholds of radio frequency fields."
-Statement by Dr. Otis Brawley| Chief Medical Officer of the American Cancer Society

"First, the American Cancer Society was not the organization who conducted the 2013 scientific review. So, we suggest you go back to the source and clarify what organization the school district consulted to make that statement."
Read the Email from the American Cancer Society to Scarato here.

The Federal Communications Commission

"...we are not aware of any report attributable to the FCC that would support the statement that you quote."
"It looks like the statement you quoted might be a slight misinterpretation of an FCC consumer guide on RF radiation, in conjunction with FCC action in 2013 opening an Inquiry into its RF Safety rules."

Read the FCC Response to Scarato on December 15, 2015

The National Cancer Institute

The National Cancer Institute (NCI) wrote back that the "review" was in fact- a webpage content review, *not a review of research* and *certainly not* a review of the adequate protection from safety thresholds. Please read these excerpts from our email exchange with NCI.

"We are unclear as to the source of this language indicating that the NCI "conducted a review (on FCC) limits as recently as 2013 and found that there is no basis to establish a different safety threshold." *This statement, as written, is incorrect.* *As I describe above, and as I have noted in our previous correspondence, NCI staff have conducted literature reviews to update our fact sheets and will continue to do so.* *Neither the literature reviews, nor the fact sheets, make safety determinations."*

The literature reviews I describe above are not intended to establish or evaluate standards or set or evaluate recommendations."

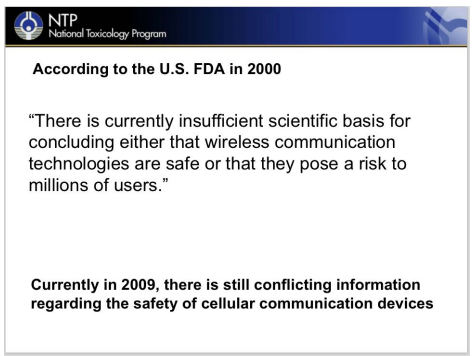
Clearly, a website update or literature review of a few studies is not the same thing as a review of research to determine safety threshold adequateness.
Read the Email Exchange with the National Cancer Institute here.

The Food And Drug Agency

"After extensive research, we were unable to find any public information regarding a review of radiofrequency radiation."
Division of Drug Information | Center for Drug Evaluation and Research
Food and Drug Administration on Feb 2 2016

"FDA did not conduct a formal meta-analysis nor a formal review of RF studies in 2013."
Daniel Kassiday SME: Electronic Product Radiation Control
Read the FDA letters to Scarato Here.

In conclusion, no such review showing these safety thresholds has been done *by any of these agencies.* These statements are FALSE.



Such a statement by MCPS represents a myth many people have about our federal regulations in regards to wireless exposures. We think that our government health agencies have appropriately dealt with wireless. In fact, the US has not a single health and science agency mandated to focus on the issue. The EPA, FDA and NCI are not tasked to ensure the RF safety thresholds are safe. In fact , the EPA was working on this issue two decades ago, but then Congress gave jurisdiction to the FCC and told the EPA not to do anything more.

Please read the following by the FCC, "*is not a health and safety agency, we defer to other organizations and agencies with respect to interpreting the biological research necessary to determine what levels are safe. As such, the Commission invites health and safety agencies and the public to comment on the propriety of our general present limits and whether additional precautions may be appropriate in some cases, for example with respect to children.* Read that statement here.

Over 900 submissions with dozens of scientists have submitted to the FCC review. The FCC which is NOT a health agency and has no medical experts on staff, is supposedly tasked to deal with this issue *and defer to these organizations, but has not acted*. In fact, the Open Docket from 2013 that supposedly is a review is just sitting there, now three years old.
"We recognize our responsibility to both protect the public from established adverse effects due to exposure to RF energy and allow industry to provide telecommunications services to the public in the most efficient and practical manner possible. In the Inquiry we ask whether any precautionary action would be either useful or counterproductive, given that there is a lack of scientific consensus about the possibility of adverse health effects at exposure levels at or below our existing limits. Further, if any action is found to be useful, we inquire whether it could be efficient and practical." Read it here.

Note that the FCC *can wait years* to do anything as there is no timetable they must follow. *It could be when the kids in kindergarten have all graduated.* The current FCC Chair Tom Wheeler is in charge of this decision and Wheeler was accused of suppressing the science showing harm from radiofrequency radiation in the 90's by his top scientist *when he headed the wireless lobby group, the CTIA.*

Read the Harvard Law publication *Captured Agency: How the Federal Communications Commission is Dominated by the Industries it Presumably Regulates* detailing how the Wireless Industry has unchecked influence on our government stating, *"It is these hardball tactics that recall 20th century Big Tobacco tactics."*
Read Harvard Book here.

FALSE STATEMENT 7
In the November 18 Memorandum by MCPS Office of Technology to the Board of Education it states that "*All levels were below the Bioinitiative 2007 precautionary level . These are the very level the Safe Tech for Schools Maryland group has argued is safe for human exposure*." Read it here.

This is false. No one in our group has ever stated that the Bioinitiative 2007 level is safe and we challenge MCPS to show where any of the members of our group cited the Bioinitiative 2012 level as safe or where

we have even presented that limit as a number for MCPS to follow. *Why would we use that outdated Report as it is superseded by the Bioinitiative 2012.* We certainly have used the Bioinitiative 2012 levels to share information on what that group advises. Such a false statement and should be removed.

FALSE STATEMENT 8 through 17

In the MCPS FAQs section, there is a list of what "public health organizations have to say about radiofrequency" . I have detailed here the information given on 8 countries which is erroneous and misleading to the reader. MCPS neglects to give the actual full statements, position and recommendations of these countries' expert reports. Additional, MCPS basically cut and pasted from a research review paper but cherry picked on which sentence to pull leading to a ninth false statement.

It is false to state something is a "concluding" statement *when it is not the conclusion of the agency.*

1. France: MCPS states that the French ANSES Report concludes "No new proven health effects". *MCPS has neglecting to state* that in the conclusion of The French ANSES Report which specifically recommends precautions, it is stated,

- **ANSES details these health effects:** *"following exposure to RF fields, the following effects have been observed: various effects on neuronal cell death depending on the type of study (in vitro or in vivo): changes (increase or decrease) in the total number of neurones and increase of cells in apoptosis following chronic exposure in vivo (in a limited number of studies); an effect on the astrocyte marker (GFAP) related to inflammation (probably transient effect) following chronic exposure in vivo; an oxidative stress-type effect following prolonged exposure to radiofrequencies on mitochondrial DNA in neurones (on the basis of a single in vitro study). Mitochondrial DNA is particularly sensitive to oxidative stress due to a lack of histone-type protective proteins, a reduced repair ability, and proximity of the respiratory chain in the mitochondrial inner membrane. This could explain the discrepant results here compared to most studies that did not target this type of DNA; changes in electrical activity in the brain (especially the power of alpha rhythm)."*
- **ANSES made recommendations to reduce exposure to children**, to study the effects of cell towers and investigate how to reduce public exposures.[1] Read the **specific recommendations**.
- **This ANSES Report led to the passing of one of the most strong National EMF reduction Laws in any country whereby Wi-Fi is banned in France for young children,** companies are fined for not showing radiation reductions methods in advertisements and a public health awareness campaign is being developed.[2]

2. Belgium: MCPS only cites Belgium's Superior Health Council as concluding that "No proven health risks. Long-term health risks cannot be ruled out." This is inaccurate.
MCPS leaves out the following:

[1] **ANSES issues recommendations for limiting exposure to radiofrequencies**
[2] France: New National Law Bans WIFI

- "**Experts – including those on the Superior Health Council – advise everyone to limit their exposure to mobile phone radiation."**[3] **Read it here.**
- Belgium has banned cell phones for children: As of March 2014, mobile phones for young children were banned because of radiation concerns. [4] Also left out of the MCPS summary were the Council's statements that "The concern is also that the cumulative exposure of the current generation of children and adolescents in their adult lives will be much higher than that of the current adults. The recent classification of mobile phone radiation as possibly carcinogenic is an additional reason to be cautious."
- **The municipality of Ghent has specifically banned Wi-Fi for young children due to health concerns.**[5]
- **The government of Belgium recommends precautions: "**to reduce your exposure" which includes specific tips for Wi-Fi installations and I quote, " In order to limit the exposure, the following simple measures can be taken: Only switch on your wireless network connection when it is needed. This concerns the wifi adapter in your laptop in particular. Otherwise, your laptop tries to continually connect to the network, and that leads to unnecessary exposure and decreases the life expectancy of the batteries. Place the access point away from places where you spend lots of time." [6]

3. Australia: MCPS says the conclusion by ARPANSA is that "*No substantiated evidence for health risk for people living near base stations. Insufficient evidence for higher risk for children. No need to reconsider exposure limits."*

- Yet MCPS leaves out critical facts about ARPANSA recommendations to reduce exposure! In the published 2014 article **International and National Expert Group Evaluations: Biological/Health Effects of Radiofrequency Fields in the International Journal for Environmental Research in Public Health** the authors state than in Australia the "Radiation Protection and Nuclear Safety Agency (ARPANSA) : *"considers that the classification by IARC corresponds to the current ARPANSA advice, including its advice on practical ways in which people can reduce their exposure"*. ARPANSA has also recommended "*parents should encourage their children use the methods to reduce exposure*".[7]
- **ARPANSA recommends that parents encourage children to reduce exposure.** "It is recommended that, due to the lack of sufficient data relating to children and their long term use of mobile phones, parents encourage their children to limit their exposure by reducing call time, by making calls where reception is good, by using hands-free devices or speaker options, or by texting."[8]

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3 http://health.belgium.be/eportal/Environment/ElectroWavesAndNoise/ElectromagneticRadiation/MobilePhone/TipsForPrudentUse/index.htm?fodnlang=en#.VqwBIjYrJR4

[4] Belgium: **New regulation for the sale of mobile phones as of 1 March 2014 http://www.health.belgium.be/eportal/Environment/19096020_EN?ie2Term=phones&ie2section=83#.VIpiON-rR2Q**

[5] **Ghent bans wi-fi from pre-schools and day carehttp://www.flanderstoday.eu/education/ghent-bans-wi-fi-pre-schools-and-day-care**

[6] Belgiums Health, Food And Safety Agency Handout on Wireless Devices http://www.health.belgium.be/internet2Prd/groups/public/@public/@mixednews/documents/ie2divers/19104272_en.pdf

[7] **International and National Expert Group Evaluations: Biological/Health Effects of Radiofrequency Fields http://www.mdpi.com/1660-4601/11/9/9376**

[8] http://www.arpansa.gov.au/mobilephones/index.cfm

- A**RPANSA details several specific recommendations to reduce exposure with other wireless devices.** Concerning wireless computer networks ARPANSA states that, "if you use them with their antennas very close to the body, you can be exposed to levels closer to the limits of the standard. You can reduce your exposure from these devices by: keeping them at a distance, for example placing the wireless router away from where people spend time reducing the amount of time you use them."[9]

4. Switzerland: MCPS quotes the Federal Office for the Environment FOEN as simply concluding "*No new confirmed health effects. "Absence of proof of health risks" does not automatically mean proof of their absence."*

Clearly MCPS quoted from the review paper but forgot to mention what the research review actually fully states which is *also,* "*In view of the fact that there are gaps in the available data, the absence of proof of health risks does not automatically also mean proof of their absence.* ***From the scientific point of view, a cautious approach in dealing with non-ionising radiation is still called for.*** *There remains a need for extensive research into the potential long-term effects".*

In fact Switzerland goes *much further* than this and in fact has a very strong precautionary policy in place.

- MCPS leaves out the following 2015 Federal Office for the Environment FOEN Environmental Report Chapter on Electrosmog that states" Effects can also be detected for weak radiation intensity." and "here is no definitive answer, however, concerning the impacts of long-term exposure" and "Reliable data are needed to monitor the temporal and spatial development of radiation exposure and identify possible health impacts." and "Federal Council imposed stricter installation limit values in this ordinance as a precautionary measure. These values are intended to ensure that exposure is kept as low as possible in locations where people spend time regularly and for extended periods (e.g. in homes, offices and schools). This will help to reduce the risk of possible, as yet unidentified, impacts on health.

  "The federal authorities base the definition of the installation limit values on the precautionary principle enshrined in the Environmental Protection Act (EPA):2 radiation levels should be limited as much as technology and operating conditions allow, provided that this is economically acceptable. Because major gaps still exist in our knowledge about the health impacts of long-term exposure to weak non-ionising radiation, the adopted protective strategy should be pursued consistently."[10]

- **MCPS failed to note** that Switzerland specifically recommends to "Prefer wired over WiFi/WLAN in schools and/or pre-schools "
- **MCPS failed to note** that **Switzerland gives a** detailed description on how to reduce exposure including turning the Wi-Fi off when not in use, installing the access point one metre away from places where you work, sit or rest for long periods of time and keeping laptops off laps. They

[9] ARPANSA RF FACTSHEET http://www.arpansa.gov.au/pubs/factsheets/ReduceExposure_wirelessDevices.pdf

[10] 2015 Federal Office for the Environment FOEN Environmental Report Chapter on Electrosmog http://www.bafu.admin.ch/publikationen/publikation/01794/index.html?lang=en&download=NHzLpZig7t,lnp6I0NTU042l2Z6ln1ad1lZn4Z2qZpnO2Yuq2Z6gpJCHd4R2gmym162dpYbUzd,Gpd6emK2Oz9aGodetmqaN19XI2IdvoaCVZ,s-.pdf

state that "It is currently not known whether the electromagnetic fields created by WLANs pose a risk to health. WLAN devices generally emit a low level of radiation, *and caution should be exercised primarily when using devices held close to the body, such as laptops, PDAs and Internet telephones.* We would offer the following advice to people who prefer to minimise their personal exposure by keeping the electromagnetic fields in their home or office as small as possible."[11]

- **MCPS failed to note** this full statement in the conclusion from their 2012 **Radiation of radio transmitters and Health** "*In view of the fact that there are gaps in the available data, the absence of proof of health risks does not automatically also mean proof of their absence. From the scientific point of view, a cautious approach in dealing with non-ionising radiation is still called for. There remains a need for extensive research into the potential long-term effects"*[12]

5. Finland: MCPS quotes STUK as concluding that, "Mobile phone use is not detrimental to health"

This is inaccurate. The Radiation and Nuclear Safety Authority(STUK) website states that, '*The level of exposure to radiation from a mobile phone held next to user's ear can approach the exposure limits. Never before have humans been exposed to equally strong sources of radiation in their living environments. Identifying any health impacts is highly important because practically everybody uses a mobile phone today.*"

- "STUK recommends that unnecessary exposure to radiation from mobile phones be avoided. In particular, children's unnecessary exposure should be avoided as their life-long exposure will be longer than that of those who begin using mobile phone as adults and as only scant research exists on health effects to children."
- Read STUK Recommendations to Reduce cell phone exposure HERE: Use a hands free device, don't use phones reception is poor, the phone should be kept on a table or similar location instead of in the user's pocket.
- Read a news article from 2009 when STUK first recommended restricting the use of mobile phones by children.

6. Germany: MCPS quoted the German Federal Office for Radiation Protection in 2011 as concluding that "Risk perception is linked to media coverage". This is inaccurate. Note the following:

- The Federal Office for Radiation Protection (FORP) provides tips for reducing radiation exposure to smartphones, tablets and wireless devices stating, "*Since long term effects could not be sufficiently examined up to now the Federal Office for Radiation Protection (BfS) recommends to keep exposures to these fields as low as reasonably achievable.*" **Read the precautionary advice here.**
- The FORP recommends landline phone instead of mobile phone base stations and that schools should not connect wirelessly to the internet. **Read a 2015 statement here.**
- **See their poster "Less radiation when Telephoning" here.**
- The German Federal Ministry for Radiation Protection stated in 2007 ,"supplementary precautionary measures such as wired cable alternatives are to be preferred to the WLAN

[11] Federal Office of Public Health on WLAN http://www.bag.admin.ch/themen/strahlung/00053/00673/03570/index.html?lang=en
[12] Switzerland FOEN 2012 **Radiation of radio transmitters and Health**
http://www.bafu.admin.ch/publikationen/publikation/01739/index.html?lang=de

system." See original German Bundestag document here, and an English translation here.

MCPS quotes SSK the German Commission on Radiological Protection. All topics. 2011 as concluding that "*Discrepancy between scientific evidence and risk perception. No overall risks."*

Please note these conclusions by SSK in 2013

- A 2013 Report Electromagnetic Fields of New Technologies - ends its summary with the statement that "In the past, the Commission on Radiological Protection (SSK) has repeatedly emphasised that *devices should be designed with a view to minimizing emissions and user exposure, especially in cases in which technically and economically equivalent alternatives are available* (SSK 2001, SSK 2003).

Furthermore Germany has states that have banned wireless in schools. In Bavaria: The State Ministry of Education and Cultural Affairs: "For precautionary reasons the Federal Office for Radiation Protection recommends for schools that if a wireless network is used to place its components in suitable locations and to prefer the use of wired network solutions whenever possible." In 2007 Parliament recommendation to all schools to *not* install wireless LAN networks. Frankfurt: "In Frankfurt's schools there will be no wireless networks in the short or mid term. The Local Education Authority did not wish to conduct a *"large scale human experiment,"* said Michael Damian, spokesperson of the Head of the School Department Jutta Ebeling.

7.England: MCPS once again selectively quoted from the research review. MCPS states of the ISLE of MAN Phone Masts/ Children that it concludes, "*no definite demonstrable effects on children", leaving out the full statement directly quoted in the review which is:*

"The Chief Minister of Isle of Man [122] in UK had set up a committee to review the scientific publications on health impact of mobile telephone masts. The recommendations of the committee in 2009 [123] were: "...although there are no definite demonstrable effects on children, it would be prudent not to site base stations in locations where children are likely to be exposed to the beams for a long duration". The committee also recommended "The use of precautionary principle in the siting of mobile phone masts".

8. MCPS cites Tanzania's TCRA as a "public health body" concluding "No substantial evidence for harmful health effects.Many benefits of modern technology."

First, TCRA is *not a public health body* but in fact **The Tanzania Communications Regulatory Authority (TCRA)** is a quasi independent Government body responsible for regulating the communications and broadcasting sectors in Tanzania and it is in no way a health and safety organizations with any Doctors on staff who have the credentials to make such a safety determination. Its mission is to develop an effective and efficient communications regulatory framework. Why is MCPS quoting *not a study* but simply a 'public statement' by the agency from 2010 that is nowhere to be found online anymore? This should be removed from the list as it is not a public health body and is outdated.

9. MCPS states of the countries they cite on their chart that, "In reviewing the large body of existing scientific evidence, health organizations across the world have all reached the same conclusion: there are no proven negative health effects from Electromagnetic Fields (EMF) that is within existing safety guidelines."

This is not even the conclusion of the paper they pulled the quotes from. In fact, the authors of **International and National Expert Group Evaluations: Biological/Health Effects of Radiofrequency Fields in the International Journal for Environmental Research in Public Health** end with their review by stating that *"In general, the expert groups suggested a reduction in exposure levels, precautionary approach, and further research."*[13]

What is the international policy response to children and radiofrequency fields?

I point you to *a more recent 2015 published review* on international advisories by Dr. Redmayne entitled International policy and advisory response regarding children's exposure to radio frequency electromagnetic fields (RF-EMF) which states that, "*Over 20 countries and municipalities have issued precautionary advice to the public concerning wireless exposures. This review of policy and advice regarding children's RF-EMF exposure shows a wide variety of approaches which I have categorized and tabulated ranging from ICNIRP/IEEE guidelines and "no extra precautions needed" to precautionary or scientific much lower maxima and extensive advice to minimize RF-EMF exposure, ban advertising/sale to children, and add exposure information to packaging.*" This review concludes with the statement, "*Therefore, minimum exposure of children to RF-EMF is recommended."*[14]

FALSE STATEMENT 18

MCPS has erroneously defined the Precautionary Principle. MCPS says, *"The "Precautionary Principle" dictates that unless something is proven absolutely safe, then it should be avoided."*

This is false and not the definition of the Precautionary Principle in any dictionary I am familiar with and by using such an inaccurate definition it misleads parents and the Montgomery County Community.

- **American Journal of Public Health Definition:** *"The precautionary principle asserts that the burden of proof for potentially harmful actions by industry or government rests on the assurance of safety and that when there are threats of serious damage, scientific uncertainty must be resolved in favor of prevention."* Read it here.
- **Wikipedia definition**: "The precautionary principle or precautionary approach to risk management states that if an action or policy has a suspected risk of causing harm to the public or

[13] **International and National Expert Group Evaluations: Biological/Health Effects of Radiofrequency Fields**
http://www.mdpi.com/1660-4601/11/9/9376

[14] International policy and advisory response regarding children's exposure to radio frequency electromagnetic fields (RF-EMF) http://www.ncbi.nlm.nih.gov/pubmed/26091083

to the environment, in the absence of scientific consensus that the action or policy is not harmful, the burden of proof that it is *not* harmful falls on those taking an action." Read it here.

- **Collaborative on Health and the Environment Definition:** "The precautionary principle is a guide to public policy decision making (Raffensperger and Tickner 1999, Schettler et al. 2002). It responds to the realization that humans often cause serious and widespread harm to people, wildlife, and the general environment. According to the precautionary principle, precautionary action should be undertaken when there are credible threats of harm, despite residual scientific uncertainty about cause and effect relationships." Read it here.

For MCPS to use a definition like this makes a mockery of those calling for it. If that were truly the definition then we would not use any product or go anywhere, as nothing can be absolutely proven safe.

The main point behind the precautionary principle is that there is **a large body of compelling research** pointing to evidence of serious harm from wireless *and* although it has not been 100% proven, it would be prudent to take action. **If we don't** take action now- we are talking about generations of children with cancer, fertility damage, neurological issues and illness *which could have easily been prevented.*

Over 20 countries are taking precautionary action because of the potential for serious harm.

FALSE STATEMENT 19 through 23
MCPS states, "However, it is important to note that, the "Precautionary Principle" is already implemented in the Wi-Fi guidelines and exposure limits set by WHO, FCC, Health Canada, Public Health England, and other public-health bodies."

MCPS's statement is nonsensical and false. How can MCPS state that there is no evidence wireless could be harmful and then states they already use precautions? Such a false statement also speaks to a lack of understanding of the complexity of this issue by MCPS . MCPS (in that sentence) has grouped the FCC with the WHO and Public Health England, *which are three very different entities with different expertise, different mandates and different missions.*

Nonetheless, technically neither the WHO, FCC, Health Canada or England have implemented the precautionary principle in regards to public exposure limits.

The World Health Organization (WHO)
The WHO is not tasked to implement anything and specifically states that its role is not to

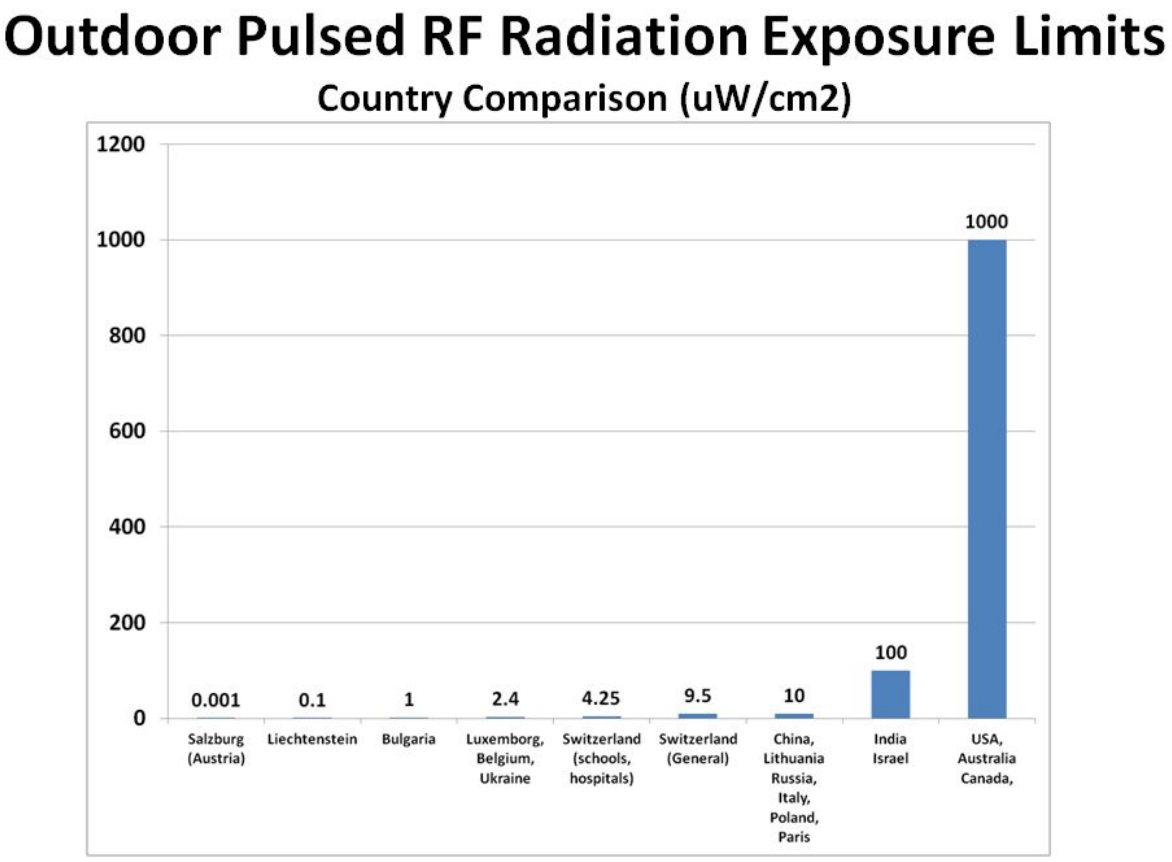
Canada
See below documentation that Canada has certainly not implemented the precautionary principle.
"Currently, RF exposure guidelines in various countries (China, Russia, Italy, Switzerland), based on biological effects, are 100 times more stringent than the guidelines based on an outdated understanding of RFR that relies primarily on thermal effects that includes Health Canada's Safety Code 6. ...Furthermore, Health Canada does not adhere to the Precautionary Principle used by states when serious risks to the public or the environment exist but lack scientific consensus."

- **Scientific Declaration to Health Canada (International Doctors) 2014**

Why would Doctors write Health Canada asking them to utilize the precautionary principle if they were already doing it?

The FCC

Want proof? If the FCC followed the Precautionary Principle *then why do their regulations look like this below.*



FALSE STATEMENT 24 through 28

MCPS Technology Staff stated in a BOE meeting that *wireless RF-EMF is arguably "not radiation"* Watch it at the September 21, 2015 BOE meeting.

This is false. MCPS needs to be honest with the MCPS community that this is *non-ionizing radiation.*

- The FCC states that, "Radio waves and microwaves are forms of electromagnetic energy that are collectively described by the term "radiofrequency" or "RF." RF emissions and associated phenomena can be discussed in terms of "energy," "radiation" or "fields." Radiation is defined as the propagation of energy through space in the form of waves or particles. Electromagnetic

"radiation" can best be described as waves of electric and magnetic energy moving together (i.e., radiating) through space…" [15]

- The United States Navy states very clearly that, "Radio waves and microwaves emitted by transmitting antennas, illustrated in Figure 3, areone form of electromagnetic energy. They are collectively referred to as "radiofrequency" radiation (RFR)."[16]

FALSE STATEMENT 29

In the FAQs section "What were the findings of the RF Monitoring conducted in MCPS schools?" MCPS states that "because students are not expected to be using their Chromebooks continually during the day, actual RF exposure for any given day is expected to be similar or less than the measured values."

- This is non-factual, conjecture and based on no science. Measurements presented were for 6-minute time-averaged, whole body exposure. Clearly, there is no documentation that the radiation levels can be *less.* Indeed, the power levels may be similar or more or less for every 6 minutes of exposure depending on various factors that MCPS neglected to detail in their "Report" . What is missing is that that different schools have different curriculum using Chromebooks. Many parents report children are on Chromebooks in several classes, some less. In some classes all may have cell phones on, actively transmitting adding to top RF exposure in the room. No where did MCPS document how many Chromebooks were on in the room nor what they were doing. When 30 kids are downloading a video, for example, the radiation exposure *will be more.* None of this was taken into account for the radiation readings and MCPS cannot state that RF exposures could be "less". That is false.

FALSE STATEMENT 30

MCPS quotes the 2003 Non-Ionizing Radiations–Sources, Biological Effects, Emissions and Exposures which is from the Proceedings of the International Conference on Non-Ionizing Radiation at UNITEN (ICNIR2003) Electromagnetic Fields and Our Health 20th –22nd October 2003 Non-Ionizing Radiations –Sources, Biological Effects, Emissions and Exposures as an example of statements by "major public health organization." Read it here http://www.who.int/peh-emf/meetings/archive/en/keynote3ng.pdf

This is false and should be removed. This is not a statement by a public health body! It is an abstract of a 2003 paper but by one person, Kwan-Hoong Ng of the Department of Radiology University of Malaya Kuala Lumpur Malaysia. *Why is this on a list of statements by public health organizations?* Furthermore, this is clearly outdated from 2003 and should be removed.

FALSE STATEMENT 31

In section 4.2.4 of the RF Summary Report it is stated, "As discussed above, the Bioinitiative Report (2007 and 2012) is a publication released on the internet by a group of 14 "...scientists, public health and public policy experts to document the scientific evidence on electromagnetic fields."

[15] https://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet56/oet56e4.pdf
[16] http://www.public.navy.mil/navsafecen/Pages/acquisition/radio_frequency-radiation.aspx

This is false. T**he Bioinitiative 2012 report was written by 29 authors from ten countries including ten MDs and 21 PhDs who are worldwide experts in the field.** Authors include three former presidents and five members of the Bioelectromagnetics Society. One author is Chair of the Russian National Committee on Non-Ionizing Radiation, and another is Senior Advisor to the European Environmental Agency.

Dr. Carl F. Blackman former research scientist in the Environmental Carcinogenesis Division of the US Environmental Protection Agency who served on the World Health Organization committee to evaluate the health implications of radiofrequency radiation exposure (Environmental Health Criteria #137, 1993), on a committee of the International Agency for Research on Cancer (IARC) to evaluate the carcinogenic potential of low frequency electric and magnetic fields in 2001 (Volume 80, 2002) and as chair of the genetic studies group of the ANSI/IEEE committee that issued the US 1992 Radiofrequency Radiation exposure guidelines.

See the 29 authors of the Bioinitiative here.

FALSE STATEMENT 32

MCPS states that, The World Health Organization (WHO) has concluded that, "In the area of biological effects and medical applications of non-ionizing radiation approximately **25,000** articles have been published over the past **30** years. Scientific knowledge in this area is now more extensive than for most chemicals. Based on a recent in-depth review of the scientific literature, **the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields**." Please review the information on the following website for further details: http://www.who.int/peh-emf/about/WhatisEMF/en/index1.html."

This is false because **it is not the conclusion of the WHO/IARC.**

The World Health Organizations International Agency for the Research on Cancer classified RF-EMF (radiofrequency electromagnetic fields, otherwise known as "wireless radiation") as a Class 2B Possible Human Carcinogen in 2011 based on credible evidence that linked long term wireless exposure to brain cancer.

- Read The Lancet's published statement by the IARC from 2011 on cancer risk of wireless radiation.
- The 2013 published Monograph shows the current evidence that led to that classification and states, "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." Read these details on page 34 of the World Health Organization's International Association for Research on Cancer's published Monograph on Non-Ionizing Radiation, Part 2: Radiofrequency Electromagnetic Fields.

FALSE STATEMENT 33

Sherwin Collette states in the Sept 21, 2015 Board meeting (Please go here https://youtu.be/VLrWE7vHQCQ) that the MCPS radiation readings are "below the Bioinitiative levels." **This is false.** Yes, they do seem to be below *the Bioinitiative 2007* but *not the most up to date Bioinitiative 2012.* Why didn't he explain they used the old numbers?

Could I tell the State I should not pay their estimated taxes and use a decade old tax assessment as proof my house did not go up in price? of course not!

Can I smoke in front of your house and state that "it was legal ten years ago ten years ago" when the police come ? Of course not.

I cannot even find the Bioinitiative 2007 online because it is no longer a valid report! 2007 was 4 years before the WHO classification! 2007. It was before so many very important research studies and before scientists had certain technologies allowing them to do the research on this they can now.

It is misleading and false to state that these limits have been met when it is not true. MCPS should state that there was a 2007 and 2012 Bioinitiative Report and that MCPS is going to only consider and compare school levels with the decade old outdated 2007 one. He should have said they are not using the Bioinitiative 2012.

Note: The Bioionitiative 2012 was written as an update to the 2007 one because of the science that has accumulated in the last decade. The reason the recommended limits changed was that science showed damaging effects at these levels and so the Bioinitiative Group dropped the limits to account for this and to protect the public.

FALSE STATEMENT 34

This sentence on the MCPS Creating 21st Century Learning Page is false:

"The weight of over 30 years of international research has not linked exposure to radiofrequency energy from mobile devices with any known health problems."

Brain Tumors are definitively linked to radiofrequency from mobile devices. That is why there is a Class 2 B Carcinogen classification for radiofrequency radiation. There is a link. There is no debate on this. *The debate rests on whether "causation' is proven.* To scientifically prove that something "causes" something is different than there being a link. Therefore the above statement is false.

> 2011 IARC Press Release:IARC CLASSIFIES RADIOFREQUENCY ELECTROMAGNETIC FIELDS AS POSSIBLY CARCINOGENIC TO HUMANS
>
> *"Lyon, France, May 31, 2011 The WHO/International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group*

2B), based on an increased risk for glioma, a malignant type of brain cancer1 , associated with wireless phone use."

"Conclusions Dr Jonathan Samet (University of Southern California, USA), overall Chairman of the Working Group, indicated that "the evidence, while still accumulating, is strong enough to support a conclusion and the 2B classification. The conclusion means that there could be some risk, and therefore we need to keep a close watch for a link between cell phones and cancer risk." Read the press release here.

What about this research? Does this show a "link".

Igor Yakymenko, Olexandr Tsybulin, Evgeniy Sidorik, Diane Henshel, Olga Kyrylenko, and Sergiy Kyrylenko,**Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation.**Electromagnetic Biology and Medicine. July 7, 2015.

- 93 out of 100 currently available peer-reviewed studies dealing with oxidative effects of low-intensity RFR, confirmed that RFR induces oxidative effects in biological systems.

Hardell L, Carlberg M. (2013). **Using the Hill viewpoints from 1965 for evaluating strengths of evidence of the risk for brain tumors associated with use of mobile and cordless phones.** Rev Environ Health. 28(2-3), 97-106.

- Based on the Hill criteria, glioma and acoustic neuroma should be considered to be caused by RF-EMF emissions from wireless phones and regarded as carcinogenic to humans, classifying it as group 1 according to the IARC classification. Current guidelines for exposure need to be urgently revised."

Jessica A. Adams, Tamara S. Galloway, Debapriya Mondala, Sandro C. Estevesb, Fiona Mathewsa, **Effect of mobile telephones on sperm quality: A systematic review and meta-analysis,** Environment International, Volume 70, September 2014, Pages 106–112

- The results were consistent across experimental in vitro and observational in vivo studies. We conclude that pooled results from in vitro and in vivo studies suggest that mobile phone exposure negatively affects sperm quality. Further study is required to determine the full clinical implications for both sub-fertile men and the general population.

Dasdag et al., **Effects Of 2.4 Ghz Radiofrequency Radiation Emitted From Wi-Fi Equipment On microRna Expression In Brain Tissue.** Int J Radiat Biol. 2015 Mar 16:1-26.

- The significant effects on microRNAs observed in this study were found from Wi-Fi exposure that was well below the legal limit.
- CONCLUSION: Long term exposure of 2.4 GHz RF may lead to adverse effects such as neurodegenerative brain diseases originated from the alteration of some miRNAs expression.

A review of the ecological effects of radiofrequency electromagnetic fields (RF-EMF)
Environment International Volume 51, January 2013, Pages 116–140

- A review of ecological studies from original peer-reviewed publications. RF-EMF had a significant effect on birds, insects, other vertebrates, other organisms and plants in 70% of the studies. Development and reproduction of birds and insects are the most strongly affected endpoints.

Alfonso Balmori **Anthropogenic radiofrequency electromagnetic fields as an emerging threat to wildlife orientation,** Science of The Total Environment, Volumes 518–519, 15 June 2015, Pages 58–60

- The growth of wireless telecommunication technologies causes increased electrosmog. Radio frequency fields in the MHz range disrupt insect and bird orientation. Radio frequency noise interferes with the primary process of magnetoreception. Existing guidelines do not adequately protect wildlife. Further research in this area is urgent.

Shahin et al. 2.45 GHz (Wi-Fi)Microwave Irradiation Adversely Affects Reproductive Function in Male Mouse, Mus musculus by Inducing Oxidative and Nitrosative Stress.Free Radic Res. 2014 Feb 4.

- Significant decrease in sperm count, sperm viability, decrease in seminiferous tubule diameter, degeneration of seminiferous tubules. Reduction in testicular 3β HSD activity and plasma testosterone levels and increased expression of testicular i-NOS was observed. These "adverse reproductive effects suggest that chronic exposure to microwave radiation may lead to infertility via free radical species-mediated pathway."

Herbert MR, Sage C., Autism and EMF? Plausibility of a pathophysiological link part II. Pathophysiology. 2013 Jun;20(3):211-34. doi: 10.1016/j.pathophys.2013.08.002. Epub 2013 Oct 8.Select item 240950038.

- Autism spectrum conditions (ASCs) are defined behaviorally, but they also involve multileveled disturbances of underlying biology that find striking parallels in the physiological impacts of electromagnetic frequency and radiofrequency radiation exposures (EMF/RFR). Part I (Vol 776) of this paper reviewed the critical contributions pathophysiology may make to the etiology, pathogenesis and ongoing generation of behaviors currently defined as being core features of ASCs. We reviewed pathophysiological damage to core cellular processes that are associated both with ASCs and with biological effects of EMF/RFR exposures that contribute to chronically disrupted homeostasis. Many studies of people with ASCs have identified oxidative stress and evidence of free radical damage, cellular stress proteins, and deficiencies of antioxidants such as glutathione. Elevated intracellular calcium in ASCs may be due to genetics or may be downstream of inflammation or environmental exposures. Cell membrane lipids may be peroxidized, mitochondria may be dysfunctional, and various kinds of immune system disturbances are common. Brain oxidative stress and inflammation as well as measures consistent with blood-brain barrier and brain perfusion compromise have been documented. Part II of this paper documents how behaviors in ASCs may emerge from alterations of electrophysiological oscillatory synchronization, how EMF/RFR could contribute to these by de-tuning the organism, and policy implications of these vulnerabilities. It details evidence for mitochondrial dysfunction, immune system dysregulation, neuroinflammation and brain blood flow alterations, altered electrophysiology, disruption of electromagnetic signaling, synchrony, and sensory processing, de-tuning of the brain and organism, with autistic behaviors as emergent properties emanating from this pathophysiology. Changes in brain and autonomic nervous system electrophysiological function and sensory processing predominate, seizures are common, and sleep disruption is close to universal. All of

these phenomena also occur with EMF/RFR exposure that can add to system overload ('allostatic load') in ASCs by increasing risk, and can worsen challenging biological problems and symptoms; conversely, reducing exposure might ameliorate symptoms of ASCs by reducing obstruction of physiological repair. Various vital but vulnerable mechanisms such as calcium channels may be disrupted by environmental agents, various genes associated with autism or the interaction of both. With dramatic increases in reported ASCs that are coincident in time with the deployment of wireless technologies, we need aggressive investigation of potential ASC-EMF/RFR links. The evidence is sufficient to warrant new public exposure standards benchmarked to low-intensity (non-thermal) exposure levels now known to be biologically disruptive, and strong, interim precautionary practices are advocated.

Herbert MR, Sage C., Autism and EMF? Plausibility of a pathophysiological link – Part I. Pathophysiology. 2013 Jun;20(3):191-209. doi: 10.1016/j.pathophys.2013.08.001. Epub 2013 Oct 4.

- Although autism spectrum conditions (ASCs) are defined behaviorally, they also involve multileveled disturbances of underlying biology that find striking parallels in the physiological impacts of electromagnetic frequency and radiofrequency exposures (EMF/RFR). Part I of this paper will review the critical contributions pathophysiology may make to the etiology, pathogenesis and ongoing generation of core features of ASCs. We will review pathophysiological damage to core cellular processes that are associated both with ASCs and with biological effects of EMF/RFR exposures that contribute to chronically disrupted homeostasis. Many studies of people with ASCs have identified oxidative stress and evidence of free radical damage, cellular stress proteins, and deficiencies of antioxidants such as glutathione. Elevated intracellular calcium in ASCs may be due to genetics or may be downstream of inflammation or environmental exposures. Cell membrane lipids may be peroxidized, mitochondria may be dysfunctional, and various kinds of immune system disturbances are common. Brain oxidative stress and inflammation as well as measures consistent with blood-brain barrier and brain perfusion compromise have been documented. Part II of this paper will review how behaviors in ASCs may emerge from alterations of electrophysiological oscillatory synchronization, how EMF/RFR could contribute to these by de-tuning the organism, and policy implications of these vulnerabilities. Changes in brain and autonomic nervous system electrophysiological function and sensory processing predominate, seizures are common, and sleep disruption is close to universal. All of these phenomena also occur with EMF/RFR exposure that can add to system overload ('allostatic load') in ASCs by increasing risk, and worsening challenging biological problems and symptoms; conversely, reducing exposure might ameliorate symptoms of ASCs by reducing obstruction of physiological repair. Various vital but vulnerable mechanisms such as calcium channels may be disrupted by environmental agents, various genes associated with autism or the interaction of both. With dramatic increases in reported ASCs that are coincident in time with the deployment of wireless technologies, we need aggressive investigation of potential ASC – EMF/RFR links. The evidence is sufficient to warrant new public exposure standards benchmarked to

low-intensity (non-thermal) exposure levels now known to be biologically disruptive, and strong, interim precautionary practices are advocated.

Martin L. Pall. Microwave electromagnetic fields act by activating voltage-gated calcium channels: Why the current international safety standards do not predict biological hazard. Recent Res. Devel. Mol. Cell Biol. 7(2014).

- "It can be seen from the above that 10 different well-documented microwave EMF effects canbe easily explained as being a consequence of EMF VGCC activation: oxidative stress, elevated single and double strand breaks in DNA, therapeutic responses to such EMFs, breakdown of the blood-brain barrier, cancer, melatonin loss, sleep dysfunction, male infertility and female infertility."

The California Medical Association passed a Wireless Resolution that states :

Whereas scientists are increasingly identifying EMF from wireless devices as a new form of environmental pollution with a growing body of peer reviewed scientific evidence finding significant adverse health and biologic effects on living organisms with exposure to low levels of non-ionizing microwaves currently approved and used in wireless communication, and

Whereas peer reviewed research has demonstrated adverse biological effects of wireless EMF including single and double stranded DNA breaks, creation of reactive oxygen species, immune dysfunction, cognitive processing effects, stress protein synthesis in the brain, altered brain development, sleep and memory disturbances, ADHD, abnormal behavior, sperm dysfunction, and brain tumors; and...Resolved, That CMA support efforts to implement new safety exposure limits for wireless devices to levels that do not cause human or environmental harm based on scientific research. Read it here . Read a magazine article on their resolution here.

Do the above document links?
This sentence on the MCPS Creating 21st Century Learning Page is clearly false:
"The weight of over 30 years of international research has not linked exposure to radiofrequency energy from mobile devices with any known health problems."

The "weight of evidence" lead to the IARC classification.

▪

APPENDIX II

OUTDATED DOCUMENTS

Why is MCPS using reviews dated over a decade ago to show wireless is not a risk?
MCPS uses OUTDATED documents to justify its current position and MCPS' stated opinion that wireless is not a health hazard. However, any report before 2011 is inadequate because it was not until 2011 that most long term researxch on wireless (Interphone studies from several countries) was even

published. The World Health Organization made its determination of RF as a Class 2 B Carcinogen in 2011. So looking at pre 2011 reviews is not the current best available science.

Nonetheless, MCPS presents these outdated reviews *which is misleading.*

OUTDATED DOCUMENT 1

MCPS cites the WHO Workgroup Report: Base Stations and Wireless Networks—Radiofrequency (RF) Exposures and Health Consequences

The possibility of RF health effects has been investigated in epidemiology studies of cellular telephone users and workers in RF occupations, in experiments with animals exposed to cell-phone RF, and via biophysical consideration of cell-phone RF electric-field intensity and the effect of RF modulation schemes. As summarized here, these separate avenues of scientific investigation provide little support for adverse health effects arising from RF exposure at levels below current international standards. Moreover, radio and television broadcast waves have exposed populations to RF for > 50 years with little evidence of deleterious health consequences.

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1849947/

MCPS forgets to state that this quote is from 2006. There is "little support for adverse health effects " because the major long term research studies were not even published at that time. *Why is MCPS quoting ten year old science?*

OUTDATED DOCUMENT 2 and 3

MCPS invalidates the Bioinitiative Report using two outdated references

1. The Australian Centre for Radiofrequency Bioeffects Research (ACRBR) published a position statement on the BioInitiative Report.http://www.acrbr.org.au/FAQ/ACRBR%20Bioinitiative%20Report%2018%20Dec%202008.pdf (OOPs this organization funded by the wireless industry closed its doors years ago and that might explain why the link does not work anymore.)
2. Health Council of the Netherlands 2008 Statement (not a report but a statement from 2008)

First of all these are 2008 Documents referencing the Bioinitiative Report 2007

Why is MCPS minimizing the Bioinitiative *2012* recommendations by referring to *2008* reviews to a *2007* Report? It makes no sense and all should take a minute to ponder this. These 2008 reports are inaccurate as they are outdated and do not incorporate current peer reviewed publications. The research has substantially increased since 2008 and of course the 2011 World Health organization Monograph was 4 years after that report. We have continuously provided MCPS with best available peer reviewed science. We have sent abstracts from peer reviewed published science where scientists call for precautions from wireless radiation. MCPS should use the current best available science instead of the outdated -non peer reviewed reports put out by known industry scientists as MCPS is currently doing on it's website.

Some facts about the Australian Centre for Radiofrequency Bioeffects Research: It seems the wireless industry itself provides funding for the work that they do. Read what it states on their website 'The ACRBR wishes to acknowledge the Australian Mobile Telecommunications Association for

providing funding for this project," [17] It is also notes that Telstra is a funder of the organization. Perhaps most notably, there have been no a position papers issued since 2009. [18]

Notably: I have never sent MCPS the Bioinitiative recommendations asking that MCPS use them as thresholds so I do not understand why MCPS is assuming this? I have simply asked for MCPS to reduce unnecessary exposures by using safe technology whenever possible.
For example Why are kindergarteners being exposed to this radiation all day long? MCPS could easily decrease the radiation exposures to these young children by making simple changes to the wireless radiation installations.

OUTDATED DOCUMENT 4

The MCPS Summary Report states, "In addition, the World Meteorological Organization (WMO) conducted ambient RF EMF measurements in a variety of settings across the United States, including urban, suburban, rural, and airport environments (Leck, 2006). The WMO found no difference between the magnitudes of the RF EMF power density regardless of location."

The scientific citation Lerk 2006 is for a 2006 Report on results from measurements taken in 2004 and 2005. Leck, R. World Meteorological Organization, Results of Ambient RF Environment and Noise Floor Measurements Taken in the U.S. in 2004 and 2005, Commission for Basic Systems Steering Group on Radiofrequency Coordination, Geneva, March 16-18, 2006.

Why are 2005 measurements being used considering that *wireless was barely rolled out a decade ago, in 2005.* A lot has changed since 2005.

Note the following from a 2015 published paper , "**the contribution made to RF exposure from wireless telecommunications technology is continuously increasing and its contribution was above 60% of the total exposure. "**

The decade since 2005 is when Wi-Fi has been rolled out to schools, homes and public spaces, not to mention coffee shops. Furthermore there was not the saturation of Smartphones with the public and that will raise ambient RF levels in highly populated areas. This reference is clearly inapplicable today. It is outdated

OUTDATED DOCUMENT 5
MCPS cites the Center for Disease Control:
"In the last 15 years, hundreds of new research studies have investigated whether health problems can be linked to cell phone use. Some of these studies have suggested the possibility that long-term, high cell

[17] http://acrbr.org.au/Research.aspx
[18] http://acrbr.org.au/FAQ.aspx

phone use may be linked to certain types of brain cancer. These studies do not establish this link definitively."
http://www.cdc.gov/nceh/radiation/factsheets/224613_faq_cell-phones-and-your-health.pdf

This Fact sheet is outdated and exists online as an example of the OLD cell phone page. Please see the CDC website explaining this in full at http://www.cdc.gov/nceh/radiation/cell_phones._faq.html
The CDC changed its website in 2014: Read about how the CDC initially called for caution. Read about this here.

OUTDATED DOCUMENT 6

Foster, K. R. Exposure Limits for Radiofrequency Energy: Three Models. World Health Organization, Conference on Criteria for EMF Standards Harmonization. Available at http://www.who.int/peh-emf/meetings/day2Varna_Foster.pdf.
page 3-3 Note: This is outdated at around the year 2000 as that is the most recent year cited. .

OUTDATED DOCUMENT 7
MCPS selectively quotes a 2010 Latin American Review. (It seems MCPS did not really do research to look at the review but instead just selectively took statements from a published article that cites the Latin American review International and National Expert Group Evaluations: Biological/Health Effects of Radiofrequency Fields) nonetheless this review is outdated and pre 2011, when the WHO made its classification. Perhaps more importantly the Chairman of this group Prof. Renato M.E. Sabbatini fyi has this on his resume.

- Scientific advisor, National Association of Cell Phone Operators (ACEL)
- Collaborator, Mobile Manufacturers Forum
- Collaborator, GSM Association

This brings us the final concern with MCPS's radiofrequency page- the use of wireless funded data.

APPENDIX III

Wireless Funded Research and Statements

MCPS Utilizes "Scientific" Reviews funded by the Wireless Industry or by Scientists who Are Consultants to the Wireless Industry.

WIRELESS INDUSTRY FUNDED SCIENCE REFERENCE 1
MCPS presents the 2010 "Latin American Review". This was organized by President of the Organizing Committe and Chairman, Prof. Renato M.E. Sabbatini who is also Scientific advisor to the National Association of Cell Phone Operators and works with the Mobile Manufacturers Forum and GSM Association.

WIRELESS INDUSTRY FUNDED SCIENCE REFERENCE 2

MCPS says "Unequivocally, the RF exposures from Wi-Fi and wireless networks are far below U.S. and international exposure limits for RF energy."

MCPS has this link as the citation:

http://www.researchgate.net/publication/258102960_Wi-Fi_and_Health

MCPS forgets to say:

Acknowledgments—This work was funded by the Wi-Fi Alliance, Washington, DC, and Mobile Manufacturers Forum, Brussels, Belgium. Neither organization had any role in the research for, or preparation of, the manuscript; and they had no knowledge of the contents or conclusions of this review prior to submission for publication. The opinions in this review are those of the present authors only.

The research study that MCPS quotes here was fully funded by the wireless industry and the scientists authoring it are long known to be industry consultants and collaborators. Author John Moulder for example is an industry consultant and decades long expert witness in various court cases for the wireless and energy company industry. Author Kenneth Foster also publishes papers financed, like this one, fully funded by the industry. Oh, he also goes on trips to Greece *funded by the industry*. In fact, scientists are calling for one of his recent works to be retracted because an analysis found systematic errors.

"The first possibility is that many authors of the 22 individual studies misinterpreted and/or misrepresented their review findings in their text summaries. This seems unlikely given the number of authors involved and the fact that the peer review process would need to have failed repeatedly for this to occur. The only other explanation is that a bias in the methods used by Foster and Chou introduced a systematic error in their abstraction of review results," stated the authors."

Read more about that here.

Who is the WiFi Alliance?

They are all the top tech companies from Cisco to Samsumg to Intel. Read the list of companies here. When schools inquire as the the health risks of wireless they also have a handy response that basically says- nothing to worry about, we met all regulations- plus *nothing is proven. This research was fully funded by the wireless industry and then is used to to justify wireless deployment.*

WIRELESS INDUSTRY FUNDED SCIENCE REFERENCE 3

Section 2.5.1 of the MCPS Radio Frequency Monitoring Report also quotes a study of Foster's "In 2007, Foster measured the RF signal from wireless devices in multiple settings (academic, commercial, health care) and multiple countries (USA and Europe). Foster found a number of interesting results…"

We assume this is a reference to the following 2007 study, RADIOFREQUENCY EXPOSURE FROM WIRELESS LANS UTILIZING WI-FI TECHNOLOGY found here

http://medfordumc.org/celltower/wifirfexposure.pdf

This research study states very clearly:

Acknowledgments— This work was supported by the Wi-Fi Alliance.

Such funding might explain why the almost decade old study has so many problems. It purports to show "low exposures" yet did not even trest near field exposures and did not even get a statistically valid sampling! . As it states, "No attempt was made in this study to assess near-field exposures to a user of the laptop itself." and "The measurement locations were chosen as a matter of convenience, not to provide a statistically valid sample of the environments (however that may be defined). " Despite the lack of looking at exposure to the laptop user and the lack of a statistically valid sample, , the paper is continuously used to show "safety". It seems to me to be an attempt to publish something that allays fears reiterating regulations are not surpassed and stating that, "any health concerns would seem to be moot."

WIRELESS INDUSTRY FUNDED SCIENCE REFERENCE 4

MCPS cites England's MTHR as concluding that, "No increased cancer risk from wireless technologies. No robust evidence of harmful effects. No definite demonstrable effects in children."

MCPs neglects to clarify that MTHR is the Mobile Telecommunications and Health Research Programme and its **Report 2012** gives the findings of 31 individual research projects, *funded by the telecommunications industry.*

WIRELESS INDUSTRY FUNDED SCIENCE REFERENCE 5

MCPs pulled most of its statements about international organizations from a 2014 paper entitled "International and National Expert Group Evaluations: Biological/Health Effects of Radiofrequency Fields" which states, "We thank Chung-Kwang Chou (chairman, SC-95 of the international committee on electromagnetic safety, Institute of Electrical and Electronic Engineers) for critical reading of the manuscript and helpful suggestions."

Left out is that CK Chou is just retired Chief EME Scientist for Motorola and published papers funded by the Wireless Alliance. Read about the scientific calls for his recent industry funded work on children and cell phones *to be retracted* here.

WIRELESS INDUSTRY FUNDED SCIENCE REFERENCE 6

MCPs says the Committee on Man and Radiation (COMAR "concluded that the weight of scientific evidence in the RF bioeffects literature does not support the safety limits recommended by the BioInitiative Group."

> *"One of the many organizations that have refuted the science behind the report is the Institute of Electrical Engineers, Inc., Engineering in Medicine and Biology Society, Committee on Man and*

Radiation (COMAR). The committee concluded that the weight of scientific evidence in the RF bioeffects literature does not support the safety limits recommended by the BioInitiative Group. For this reason, COMAR recommends that public health officials continue to base their policies on RF safety limits recommended by established and sanctioned international organizations such as the Institute of Electrical and Electronic Engineers International Committee on Electromagnetic Safety and the International Commission on Non-Ionizing Radiation Protection, which is formally related to WHO." **See the COMAR outdated 2009 Report here http://www.ncbi.nlm.nih.gov/pubmed/19741364**

This report is from 2009 (so an example of outdated material) ***Since when was COMAR an expert group worth listening too above the Bioinitiative authors?*** COMARs website is here http://ewh.ieee.org/soc/embs/comar/ and it shows that the IEEE Engineering in Medicine and Biology Society, Committee on Man and Radiation (COMAR) *is basically mostly industry funded engineers who made a group.*

COMAR has a total of 3 officers, and 24 members and includes

- **Ken Foster**: Multiple industry funded research studies plus the trip to Greece.
- **Jerrold T. Bushberg:** He runs a health and medical physics consulting firm and has long served as an expert witness for the cell phone and broadcast industries on the health effects of RF energy, servicing, among others, Cingular Wireless, Crown Castle, Newpath Networks, and Verizon. Bushberg has also helped town officials evaluate proposals for siting cellular antennas and has testified for broadcasters who wanted to site high-power antennas on Lookout Mountain outside of Denver.
- **C-K Chou -** former Chief Scientist for Motorola
- **Antonio Faraone** of Motorola Labs – Corporate EME Research Laboratory
- **Ralf Bodemann** PhD Radiation Physicist for Siemens AG
- **Linda Erdreich,** is Exponent's Sr. Managing Scientist Exponent is the energy's Industry GO TO consulting firm to testify as "expert witness' when defending claims of harm.
- **Rob Kavet, ScD *** EMF Business Area Manager EPRI

(EPRI is an "independent" nonprofit scientific organization funded by the electric power industry in the United States.)

- **The Chair is Richard Tell** of Richard Tell Associates, Inc. which is "a scientific consulting business focused on electromagnetic field exposure assessment'

In fact, it is stated plain as day that their "technical information statement" reports are theirs alone and that their statements represent 'The statement of the committee". Their statements do not even represent IEEE as a whole.

N*o one is even reviewing these propaganda like statements and the MCPS tech group is putting it forward as some sort of truth? None of the COMAR members have medical degrees.* They are a self selected group of people writing their own statements with a very big fancy name. As they state "*COMAR does not establish safety standards, but it has an interest in the standards activity within its scope."* and their papers '*represent the consensus of the Committee*'.

I recommend that you take a look at the people who make up COMAR and compare their background and funding *to the people who wrote the Bioinitiative report.*

Why is MCPS using industry funded work to invalidate research showing wireless could be harmful?

WIRELESS INDUSTRY FUNDED SCIENCE REFERENCE 7
Another one of Ken Foster's articles is cited in the AECOM RF Report (total of 3)

Foster, K. R. Exposure Limits for Radiofrequency Energy: Three Models. World Health Organization, Conference on Criteria for EMF Standards Harmonization. Available at http://www.who.int/peh-emf/meetings/day2Varna_Foster.pdf.
page 3-3 Note: This is also outdated at around the year 2000.

WIRELESS INDUSTRY FUNDED SCIENCE REFERENCE 8

Yet another Foster article is cited in the AECOM RF Report

Foster, K. R. Response to Lora Lee Martin Regarding Smart Meters and EMFs, September 23, 2010, available at http://www.ccst.us/projects/smart/documents/foster_response.pdf.

APPENDIX IV

Misleading Statements

MISLEADING STATEMENT 1
The MCPS webpage selectively cites Group 2 B agents by naming others in the category which seem silly. "Here is a sampling of Group 2B agents classified by the IARC: magnetic fields (extremely low-frequency), aloe vera (whole leaf extract), coconut oil, coffee, dry cleaning, engine exhaust (gasoline and diesel), ginkgo Biloba extract, nickel (metallic and alloys), pickled vegetables, talc-based body powder, titanium dioxide (found in personal care products and in sunscreen), and amaranth."

- MCPS forgets to mention the dozens of *other* Group 2 B carcinogens such as lead, Chloroform, Welding fumes, Hexachlorobenzene, *many of which were pulled off the market before further testing was done.* Would we want these substances in our classrooms?
- MCPS also neglects to mention that many now 100% proven carcinogens that *used to be on the Group 2 B list* for a decade have since **moved** to a higher risk category such as styrene, DDT . These used to be on the Class 2 B list but have since moved up in risk.

It is misleading to put amaranth and aloe vera next to RF radiation. The WHO is clear that being in the same category does not mean that the risk is the same. Furthermore, the body of research is incomparable.

MISLEADING STATEMENT 2

MCPS quote the WHO as below

Non-Ionizing Radiations–Sources, Biological Effects, Emissions and Exposures

NRPB has made many measurements of exposure levels at publicly accessible locations around base stations. One study [12] reported measurements taken at 118 locations from 17 different base station sites. Average exposures were found to be 0.00002% of the ICNIRP public exposure guidelines and at no location were exposure found to exceed 0.02% of the guidelines.

The maximum exposure at any location was 0.00083 mWcm-2 (on a playing field 60 meters from a school building with an antenna on its roof). Typical power densities were less than 0.0001 mWcm-2 (less than 0.01% of the ICNIRP public exposure guidelines). (See Fig. 2) Power densities indoors were substantially less than power densities outdoors. When RF radiation from all sources (mobile phone, FM radio, TV, etc.) was taken into account the maximum power density at any site was less than 0.2% of the ICNIRP public exposure guidelines. [12, 13]

http://www.who.int/peh-emf/meetings/archive/en/keynote3ng.pdf

MCPS left out that this statement was from cell tower radiation readings in 2003.

Cell Tower radiation has substantially increased since 2003 as far more people are using cellphones and the radiation densities have increased because of this. The quotes information is from the Proceedings of the International Conference on Non-Ionizing Radiation at UNITEN (ICNIR2003) Electromagnetic Fields and Our Health 20 th–22 nd **from October 2003 .**

Why is MCPS quoting a paper on cell towers radiation that is entirely inapplicable to today's radiation exposures and using it to show RF is not a problem? This is misleading.

Concerning the World Health Organization WHO IARC scientists continue to publish research and commentary in medical journals detailing that there are *no safety assurances with wireless*. Please note the following:

Dr. Samet, Senior Scientist, Chair of the World Health Organization's International Agency for the Research on Cancer 2011 RF-EMF Working Group stated, "*The IARC 2B classification implies an assurance of safety that cannot be offered—a particular concern, given the prospect that most of the world's population will have lifelong exposure to radiofrequency electromagnetic fields."* in his 2014 Commentary calling for more directed research published in the journal *Epidemiology*.

It is misleading that MCPS has left out the following:

Many WHO scientists who served as IARC advisors on RF Radiation for the 2011 working group now state *that additional scientific evidence* indicates that wireless radiation should be re-classified as a "probable human carcinogen."

- "Radiofrequency fields should be classified as a Group 2A˙probablė human carcinogen under the criteria used by the International Agency for Research on Cancer (Lyon, France)." Read the 2015 published review *by a group of scientists that includes World Health Organization EMF Working Group Experts* in the *International Journal of Oncology* entitled Mobile phone radiation causes brain tumors and should be classified as a probable human carcinogen (2A) (review) which also

advises that the *as low as reasonably achievable* (ALARA) principle be adopted for uses of this technology.

The following experts were part of the WHO IARC's RF-EMF Review in 2011. Read their statements:

- **Dr. Chris Portier** "*A careful review of the scientific literature demonstrates there are potentially dangerous effects from RF*," stated Portier, a recently retired *CDC Director, Center for Environmental Health and the Agency for Toxic Substances and Disease* in his official call for invoking the precautionary principle with wireless. See also a poster presentation he penned for the conference here.
- **Dariusz Leszczynski,** WHO IARC expert, former Finnish government researcher, lectures widely on the urgent need for the precautionary principle. See slides from a recent lecture in Belgrade, Serbia attended by governmental officials. Read his laypersons article on the need for the Precautionary Principle here.
- **Dr. Anthony Miller** publishes research, lectures, testifies to government officials *on the increased evidence of risk from wireless technology*, and has four decades of expertise with the WHO IARC. See his testimony to the City of Toronto against cell towers here. Watch his 2014 lecture at Women's College Hospital here. Read his published research here.
- **Dr. Igor Belyaev** "There are many publications showing health effects of radiofrequency radiations. Approximately half of all published papers show such effects. This apparent discrepancy can be accounted for various conditions of exposure, because non-thermal RF effects are critically dependent on various parameters and also biological variables." Dr. Igor Belyaev is the Head Research Scientist at the Cancer Research Institute at the Slovak Academy of Science in Bratislava, Slovakia. Dr. Belyaev was one of the 30 members of the IARC Working Group tasked with classifying the carcinogenicity of cell phone radiation—the Group that produced the 2013 IARC Monograph. Please watch him speak at the National Press Club at this video link.
- **Dr. Lennart Hardell** published research in the *International Journal of Oncology* entitled Case-control study of the association between malignant brain tumours diagnosed between 2007 and 2009 and mobile and cordless phone use concluding, "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". Read his scientific blog with a letter to the WHO here.

Dr. Hardell is an International Agency for the Research on Cancer expert and now states that wireless *"should be regarded as human carcinogen requiring urgent revision of current exposure guidelines."*

- Read his 2014 research published in the *Journal of Environmental Research and Public Health* entitled Decreased Survival of Glioma Patients with Astrocytoma Grade IV (Glioblastoma Multiforme) Associated with Long-Term Use of Mobile and Cordless Phones which determined the use of wireless phones in the >20 years latency group (time since first use) was correlated to decreased survival for those diagnosed with astrocytoma grade IV. The conclusion reads, "Due to

the relationship with survival the classification of IARC is strengthened and RF-EMF should be regarded as human carcinogen requiring urgent revision of current exposure guidelines."

In 2015 over 200 scientists appealed to the WHO and the United Nations to take immediate action to reduce health risks of wireless radiation and "the emerging public health crisis related to cell phones, wireless devices, wireless utility meters and wireless infrastructure in neighborhoods."

- Read the Medical Doctor and Scientists' Appeal here.
- Read the names of the Doctors and Scientists and their qualifications here.

MISLEADING STATEMENT 3

Spain: MCPS cites The Scientific Advisory Committee on Radio Frequencies and Health as stating that "To date, no scientific evidence that exposure to the low emissions levels of these systems produces adverse health effects in school children."

Interestingly, this organization does not exists anymore and as far as we know it is not the official position of the Spanish government's position on RF.(Often these "scientific" committees are created to invalidate the research and are funded by the industry.) MCPS misleads by putting it forward as a public health organization when it is NOT and forgot to mention this information about Spain:

- The Parliament of Navarra voted to urge removal of WIFI in schools and to apply the precautionary principle in relation to exposure limits to electromagnetic fields whose boundaries have become "obsolete".
    - The Parliament voted to adopt a resolution which calls to implement the Parliamentary Assembly of the Council of Europe resolution 1815 of 2011, which recommends to "review the scientific basis for the standards of exposure to electromagnetic fields" and " set thresholds for levels of preventive long-term exposure in all indoor areas not exceeding 0.6 volts per meter ".

- The Vitoria City Council unanimously approved a precautionary approach with wireless: Citizens will be informed of the location of wireless transmitters are in civic centers and municipal buildings. It is recommended that children's spaces such as playgrounds and family libraries, will be free of WiFi or have decreased wifi and wifi free zones will be established in playgrounds and building entrances.

- **The Basque Parliament** joined the resolution of the Parliamentary Assembly of Council of Europe in 2011, which warns of the "potential risk" of electromagnetic fields and their effects on the environment and urged the promotion of campaigns against "excessive use "mobile phones among children.In a statement, the parliamentary Aralar, Dani Maeztustated, "To protect children's health, recommends the implementation of information campaigns and portable devices that emit microwaves, and prioritizes the use of cable connections in schools."
- **City of Tarragona Municipal Government (Tarragona is a major city 100 kilometres south of Barcelona) approved the "Institutional Declaration of support for people with Central Sensitivity Syndromes" including electromagnetic fields.** This means spaces are being set aside that are "white zones" meaning no RF radiation.

MISLEADING STATEMENT 4

MCPS states this about the BioInitiative Report" "This report was compiled, self-edited, and published by Cindy Sage and David Carpenter in 2007 and claims to be based in science." MCPS then goes on to negate the 2012 Report validity (addressed more in industry funded science section of this document as they reference a group made up of industry consultants)

This is a misleading and seems to be an attempt to delegitimize and discredit and neglects to inform readers that the Bioinitiative 2012 report was written by 29 authors from ten countries including ten MDs and 21 PhDs who are worldwide experts in the field. Authors include three former presidents and five members of the Bioelectromagnetics Society. One author is Chair of the Russian National Committee on Non-Ionizing Radiation, and another is Senior Advisor to the European Environmental Agency.

Dr. Carl F. Blackman former research scientist in the Environmental Carcinogenesis Division of the US Environmental Protection Agency who served on the World Health Organization committee to evaluate the health implications of radiofrequency radiation exposure (Environmental Health Criteria #137, 1993), on a committee of the International Agency for Research on Cancer (IARC) to evaluate the carcinogenic potential of low frequency electric and magnetic fields in 2001 (Volume 80, 2002) and as chair of the genetic studies group of the ANSI/IEEE committee that issued the US 1992 Radiofrequency Radiation exposure guidelines.

See the authors here.

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MISLEADING STATEMENT 5

MCPS quotes England's IET which is The Institution of Engineering and Technology as concluding that "No new robust evidence for adverse effects. Policy makers should consider all evidence including cost and benefits of mobile phone use."

Why is this misleading ? Because first, IET is not a public health institution. It is an engineering group whose website is filled with logos for various companies. They have an interest in promoting this technology and you can read their countless documents *all about using radiofrequency in the world.* This is not a scientific organization who understands biology and I am at a loss as to why MCPS would cite this as a public health group. That is tantamount to putting forth information on the toxicity of lead by an organization funded by paint companies.

MISLEADING STATEMENT 6

In the MCPS RF FAQS section on "Additional Information". MCPS shows " statements from major health organizations that have been involved in studying Radiofrequency for years but have not concluded that Radiofrequency poses any adverse health effects" The entire section is misleading as it is cherry picking specific statements and leaving out others. For example:

MCPS quotes the World Health Organization:

> *"To date, no adverse health effects have been established as being caused by mobile phone use."*
> *"Studies to date provide no indication that environmental exposure to RF fields, such as from base stations, increases the risk of cancer or any other disease."*
> http://www.who.int/features/qa/30/en/

As mentioned and documented earlier in this document, the WHO has far more to say about RF than that quote. For example, later on this very same page it states that *"While an increased risk of brain tumours from the use of mobile phones is not established, the increasing use of mobile phones and the lack of data for mobile phone use over time periods longer than 15 years warrant further research of mobile phone use and brain cancer risk. In particular, with the recent popularity of mobile phone use among younger people, and therefore a potentially longer lifetime of exposure, WHO has promoted further research on this group and is currently assessing the health impact of RF fields on all studied endpoints."*

MCPS should be providing the whole story and not selectively quoting statements on the WHO's position.

MISLEADING STATEMENT 7

Previously MCPS stated and then removed the following:
"The 2B classification was based on studies of extremely heavy cell phone use: 1,640 hours or more per year, which is equal to holding a cell phone to the side of one's head for four hours a day, every day for an entire year."

The facts:

1. The 1640 hours linked to increased brain tumors in the Interphone Study pertained to ***lifetime*** *cumulative cell phone use (**not** annually as MCPS falsely states).*
2. Heavy use in the long term cell phone research informing the Class 2 B classification **was often defined** as 30 minutes a day over ten years (***not*** 4 hours a day as MCPS falsely states). Watch WHO IARC expert Dr. Bann state this clearly in this video here.

Then MCPS wrote "Using the Group 2B classification of the entire spectrum of radiofrequencies as an indication that Wi-Fi is harmful when the classification came about due to extremely heavy cell phone use and not Wi-Fi does not accurately represent the intention of the classification."
*and "The International Agency for Research on Cancer (IARC) classification of exposure to radiofrequency as possibly carcinogenic was based on **heavy mobile phone use**. "*

MISLEADING STATEMENT 7
What is misleading? MCPS removed it's clearly incorrect fact about what "heavy cell phone use" was but then *did not replace that text with easy to understand information.* "heavy cell phone use" is equivalent to 30 minutes a day and long term research shows an association between this amount of use and brain cancer. *Why won't MCPS post this information?*

MCPS states that "MCPS has made sure to review the exposure limits set by the FCC and the Occupational Safety and Health Administration and have ensured that the wireless networks in MCPS remain well below these established guidelines."

However the Occupational Safety and Health Administration states:

- "There are no specific standards for radiofrequency and microwave radiation issues." Read it on OSHA's website here.
- **OSHA has stated that RF could act as a cancer promoter:** OSHA also states that, "in 1987, the Hazard Evaluation and Technical Assistance Branch of the National Institute for Occupation Safety and Health (NIOSH) conducted a field investigation into possible health hazards at an acceleration laboratory9. NIOSH's report addressed both radio frequency (rf) and static magnetic fields. The report at its conclusion indicates that evidence that rf radiation alone can produce cancer was weak but it might act as a cancer promoter in animals." Read it here https://www.osha.gov/dts/hib/hib_data/hib19900207.html
- **NIOSH lists reproductive damage as concern.** "There have been reports which suggest an association between RF exposure and reproductive damage in animals and humans. These reports, primarily from Eastern Europe and the Soviet Union, list a variety of reproductive and developmental effects resulting from occupational exposures of workers and experimental exposures of laboratory animals to electromagnetic energy at frequencies in the RF and microwave ranges. Reported effects from exposure of women to fields of relatively high intensity RF and microwave energy have included changes in menstrual pattern, increased incidence of miscarriage, and decreased lactation in nursing mothers.13 Retarded fetal development and increased congenital anomalies have been noted among exposed offspring.13 Laboratory studies have shown that exposure of pregnant rats to RF energy (at levels believed to have been relatively high) resulted in numerous fetal malformations including abnormalities of the central nervous system, eye deformities, cleft palate, and deformation of the tail.14 There is a report of changes in spermatogenesis (production of male germ cells in the testicles) among workmen exposed to nonionizing electromagnetic energy.15 Reproductive effects in male experimental animals, including testicular damage, debilitated or stillborn offspring and changes in spermatogenesis, have been reported to be related to exposure to electromagnetic energy at microwave frequencies.16,17**"**
- **NIOSH validated that nonthermal effects can occur at levels that do not produce heating. "**Absorption of RF energy may also result in "nonthermal" effects on cells or tissue, which may occur without a measureable increase in tissue or body temperature. "Nonthermal" effects have been reported to occur at exposure levels lower than those that cause thermal effects. While scientists are not in complete agreement regarding the significance of reports of "nonthermal" effects observed in laboratory animals, NIOSH believes there is sufficient evidence of such effects to cause concern about human exposures. NIOSH and OSHA recommend that precautionary measures be instituted to minimize the risk to workers from unwarranted exposure to RF energy." While this is from a very outdated report it is interesting that his is the information presented on the webpage. Read it here http://www.cdc.gov/niosh/docs/80-107/
- "While scientists are not in complete agreement on the interpretation of available data on biological effects, NIOSH believes there is sufficient evidence of such effects to cause concern about human exposures. **NIOSH and OSHA recommend that precautionary measures, as listed in Section V of the attached Appendix , be instituted to protect workers from unwarranted exposure to RF energy."**
- **Read it here. http://www.cdc.gov/niosh/docs/80-107/default.html**

It is notable that a December 2013 Report by the U.S. Department of Health and Human Services Centers for Disease Control and Prevention National Institute for Occupational Safety and Health finds that education on RF and EMF exposures safety is lacking at a site and speaks to health concerns about low level exposures stating that:

"Much of what is known about RF biological effects pertains to acute (short-term) exposure; relatively little is known about the effects of long-term low-level RF exposure. Human and animal studies show that exposure to RF fields above OELs may cause harmful biological effects as a result of heating of internal tissues. The extent of heating depends primarily on the RF frequency, intensity of the RF field, and duration of exposure.
However, some researchers have reported that absorption of RF radiation may result in nonthermal effects that occur without a measurable increase in tissue temperature, and at RF field strengths lower than those that cause thermal effects [NIOSH/OSHA 1979; FCC 1999]. Read it here http://www.cdc.gov/niosh/hhe/reports/pdfs/2011-0097-3200.pdf

NIOSH pointed to weakness in US standards in 1994 "While the maximum permissible exposure levels defined by ANSIJIEEE C95.1-1992 are similar to those defined by other related publications [NCRP 1986; WHO 19931, NIOSH is concerned about the lack of participation by experts with a public health perspective in the IEEE RF standards setting process. For example, epidemiology studies were categorically rejected as not useful in the process of setting the ANSIJIEEE C95.1-1992 limits. This lack of public health perspective creates a weakness in the ANSIIIEEE C95.1-1992 standard that should be acknowledged by the FCC in adopting these guidelines for regulating occupational and environmental exposures to RF radiation."
"The exposure levels that would be set by the standard are based on only one dominant mechanism -- adverse health effects caused by body heating. Nonthermal biological health effects have been reported in some studies and research continues in this area [NCRP 1986; WHO 19931. The standard should note that other health effects may be associated with RF exposure and that exposure should be minimized to the extent possible." page 54 http://www.cdc.gov/niosh/hhe/reports/pdfs/1993-0424-2486.pdf

On OSHA's Hazards locations and Solutions webpage it states:
"Non-thermal effects, such as alteration of the human body's circadian rhythms, immune system and the nature of the electrical and chemical signals communicated through the cell membrane have been demonstrated. However, none of the research has conclusively proven that low-level RF/MW radiation causes adverse health effects." Read it here.

A 2002 Slide Presentation Implement an RF program where exposures exceed FCC "General Population" or Public limits

"Because of the scientific uncertainty, no Federal limits for worker exposures to EMFs have been recommended or established in the United States." states NIOSH on a webpage last reviewed in 2014. Read it here http://www.cdc.gov/niosh/docs/96-129/

It is misleading for MCPS to present this agency as validating that MCPS is compliant when OSHA posts contradictory information on their website. They link to copious information (although *very* outdated) recommending precautionary measures on their website and talk about "insufficient information" and concerns with the FCC guidelines.

"Research continues on possible biological effects of exposure to RF/MW radiation." In the first parargraph of their Safety and Health section.Read it here.

Teachers and staff at MCPS *do* have a possible work safety issue which OSHA and NIOSH has clearly not adequately dealt with. All the information from these agencies websites points to outdated reviews and "insufficient evidence". In my opinion, this speaks to a dropping of the ball and a lack of accountability to workers. OSHA should responsibly be looking at exposures in schools, hospitals and government buildings now that such buildings have multiple transmitting antennas in addition to cell towers placed on the grounds.This issue has not received the attention needed considering the recent increase in exposure for workers throughout the country. MCPS should not be citing this agency and if so *MCPS should cite which specific regulation* they are even referring to (as no where on OSHA's website did I find details pertaining to safety in work environments such as schools with dozens of access points, hundreds of cell phones and laptops transmitting continuously.)

PERHAPS THE MOST EGREGIOUS MISLEADING STATEMENT

Under the heading "**What were the findings of the RF Monitoring conducted in MCPS schools?"** MCPS seems to put forth the radiofrequency reading from AECOM as proof that the radiation is not a health risk stating that, *"All of the average power density results were several orders of magnitude below FCC regulatory limits. Note that measurements and regulatory limits were for six-minute time-averaged, whole body exposure. Average power density results were also below recommended levels from non-regulatory agencies, including the IEEE, the ICNIRP, and the Bioinitiative Report 2007."* MCPS does not actually state that such levels are safe in any sentence but continuously states that the levels meet FCC guidelines. Most parents will view this as a statement that the level is too low to cause harm. Furthermore parents will not understand that such statement is meaningless when it comes to understanding the risk to students and staff.

Such a statement is inaccurate and misleading. Why?

1. 6 minutes is not in accordance with FCC limits for public exposures: In the US, regulations look at averages *over 30 minutes* , not 6 minutes as was done at MCPS. This is pointed out by Arthur Firstenberg in his letter to MCPS here. Therefore testing was not done in accordance to FCC regulations.

2. Average power density is <u>not a way to understand the effect on biological systems.</u> This report displays average power readings and does not report *peak pulses*. Best available science speaks to the importance of the pulsed nature of the signal. The measurements did not take into account peak pulses and therefore they are not helpful in understanding risk to students.

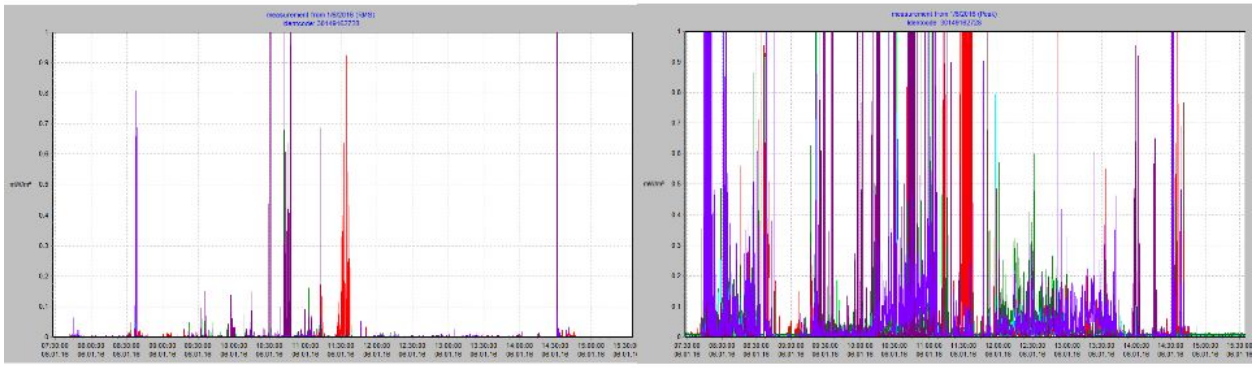
- **Department of the Navy, Aerospace Med Research Laboratory:** In *Some considerations concerning the use of magnetron generators in microwave biological research*, written by Vernon R. Reno for the Department of the Navy. at the shows that the waveform, as well as the type of instrumentation used to both create and measure the waveform are important when considering the biological effects of microwave radiation. Reno clearly states that "average" power density is an inadequate metric for assessing the effects on animals in experimental studies. By extension, it should be inadequate for monitoring exposure of human populations as well.

"Pulsed radiation is underestimated when "averaging" is used. That is a simple math fact. This fact is one reason that FCC regulations are outdated. Do the math. See below an example of how averaging is a method that skews understanding exposures. The first Figure shows all frequencies. The second shows just WLAN 2.45 frequencies.

Measurements From An MCPS High School 7:45 am to 3:00pm

All Frequencies Shown Graphed up to 1mW/m2

Average Exposures	Peak Exposures
This is how MCPS measures radiation.	**This is the actual exposure to the student.**



Averaging minimizes the peak levels.

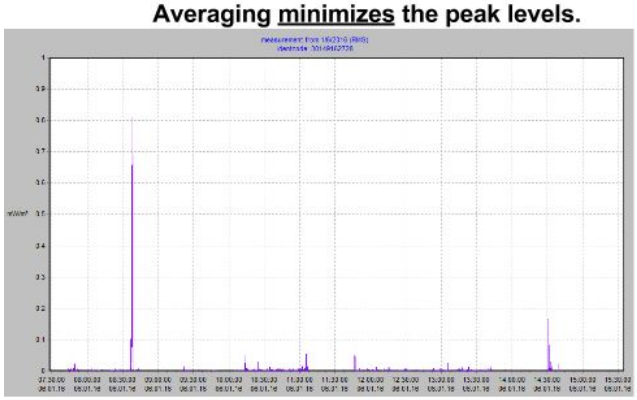
These graphs show the results of measurements done with an ESM 140 Dosimeter worn on the arm for a 2015 school day at an MCPS School.

Measurements From an MCPS High School 7:45 am to 3:00pm

WLAN Wi-Fi 2.45 only, Graph until 1 mW/m2

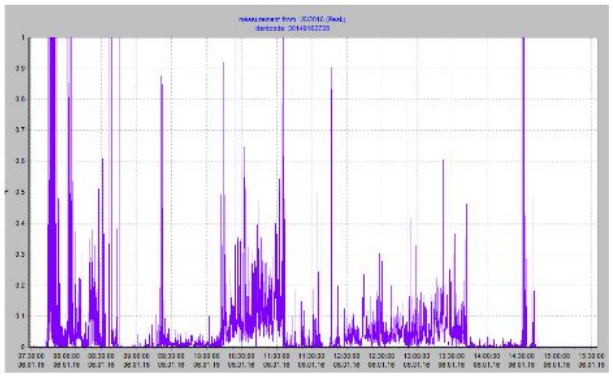
Average WLAN Exposures

This is how MCPS measures radiation.
Averaging minimizes the peak levels.



Peak WLAN Exposures

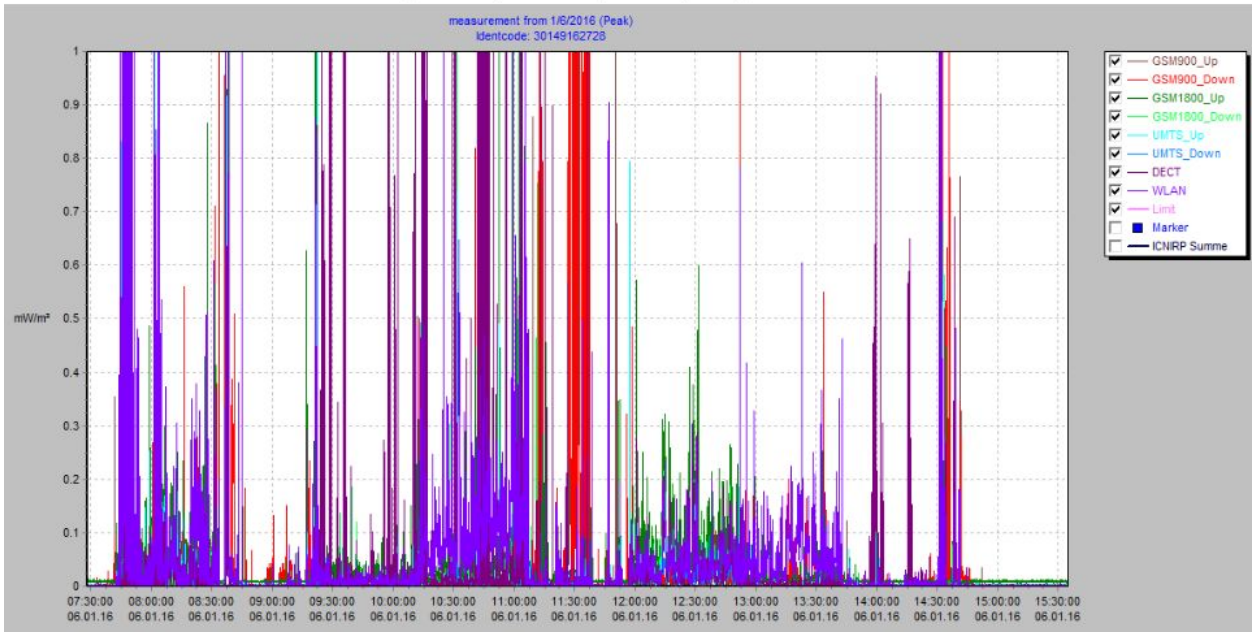
This is the actual exposure to a student.



These graphs show the results of measurements done with an ESM 140 Dosimeter worn on the arm for a 2015 school day at an MCPS School.

A child in a classroom is exposed to the sum of frequencies from transmitters in the room. MCPS only looked at WLAN. Therefore, MCPS did not fully detail exposures in classrooms because they did not account for cell phone use in class as a source of exposure. See below the same graph as in Figure 1 with the Key showing all frequencies.

Measurements at MCPS High School
All Frequencies, Peak Exposures, Graph until 1 mW/m2



The above graphs are from a specialized instrument that took measurements at a local MCPS High School a few weeks ago. A report will soon be prepared showing the results for the community. The Dosimeter used is a ESM-140 and it is able to identify and measure all of the frequencies in the classroom from GSM 900 to WLAN at 2.45 GHz. It does not measure 5 GHz so it in fact is an underrepresentation of exposure in the school.

3. Exposures could be 100 fold more than average power densities. Please read what Mikko Ahonen PhD, Lena Hedendahl MD and Tarmo Koppel MSc wrote MCPS in December 2015

> "In the Comparison-table 2.2. the MCPS provides only average values, no peak values. In cell phone technologies (like GSM) the difference between average and peak value is 2-fold. In Wireless local area technologies like Wi-Fi, the difference between average value and peak value is up to 100-fold (Ferro & Potorti, 2005). Note that in the table 2.2. by the MCPS only average values are presented. Later you provide in the chapter 7.2.2 Maximum, Instantaneous Power Density, which needs attention since these levels occasionally exceeded in your school measurements allowable EMC-levels (EN60601-1 3 V/m) for medical instruments (Robinson *et al.*, 2003)." Read it here.

4. The RF Summary did not document the transmitting sources in the room measurements were taken. None of the following was noted: Distance from the AP for the Chromebooks tested, Number of end devices in use at the time nor the type or amount of data transferred, Number of cell phones transmitting in room nor their location (some classes have policies stating no phones in the class and others encourage cell phones so that should have been noted) , Location of antennae on Laptop and angle from antennae,

Why is this important? The AP can only service one end user at a time. Multiple end users generates additional EMFs because of the need to reconnect. The closer the end device is to the

AP, the lower the signal strength necessary to transmit the information between the two devices. Similarly, the farther away the end device is from the AP, the stronger the signal that must be employed for the AP to accurately receive and transmit. Yet at the same time, a very close access point results in continuous exposures to those seated nearby. Sitting near an access point when no laptops are in use will present a different exposure than if all laptops are in use. The exposures might be far higher depending on these variables.

Without any of this exposure information, the numbers are simply not useful and do not thoroughly document actual exposure to children in MCPS schools.

Common scenarios are not accounted for in the MCPS Report:

> What about the child using the laptop to download a video at a location far from the AP?
>
> What about the child sitting directly under the AP while the room of 30 are downloading a video at the same time?
>
> What about the teacher standing directly under the AP with their head a few feet from the AP while all 30 kids are downloading?
>
> What about the children sitting with laptops on their laps huddled together on the floor close together so in circles of 4 or more children? (that would mean each child is receiving exposures for the other laptops.)
>
> What about the use of cell phones as classroom tools? What about how students transport these cell phones around the school building?

The MCPS Report did not detail these critical scenarios and thus cannot present its "findings' as applicable to the students exposure. It is important to note the I have addressed issues of radiofrequency exposures from laptops as well as cell phones and other wireless devices in my communications with MCPS and yet MCPS did not account for any exposures from cell phones in this measurement report.

MCPs has the students using the MCPS network ON STUDENTS phones. Therefore MCPS is accountable and should be responsible for cell phone exposures as well as any exposures from devices brought in as part of the Bring Your Own Device Policy.

4. Multiple experts have written to MCPS detailing technical concerns about the Radiofrequency report. They state the instrumentation was inadequate, the scenarios were not documented and the measuring set up inadequate to properly represent children's exposures. Equally important, the reference standards employed are **out of date.** There is a sufficient number of concerns that it seems this Measurement Report *cannot* be used to verify whether the radiation levels are safe or harmful.

> "The instrument cited as being used for the peak measurements in section 7, a Narda SRM-3006, is not suitable to measure the very short (1 millisecond) spikes typically found in WiFi 802.11n communication."
>
> " The conclusions of this report cannot be said to give a positive assertion of safety because of the degree of uncertainty over whether the testing equipment was adequate (we believe it was not); the lack of comparison data; and the failure to measure RF exposures at realistic distances from the student(s)."
>
> **-Cindy Sage And Professor Trevor Marshall in their letter to MCPS found here.**

"In the Comparison-table 2.2. the MCPS provides only average values, no peak values. In cell phone technologies (like GSM) the difference between average and peak value is 2-fold. In Wireless local area technologies like Wi-Fi, the difference between average value and peak value is up to 100-fold (Ferro & Potorti, 2005). Note that in the table 2.2. by the MCPS only average values are presented. Later you provide in the chapter 7.2.2 Maximum, Instantaneous Power Density, which needs attention since these levels occasionally exceeded in your school measurements allowable EMC-levels (EN60601-1 3 V/m) for medical instruments (Robinson et al., 2003)."

"In order to assess power density exposure in near field one needs to measure both electric and magnetic field components."

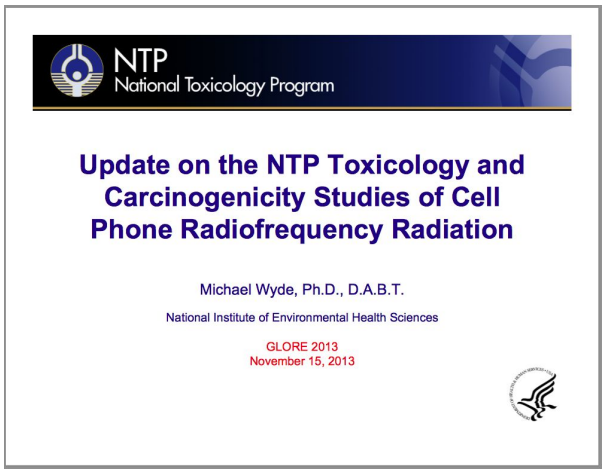
"The MCPS has not provided information about Wi-Fi technology, namely it's beacon signal."

-Technical Experts Mikko Ahonen PhD, Lena Hedendahl MD and Tarmo Koppel MSc
Read it here.

Overall, MCPS' Website Statement on Radiofrequency is filled with false facts and not therefore a reliable source of information. The MCPS Measurement Report does nothing to progress an understanding of safety at Montgomery County Schools.Therefore there is no proof of safety.

APPENDIX V

The National Toxicology (NTP) Study on Rodents and Radio-Frequency



Objective: To identify potential toxic and carcinogenic effects associated with chronic exposure to modulated cell phone radiofrequency radiation (RFR) and to characterize dose-response relationships in animals.

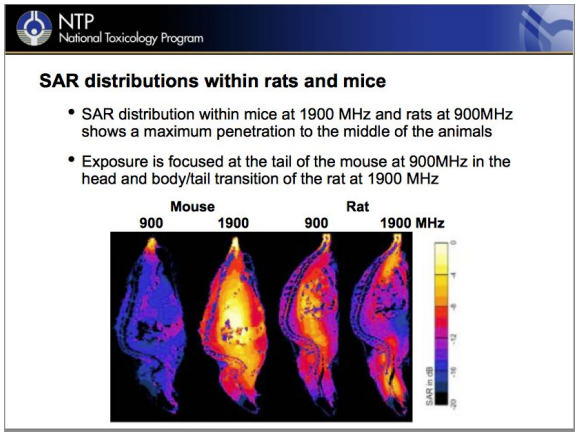
First proposed in *2001*, the laboratory studies on mice and rats examine exposure to frequencies centering around 900 megahertz and 1900 megahertz, as well as the two 2G (second generation) modulations used for voice transmission—CDMA and GSM. The study is seriously behind schedule.

2009 NTP Update: At a Senate hearing in 2009, Dr. John Bucher, Associate Director of the National

Toxicology Program of the National Institutes of Health, made the following apologetic statement regarding the aforementioned $25+ million NTP research project:

> "The pilot studies are nearly complete. Subchronic studies will begin early next year and the chronic toxicology and carcinogenicity studies will start in late 2010, finish in 2012, with peer review and reporting in the 2013-2014 time frame."

See slides from NTP in 2009 about the set up including this image of the mice below.
http://mommath.cy1000.com.tw/register/download/PPT5.pdf



"These studies will be conducted at multiple power levels and will include special emphasis on potential adverse effects in the brain. In addition to histopathological evaluations for toxic or neoplastic lesions, special studies will examine effects on the blood brain barrier, neonatal cell migration patterns in the brain, and DNA strand breaks in brain cells."
Read a fact sheet on the way the study will be set up here.

2013 NTP Report: "Pilot NTP experiments found that rats did respond to both GSM and CDMA cell phone radiation. Those exposed before and after birth gained weight more slowly. The exposure levels were lower than government regulations and low enough to challenge the widely-held view that wireless radiation is harmless. Importantly, the observed effects were dose-dependent." In english this means that these low levels did cause biological changes.

Read more at Microwave News and see the Powerpoint Slides from NTP in 2013

Read more about this study at http://ehtrust.org/cell-phone-radiofrequency-radiation-study/

This letter from Dr. Martin Pall, Professor Emeritus, Biochemistry and Basic Medical Sciences, Washington State University should be read first. He discovered that wireless radiation can activate (open) VGCC's in cell membranes of excitable cells (e.g. muscle, glial, neurons) which increases calcium within cells - this increased intracellular calcium concentration accelerates death of these cells (e.g. neurons and myelin cells protecting nerves) and degrades essential cell structures. This 2013 paper [8]

was honored by being placed on the Global Medical Discovery web site as one of the most important medical papers of 2013. Dr. Pall got his BA in Physics at Johns Hopkins University Baltimore, MD and PHD in Biochemistry and Genetics at the California Institute of Technology, CA. He is former Acting Chairman of the Program in Genetics, Washington State University, and has been a Professor of Genetics and Cell Biology and Biochemistry and Professor of Biochemistry and Basic Medical Sciences.

Here are the 14 other letters:

Dr. Martha Herbert's Letter, pediatric neurologist and neuroscientist on the faculty of Harvard Medical School and on staff at the Massachusetts General Hospital. Board Certified in Neurology with Special Competency in Child Neurology, and Subspecialty Certification in Neurodevelopmental Disorders

Dr. Anthony Miller's Letter, physician epidemiologist specializing in cancer etiology, currently Professor Emeritus at the School of Public Health, University of Toronto. Director, Epidemiology Unit, National Cancer Institute of Canada. Chairman, Department of Preventive Medicine and Biostatistics, University of Toronto. Former member of the World Health Organization's International Agency for Research on Cancer (IARC)

Dr. Lennart Hardell's Letter , MD PhD, Dept of Oncology, Oreboro University Hospital, Sweden, former member of WHO IARC

Dr. Carpenters Letter, MD, Director Institute for Health and Environment, University of Albany, Co-Editor of Bioinitiative Report

Dr. Olle Johansson's Letter, associate professor, The Experimental Dermatology Unit, Department of Neuroscience, Karolinska Institute, Stockholm

Dr. Devra Davis' Letter , PhD MPH, Oncology Epidemiologist, President Environmental Health Trust

Cris Rowan Letter,,, Pediatric Occupational Therapist BScBi, BScOT, SIPT,

Katie Singer's Letter, author of *Electronic Silent Spring*

Letter from Cindy Sage, MA and Co-Editor of Bioinitiative Report, and Trevor Marshall, PhD Director, Autoimmunity Research Foundation, Senior Member IEEE, Fellow, European Association for Predictive, Preventive and Personalised Medicine (Brussels)

Ellie Marks Letter , Director, California Brain Tumor Association

Arthur Firstenberg Letter, president of the Cellular Phone Task Force. B.A. in mathematics and physics, studied bioelectromagnetics for 35 years.

Mikko Ahonen PhD, Lena Hedendahl MD and Tarmo Koppel MSc PhDs Letter, Mr. Mikko Ahonen, PhD, Research manager of Finland, Institute of Environmental Health and Safety, Tallinn, Estonia & Partner. Dr. Lena Hedendahl, M, Sweden. Mr. Tarmo Koppel, MSc., PhD Can.Department of Work Environment and Safety, Tallinn University of Technology, Tallinn, Estonia,

Cece Doucette's Letter, leader of local education foundation, school district grant coordinator to secure iPads, Chromebooks, smartboards, Apple TVs

Alisdair Philips Letter, Technical Director of EMFields, the company that manufactures the Acoustimeter for RF measurements

Lloyd Morgan's Letter , Senior Research Fellow, EHT

Peter Sullivan's letter. BA Psychology, MS Computer Sci. Silicon Valley Education Philanthropist

Letter from Ms. Véronique Terrasse of the World Health Organization confirming Wi-Fi is in the Carcinogenic classification,

Dr. Elizabeth Cardis confirming 30 minutes a day resulted in increased brain cancer. lead researcher for the Interphone study and international ionizing and non-ionizing radiation expert, research showing **links between long-term cell phone use and cancer after**1640 hours of *lifetime use.* This roughly corresponds to **about 30 minutes a day over ten years.**

Read Email chain from Paul Kirby of TR Daily

From Paul Kirby

-----Original Message-----

From: Kirby, Paul <paul.kirby@wolterskluwer.com>

To: theodorams <theodorams@aol.com>

Sent: Sun, Feb 21, 2016 3:43 pm

Subject: RE: a question about your article

Your school district is incorrect. That is the purpose of this proceeding launched in 2013, which has not yet been completed.

Paul Kirby

Senior Editor

TRDaily

(A Unit of Wolters Kluwer

Legal & Regulatory Solutions U.S.)

202-842-8920

1015 15th St. NW, 10th floor

Washington, D.C., 20005

www.trdailyonline.com

paul.kirby@wolterskluwer.com

From: theodorams@aol.com [mailto:theodorams@aol.com]
Sent: Saturday, February 20, 2016 4:37 PM
To: Kirby, Paul
Subject: Fwd: a question about your article

Thank you Paul,

So I think I am correct in that the FCC has not done completed a review of radio-frequency since 1996. I think I am also correct that an inquiry was started but so far there has been no action? In other words, they did not review and make a determination?

Our school district stated a review was done - completed - in 2013 confirming RF levels are adequate and Im trying to get the facts on the matter.

Thank you so much,
Theodora Scarato

-----Original Message-----

From: Kirby, Paul <paul.kirby@wolterskluwer.com>

To: theodorams <theodorams@aol.com>

Sent: Sat, Feb 20, 2016 4:12 pm

Subject: RE: a question about your article

Theodora,

Here is the article I wrote in 2013 when the FCC released its first report and order, further notice of proposed rulemaking and NOI.

The order addressed a few issues but generally the FCC in this proceeding is considering whether to modify its RF standards or not. It has not yet acted in this proceeding yet. If you have any other questions, please let me know.

Paul

FCC RELEASES LONG-AWAITED ITEM ON RF EXPOSURE STANDARDS

The FCC this afternoon released its long-awaited item opening a proceeding to explore whether it should modify its radio frequency exposure standards. The review will be the first time the FCC has considered whether to reexamine its RF standards since they were adopted in 1996.

In 2003, the FCC adopted a notice of proposed rulemaking proposing changes to regulations governing human exposure to RF energy as part of an "action plan" designed to streamline the siting of communications towers (TRDaily, June 26, 2003). But the item was not meant to consider the actual RF exposure limits, only the procedures for complying with them.

The FCC requires wireless phones to have an SAR (specific absorption rate) of no more than 1.6 watts per kilogram.

Environmental activists and some in the medical community have called on the FCC for years to update its RF emission standards, saying they don't adequately protect users of wireless devices, especially children and pregnant women. Some of these critics also contend that enough research has shown a connection between mobile phone use and brain tumors and other ill health effects. They also have pushed for greater labeling of SAR values – including at the point of sale. And they have raised concerns about the health impact of living near cell sites and to workers who are near antennas every day.

The first report and order, further notice of proposed rulemaking, and notice of inquiry adopted March 27 and released today in ET dockets 13-84 and 03-137 was first circulated in June 2012 (TRDaily, June 15, 2012). An FCC official told TRDaily today that it took a long time for FCC officials to comb through the item due to its heft – it runs 201 pages with appendices – as well as its complex technical details.

The long pleading cycle reflects the complexity. Comments are due 90 days after "Federal Register" publication and replies are due 60 days after that.

The FCC said that it continues "to have confidence in the current exposure limits," adding "that more recent international standards have a similar basis. At the same time, given the fact that much time has passed since the Commission last sought comment on exposure limits, as a matter of good government, we wish to develop a current record by opening a new docket with this Notice of Inquiry (Inquiry)."

The FCC said that the order portion of the item resolves "several issues regarding compliance with our regulations for conducting environmental reviews under NEPA [National Environmental Policy Act] as they relate to the guidelines for human exposure to RF electromagnetic fields. More specifically, we clarify evaluation procedures and references to determine compliance with our limits, including specific absorption rate (SAR) as a primary metric for compliance, consideration of the pinna (outer ear) as an extremity, and measurement of medical implant exposure. We also elaborate on mitigation procedures to ensure compliance with our limits, including labeling and other requirements for occupational exposure classification, clarification of compliance responsibility at multiple transmitter sites, and labeling of fixed consumer transmitters. … We defer some decisions on topics initiated by the Notice and make new proposals in the Further Notice, which extends the Notice's scope to encompass specific items that either were raised in comments for the first time or have evolved significantly since the Notice was issued, including the categorical exclusion of fixed transmitters."

The further notice seeks "comment on new proposals developed in the course of this proceeding regarding compliance with our guidelines for human exposure to RF electromagnetic fields," the FCC said. "Our proposals reflect an effort to provide more efficient, practical, and consistent application of evaluation procedures to ensure compliance with our guidelines limiting human exposure to RF energy from Commission-regulated transmitters and devices. We are proposing to broadly revise and harmonize the criteria for determining whether single or multiple fixed, mobile, or portable RF sources are subject to routine evaluation for compliance with the RF exposure limits or are exempted from such evaluations. Additionally, we propose clarifications of evaluation requirements for portable and medical implant devices. We also propose to adopt specific new requirements for signs and barriers at fixed transmitter sites to ensure compliance with public and occupational exposure limits. Further, we propose a clarification of the definition of transient exposure for non-workers exposed at levels up to occupational limits."

The FCC added that in the further notice, it makes "proposals by which we seek to streamline and harmonize many procedures to achieve equal treatment of RF-emitting sources based on their physical properties rather than service categories. Thus, we propose establishing general exemptions from evaluation to determine compliance in place of existing service-specific 'categorical exclusions.' These proposed exemptions involve simple calculations to establish whether any further determination of compliance is necessary."

The purpose of the NOI is "to determine whether there is a need for reassessment of the Commission radiofrequency (RF) exposure limits and policies," the FCC said. "The Inquiry focuses on three elements: the propriety of our existing standards and policies, possible options for precautionary exposure reduction, and possible improvements to our equipment authorization process and policies as they relate to RF exposure.

We adopted our present exposure limits in 1996, based on guidance from federal safety, health, and environmental agencies using recommendations published separately by the National Council on Radiation Protection and Measurements (NCRP) and the Institute of Electrical and Electronics Engineers, Inc. (IEEE). Since 1996, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) has developed a recommendation supported by the World Health Organization (WHO), and the IEEE has revised its recommendations several times, while the NCRP has continued to support its recommendation as we use it in our current rules. In the Inquiry, we ask whether our exposure limits remain appropriate given the differences in the various recommendations that have developed and recognizing additional progress in research subsequent to the adoption of our existing exposure limits."

The Commission added that because it "is not a health and safety agency, we defer to other organizations and agencies with respect to interpreting the biological research necessary to determine what levels are safe. As such, the Commission invites health and safety agencies and the public to comment on the propriety of our general present limits and whether additional precautions may be appropriate in some cases, for example with respect to children. We recognize our responsibility to both protect the public from established adverse effects due to exposure to RF energy and allow industry to provide telecommunications services to the public in the most efficient and practical manner possible. In the Inquiry we ask whether any precautionary action would be either useful or counterproductive, given that there is a lack of scientific consensus about the possibility of adverse health effects at exposure levels at or below our existing limits. Further, if any action is found to be useful, we inquire whether it could be efficient and practical."

Specifically, the FCC seeks views "on the feasibility of evaluating portable RF sources without a separation distance when worn on the body to ensure compliance with our limits under present-day usage conditions. We ask whether the Commission should consistently require either disclosure of the maximum SAR value or other more reliable exposure data in a standard format – perhaps in manuals, at point-of-sale, or on a website. Additionally, we seek comment on appropriate education and outreach to the public on low-level exposure to RF energy from fixed transmitters in the environment. We also inquire about aspects of evaluation procedures to establish whether the standardization process can be improved considering the fast pace at which technology changes."

The FCC proposes "that any NEPA evaluation is premature at this time with respect to the Inquiry, which merely seeks to determine whether there is a basis to reevaluate the Commission's RF exposure limits and policies. Such impact will be considered and the need for an environmental assessment (EA) will be evaluated at that time if we decide in the future to adopt new rules in the course of the new docket initiated by the Inquiry."

In the NOI, the FCC said, "As an initial matter, while there has been increasing public discussion about the safety of wireless devices, to date organizations with expertise in the health field such as the FDA have not suggested that there is a basis for changing our standards or similar standards applied in other parts of the world. As stated above, our purpose in opening this proceeding is to provide a forum for a full and transparent discussion to determine whether any action may be appropriate. Accordingly, we ask generally whether our current standards should be modified in any way, notwithstanding the detailed discussion

below. We specifically solicit information on the scientific basis for such changes as well as the advantages and disadvantages and the associated costs of doing so.

“ In addition to seeking input from federal health and safety agencies and institutes, we solicit comment from national and international standards organizations (specifically including NCRP [National Council on Radiation Protection and Measurements] and IEEE) on the currency of their exposure limits and supporting documents in light of recent research and IARC’s [International Agency for Research on Cancer] announcement on its classification of RF fields,” the NOI added. “We note that IARC’s detailed monograph on this classification is not yet available, but may become available to inform our consideration during the course of this proceeding, and we invite parties to comment on this monograph if it is released during the comment period established for this Inquiry. Although IEEE Std 1528-2003, which we use to determine the compliance of devices such as cell phones intended to be used against the head, states that the mannequin in its measurement test setup represents a conservative case for men, women, and children’ alike, we specifically seek comment as to whether our current limits are appropriate as they relate to device use by children.”

In response to the NOI, John Walls, CTIA’s vice president-public affairs said in a statement that the trade group “welcomes the FCC’s focus on cellphones and health effects. In establishing RF emission requirements for wireless devices, the FCC has always been guided by science and the evidence produced by impartial health organizations and the scientific community. As the GAO stated in its July 2012 report, ‘Scientific research to date has not demonstrated adverse human health effects of exposure to radio-frequency energy from mobile phone use, but research is ongoing that may increase understanding of any possible effects.’ The U.S. Food and Drug Administration and the National Institutes of Health have reached similar conclusions about the state of the science.”

Environmental and health activists said today they are pleased they the FCC is looking at updating its rules, but they criticized numerous portions of the document. They also questioned whether the Commission is even qualified to undertake the task given its lack of knowledge in public health matters.

“We have a serious public health risk that is not being addressed by people who aren’t experts in public health,” Devra Davis, founder and president of the Environmental Health Trust, told TRDaily.

She suggested that Congress should reconsider whether the Commission should even have the authority to issue RF safety rules, saying there is a “glaring contradiction” to have the agency do this when it is charged with helping increase the deployment of technology to Americans.

As for specifics in the item released today, Ms. Davis complained that the FCC was classifying the outer ear as an extremity even though it is close to the brain.

She also took issue with the agency’s placing reliance on the determinations of some health authorities while apparently discounting others. “They select the experts they want to listen to,” she said, saying the agency cited a 2010 World Health Organization expert opinion while ignoring one issued a year later.

Ms. Davis also said that the FCC’s statement that its “exposure limits are set at a level on the order of 50 times below the level at which adverse biological effects have been observed in laboratory animals as a result of tissue heating resulting from RF exposure” has been disproven.

But Ms. Davis said she is pleased that the FCC acknowledges that some devices, such as tablets, are built to be used at least 20 centimeters from users, which in practice often does not occur. But she said the FCC knows that advisory labels are likely to be ignored, particularly by parents and their children who use the devices for school.

In a footnote in the NOI, the FCC says that "[f]or mobile consumer devices where … a separation distance of at least 20 cm is normally maintained, we will continue to allow awareness of exposure from devices to be accomplished by the use of advisory labels and by providing users with information concerning minimum separation distances from transmitting structures and proper installation of antennas, as established in the Order adopted supra, in ET Docket 03-137."

But Ms. Davis said she was pleased that the item cites various ways to mitigate RF emissions from wireless devices, some steps that Ms. Davis noted that her group has suggested for years.

"Several general strategies are available for users of portable devices that want to reduce their exposure. While increasing distance from the device and decreasing time of use are obvious actions to reduce exposure, the benefits of other strategies are not immediately obvious and could be subject to significant research to determine whether they may be effective," the NOI said. "For example, factors such as power control (e.g., the relationships of indicated signal level ('bars'), geographic location, and network technologies to SAR), modulation, low frequency fields, headset use, texting instead of talking, device antenna location, etc., could all affect exposure, but whether exposure awareness and control of these factors can reduce exposure may depend on many variables."

Janet Newton, president of the EMRadiation Policy Institute, said the FCC's current RF standards are based on research conducted decades ago that didn't include the health impact of digital wireless devices. The SAR limits also assume that users of devices are men who weigh about 200 pounds, not women and children and not people using their devices for hours each day.

"There's so much more for them to consider this time around given the proliferation" of devices, Ms. Newton said. "Are they really taking a serious look at how things have changed?"

Ms. Newton said she would look to whether the FCC's item seeks to address RF exposure to workers who are near antennas as part of their jobs. Her group says that hundreds of industry-operated antennas it has had tested have violated the FCC's exposure limits by, in some cases, more than six-fold.

"The fundamental purpose of our rules regarding occupational/controlled exposure is to require that workers at the higher permitted levels of exposure have the appropriate level of awareness and control to ensure that they are not exposed above the occupational/controlled limits," the FCC said in the order. "We agree with commenters that argue that flexibility is needed with respect to how such information is provided to adapt to the needs of various sites and circumstances. Therefore, we are specifying that for individuals exposed as a consequence of their employment, using the occupational/controlled limits, written and/or verbal (orally-communicated) information must be provided, at the discretion of the responsible party as is necessary to ensure compliance with the occupational/controlled limits."- Paul Kirby,

paul.kirby@wolterskluwer.com

TRDaily - March 29, 2013

Paul Kirby

Senior Editor

TRDaily

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From: theodorams@aol.com [mailto:theodorams@aol.com]

Sent: Friday, February 19, 2016 7:37 PM

To: Kirby, Paul

Subject: a question about your article

Dear Mr. Kirby,

Way back you wrote an article on rf fields called

The FCC This Afternoon Released Its Long-Awaited Item Opening A Proceeding To Explore Whether It Should Modify Its Radio Frequency Exposure Standards. The Review Will Be The First Time The FCC Has

Considered Whether To Reexamine Its RF Standards Since They Were Adopted In 1996.

I am writing because I have been told that the FCC "updated its guideline in 2013". Is this true? Also do you have an online link to that article? or can you send it to me.

Thank you,
Theodora Scarato , parent

Research showing Children's Increased Radiofrequency Exposure

Fernandez-Rodriguez, C.E.; De Salles, A.A.A.; Davis, D.L., "Dosimetric Simulations of Brain Absorption of Mobile Phone Radiation–The Relationship Between psSAR and Age," in Access, IEEE , vol.3, no., pp.2425-2430, 2015 doi: 10.1109/ACCESS.2015.2502900

Morris, R.D.; Morgan, L.L.; Davis, D.L., "Children Absorb Higher Doses of Radio Frequency Electromagnetic Radiation From Mobile Phones Than Adults," in Access, IEEE , vol.3, no., pp.2379-2387, 2015 doi: 10.1109/ACCESS.2015.2478701

Gandhi OP, Morgan LL, De Salles AA, Han YY, Herberman RB, Davis DL. (2012). Exposure limits: the underestimation of absorbed cell phone radiation, especially in children. Electromagn Biol Med. 31(1), 3451.

Redmayne M, Johansson O. Radiofrequency exposure in young and old: different sensitivities in light of age-relevant natural differences. Rev Environ Health. 2015 Dec 1;30(4):323-35. doi: 10.1515/reveh-2015-0030.

Gandhi, Om. Yes the Children are more exposed to radio-frequency energy from mobile telephones than adults. IEEE Spectrum. PP(99):1. Jun 23, 2015.

Christ A, Gosselin MC, Christopoulou M, Kühn S, Kuster N. Age-dependent tissue-specific exposure of cell phone users. Phys Med Biol. 55(7):1767-1783, 2010.

de Salles, A. A., Bulla, G., Rodriguez, C. E. (2006). Electromagnetic absorption in the head of adults and children due to mobile phone operation close to the head. Electromagn. Biol. Med 25(4):349–360.

Wiart, A. Hadjem, M.F. Wang and I. Bloch, " Analysis of RF exposure in the head tissues of children and adults" Physics in Medicine and Biology, Vol.53, pp. 3681-3695, 2008

Kühn S, Jennings W, Christ A, Kuster N. Assessment of induced radio-frequency electromagnetic fields in various anatomical human body models. Phys Med Biol. 54(4):875-890, 2009.

Selected Research on Radiofrequency Impacts on Health

CANCER

1.F. Barnes and B. Greenenbaum, "Some Effects of Weak Magnetic Fields on Biological Systems: RF fields can change radical concentrations and cancer cell growth rates," in *IEEE Power Electronics Magazine*, vol. 3, no. 1, pp. 60-68, March 2016.
2.Coureau et al., (2014). Mobile phone use and brain tumours in the CERENAT case-control study. *Occup Environ Med.* 71(7), 514-22.
3.Lerchl et al., (2015) **T**umor promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans, .Biochemical and Biophysical Research Communications, Available online 6 March 2015.
4.Morgan LL, Miller AB, Sasco A, Davis DL**,** Mobile phone radiation causes brain tumors and should be classified as a probable human carcinogen (2A) (review). Int J Oncol. 2015 May;46(5):1865-71. Epub 2015 Feb 25.
5.Carlberg M, Hardell L. Decreased Survival of Glioma Patients with Astrocytoma Grade IV (Glioblastoma Multiforme) Associated with Long-Term Use of Mobile and Cordless Phones. International Journal of Environmental Research and Public Health. 2014;
6.L. Hardell, M. Carlberg, Cell and cordless phone risk for glioma - Analysis of pooled case-control studies in Sweden, 1997-2003 and 2007-2009, Pathophysiology (2015), Available online 29 October 2014.
7. Lerchl et al., Tumor promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans, Biochemical and Biophysical Research Communications, Available online 6 March 2015.
8. Soffritti et al., Life-span exposure to sinusoidal-50 Hz magnetic field and acute low-dose γ radiation induce carcinogenic effects in Sprague-Dawley rats, International Journal of Radiation Biology. Vol. 92, Iss. 4, 2016

9. Yakymenkoet al.,(2015) **Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation.** Electromagnetic Biology and Medicine. July 7,

REPRODUCTION

1.Adams J, Galloway T , Mondal D, Esteves S, Mathews F. (2014). Effect of mobile telephones on sperm quality: A systematic review and meta-analysis. *Environment International*. 80, 106-112.
2.Atasoy HI, Gunal MY, Atasoy P, Elgun S, Bugdayci G. (2013). Immunohistopathologic demonstration of deleterious effects on growing rat testes of radiofrequency waves emitted from conventional Wi-Fi devices**.** *Journal of Pediatric Urology.* 9(2), 223-9.
3.Avendaño C, Mata A, Sanchez Sarmiento CA, Doncel GF.(2012). Use of laptop computers connected to internet through Wi-Fi decreases human sperm motility and increases sperm DNA fragmentation. *Fertility Sterility.* 97(1), 39-45.
3.Yüksel M, Nazıroğlu M, Özkaya MO. **L**ong-term exposure to electromagnetic radiation from mobile phones and Wi-Fi devices decreases plasma prolactin, progesterone, and estrogen levels but increases uterine oxidative stress in pregnant rats and their offspring. Endocrine. 2015 Nov 14. [Epub ahead of print]
4. Odacı E, Hancı H, Yuluğ E, Türedi S, Aliyazıcıoğlu Y, Kaya H, Çolakoğlu S.Effects of prenatal exposure to a 900 MHz electromagnetic field on 60-day-old rat testis and epididymal sperm quality. Biotech Histochem. 2015 Oct 15:1-11.
5. Ziberlicht A, Wiener-Megnazi Z, Sheinfeld Y, et al. Habits of cell phone usage and sperm quality – does it warrant attention? Reproductive BioMedicine. Published online September 2015
Gul A, Celebi H, Uğraş S.(2009). The effects of microwave emitted by cellular phones on ovarian follicles in rats. Arch Gynecol Obstet. 280(5), 729-33.
6. Bakacak M, Bostancı MS, Attar R, Yıldırım ÖK, Yıldırım G, Bakacak Z, Sayar H, Han A.The effects of electromagnetic fields on the number of ovarian primordial follicles: An experimental study. Kaohsiung J Med Sci. 2015 Jun;31(6):287-92. doi: 10.1016/j.kjms.2015.03.004. Epub 2015 Apr 30.

STRUCTURAL

1.Zhang (2015), Exposure to 900 MHz electromagnetic fields activates the mkp-1/ERK pathway and causes blood-brain barrier damage and cognitive impairment in rats. Brain Res. 2015 Mar 19;1601:92-101. doi: 10.1016/j.brainres.2015.01.019. Epub 2015 Jan 15.
2.Dasdag et al., Effects Of 2.4 Ghz Radiofrequency Radiation Emitted From Wi-Fi Equipment On microRna Expression In Brain Tissue. Int J Radiat Biol. 2015 Mar 16:1-26.
3.Bas etal., (2009). 900 MHz electromagnetic field exposure affects qualitative and quantitative features of hippocampal pyramidal cells in adult rat. Brain Research. 1265, 178–185.
4.Jing J, Yuhua Z, Xiao-qian Y, Rongping J, Dong-mei G, Xi C. (2012). The influence of microwave radiation from cellular phone on fetal rat brain, Electromagn Biol Med 31(1), 57-66.

5.Naziroğlu M. and Gumral. (2009). Modulator effects of L-carnitine and selenium on wireless devices (2.45 GHz)-induced oxidative stress and electroencephalography records in brain of rat. Int J Radiat Biol. 85(8), 680-689..
6.Nittby H, Brun A, Eberhardt J, Malmgren L, Persson BR, Salford LG. (2010). Effects of microwave radiation upon the mammalian blood-brain barrier. European Journal of Oncology. 5, 333-355.
7.Sirav B, Seyhan N. (2011). Effects of radiofrequency radiation exposure on blood-brain barrier permeability in male and female rats. Electromagnetic Biology and Medicine. 30(4), 253-60.
8.Narayanan SN, Kumar RS, Karun KM, Nayak SB, Bhat PG., (2015) Possible cause for altered spatial cognition of prepubescent rats exposed to chronic radiofrequency electromagnetic radiation. Metab Brain Dis. 2015 Oct;30(5):1193-206.
9.Margaritis L.H. et al., 2014. Drosophila oogenesis as a bio-marker responding to EMF sources. Electromagn Biol Med. 33(3): 165-189.
http://www.ncbi.nlm.nih.gov/pubmed/23915130
10. Papageorgiou C.C. et al,(2011) Effects of Wi-Fi signals on the p300 component of event-related potentials during an auditory hayling task Journal of Integrative Neuroscience 10(2):189–202
11.Leszczynski et al., (2002) Non-thermal activation of the hsp27/p38MAPK stress pathway by mobile phone radiation in human endothelial cells: molecular mechanism for cancer- and blood-brain barrier-related effects. Differentiation.May;70(2-3):120-9

Research Selections From Dr. Hugh Taylor's Presentation at the Pediatric Academic Society Conference on Fetal Impacts From Radiofrequency Radiation.

Aldad TS, Gan G, Gao XB, Taylor HS. (2012). Fetal Radiofrequency Radiation Exposure From 800-1900 MHz-Rated Cellular Telephones Affects Neurodevelopment and Behavior in Mice. Scientific Reports; 2, 312.

Bas O, Odaci E, Kaplan S, Acer N. (2009). 900 MHz electromagnetic field exposure affects qualitative and quantitative features of hippocampal pyramidal cells in adult rat. Brain Research. 1265, 178–185.

Bas et al., (2009). Chronic prenatal exposure to the 900 megahertz electromagnetic field induces pyramidal cell loss in the hippocampus of newborn rats. Toxicol Ind Health. 25, 377–384.

Bin Lv, Zhiye Chen, Tongning Wu, Qing Shao, Duo Yan, Lin Ma, Ke Lu, Yi Xie. (2014). The alteration of spontaneous low frequency oscillations caused by acute electromagnetic fields exposure. Clin Neurophysiol. 125(2), 277-86.

Byun Y-H, Ha M, Kwon H-J, Hong Y-C, Leem J-H. (2013). Mobile Phone Use, Blood Lead Levels, and Attention Deficit Hyperactivity Symptoms in Children: A Longitudinal Study. PLoS ONE. 8(3)

Deshmukh P.S. et al., 2015. Cognitive impairment and neurogenotoxic effects in rats exposed to low-intensity microwave radiation. Int J Toxicol. 34(3): 284-290.

Deshmukh et al., (2013). Effect of low level microwave radiation exposure on cognitive function and oxidative stress in rats. Indian J Biochem Biophys; 50(2), 114-9.

Divan HA, Kheifets L, Obel C, Olsen J. (2012). Cell phone use and behavioural problems in young children. J Epidemiol Community Health. 66(6), 524-9.

Divan HA, Kheifets L, Obel C, Olsen J. (2008). Prenatal and postnatal exposure to cell phone use and behavioral problems in children. Epidemiology. 19(4), 523-9.

Hao, Y.-H., Zhao, L., & Peng, R.-Y. (2015). Effects of microwave radiation on brain energy metabolism and related mechanisms. Military Medical Research,2, 4. http://doi.org/10.1186/s40779-015-0033-6

Júnior et al., (2014). Behavior and memory evaluation of Wistar rats exposed to 1·8 GHz radiofrequency electromagnetic radiation. Neurol Res. 36(1).

Jing et al., (2012). The influence of microwave radiation from cellular phone on fetal rat brain, Electromagn Biol Med.
31(1), 57-66.

Megha, K Deshmukh, PS, Banerjee, BD, Tripathi, AK, Abegaonkar, MP. (2012). Microwave radiation induced oxidative stress, cognitive impairment and inflammation in brain of Fischer rats. Indian J Experimental Biology. 50(12), 889-896.

Narayanan SN, Kumar RS, Karun KM, Nayak SB, Bhat PG., (2015) Possible cause for altered spatial cognition of prepubescent rats exposed to chronic radiofrequency electromagnetic radiation. Metab Brain Dis. 2015 Oct;30(5):1193-206. doi: 10.1007/s11011-015-9689-6. Epub 2015 Jun 3.

Odaci et. al., (2015) Maternal exposure to a continuous 900-MHz electromagnetic field provokes neuronal loss and pathological changes in cerebellum of 32-day-old female rat offspring. J Chem Neuroanat. Sep 21.

Odaci E, Bas O, Kaplan S. (2008). Effects of prenatal exposure to a 900 megahertz electromagnetic field on the dentate gyrus of rats: a stereological and histopathological study. Brain Research. 1238, 224–229.

Ozgur et al., (2013) Effects of prenatal and postnatal exposure to GSM-like radiofrequency on blood chemistry and oxidative stress in infant rabbits, an experimental study. Cell Biochem Biophys. 2013 Nov;67(2):743-51. doi: 10.1007/s12013-013-9564-1.

Güler et al., (2015) Neurodegenerative changes and apoptosis induced by intrauterine and extrauterine exposure ofradiofrequency radiation. J Chem Neuroanat. 2015 Oct 28. pii:

Razavinasab M, Moazzami K, Shabani M. (2014). Maternal mobile phone exposure alters intrinsic electrophysiological properties of CA1 pyramidal neurons in rat offspring. Toxicol Ind Health. 30(2), 101-196.

Roggeveen S, van Os J, Viechtbauer W, Lousberg R (2015) EEG changes due to experimentally induced 3G mobile phone radiation. PLoS One. 2015; 10(6): e0129496.

Saikhedkar N, Bhatnagar M, Jain A, Sukhwal P, Sharma C, Jaiswal N. (2014). Effects of mobile phone radiation (900 MHz radiofrequency) on structure and functions of rat brain. Neurol Res. 2(6), 2499-2504.

Sirav B, Seyhan N. (2011). Effects of radiofrequency radiation exposure on blood-brain barrier permeability in male and female rats. Electromagnetic Biology and Medicine. 30(4), 253-60.

Sahin et al.,(2016)The 2100MHz radiofrequency radiation of a 3G-mobile phone and the DNA oxidative damage in brain. J Chem Neuroanat. Jan 8.

Sonmez OF, Odaci E, Bas O, Kaplan S., (2010) Purkinje cell number decreases in the adult female rat cerebellum following exposure to 900 MHz electromagnetic field. Brain Res. 2010 Oct 14;1356:95-101.

Sudan et al., (2012) Prenatal and Postnatal Cell Phone Exposures and Headaches in Children. Open Pediatr Med Journal. 2012 Dec 5;6(2012):46-52.

Qiao, et al. (2014) Reduction of Phosphorylated Synapsin I (Ser-553) Leads to Spatial Memory Impairment by Attenuating GABA Release after Microwave Exposure in Wistar Rats. PLoS ONE. 9(4)

Volkow et al.,(2011). Effects of cell phone radiofrequency signal exposure on brain glucose metabolism. Journal of the American Medical Association, 305(8), 808-13.

Zarei et al,. A Challenging Issue in the Etiology of Speech Problems: The Effect of Maternal Exposure to Electromagnetic Fields on Speech Problems in the Offspring. J Biomed Phys Eng. 2015 Sep 1;5(3):151-4. eCollection 2015.

US Government Documents on RF Radiation.

2014: U.S. Department of the Interior Letter (2014) on FCC Guidelines

2008: National Academy of Sciences (NAS) Report, Identification of Research Needs Relating to Adverse Health Effects of Wireless Communication,

2003: Interagency Radio Frequency Workgroup 2003 Letter from EPA Norbert Hankin on Additional Concerns about RF Exposure Guidelines

1999: Radio Frequency Interagency Workgroup Concerns About RF Exposure Gregory Lotz NIOSH Letter

1995: EPA Letter to the FCC on Development of Guidelines by the EPA- they were never finished. .
1984: US Science Advisory Board Letter that recommends that the EPA develop radiation protection guidance to protect the public (Note: the standards were never issued.)
1983: EPA: Biological Effects Of RadioFrequency Radiation
1981: EPA: Index of Publications on Biological Effects of Electromagnetic Radiation

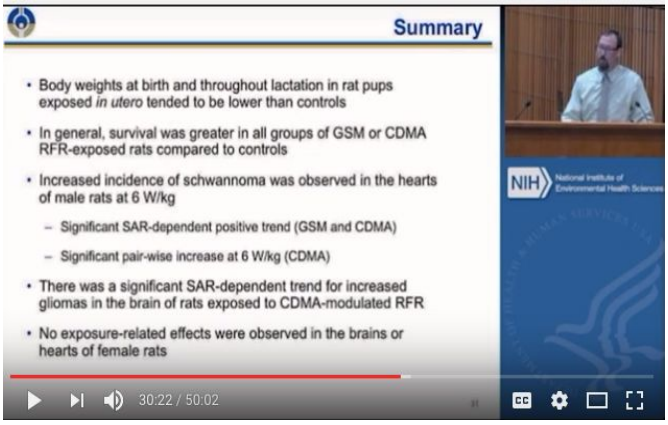
The U.S. National Toxicology Program Radiofrequency Carcinogenicity Research Study

On May 27th, 2016, the U.S. National Toxicology Program, of the U.S. National Institutes of Health, released a report with partial results of their large study on the carcinogenicity of radiofrequency radiation (RFR, also known as microwave radiation) in male and female rats and mice.

The world's largest, most well-designed study of its type, at a cost of $25 million, found increased occurrence of rare brain tumors in male rats and increases in rare heart tumors in both male and female rats exposed to RFR. The results also show increased DNA damage in exposed rats and mice. The released results are "partial" because more rat results and all of the mouse study results will be forthcoming, by 2017.

Quick Links

United States National Toxicology Program Video Presentation on the Results of Toxicology and Carcinogenicity of Radiofrequency Radiation Studies at the National Institute of Environmental Health Sciences, June 2016.



Report of Partial findings from the National Toxicology Program Carcinogenesis Studies of Cell Phone Radiofrequency Radiation in Hsd: Sprague Dawley® SD rats (Whole Body Exposure)

Powerpoint Slides of NIEHS Study by NIEHS for BIOEM Conference

Spin Versus Fact on the NTP Study by Dr. Moskowitz Download the Factsheet

American Cancer Society Press Release: ACS Responds to New Study Linking Cell Phone Radiation to Cancer

Study Design and Results

How were the animals exposed?

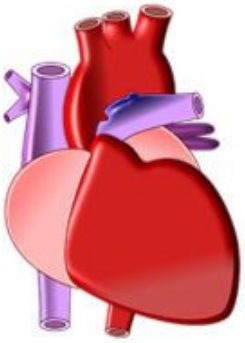
Animals were exposed daily during gestation and for two years after their birth to two commonly used types of RFR—Global System for Mobile (GSM) and Code Division Multiple Access (CDMA). For the rats studies, in each type of RFR there were three exposure groups: 1.5 W/kg, 3W/kg, and 6 W/kg.

The rodents were housed in specially designed underground chambers for uniform RFR exposure.

RFR exposures were 10-minutes on, 10-minutes off for 18 hours a day, resulting in a total exposure of 9 hours daily.

Exposure intensity was set to low *nonthermal or non-heating levels*. Heating from microwaves is the only adverse effect currently recognized by US regulators, who rely on standards set almost two decades ago. In order to test if biological effects occur at non-thermal levels, the NTP study set exposures at low levels determined *not* to heat the body.

What cancers and tumors were found?



Increased incidence of gliomas (a rare, aggressive and highly malignant brain cancer) as well as schwannomas (a rare tumor of the nerve sheath) of the heart were found in both sexes, but reached statistical significance only in males. Overall, a higher number of brain abnormalities and tumors were observed in exposed male rats in comparison to exposed female rats. In humans, gliomas are also more common in men than in women.

In addition to the gliomas, there were significantly more rare, pre-cancerous changes in the glial cells of the brain in both sexes, while not a single unexposed control animal developed these abnormal brain cells. Male rats exposed to all levels of CDMA developed exceptionally high numbers of damaged, pre-cancerous brain cells (glial hyperplasia). Both male and female rats, exposed to all levels of microwave radiation, developed increased incidence of rare malignant tumors of Schwann cells (nerve sheaths) of the heart. Females exposed to all levels of CDMA also developed precancerous hyperplastic Schwann cells, while none of the unexposed controls developed this rare abnormality.

It should be noted that this partial report focused only on these brain and heart tumors, and that additional results from the rats study will be released by 2017.

How strong are these results?

"Game-changer" is increasingly being used to describe these results. For decades people believed that microwave radiation at low (non-heating) levels is safe and cannot cause harm. The NTP results clearly show that this assumption is false. Microwave radiation can cause harmful effects even at low non-heating levels.

Although the results show "low" increases in tumors, these tumors are quite lethal. Moreover, even a small increase can have a large impact. As the NTP report stated, "*Given the extremely large number of people who use wireless communication devices, even a very small increase in the incidence of disease resulting from exposure to the RFR generated by those devices could have broad implications for public health.*"

Significantly more gliomas were seen in males exposed to CDMA (95% confidence level). Positive trends for a greater number of tumors at higher doses were observed for both gliomas and schwannomas of the heart in males. Both the trends and the replication make these very strong results.

Why is this study considered a "landmark" study?

These results are very significant for three reasons:

1. In case-controlled studies, humans develop the same types of tumors from cell phone exposures.

Epidemiological studies in humans show increased risks for gliomas and schwannomas after long-term use of cell phones – these are the same types of tumors that were found in the exposed rats.

2. The results show adverse biological effects *at non-thermal levels* meaning that current international regulations (based on avoiding heating) do not adequately protect public health.

The NTP study was designed to test if the basis for government safety standards is accurate. Current safety standards are based on the premise that only RFR levels that cause heating are harmful. The study was carefully designed to ensure that the body temperature of the exposed rats did not increase significantly. *Yet*

an effect was shown at non-thermal levels. The NTP study provides well-documented, scientific evidence that current international regulations are based on a faulty assumption.

3. The results add significant weight to the scientific evidence that radio frequency radiation is carcinogenic.

In 2011, the International Agency for Research on Cancer of the World Health Organization (IARC/WHO) classified radio frequency radiation as a Class 2B "possible carcinogen." One of the reasons for the classification "possible" was because human epidemiological studies showed increased brain tumors after long term exposures, however, *more evidence* was needed from animal studies showing carcinogenicity and a mechanism of action. The recent NTP results provide new, well-designed research evidence in animal models that links RFR to cancer. As the NTP stated, "These findings appear to support the International Agency for Research on Cancer (IARC) conclusions regarding the possible carcinogenic potential of RFR."

Is it true that the NTP study found DNA damage in the exposed animals?

Yes - the NTP study found statistically significant evidence of DNA damage. The preliminary data with comet assay showed a statistically significant trend in RF-induced DNA damage in both rat and mice brain tissues. These findings were shared by the National Toxicology Program during the BIOEM 2016 Annual Meeting.

Associate Director of NTP John Bucher described some of the DNA findings in a Science Magazine interview stating that, "In a small side experiment of the NTP study, DNA from the tissues of 80 mice and rats that had spent 90 days in the reverberation rooms were examined for breaks in the DNA strands. There was more DNA damage in some of the rodents that received the highest radiation levels."

Genotoxicity findings will be published in the forthcoming paper from the NTP rodent study entitled "Evaluation of the genotoxicity of cell phone radiofrequency radiation in male and female rats and mice following subchronic exposure" (as noted on page 3 of the released NTP Report).

Is this study well designed?

This $ 25 Million Study is, in fact, the world's largest and most comprehensive rodent study of radiofrequency electromagnetic fields. The design of this study was presented at an annual meeting of the Bioelectromagnetics Society prior to the start of these studies.

According to Ron Melnick PhD, *"the overwhelming opinion expressed by the meeting participants was that this would be the largest and most comprehensive study in animals exposed to cell phone radiation, and that the results from this study would trump all other animal carcinogenicity studies of this agent."*

Seven thousand rodents were used for the entire study, which used a three-phased study design: (1) Pilot studies to establish field strengths that did not excessively raise body temperatures; (2) Subchronic toxicology studies in which the rodents were exposed to various low-level field strengths for up to two months; and (3) Chronic toxicology and carcinogenicity studies in which the rodents were exposed prenatally and for the majority of their lifetime (up to 24 months). The chronic exposure study employed seven groups of 90 rats: a sham control group that was not exposed to the radiation, and three groups for each of two common types of cell phone signal.

Why was this study initiated?

The US Food and Drug Administration (FDA) nominated this study because, "There is currently insufficient scientific basis for concluding either that wireless communication technologies are safe or that they pose a risk to millions of users. A significant research effort, including well-planned animal experiments, is needed to provide the basis to assess the risk to human health of wireless communications devices." Read the FDA Nomination here.

The National Toxicology Program Testified to US Congress that, "The FDA nomination was based on the following concerns:

- There is widespread human exposure;
- Current exposure guidelines are based on protection from acute injury from thermal effects;

- Little is known about the potential for health effects of long-term exposure; and
- Sufficient data from human studies to definitively answer these questions may not be available for many years."

The recommendation for the NTP study was made in 1999 with a contract signed in 2005. It is years behind schedule as results were due to be published in 2014. See the slide presentation that the NTP gave in 2013 here describing the experiments initial results. See slides from 2009 NTP presentation describing the experiment setup.

What was the objective of the study?

According to Ron Melnick who lead the study design, the researchers wanted to test the hypothesis that *cell phone radiation could not cause adverse health effects at levels that did not cause heating*. The study was designed to provide data to characterize dose-response for any detected toxic and/or carcinogenic effects of cell phone radiofrequency radiation (RFR) in Sprague-Dawley rats and B6C3F1 mice exposed unconstrained in reverberation chambers.

At the time the study was initiated, slightly more more than 100 million Americans used wireless communication devices, yet guidelines for cell phone radiation were (and still are) are based largely on protection from acute injury from thermal effects. The researchers were aware of several ongoing animal studies, but felt they might not provide an adequate challenge to the null hypothesis, so the NTP set out to design the world's largest animal study on radiofrequency radiation to date.

Some Clarifications in Response to Concerns Raised In the Media

Does the fact that increased numbers of tumors were statistically significant in the male rats, but not in the female rats, mean the findings of carcinogenicity can be dismissed?

No. In *previous* NTP toxicology studies male rats were *more than ten times more likely* to develop malignant gliomas (brain tumors) than females. For malignant schwannoma of the heart, males were *more than twice as likely* to develop this type of cancer than the females. (These statistics called "historical control incidence" are

documented in the NTP report at the bottom of the tables starting at page 9.)

Microwave News quoted Ron Melnick's comments on the sex differences:

> "It is not surprising that the exposed males had more tumors than the females given what we have seen in the historical controls. But we can go one step further, the fact that we saw any of these tumors in the exposed females but none in the concurrent controls adds support to the conclusion that cell phone radiation leads to cancer among rats."

These gender-specific results are not uncommon in animal carcinogenicity research studies. As the American Cancer Society explains in their statement about the NTP results, "It's important to note that these sorts of gender differences often appear in carcinogenic studies, so the fact they show up here should not detract from the importance of the findings."

Analyses of NTP bioassays show that "male rats are more sensitive to chemical carcinogens compared to female rats." The fact that male rats are more likely to show carcinogenesis in NTP studies is well documented in "Gender differences in chemical carcinogenesis in National Toxicology Program 2-year bioassays".

It is also important to note that in human studies, gender differences in cancer incidence and mortality is a regular finding.

Notably, in the NTP study, increased incidence of rare malignant tumors of Schwann cells (nerve sheaths) in the heart was found in both male *and* female rats, as were precancerous hyperplastic Schwann cells. The findings in the female rats were not statistically significant, but these tumors are known to occur more rarely in females.

The NTP findings cannot be dismissed because of the gender differences.

Were the results peer reviewed?

The findings have undergone extensive reviews. The biological tissue analyses were reviewed by multiple pathologists and statisticians who were unaware of the test agent being evaluated, and looked solely at the obtained slides. The report has addressed several expert reviews with responses that are appended to the online document.

The National Toxicology Program states in the abstract, "The findings in this report were reviewed by expert peer reviewers selected by the NTP and National Institutes of Health (NIH). These reviews and responses to comments are included as appendices to this report, and revisions to the current document have incorporated and addressed these comments."

Results have not yet been published in a journal but were released early by the NTP because of their importance for public health.

Is the statistical power strong?

Typically, in this type of testing the NTP uses 50 animals per group. For this study they used 90 animals per group, as such, so it may be considered a large study relative to other similar animal studies. The expected background rate of the two tumors that have been found (glioma and Schwannoma of the heart) is also extremely low.

The chances of finding a true effect--or power of a study--depend on two principal things: (1) the size of the sample studied and (1) the size of the expected occurrence of the endpoints under study. With smaller numbers of animals, the chances of finding an effect—called the statistical power—would have been lower. Studies that are underpowered do not have enough data to present a full and clear picture. Had more animals been studied, there might have been further positive associations, possibly resulting in statistical significance in the female rats as well. The NTP finding of positive results in *multiple* tumor types means that these study results are even more important.

As Associate Director of the U.S. National Toxicology Program John Bucher stated in the May 27, 2016 NTP Press conference, "The power to detect these tumors is probably in the range of between 10% and 20%, which also actually makes it more interesting that we have found statistically significant findings."

Contrary to some claims about this study, false positives are not a significant concern. The reason that clinical trials (such as those Dr. Lauer conducts) use large numbers of people is to *increase* their chances of finding a true effect. The smaller the sample, the greater the chance of NOT finding an effect *when one is actually there*--also called a false negative.

Control group animals did not develop either schwannomas in the heart or gliomas. The control group animals also did not live as long as those that were exposed. Does this call into question the validity of the study?

NTP scientists carefully considered this question. Control group lifespans were within historical ranges, and a statistical procedure was used so as not to over-estimate risks. In fact, it is not surprising to see that the stresses of RFR exposure might contribute to increased lifetime while also contributing to

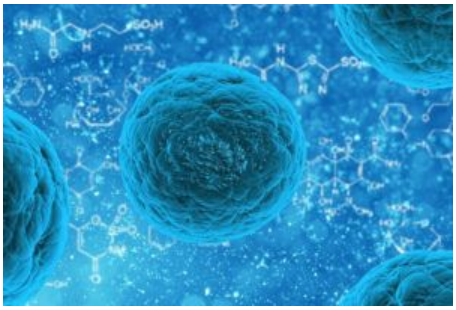
serious health damage. For example, calorie-restricted animals live longer on average. It is important to note that other statistically significant effects from exposure were seen early on, as the pups exposed *in utero* had lower body weights at birth and remained at a lower weight throughout their lifetimes.

The mortality rates are not as important a fact as it seems when the data is analyzed. First, there was no statistical difference in survival between control male rats and those exposed to CDMA at 6 W/kg (the group with the highest rate of gliomas and heart schwannomas); at week 94, survival of rats in these two groups were the same. Second, no glial cell hyperplasias (potential precancerous lesions) or heart schwannomas were observed in any control rat, even though glial cell hyperplasia was detected in a CDMA-exposed rat *as early at week 58* **a**nd heart schwannomas were detected as early as week 70 in exposed rats. If the control rats were going to develop tumors, these precancerous lesions and tumors *would have already been present*. Yet not a single control had any evidence of an effect.

It is notable that a US Air Force study from the 80's which *also found increased cancer* also showed chronic RF exposure increased lifespan in rodents. The median survival time was 688 days for exposed animals and 663 days for the sham-exposed.

In this study, the exposed group developed tumors at rates comparable to historic rates of tumors in rats in other such studies. How is this finding considered statistically significant?

Most importantly, in every study, *the preferred control group is the present one*, as every detail of feed, housing, etc. is truly identical. If all groups of rats are treated the same in the same experiment and only the exposed group has a statistically significant effect, then an effect has been shown.



A crude analysis comparing all controls—historic and present—with all exposed animals in the present study still shows a consistently increased probability of developing cancer.

This chart shows the percentage of exposed rats that developed tumors as compared with the percentage of the same tumor in all current and historical control rats. *In every case there were more tumors in the exposed group than in the control group.*

Probability of cancer compared with all controls, in rats in NTP wireless radiation study

	Ratio of % exposed cases / % cases in all controls including historic
Glioma	
Male	1.19
Female	3.50*
Schwannoma	
Male	3.08
Female	2.19

*gliomas are extremely rare in these female rats; there were more gliomas in males, both in unexposed and exposed animals, so the ratio is lower.

The rats were exposed for nine hours per day for two years, over the whole body, with some at levels higher than cell phones. How is this study relevant to people?

The study is relevant to humans because it tests the scientific basis for current cellular communication safety regulations, which are intended to protect humans from adverse health effects.

In case-control studies that compare persons with brain cancer to matched controls without the disease, increased gliomas have been seen with less than 1,000 hours of cell phone exposure. Animal studies typically last two years, or the lifetime of the rodent. The animals are specially bred in an attempt to induce tumors in an animal with a short lifetime. The overall exposure of the rats is set to approximate that of humans.

Government safety regulations for microwave radiation are based on the assumption that "*as it does not heat you, it will not hurt you.*" To test the "no-heating" cut-off for harm, animals were exposed up to almost the maximum dose they could tolerate with no increase in body temperature. The animals in this experiment never had an increase in body temperature over one degree Celsius. This study shows that adverse biological effects occur at non-thermal (non-heating) levels.

Dr. Moskowitz calculated the overall risk for the male rats in the group exposed to the lowest intensity of cell phone radiation (i.e., 1.5 watts/kilogram or W/kg). He found 12 of 180 (or 1 in 15) male rats in the exposed group developed cancer or a precancerous lesion. He concluded that, "This latter finding has policy implications as the FCC's current cell phone regulations allow cell phones to emit up to 1.6 W/kg at the head or near the body (partial body SAR)." Read his review here.

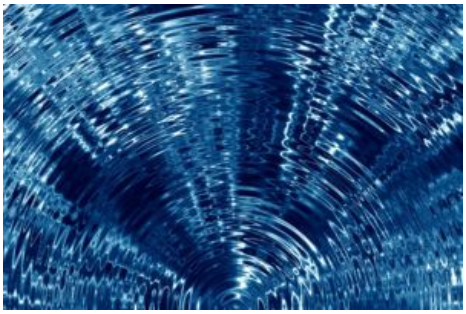
Why was keeping the rats from overheating so important?

Exposure to high levels of RFR energy, particularly at microwave frequencies, can rapidly heat biological tissue. This is known as a *thermal effect*. Thermal effects can cause harm by disrupting biological processes, and damaging tissue. Government safety regulations require mobile phones and wireless devices to operate at power levels well below the threshold for known thermal effects.

The study was carefully designed to ensure that the exposed rats did not have an increase in temperature beyond one degree, so the tumor development reflects a "non-thermal" mechanism of action. If adverse non-thermal effects are confirmed, then cell phone and wireless device emission regulations will need to be re-evaluated *because they would not be protecting humans from non-thermal effects*. This is precisely why this NTP study is so significant.

Why were effects for CDMA-modulated RFR exposures different from GSM?

Code Division Multiple Access (CDMA) and Global System for Mobile (GSM) are two *different* communication technologies. CDMA is the primary type of technology used for cell phones in the United States with providers including Verizon, Sprint, and US Cellular. GSM is the primary type of technology used for cell phones in the rest of the world. In the United States, T-Mobile and AT&T use GSM. Europe adopted GSM technology in the 1980s, and users will not find access to CDMA networks in any European countries.



It is unclear why the more modern modulation (CDMA) proved to be more harmful, and there is no way to determine this from the NTP study. However, it makes sense that the body, at a cellular level, may have a different reaction to different types of exposures and waveforms, *even if the power level is the same*.

Swedish cancer researchers have reported differences in gliomas associated with different modulations, with the more recent technologies appearing to have more a more dramatic biological effect. Modulations are evolving to transmit more data faster at a given frequency, and this results in higher peak to average power ratios. In the lab, it is notable that experiments using real-life devices are much more likely to find significant effects.

This is an important finding which will hopefully will spur researchers to explore in future studies how different radio frequency radiation technology impacts the body. Until recently, regulators considered the power density of the radiation (linked to heating) important for human health and the issue of modulation was assumed to be less significant. *However, the reality is that cellular communication signals are very complex and all signal characteristics, such as modulation, waveform, and power density, must be considered.*

This is a topic of great concern as we prepare to move to newer technologies, driverless cars, and more and more wireless in schools with young children.

The study is not applicable to modern cell phones and wireless devices. Cell phones are now using even newer technology that uses even lower power.

In fact, the newer technology may have more adverse effects. These newer devices involve technology with greater variations in pulsed signaling the information content of signals that are being used. The pulse of the signals may well prove to be more important biologically than their power. The biological effects of the NTP study that produced an increase in cancer occurred *without heat*.

In addition, the NTP animals were exposed solely to *one frequency* throughout their lifetimes. This scenario does not even compare to the real life exposures *we* are exposed to. People are now exposed to *multiple exposures* from multiple devices in our everyday environment. Each device itself often has multiple antennas. The combined effect of such microwave radiation exposures is a matter of serious concern in light of these findings of increased cancer in the NTP animals which were exposed to just *one frequency* at non-thermal levels.

Cell Phones have been around for decades and if they caused cancer brain, then cancer rates would be rising. Instead research shows brain cancer rates to be steady for the last few decades. These results must then be wrong.

Brain tumours are now the leading cancer in American adolescents, and according to the American Brain Tumor Association's largest, most comprehensive analysis of these age groups to date, *the incidence of the most aggressive gliomas (*a category of brain tumors*) are rising in young adults within the US*. This study shows increased yearly incidence of the following brain tumors: anaplastic astrocytoma, tumors of the meninges, tumors of the sellar region and unclassified tumors. Glioblastomas, the type of brain cancer found to be linked to cell phone radiation in the NTP study and in human studies, are increasing in those age 15-39 in the United States.

These increases are *not* evident in population based research studies when the incidence of *all* brain cancers "overall" are considered. As Microwave News points out in a detailed analysis of this rise of glioblastomas, "The higher incidence of glioblastomas is being masked by the lower rates of the other types of brain cancer."

International registries have *also* indicated an increase. Zada et al, 2012 shows an increase in brain tumors in three major cancer registries in the United States. An Australian study showed an overall significant increase in primary malignant brain tumors from 2000 to 2008, particularly since 2004 (Dobes 2011).

Brain cancers are slow growing and can take decades to develop after toxic exposure. For example, studies of smokers found no increase in risk just ten years after most have begun to smoke. While cell phones have been around for decades, the majority of cellphone users have only become heavy users recently, so it is not likely that a large *overall* increase in incidence rates will have appeared yet. Research shows increased prevalence in the most aggressive malignant forms of brain cancer in younger people; however, since brain tumors are predominantly a disease of aging, and there are not increases in all *other* tumor types, the level of brain tumors "overall" is not rising.

More importantly, population based studies are not the best way to assess the cell phone cancer link. Instead, research looking at high-risk groups using case-control designs are more suited to showing cancer risk from cell phones. All independant research using a case control design that looked at long term (ten years plus) users have showed increases in brain cancer.

Read Dr. Davis, Dr. Miller and Lloyd Morgan's response in Oxford University Press: Why there can be no increase in all brain cancers tied with cell phone use where they state:

> "The link between the carcinogenic effects of tobacco and cancer did not come about from studying population trends, *but by special study of high-risk groups using case-control designs of selected cases and comparing their histories with those of persons who were otherwise similar but did not smoke, and cohort studies of groups with identified smoking histories followed for up to 40 years,* as in the American Cancer Society and British Doctors studies. The fact that population-based trends in Australia do not yet show an increase in brain cancer does not mean it will not be detectable in the future—perhaps soon."

While glioblastoma is a very rare cancer, it is an often fatal one.

Putting the National Toxicology Program Study in Context

Have any other animal studies shown a link to cancer?

Yes. With the results of the NTP, there are now *three* important animal studies within the past six years showing increased development of cancers after RF-EMF exposure. A German study published in 2015 replicated 2010 research which showed carcinogen-induced tumor rates were significantly higher in the lung and liver of animals exposed to RF -EMF along with a known carcinogen.

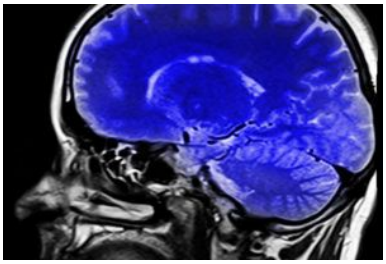
Furthermore, there are many examples of research over the last few decades which have indicated that radiofrequency radiation is carcinogenic and can damage DNA.

A 5 year, $5 Million U.S. Air Force study conducted in the early 1980's and later published in Bioelectromagnetics (Chou et al., 1992) found that significantly higher numbers of male rats exposed to low-intensity microwave radiation developed cancer in comparison to those not exposed. The Chou study exposed experimental animals to 2450 MHz, which is similar to the frequencies used for WiFi, whereas the NTP study exposed rodents to 900 MHz and 1800 MHz microwave radiation. However in the Air Force Study, the rats' average exposure was about 4-10 times *lower* than in the NTP study. Read more about this study in Dr. Moskowitz analysis. It is notable that in this study the researchers state, "Only male rats were used to minimize statistical variation, i.e., to avoid the hormonal variations characteristic of female rats. Use of female rats would have required a substantial increase in the number of animals."

In the 1990's, Henry Lai and V.J. Singh demonstrated that low levels of microwave radiation (2.45GHz) well below that of cell phone radiation levels could increase the frequency of single-strand DNA breaks in the brain cells of live rats. The in-vitro studies of the $15 Million dollar REFLEX project *lead by Franz Adlkofer* also indicated a genotoxic effect of RF-EMFs at levels below proposed radiation safety levels. In an June 2016 interview, Professor Adlkofer commented that the NTP and Reflex study complement each other, and "intensify in their significance."

In the late 90's, the $25 Million Wireless Technology Research (WTR) project (funded by the Wireless Industry) researchers found genetic damage inside cells exposed to RF radiation in two separate studies, an increased risk of a non-malignant tumor called acoustic neuroma, and an increased risk of neuroepithelial cancer (both rare brain tumors). The WTR epidemiologist George Carlo, later wrote the book Cell Phones, Invisible Hazards in the Wireless Age documenting the suppression of these research results by the Wireless Industry. The research studies listed above are just a few examples of the past research demonstrating the link between radiofrequency and radiation cancer.

How could radiofrequency radiation "cause "cancer?

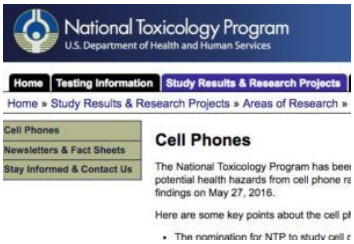


A 2016 review paper reported that in 93 of 100 studies RFR produced a cellular stress response which can lead to DNA damage and cancer. In 2001, Catholic University physics professor Theodore A. Litovitz briefed US Congressional members on how chronic exposure to non-thermal levels of electromagnetic radiation can diminish DNA repair and the

body's immune response. His conclusion, "because stress proteins are involved in the progression of a number of diseases, *heavy daily cell-phone usage* could lead to great incidence of disorders such as Alzheimer's and cancer" has been reiterated by two leading EMF/RF researchers, Frank Barnes and Ben Greenebaum in a 2016 article published in *IEEE Power Electronics Magazine*. Barnes and Greenebaum stated, "We present the possible theoretical mechanisms and experimental data that show long-term exposures to relatively weak static, low-frequency, and RF magnetic fields can change radical concentrations. As a consequence, a long-term exposure to fields below the guideline levels may affect biological systems and modify cell growth rates, while an organism's built-in mechanisms may compensate for these changes."

Notably, in 2002, Leszczynski and colleagues published the results of an experiment using a human cell line and *just like in the NTP rat study*, the researchers ensured that the exposures were non thermal. They found that after merely one hour of exposure to a 900 MHz GSM signal at an average SAR of 2 W/kg , a specific type of cellular stress response was activated. They hypothesized that this effect links the radiation to cancer because "These events, when occurring repeatedly over a long period of time, might become a health hazard because of the possible accumulation of brain tissue damage. This suggests that the presently allowed radiation emission levels for the mobile phones, although low, might be sufficient to induce biological effects."

Why was this study released *before* it was published in a journal?
According to page 4 of the NTP Report, these findings were released after extensive reviews because:



"Given the extremely large number of people who use wireless communication devices, even a very small increase in the incidence of disease resulting from exposure to RFR resulting from those devices could have broad implications for public health."

"Lastly, the tumors in the brain and heart observed at low incidence in male rats exposed to GSM- 2 and CDMA-modulated cell phone RFR in this study are of a type similar to tumors observed in some epidemiology studies of cell phone use. These findings appear to support the International Agency for Research on Cancer (IARC) conclusions regarding the possible carcinogenic potential of RFR."

The NTP has now created a new webpage on cell phones and posted a link to the FDA's recommendations on how to reduce cell phone radiation exposure.

How are humans exposed to radiofrequency radiation?

The International Agency for Research on Cancer (IARC) of the World Health Organization classified the range of radio frequency from 30 kHz to 300 GHz as a "Possible Human Carcinogen." The classification is for radio frequency *from any source,* be it a cell phone, laptop, Wi-Fi, baby monitor, cell tower, tablet or electric utility meter.

Dr. Robert Bann, the World Health Organization International Agency for Research on Cancer Secretary stated in a 2011 lecture and in his writing found here.

> *"It should be noted that the working group in the overall evaluation decided to make a generic evaluation of radio frequency fields and did not want to limit it to mobile telephone use and all other exposures .. that was based on the diversity of the exposures in the animal cancer studies where different types of radiation with different frequencies across the radio frequency part of the emf spectrum were noted and* ***the radiation from the environmental sources.(i.e Wi-Fi, Cell Towers etc) and from the mobile telephones is basically and physically speaking the same type of agent ."***

Considering we now use cell phones all day and even sleep with them at night, cell phones likely expose humans to more radio frequency than any other single device. Indoor exposures are primarily from wireless computer networks, home cordless phones and the myriad of wireless devices we purchase and bring into our home. In addition, homes, offices and buildings now have various built-in wireless equipment and apparatus such as thermostats, security networks, sound systems, appliances and utility meters called "Smartmeters".

Outdoor exposures are primarily from base stations (cell towers) and building-mounted cellular antennas *in addition to* the cell phone you may carry in your pocket as you walk down the street.

The Bottom Line

Wireless radiation from phones, tablets, routers, baby monitors, and a growing number of applications has never been tested for safety, because it was assumed to have no effect except heating. That assumption is no longer valid. While details relating to the increased cancer will continue to be evaluated, this study clearly shows that wireless radiation produces adverse biological effects in animals. The weight of evidence has significantly *increased* now that the the NTP study findings are placed in the context of the epidemiological, animal and in vitro studies done to date.

Rates of cancers specifically associated with cell phones are increasing, especially the most aggressive forms. In February 2016, the CBTRUS (Central Brain Tumor Registry of the US) reported that brain tumors are now the leading type of cancer in adolescents, surpassing leukemia and lymphoma.

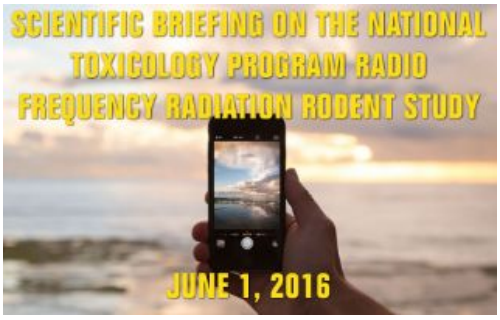
It is imperative that there be experimental testing, *now*, of newer technologies *before* they enter the marketplace. Data on wireless exposures must be collected in a systematic way to understand real life exposures, and to enable correlation with health. Without such testing and monitoring, we are engaging in a massive human experiment with no controls and without the public's knowledge or consent.

Based on this new information, regulatory and health agencies should make strong recommendations for consumers to take precautionary measures, to choose non-wireless devices whenever possible, and to avoid close contact with their cell phones and Wi-Fi devices. Since children and pregnant women are more vulnerable to radiation exposures, health authorities must place additional importance on educating families and communities about how to reduce children's exposures. Schools, offices and homes can be equipped with non-wireless internet connections to significantly reduce indoor exposures. Technology companies must design and provide safer communication devices so that the public can reduce exposure.

Most importantly, international regulations on cell phones and radiofrequency radiation exposures need to be immediately updated. The NTP study provides strong evidence that the current limits- based on thermal effects only- *do not adequately protect us.* New regulations must protect against these non-thermal biological effects.

The Israeli Institute Of Advanced Studies At Hebrew University Press briefing, June 1st, 2016 with Ronald L. Melnick, PhD, the senior toxicologist

who designed the National Toxicology Program (NTP) study. [Click here to watch youtube video.]



"We tested the hypothesis that cell phone radiation could not cause health effects. We feel that this hypothesis has now been disproved because these results clearly show cell phone radiation has adverse cell effects. These same cells that became cancerous in rats are the same cells that are reported to turn into tumors in epidemiology studies," remarked Dr. Melnick.

Referring to the widely circulated reviewer critique that "the study had low statistical power and that might lead to a false positive," Melnick responded, "I'm not sure if that was a misstatement by the reviewer because low statistical power means that there is a high probability of accepting the null effect hypothesis even when a true effect may exist."

Regarding the finding of increased, rare, pre-cancerous lesions in the brain and heart, Melnick added, "If this study had continued for a longer period of time, it is likely that some of those hyperplasias found in the exposed rats would have progressed into a tumor. It was unfortunate that the study only lasted two years."

Watch a Wall Street Journal Interview on the NTP Cell Phone Cancer Research Study here

Read the NPR News Story Here.

Listen to the NPR News Story Here.

Read Scientific American Article Here.

Read Consumer Reports Article Here.

Watch a WTOP radio interview with Dr. Melnick here.

NATIONAL TOXICOLOGY PROGRAM (NTP) INFORMATION

Report of Partial findings from the National Toxicology Program Carcinogenesis Studies of Cell Phone Radiofrequency Radiation in Hsd: Sprague Dawley® SD rats (Whole Body Exposure)

NTP Press Conference Audio is online to listen to here.

NTP Press Release: Media Telebriefing: NTP Cell Phone Radiofrequency Radiation Study: Partial Release of Findings

New NTP Webpage on Cell Phones

NEWS MEDIA COVERAGE

Wall Street Journal: Debate Renews Over Health Risks from Cell Phone Use
Wall Street Street Journal: Cell Phone Study Fans Cancer Worries
Consumer Reports: Does Cell Phone Use Cause Brain Cancer? What the New Study Means For You
Science Magazine: Questions abound after study links tumors to cellphone radiation
Mother Jones: Game-Changing" Study Links Cellphone Radiation to Cancer
PBS: How Might Cell Phone Signals Cause Cancer May 30, 2016
Scientific American: How Might Cell Phones Cause Cancer in Rats
Scientific American: Major Cell Phone Radiation Study Reignites Cancer Questions: Exposure to radiofrequency radiation linked to tumor formation in rats
Science Magazine: Questions abound after study links tumors to cellphone radiation

ADDITIONAL RESOURCES ON THE NTP STUDY RESULTS

Joel Moskowitz, PhD. Summary and preliminary analysis EMR Safety; May 27, 2016

- National Toxicology Program Finds Cell Phone Radiation Causes Cancer
- Spin Versus Fact on the NTP Study by Dr. Moskowitz Download the Factsheet
- STORYLINE vs. REST-OF-THE-STORY: Brain cancer incidence, cellphone use, and trends data

Environmental Health Trust: Everything You Wanted to Know About the National Toxicology Program Rodent Study on Cell Phone Radiation

Microwave News Cell Phone Radiation Boosts Cancer Rates in Animals

Dr. Gautam Khurana, NeuroSurgeon, Comments: Breaking News – Cell Phones and Brain Tumors – Leaked Insight from the U.S. National Toxicology Program?

Interview with Prof. Adlkofer the NTP study of the US government: Translate the page.

American Cancer Society Press Release: ACS Responds to New Study Linking Cell Phone Radiation to Cancer