



5 G, Wireless and Health

Theodora Scarato MSW

Director of Educational Programs
and Resources

Environmental Health Trust

EHTrust.org



New wood pole (holding up cell and microwave antennas) and equipment enclosures for a for a “Small Cell” (appears to be by “Mobilitie” for Sprint) in the public right of way (where all other electric/telephone/cable utilities are already undergrounded) in Woodbridge, Virginia.

Omar Masry City Planner/Senior Analyst, San Francisco Bay Area.

Sep 17, 2016 10 Key Issues for California Cities & Counties on the Challenges of Small Cells & “Not So Small Cells”



- Massive rollout of dense infrastructure to connect products.
- Thousands of new antenna small cell/DAS in neighborhoods.
- Mix of frequencies, technologies in development in addition to current.
- US FCC letting companies lead the research and standard development.
- State Bills to preempt local authority.
 - AR, AZ, CA, CO, FL, HI, IA, IL, IN, KS, MN, MO, NB, NC, NE, OH, PA, RI, TX, VA, WA
- [Learn more at EHT 5G page](#)

Crown Castle

10k Annual Report 2016

- “If radio frequency emissions from wireless handsets or equipment on our wireless infrastructure are demonstrated to cause negative health effects, potential future claims could adversely affect our operations, costs or revenues.
- The potential connection between radio frequency emissions and certain negative health effects, including some forms of cancer, has been the subject of substantial study by the scientific community in recent years. **We cannot guarantee that claims relating to radio frequency emissions will not arise in the future or that the results of such studies will not be adverse to us.**
- If a connection between radio frequency emissions and possible negative health effects were established, our operations, costs, or revenues may be materially and adversely affected. **We currently do not maintain any significant insurance with respect to these matters. “**

[Read more about legal liability issues](#)



OFFICE OF THE COUNTY EXECUTIVE
ROCKVILLE, MARYLAND 20850

FCC

May 10, 2017 Meeting

US Congressman Raskin, Councilmember Riemer, FCC
Chairman Ajit Pai, FCC Commissioner O'Reilly, US
Senate/House staff.

May 17, 2017 Memo

Meeting Summary

Advocated against potential federal preemption of local zoning.

Five Key Points

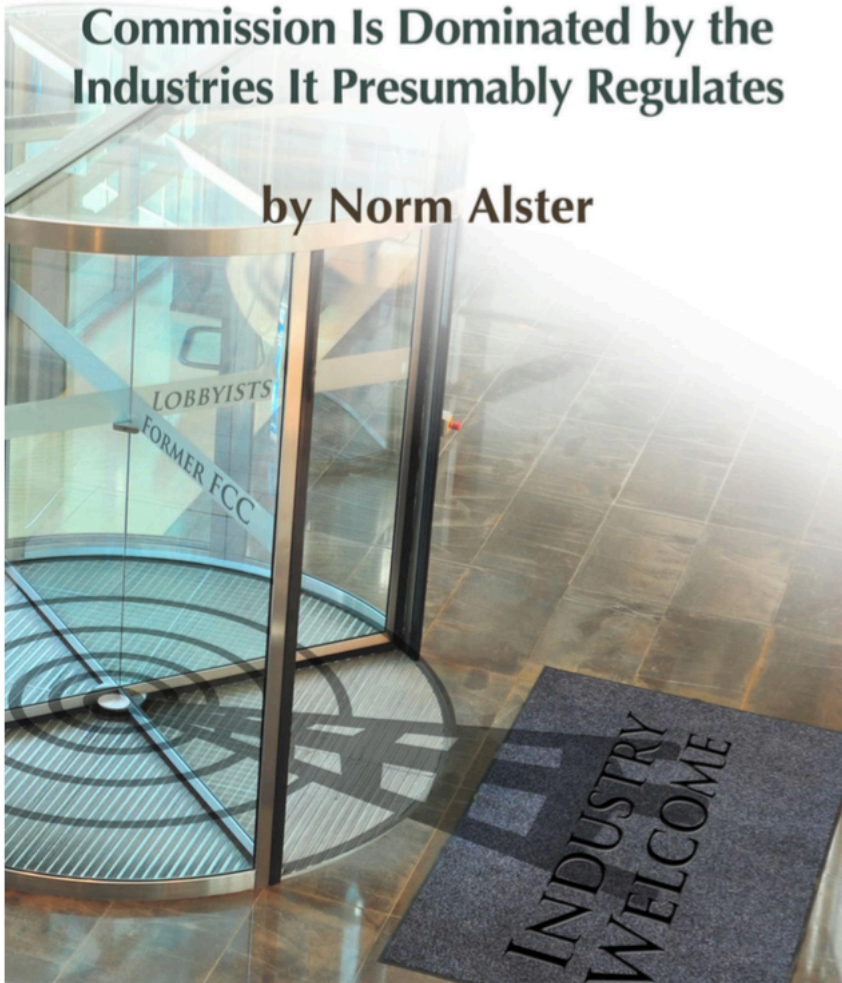
1. **FCC must complete the 2013 Radio Frequency Commission Standards proceedings** before issuing new time limits for local government action and before taking further action to preempt local zoning
 - The commissions failure to issue new standards is raised as an issue in every citing proceeding and **the commissions 20-year-old standards undermine public confidence** that commission rules will address current and new wireless technology.
 - Residents are concerned about the health effects having more antennas in their neighborhoods and closer to homes.

[Read the Full Memo](#)

Captured Agency:

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

by Norm Alster



www.ethics.harvard.edu

Harvard Press

- FCC Chair Tom Wheeler prior Head Wireless Industry
- Revolving door between regulators and companies.
- Financial Contributions to Congress
- FCC is a captured agency.
- [Read The Book](#)



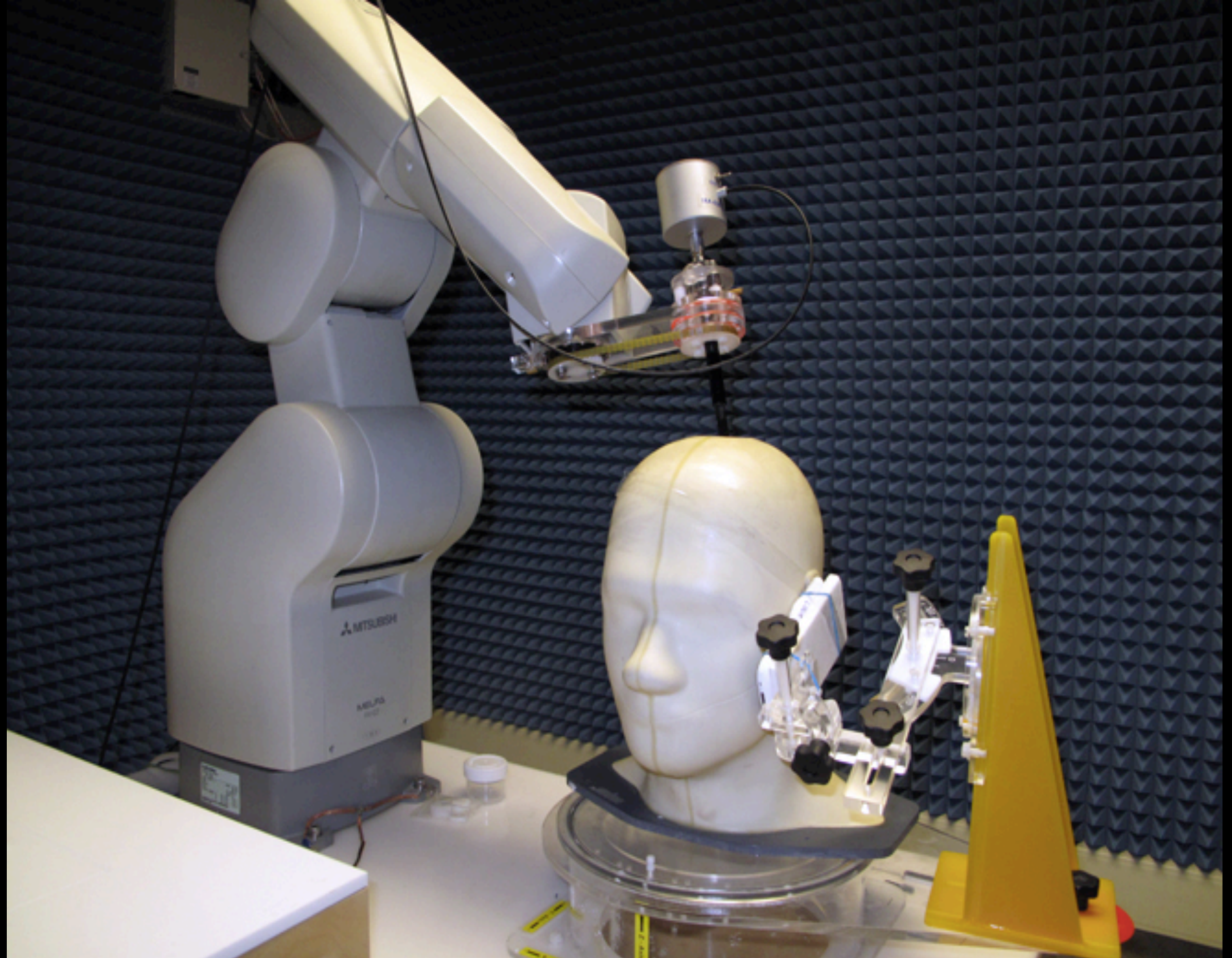
FCC RF Exposure Limits

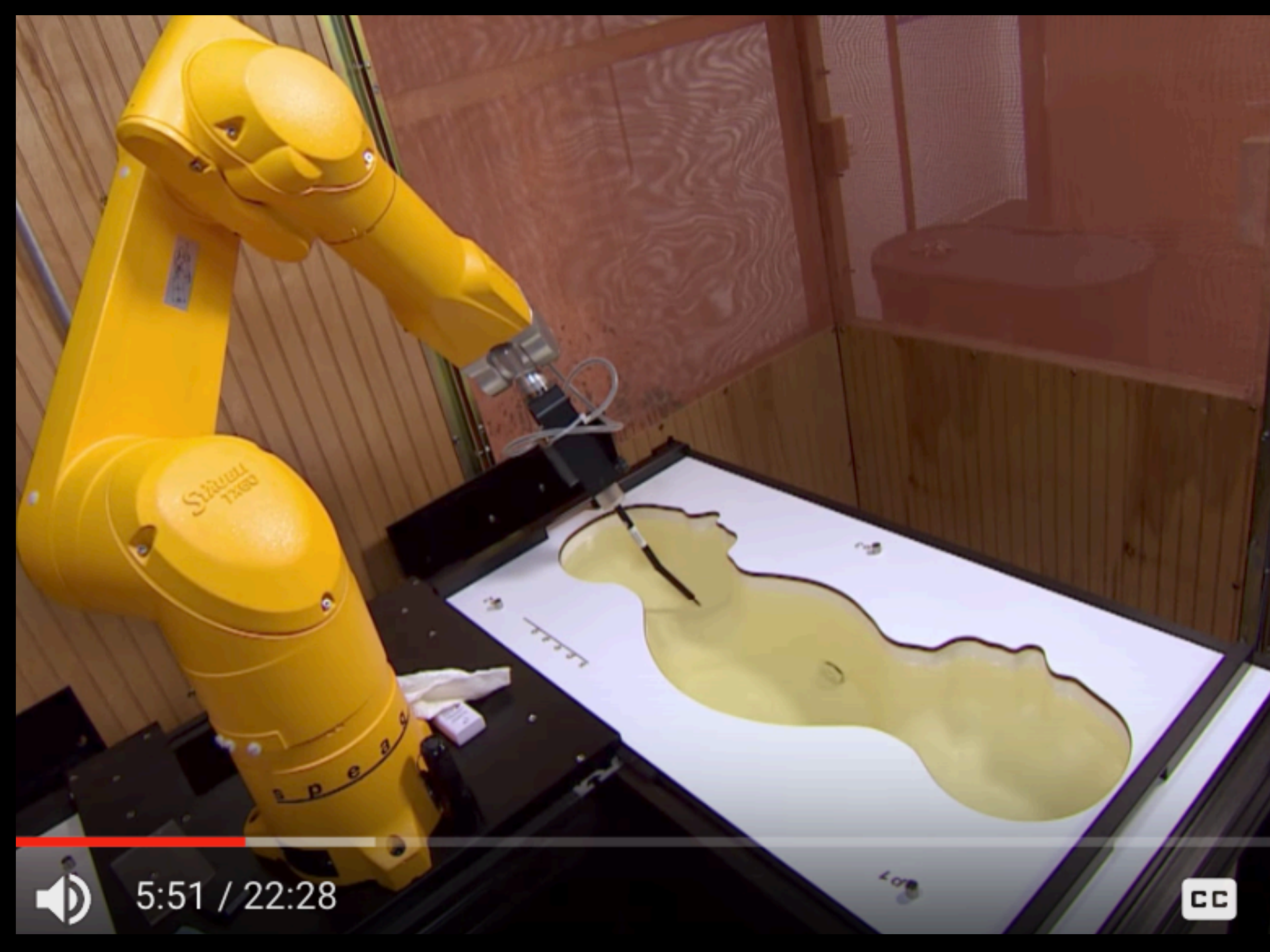
Open Proceeding 2013



FCC Human Exposure to Radiofrequency Limits Set 1996

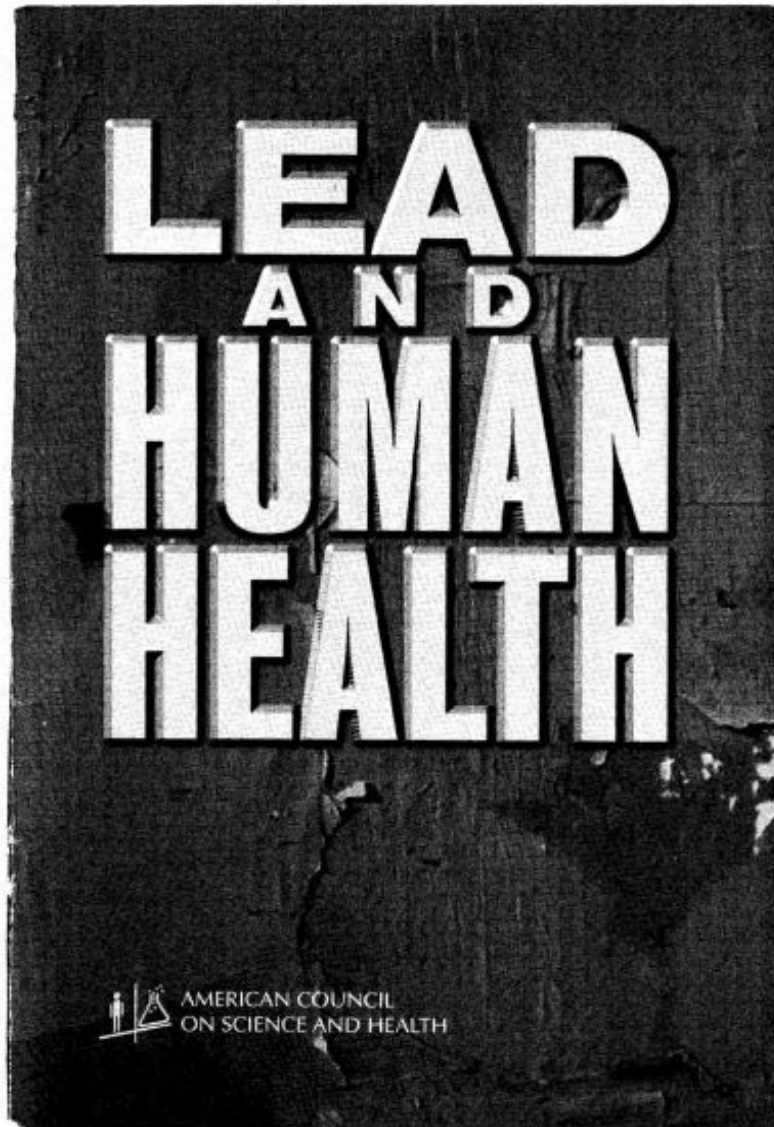
- 20 years outdated.
- Based on thirty year old science (IEEE C95.1 1991 ANSI C95.1 1982 and NCRP 1986.)
- Initially researched for military use of radar.
- Inadequate to address children and pregnant women.
- No systematic research review by US government.
- EPA research defunded in mid 90's.
- [Go to the open FCC docket](#)





5:51 / 22:28





Parallels: Industry Involvement , “low levels do not harm” years for regulation.



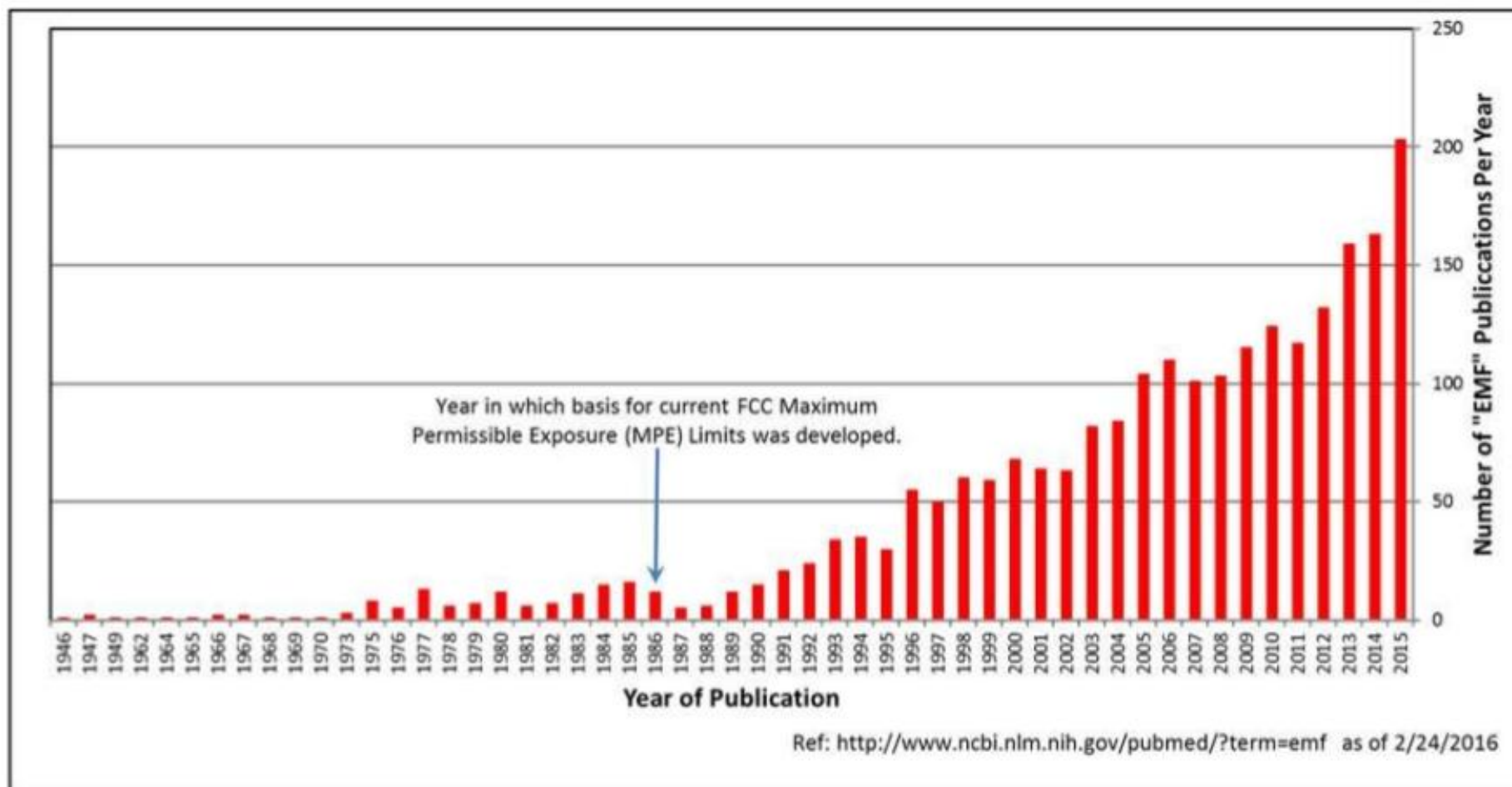
Ethyl

IS TO GASOLINE *what*
VITAMINS *are to* **FOOD**

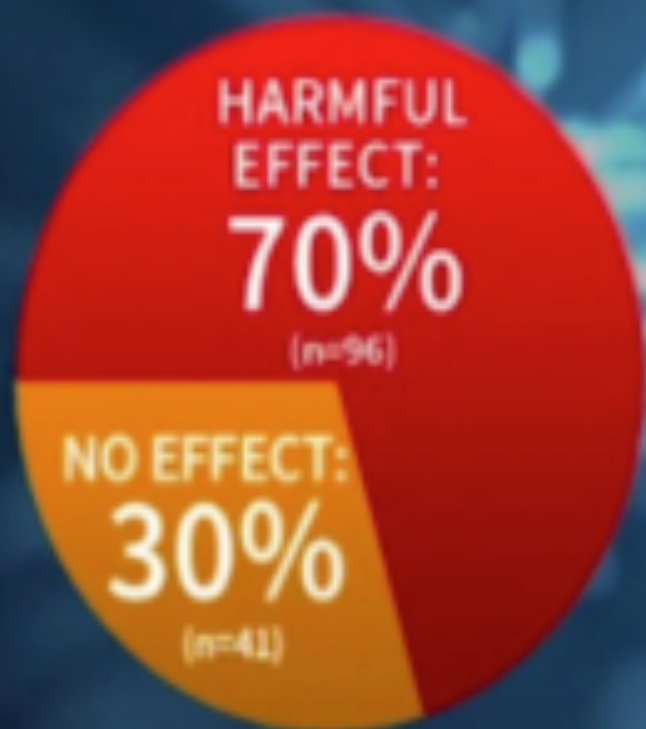
Buy **ETHYL**

GASOLINE

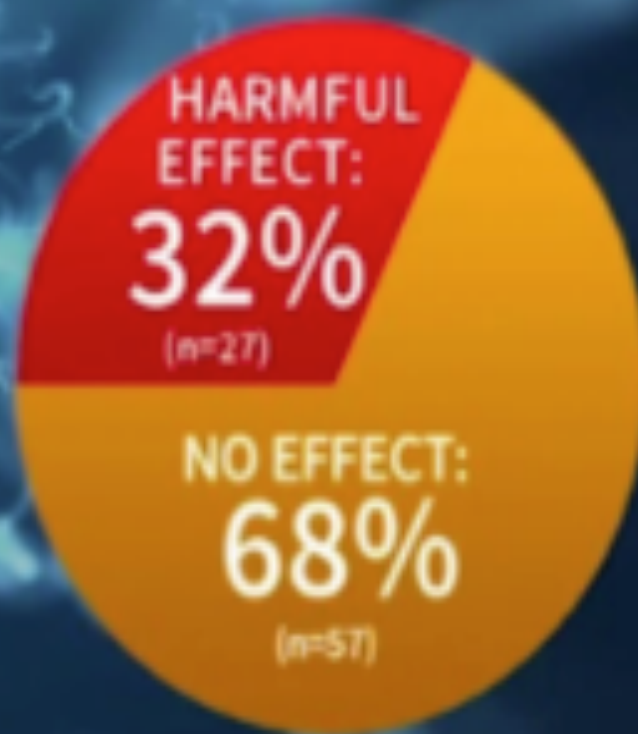
Number of "EMF" Publications Per Year on NIH's Pubmed Database



Non-industry studies



Industry studies

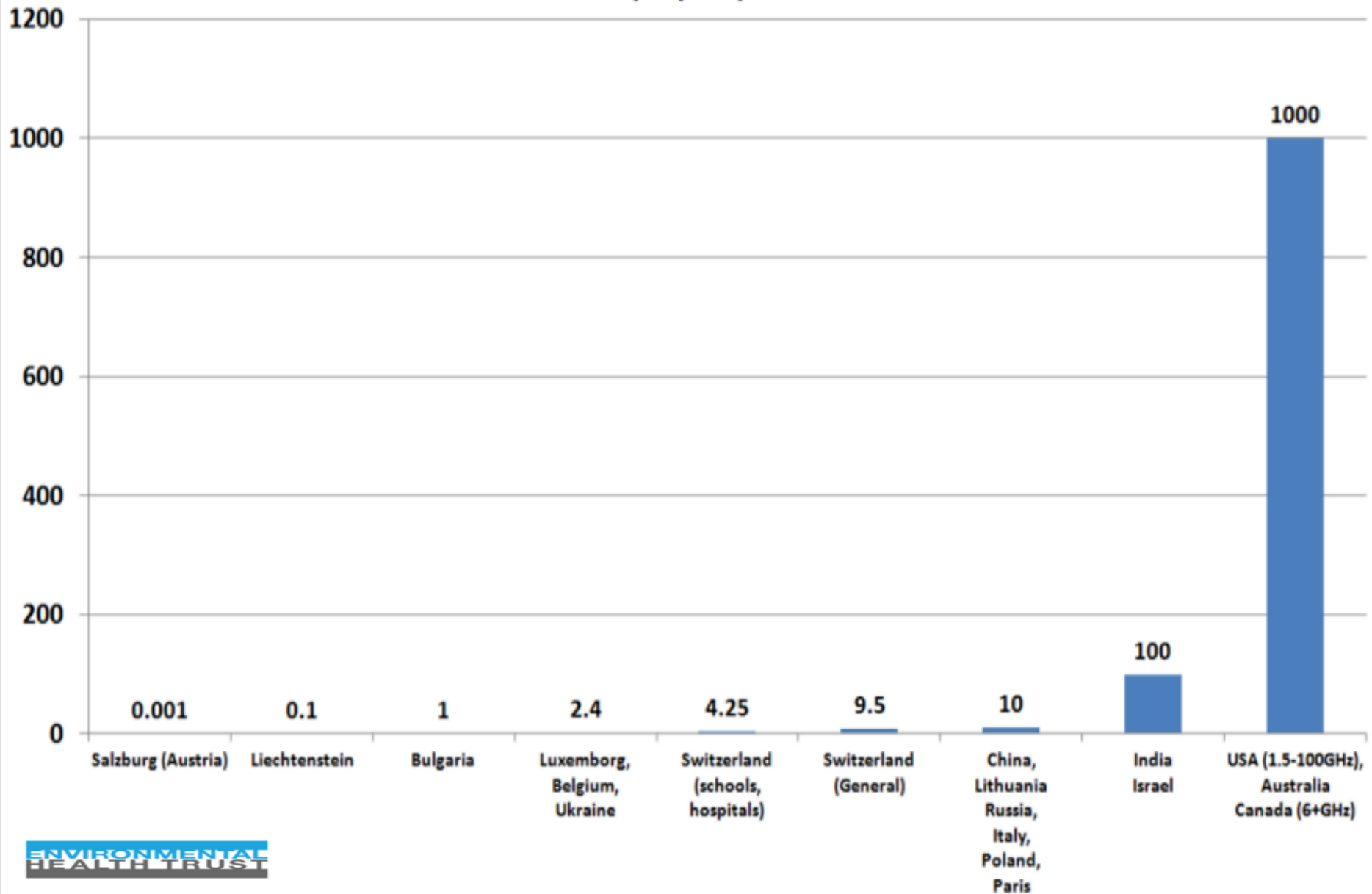


Data Compiled by Dr. Henry Lai, University of Washington

Huss 2007: Systematic review- industry funded studies 90% less likely to report effect.
Valentiniet al. 2011: “the existence of sponsorship and publication biases should encourage
WHO intervention to develop official research standards and guidelines.”

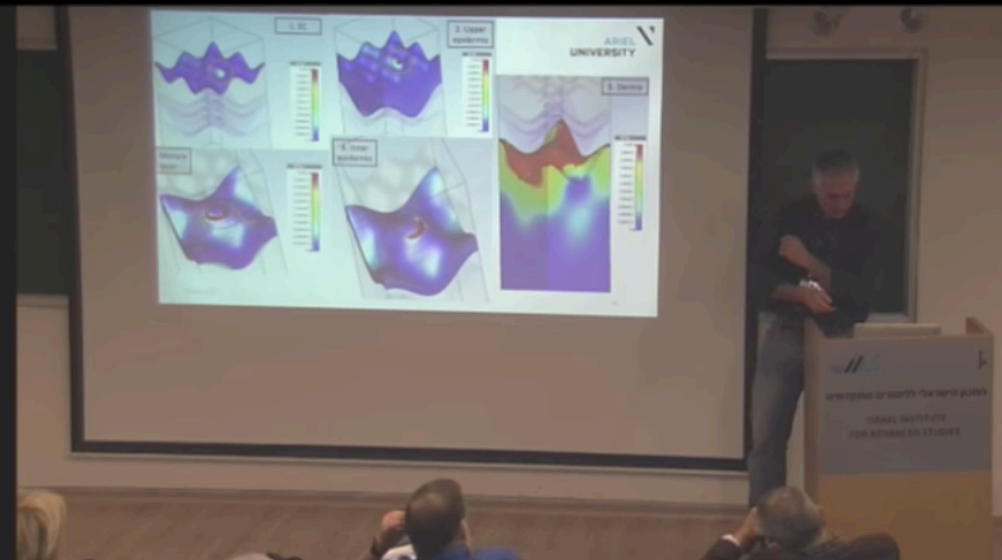
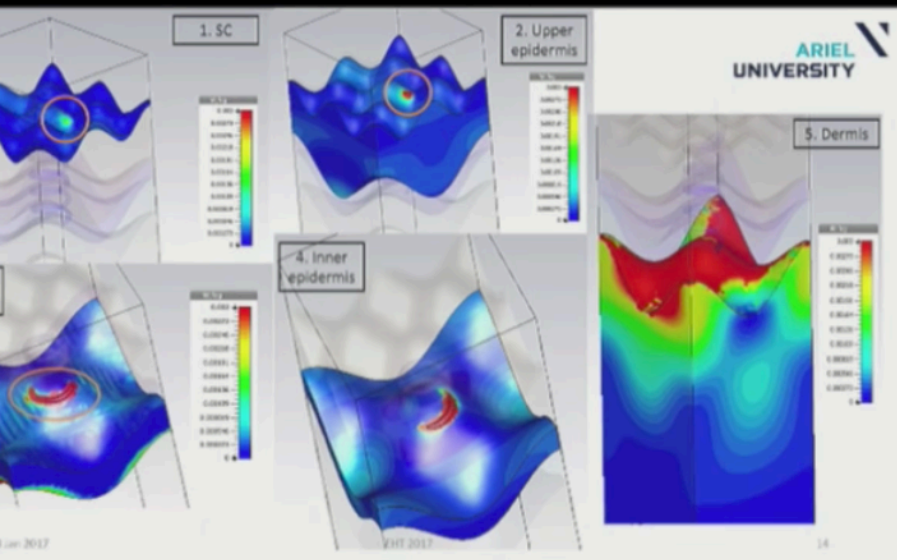
Outdoor Pulsed RF Radiation Limits - Other Countries

(uW/cm²)



5G, Sub Millimeter and Millimeter Waves

- Interact with the sweat glands of the skin
- Glands act as helical antennas
- Frequencies also used as crowd control weapon by military





RF Effects Sleep

- Regel Set al. Pulsed radio-frequency electromagnetic fields: dose-dependent effects on sleep, the sleep EEG and cognitive performance. J Sleep Res. 2007 Sep;16(3):253-8.
 - Showed a dose-response relationship between EMF field intensity and its effects on brain physiology as demonstrated by changes in the sleep EEG and in cognitive performance.
- Schmid et al., Sleep EEG alterations: effects of different pulse-modulated radio frequency electromagnetic fields. Sleep Res. 2012 Feb;21(1):50-8. Apr 12.
 - “Consistent with previous findings, our results provide further evidence that pulse-modulated RF EMF alter brain physiology.”
- Bengt et al., The Effects of 884 MHz GSM Wireless Communication Signals on Self-reported Symptom and Sleep (EEG)- An Experimental Provocation Study PIRS Online Vol. 3 No. 7 2007 pp: 1148-1150
 - A prolonged latency to reach the first cycle of deep sleep (stage 3). The amount of stage 4 sleep was also decreased in exposed subjects. Subjects reported more headaches during exposures vs. sham exposure.

American Academy
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™

American Academy Of Pediatrics (AAP) Recommendations

- 2012: Urged support of Federal Legislation HR 6358 to develop safety standards and inform the public.
- 2013: Urged FCC to reevaluate RF guidelines to ensure they protect children and pregnant women and reflect current use patterns in testing and regulatory limits.
- 2016: Reduce radiofrequency radiation: After NTP study results released AAP issued “Ten Tips” to reduce children’s radiofrequency radiation.
- [Read Press Release here](#)



American Academy Of Pediatrics Recommends Reducing Exposure to RF Radiation

“An Egyptian study confirmed concerns that living nearby mobile phone base stations increased the risk for developing:

- Headaches
- Memory problems
- Dizziness
- Depression
- Sleep problems

Short-term exposure to these fields in experimental studies have not always shown negative effects, but this does not rule out cumulative damage from these fields, so larger studies over longer periods are needed to help understand who is at risk. In large studies, an association has been observed between symptoms and exposure to these fields in the everyday environment.”

[Click here to go to the American Academy Of Pediatrics Webpage on Cell Towers and Electromagnetic Fields](#)

Seawind Project, EU Commission

Image of far field simulation



Penetration of
Radiofrequency
Radiation Energy into
Child, Man and Woman
From Cellular Antennae.

Yellow = Highest
Absorption
Blue = Lowest Absorption

Images from Seawind
Project, European
Commission

http://seawind-fp7.eu/uploads/SEAWIND_FINAL.pdf

The radiation penetrates children's thinner skulls, brains and bodies more deeply than into adults.

Nonionizing Electromagnetic fields

Myth: No effects At *low non thermal levels*

Fact: Research has found biological effects at non thermal levels in thousands of studies.

EEG well replicated

Sleep architecture

Brain Cancer: All human epi- independent +10yrs

Oxidative stress markers

Immune system

5G Health Effects

Santa Clara Medical Association Bulletin [Click for article online.](#)



A 5G WIRELESS FUTURE

WILL IT GIVE US A SMART NATION OR CONTRIBUTE TO AN UNHEALTHY ONE?

Dr. Cindy Russell

SCCMA V.P. Community Health

It would greatly extend FCC's current policy of the mandatory irradiation of the public without adequate prior study of the potential health impact and assurance of safety. It would irradiate everyone, including the most vulnerable to harm from radiofrequency radiation: pregnant women, unborn children, young children, teenagers, men of reproductive age, the elderly, the disabled, and the chronically ill." —Ronald Powell, PhD, Letter to FCC on 5G expansion (7)

BRAVE NEW WORLD OF COMMUNICATION

The use of mobile wireless technologies continues to increase worldwide. A new faster 5th generation (5G) telecommunication system has recently been approved by the Federal Communications Commission (FCC) with new antennas already being installed and tested in Palo Alto and Mountain View. While it may give us uber automation and instantaneous "immersive entertainment" a lot of questions remain with regards to public health and safety of wireless devices. Will the adoption of this new 5G technology harm directly or indirectly the consumers and businesses it hopes to attract?

5G is the new promised land for wireless technology. It could connect us in our homes, workplaces and city streets to over a trillion objects around the world. (96) The Internet of Things (IoT) is primed to give us self-driving cars, appliances that can order their own laundry soap, automation hubs that pay your bills, not to mention fast movie downloads and virtual reality streaming from anywhere when you are on the go. Companies are already asking local cities and counties to move forward to create "Smart Cities" which have comprehensive digital connectivity by installing a massive wireless sensor network of almost invisible small cell antennae on light posts, utility poles, homes and businesses throughout neighborhoods and towns in order to integrate IoT with IT. They state it will improve services, the economy and quality of life. This communication network will

form an expanded electromagnetic microwave blanket above each city and county, permeating the airspace and providing seamless connectivity where people and things will exchange data.

Former Federal Communications Commission (FCC) chair Tom Wheeler called this a "National Priority" and thus ushered in approval for the addition of this new pervasive network of high frequency short wave millimeter broadband for commercial use first planned in urban areas.

DEVELOPING A "SMART" WORLD?

Engineers and physicists are busy working out the details of carrier frequencies and the architecture of the new network. Manufacturing industries are already developing commonly used products that feature wireless integration that will connect to the densely clustered antennas. Marketing companies are now pushing ads for "smart" devices for "smart" people in "smart" cities. Even the healthcare industry is anticipating using some of these wearable devices for patients with cardiac conditions or to do remote surgery in other parts of the world. Opening up 5G Spectrum access hopes to drive an explosion of new products. The economic opportunities are obvious and business will be booming in the tech industry.

Concerns continue to rise however about the basic safety of our current use of wireless technologies not to mention adding layers of newer microwave frequencies that have not been tested for short term or long term safety. Important questions have not been addressed while industry and government policy have already moved forward.

- Why is the FCC streamlining permitting of 5G high frequency when they have not completed their investigation on health effects nor updated safety limits for low-intensity radio frequency radiation?
- Is the widespread "deployment" of this pervasive higher frequency small cell distributed antennae system in our cities and on our homes safe for humans and the environment?
- Will it add to the burden of chronic disease that costs our nation over a trillion dollars annually? (105)
- Are we already digitally over connected, outsourcing our grey matter and becoming a dysfunctional addicted nation because of it? (136,137,138)
- How will this affect our privacy, cyber security and the security of medical records?
- Will we as physicians be able to recognize the emerging adverse health effects of new millimeter technology and wearable technology let alone that of current wireless devices?

A GOOD READ: FEDERAL COMMUNICATIONS COMMISSION 5G LETTERS

Letters to the FCC in 2016 responding to the 5G roll out with the addition of new high frequencies were mixed. Industry generally applauded the FCC for its efforts and discussed the growing demand for this technology along with a need for flexible regulation to implement it. Some expressed concerns about interference with other satellite systems. Some felt there should be maximum spectrum usage opening up even higher frequencies that are only experimental now in order to help "the underserved". Others argued about opening this up to licensed versus unlicensed uses. Industry did not mention any potential public or environmental health hazards regarding the use of these new frequencies.

RAISING A RED FLAG TO PUSH THE PAUSE BUTTON ON 5G

Private citizens and PhD's, however did raise a red flag at the FCC, recommending a halt to infrastructure plans and more testing for health and environmental reasons. They questioned the current FCC standards

which are outdated and not protective of human health. They asked "How will it affect children, pregnant women and the elderly who are the most vulnerable in our population?" While scientists gave ample evidence that precaution should prevail, I found the most compelling letters were from those who describe their fear as electro-sensitive people in an already dangerously high electromagnetic environment for them.

GIMME SHELTER: NO ESCAPE FOR ELECTRO-SENSITIVE INDIVIDUALS

Linda K., a Michigan resident, explained how she became increasingly sensitive to EMF after a cell tower was placed within 1000 feet of her house.

She experienced insomnia at first and did not know there was a cell tower until several years later when she then associated the timing of its placement with her symptoms. After smart meters were installed in her area (but not on her house) she became sensitive to her laptop on wireless and her cell phone. Comcast then placed a Wi-Fi hotspot within 400 feet of her house and she stated her symptoms increased to the point that if she was outside in her yard more than 20 minutes she developed increasing fatigue, headaches, heart palpitations and high pitched ringing in her ears. These are all reported effects in those sensitive to EMF from wireless devices. She wrote about her concerns and that the new frequencies may add to her symptoms and inability to leave her house. (54)

In another letter Veronica Z. noted "This is a notice of survival. What many of us deal with currently is trying to survive in an environment that is hostile to us biologically. We have lost all of our rights, our finances, our homes, our ability to earn a living due to this ubiquitous exposure. We are being tortured every second of every day and have been reduced to simply trying to survive the moments we are alive. Others have been unable to do so and have opted to not stay living on this planet of torture...There is no escape for people with severe sensitivities to this deadly radiation." (55)

ASK NASA: IS ELECTRO-SENSITIVITY REAL OR IMAGINED?

Are these people telling the truth? Is this just psychological? You may wonder, however, more and more people from all ages, professions and walks of life are relating similar symptoms in the presence of wireless devices. Some children reported these symptoms when their school adopted WiFi.

Dr. Scott Eberle, a well respected Petaluma hospice physician, eloquently described his development of electro-sensitivity in the November 2016 issue of the SCCMA Bulletin. He goes to great lengths to continue his profession, interact with his colleagues and maintain a healthy existence. (67)

We are exposed to increasing levels of microwave EMF in our daily lives. More scientific evidence links biologic effects with increased reports of health related effects including electrosensitivity. In 1971 Russian scientists Gordon and Sadchikova from the Institute of Labor Hygiene and Occupational Diseases described a comprehensive series of symptoms which they called 'microwave sickness' and presented this at an international WHO meeting. (109)

In a 1981 NASA report, "Electromagnetic Field Interactions: Observed Effects and Theories" microwave sickness was also described. The symptoms recorded were headaches, eyestrain, fatigue, dizziness, disturbed sleep at night, sleepiness in daytime, moodiness, irritability, unsociability, hypochondriac reactions, feelings of fear, nervous tension, mental depression, memory impairment, pulling sensation in the scalp and brow, loss of hair, pain in muscles and heart region, breathing difficulties, increased perspiration of extremities. (63)

Medical organizations, expert groups and governments recommend reducing radiofrequency exposure to children.

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

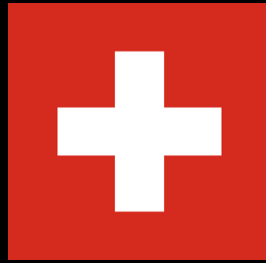
Government Health Agencies Advise Reducing Children's Cell Phone Radiation Exposure



United Kingdom



Russia



Switzerland



Finland



Ireland



Germany



Belgium



Greece



Israel



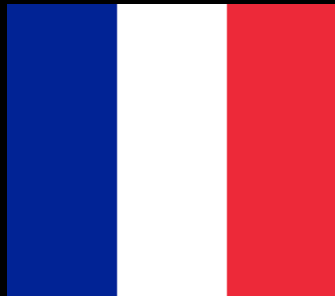
Turkey



Austria



Singapore



France



Denmark



India



Australia

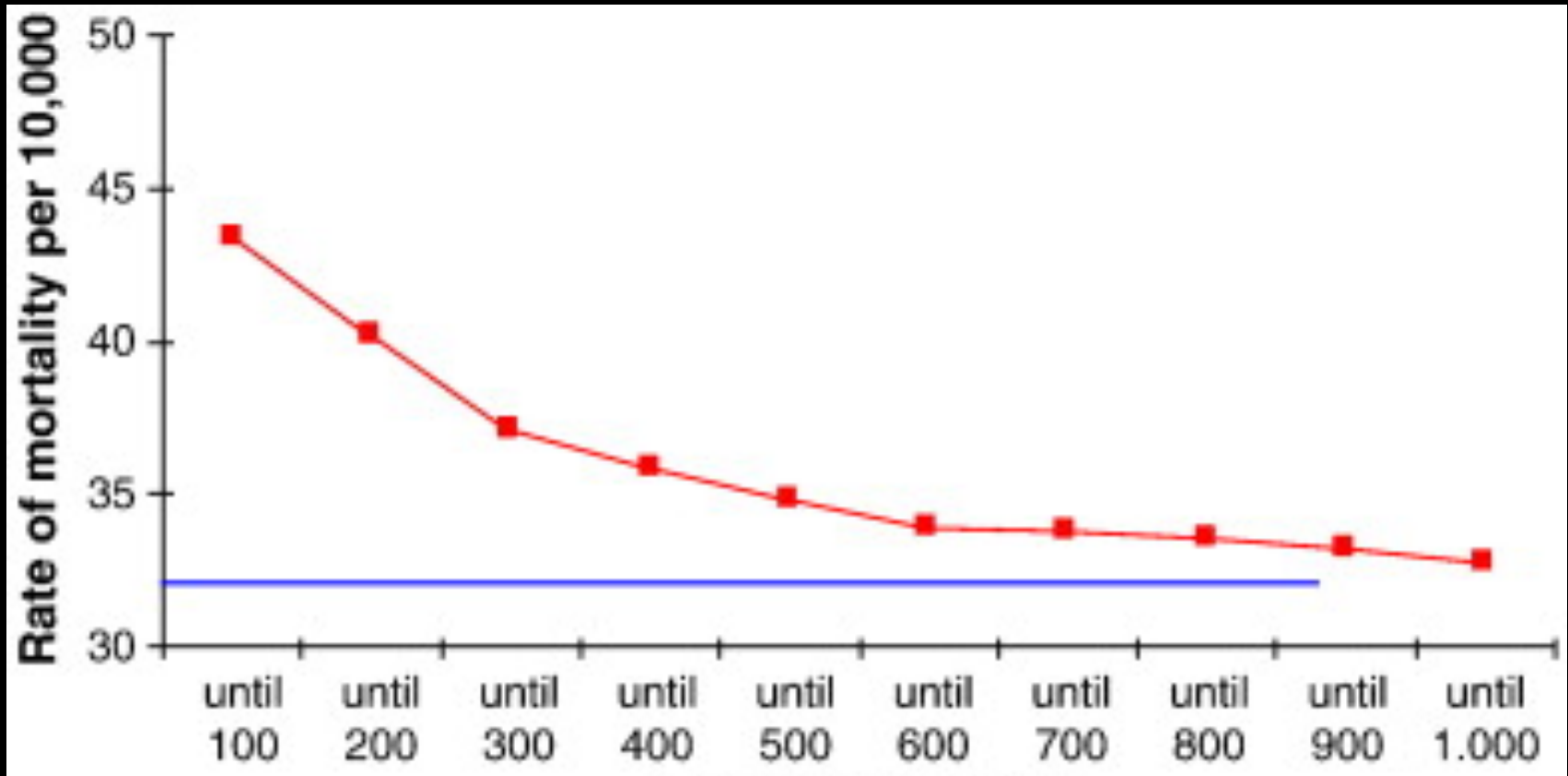
IARC CLASSIFIES RADIOFREQUENCY ELECTROMAGNETIC FIELDS AS POSSIBLY CARCINOGENIC TO HUMANS

Current research has increased the evidence showing long term effects from radiofrequency exposure.

- Canadian study 2017
- French CERENAT Study 2014
- Hardell 2017
- Hundreds of experimental studies

Brazil Cell Tower Study Found Increased Cancers: Towers Dismantled (Dode et al. 2011)

[Mortality by neoplasia and cellular telephone base stations." *Science of The Total Environment* 409.19 \(2011\): 3649-65.](#)



Distance from cellular antennas in meters



National Toxicology Program
U.S. Department of Health and Human Services

\$25 Million NIH National Toxicology Program Study Finds Increased Rare, Malignant Cancers in Rats Exposed to Radiofrequency Radiation

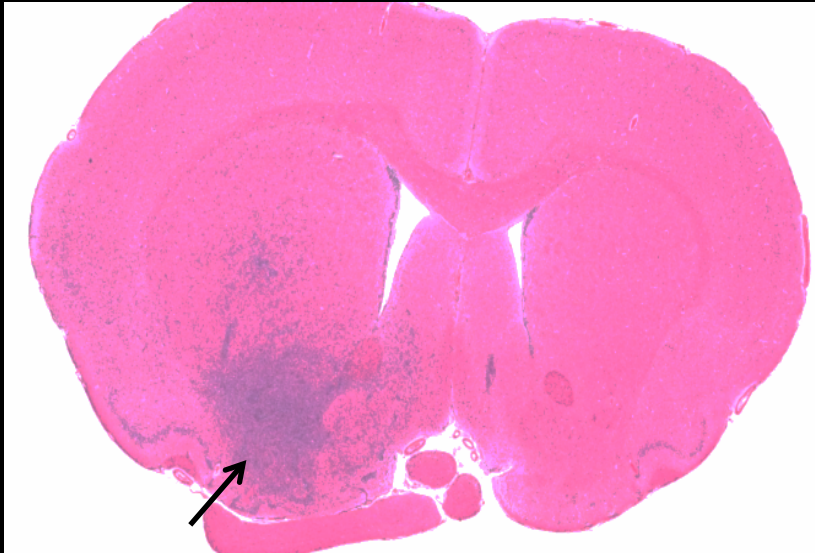


- 2-Year Daily Exposure to Cell Phone Radiofrequency Radiation – CDMA and GSM
- Mice studies at 1900 MHz, Rat studies at 900 MHz

Wyde et al 2016

Cancers in NTP Rats Parallel Findings from Human Epidemiological Studies

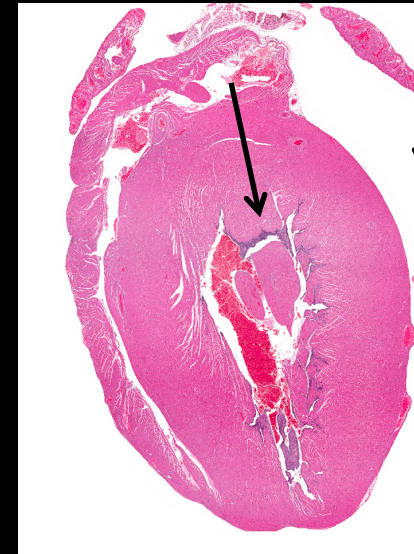
Increased Gliomas in Brain



Images from Birnbaum NIEHS Presentation 2017

Increased incidence of brain gliomas reached statistical significance in males with CDMA modulation.

Increased Schwannomas



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

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

-
[National Toxicology Program, June 2016 Presentation](#)

Additional Findings in NTP Study

- Lower body weights at birth and throughout lactation.
- Not-yet reported cardiac abnormalities ~4 times greater, right ventricle degeneration.
- DNA damage in frontal cortex of rats and mice



Comet assay summary for rats and mice

		MALE					FEMALE				
RATS	CDMA	Frontal Cortex	Cerebellum	Hippocamp	Liver	Blood	Frontal Cortex	Cerebellum	Hippocamp	Liver	Blood
	GSM	Frontal Cortex	Cerebellum	Hippocamp	Liver	Blood	Frontal Cortex	Cerebellum	Hippocamp	Liver	Blood
MICE	CDMA	Frontal Cortex	Cerebellum	Hippocamp	Liver	Blood	Frontal Cortex	Cerebellum	Hippocamp	Liver	Blood
	GSM	Frontal Cortex	Cerebellum	Hippocamp	Liver	Blood	Frontal Cortex	Cerebellum	Hippocamp	Liver	Blood

Yellow

Statistically significant trend and pairwise SAR-dependent increase

Blue

Statistically significant trend or a pairwise increase

Green

Not significantly different, but increased in 2 or more treatment groups

Ramazzini Institute Cell Tower Study

Preliminary Findings of Low Birth Weight

Radiofrequency Radiation Exposures 1000 x less than NTP
to mimic people's exposure to cell tower "Environmental" Levels



*** Final analysis at end of 2017

Image is from Dr. Fiorella Belpoggi's presentation at IIAS 2017

The BabySafe Project

Over 200 Doctors Signed the Joint Statement

"As a research scientist and physician who studies how microwave radiation affects the outcomes of pregnancy, I am deeply concerned about growing exposures to cell phone and other wireless radiation." - Dr. Hugh Taylor, Chief of Obstetrics at Yale

Information for a Safe and Healthy Pregnancy



Doctors Recommend That
Pregnant Women Reduce Wireless Radiation.

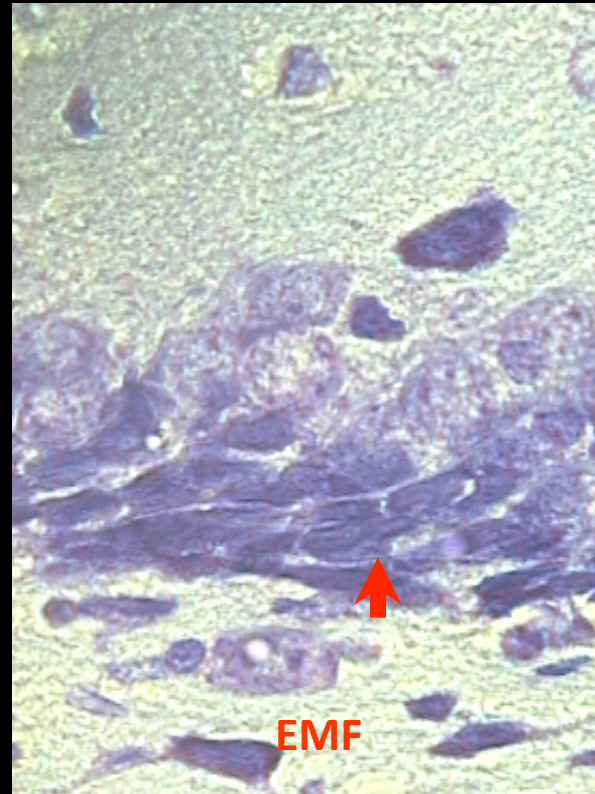
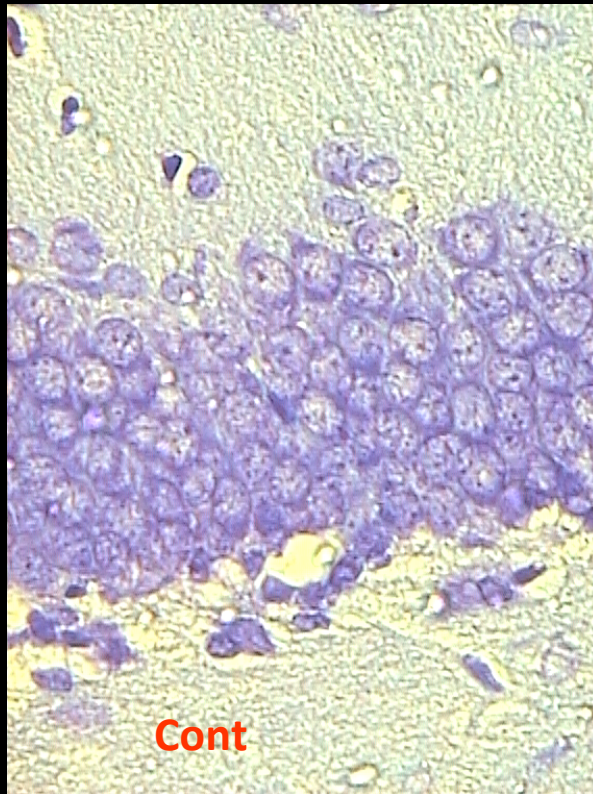
10 Tips to Reduce Exposure including:

- Avoid carrying your cell phone on your body
- Avoid holding any wireless device against your body when in use.
- Whenever possible, connect to the internet with wired cables.
- When using Wi-Fi, connect only to download, then disconnect.
- Avoid prolonged or direct exposure to Wi-Fi routers.

<http://www.babysafeproject.org/>

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

Granular cell loss might be caused by an inhibition of granule cell neurogenesis in the dentate gyrus during prenatal life as well as in the postnatal.



Synergistic effects of electromagnetic fields and chemicals

Medical applications to treat cancer are relying on interactions of EMF/RF with chemicals (Kostoff and Lau, 2015)

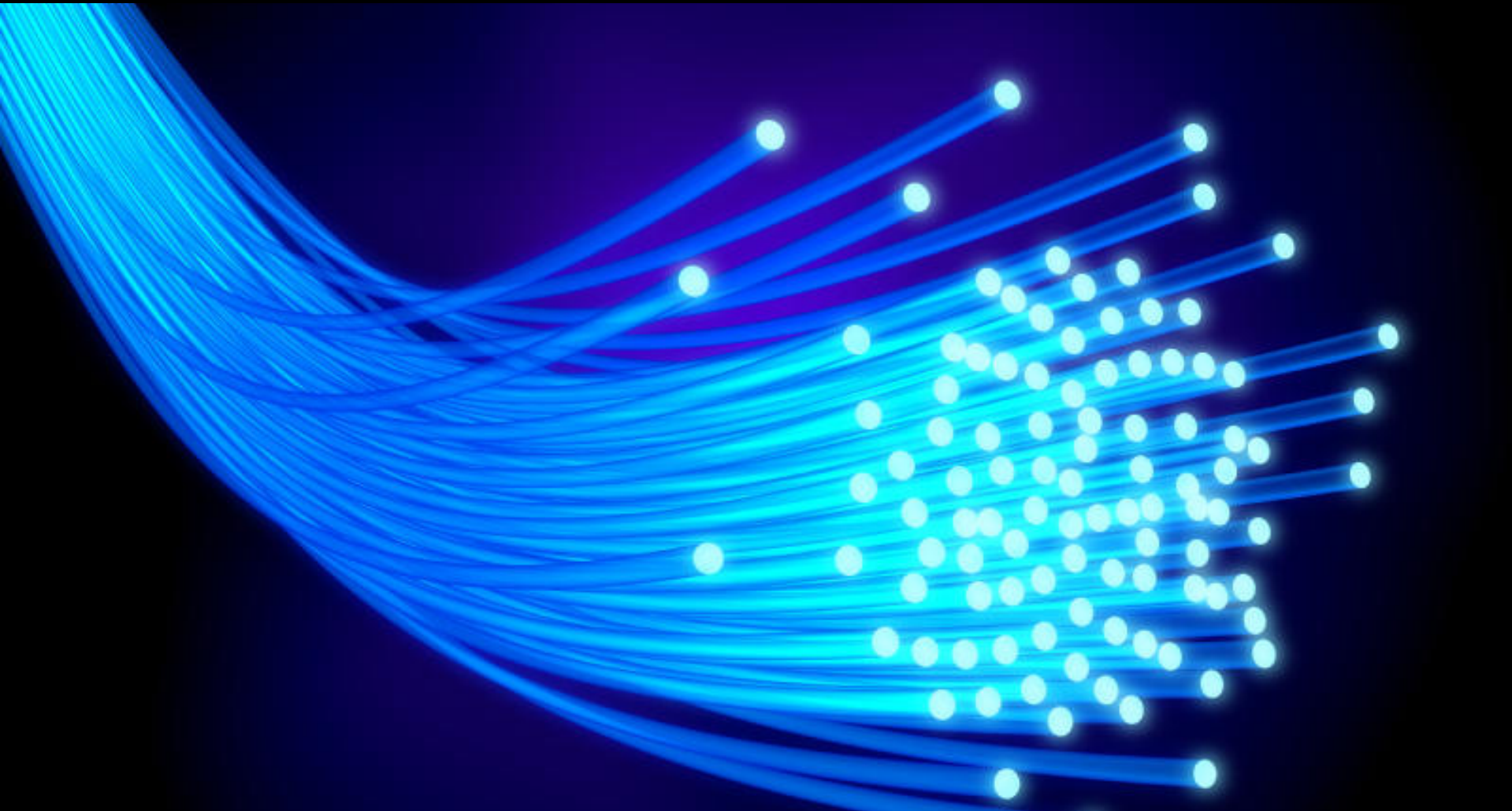
- “Substantial credible scientific evidence” supports that RF results in synergistic effects-beneficial *and* adverse.
- RF changes biochemical markers of inflammation
- RF enhances carcinogenesis, mutations, and teratogenicity.

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

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

Solutions

Premarket safety testing, postmarket surveillance, fiberoptics, R and D, halt 5 G rollout until safety standards set.



Ohio: Lawsuits By 80 Municipalities

Petland Bill: SB 331 Would limit cities
ability to regulate wireless placement.

“The law gives utilities “the kind of rights no
utility has ever had or should ever get.”

- Bexley Mayor Ben Kessler



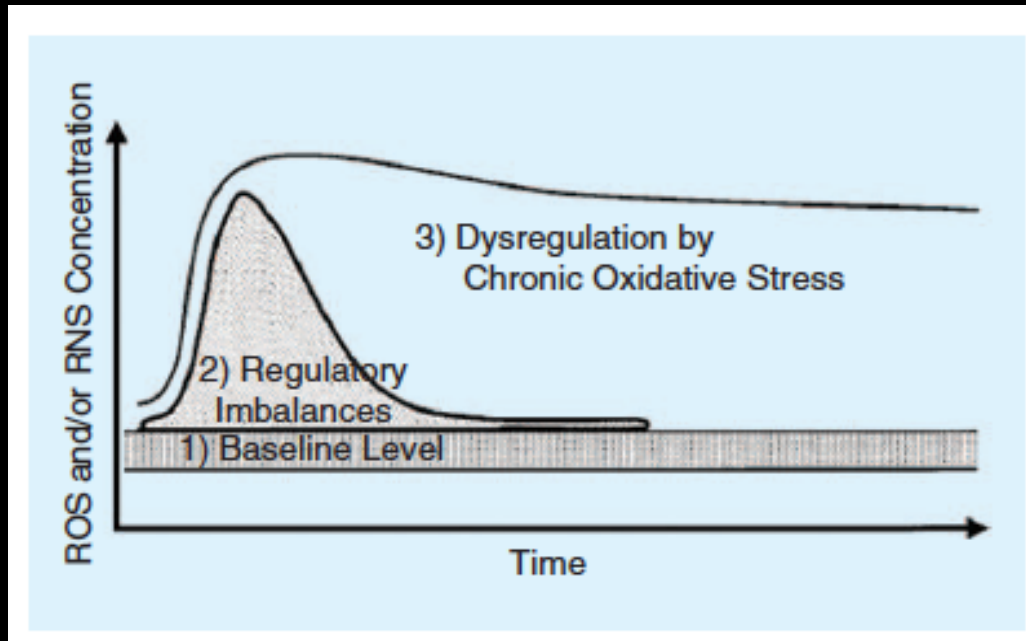


The most important
human endeavor is
the striving for
morality in our
actions.

-Albert Einstein

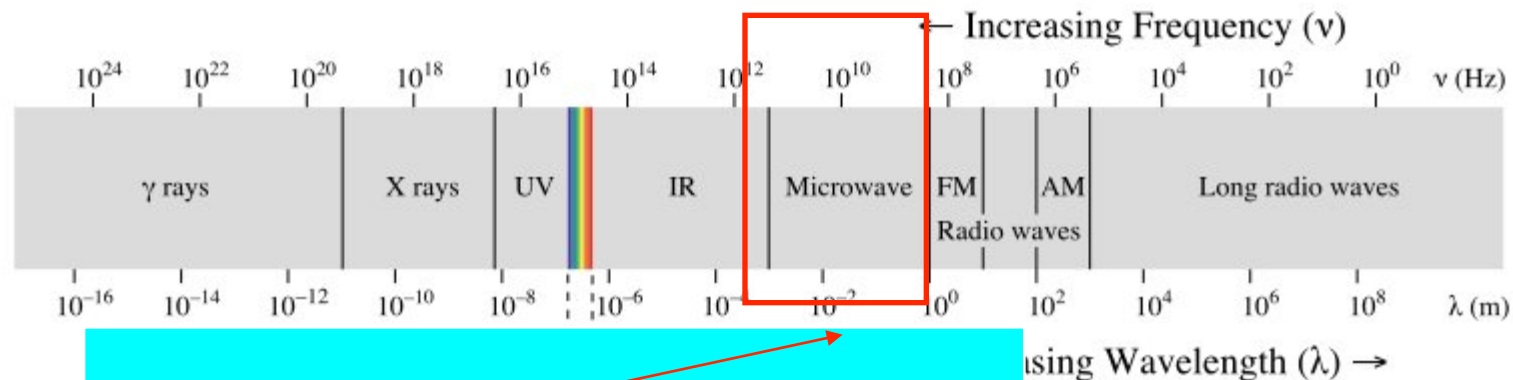
Slides For Discussion

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



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

Radiation Electromagnetic Spectrum



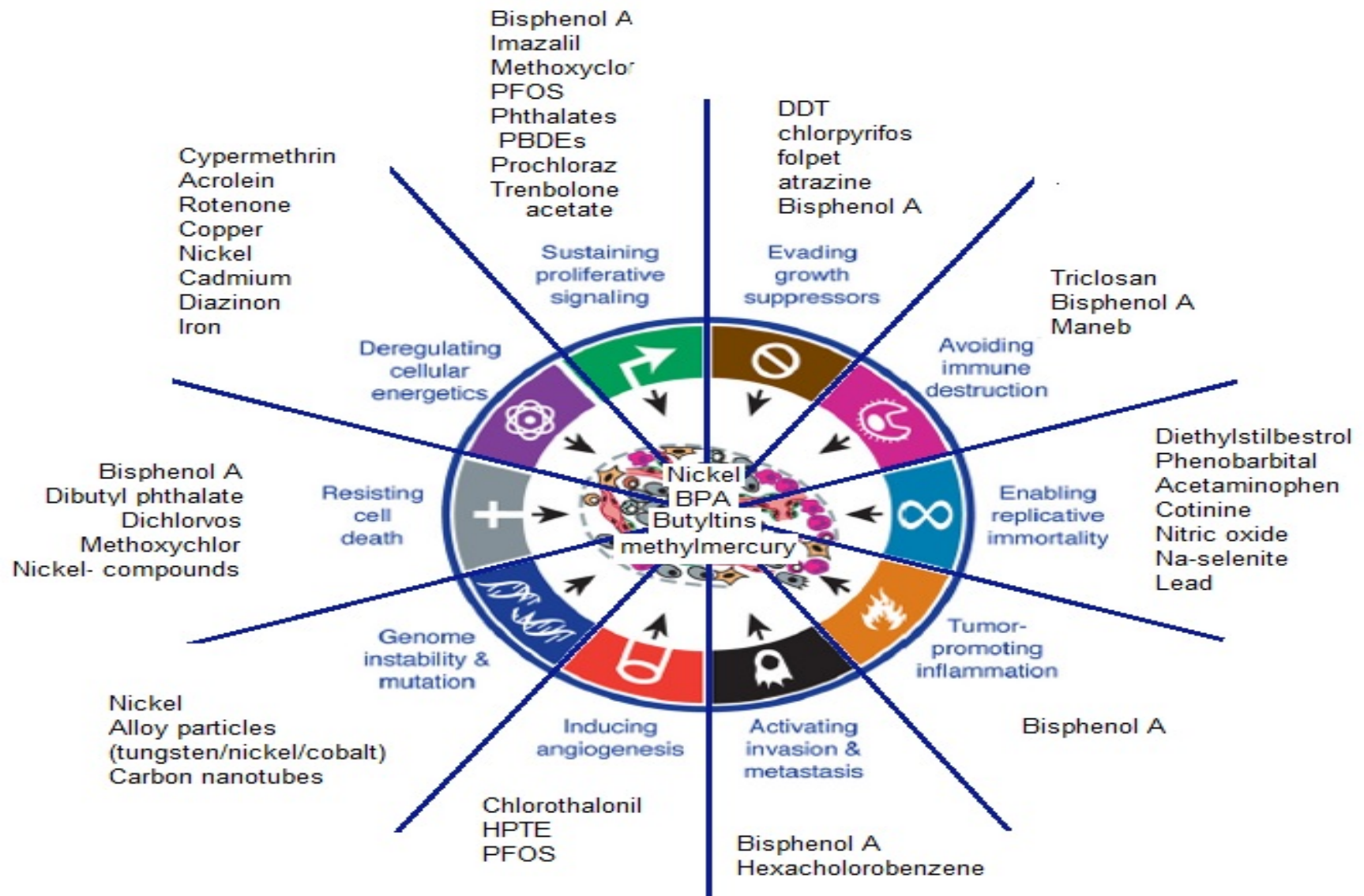
Microwaves:

- Ovens
- Cellphones (GSM-3G UMTS)
- Home Cordless phones
- Wi-Fi (WLAN)

Cellphones Emit
Pulsed Microwave
(non-ionizing)
radiation

copyright@ www.ehtrust.org permission
granted only for limited use with
attribution to Environmental Health
Trust copy to info@ehtrust.org
Do not take without permission

Low-dose Cumulative Synergies



Since 1997 Secondary Insurers do not cover health damages from wireless

Lloyds of London underwriters deny coverage for health damages from wireless devices

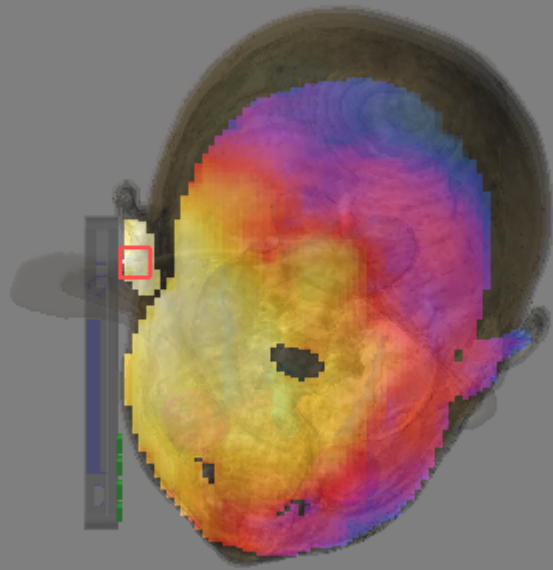
Swiss Re 2014 rates electromagnetic fields as one of the 6 top risks businesses face today, above things like Mad Cow Disease.

“Risk from dangers linked to EMF can be classified as an emergent risk”-- the same category once occupied by asbestos

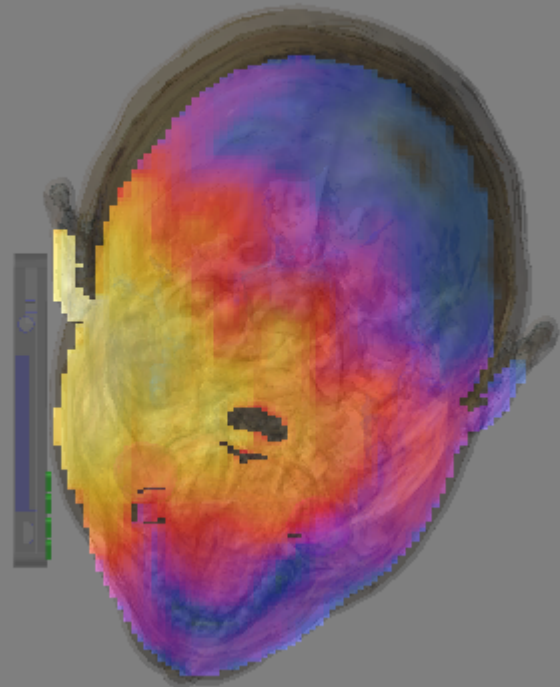
General Insurance Exclusions: Electromagnetic fields directly or indirectly arising out of, resulting from or contributed to by electromagnetic fields, electromagnetic radiation, electromagnetism, radio waves or noise.



Children Absorb Greater Microwave Radiation in Proportion to Adults



6 year old model

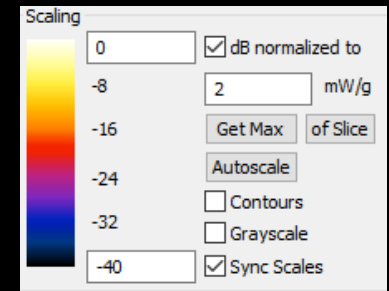
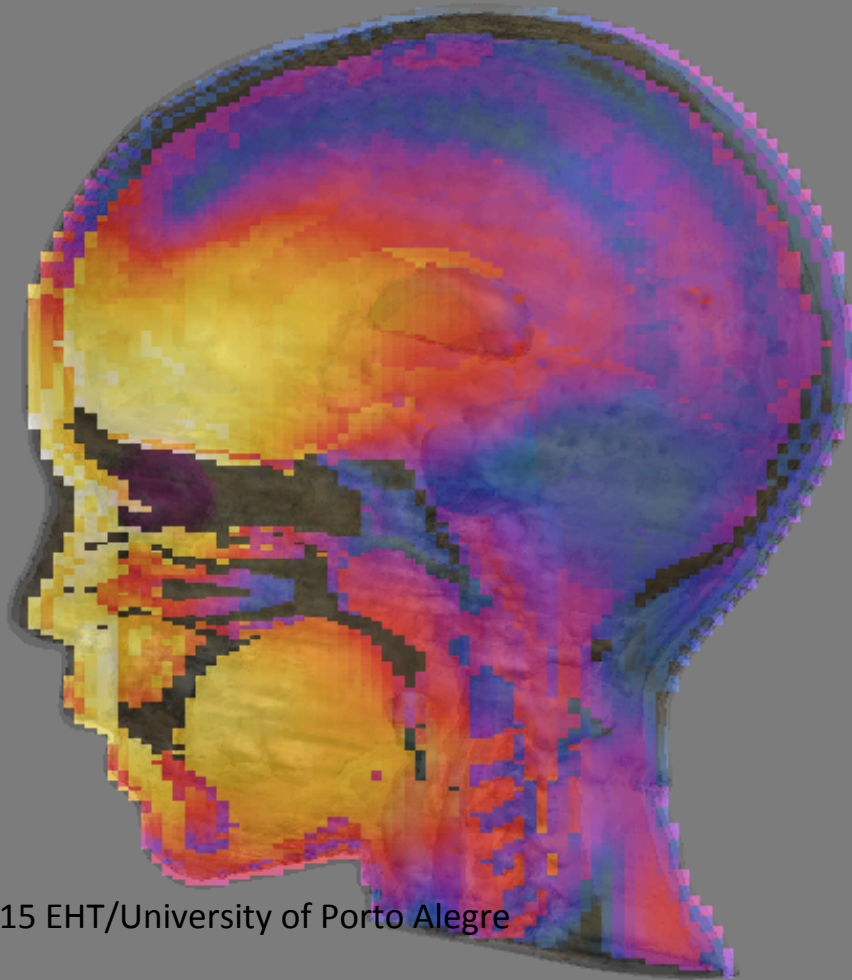


34 year old model

1g-psSAR (0 dB = 2mW/g, 50 dB scale
900 MHz. The delivered power to the cell phone 250 mW

Microwave Radiation into the 6 Year Old Child

From Virtual Reality Simulations



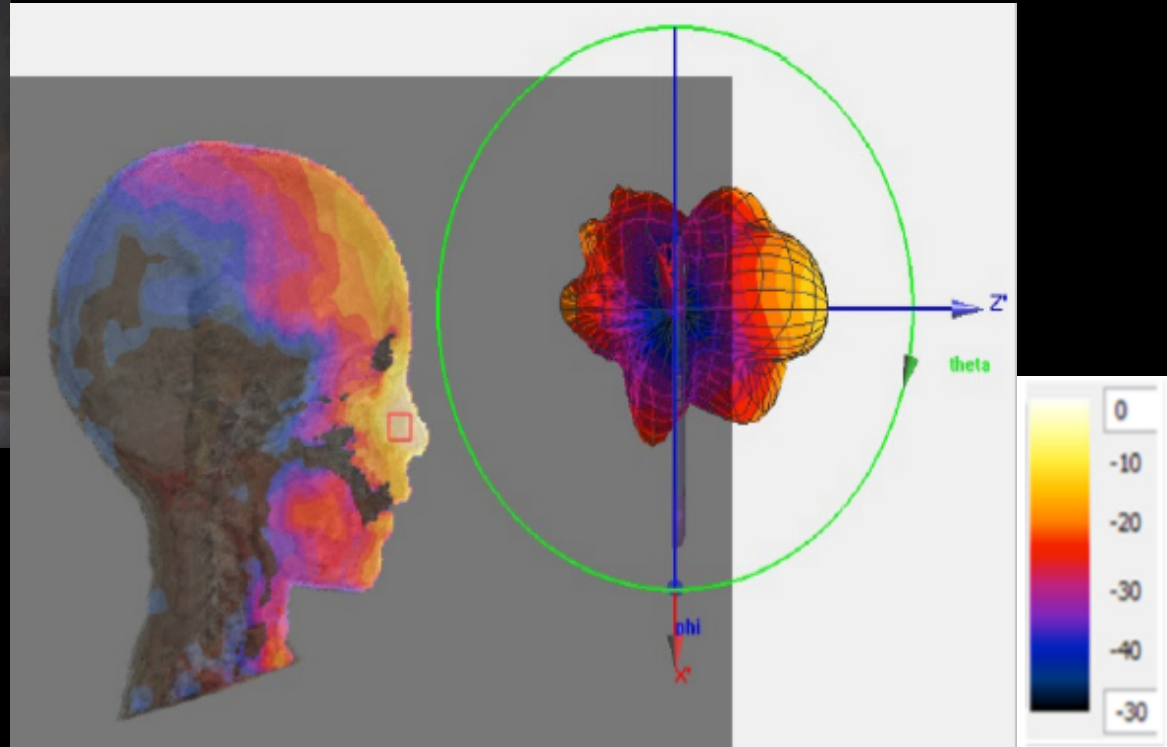
40dB color Scale.
Smartphone
placed in front of
the eyes as it
would be placed
using the
cardboard virtual
reality holder.

© 2015 EHT/University of Porto Alegre

SAR in 6 Year Old from 2.45 GHz Wi-Fi Tablet



Tablet at 150 mm (5.9 inches)
from eye lens



JULIANA BORGES FERREIRA, AND ALVARO AUGUSTO ALMEIDA DE SALLES (2015)

Fig. 7. Radiation pattern normalized to $0.0132 \text{ W/g} = 0 \text{ dB}$, with a 30 dB color scale, and SAR averaged over 1g cube of tissue.

Specific Absorption Rate (SAR) in the head of Tablet user's

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

10 WAYS TO HELP REDUCE YOUR EXPOSURE.

The BabySafe Project



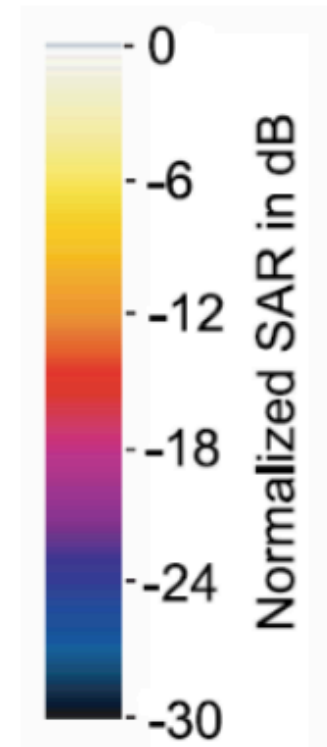
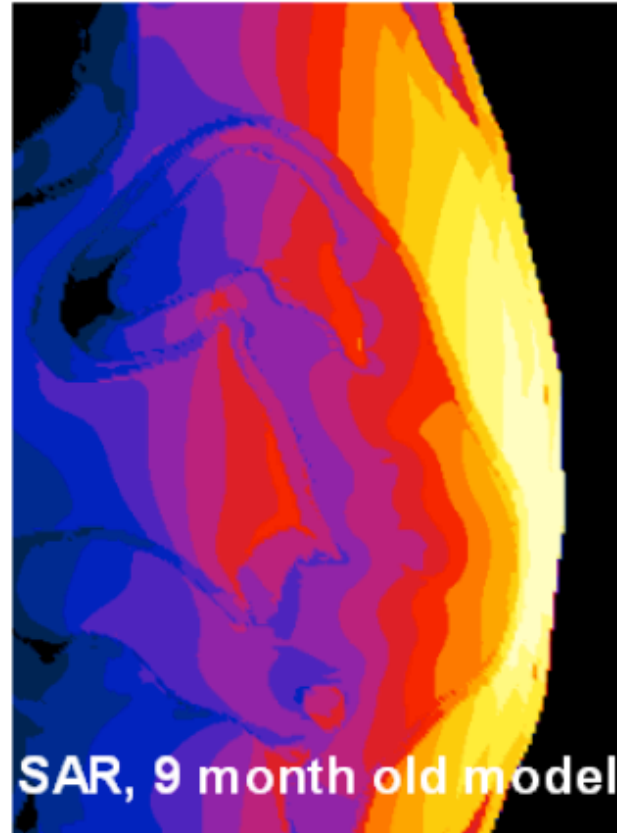
www.BabySafeProject.org
#KnowYourExposure

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

The BabySafe Project is signed by over 140 medical experts .

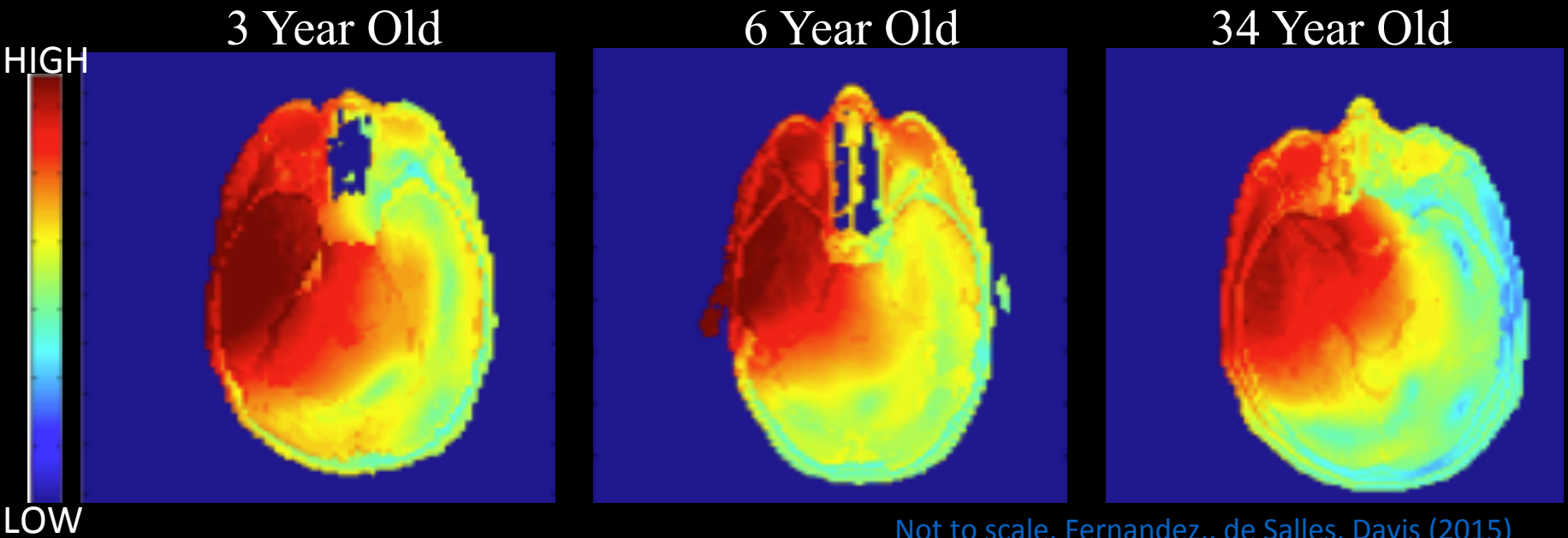
Greatest exposure occurs to fetal head/spinal cord

Normalized SAR when 7 and 9 month fetus exposed to a dipole antenna in front of abdomen



(courtesy Andreas Christ, IT'IS, 2013)

Children Receive Higher Doses of Cell Phone Radiation Than Adults

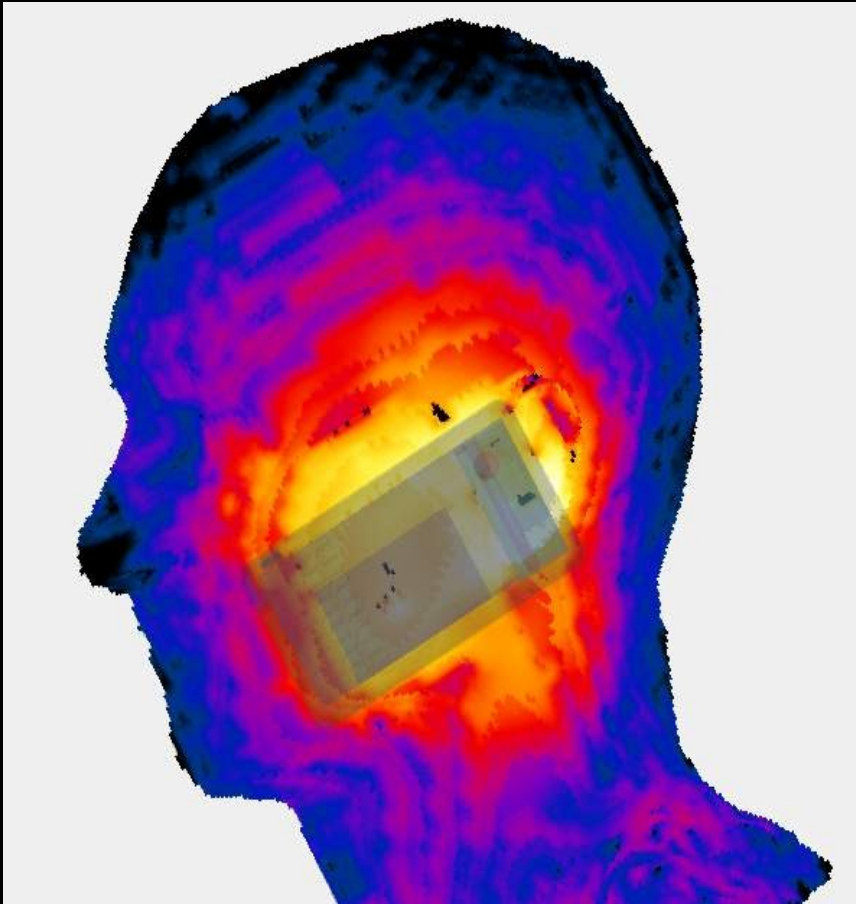


Not to scale. Fernandez,, de Salles, Davis (2015)

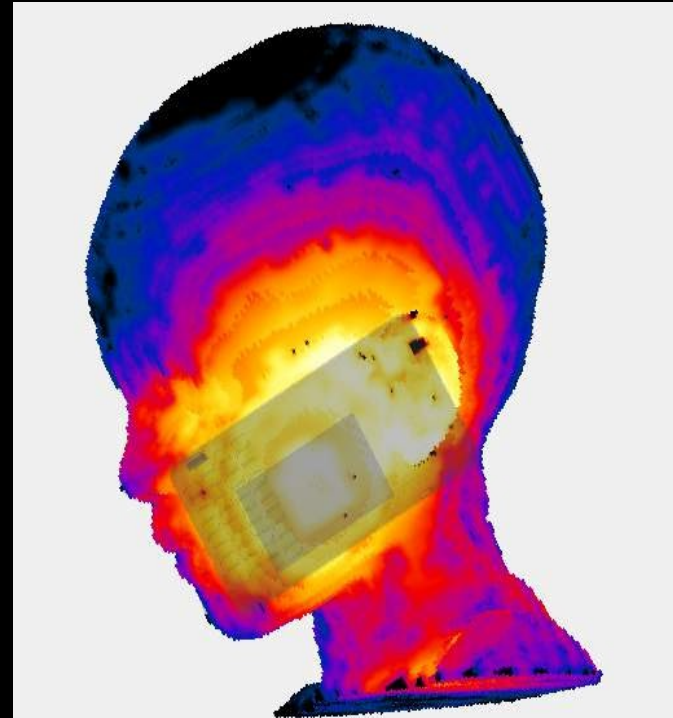
- Thinner skulls, Smaller heads (shorter distance to brain centers)
- Different dielectric properties (higher liquid content)
- Brains are less myelinated and still developing.

Children are More Vulnerable

34 Year Old Male



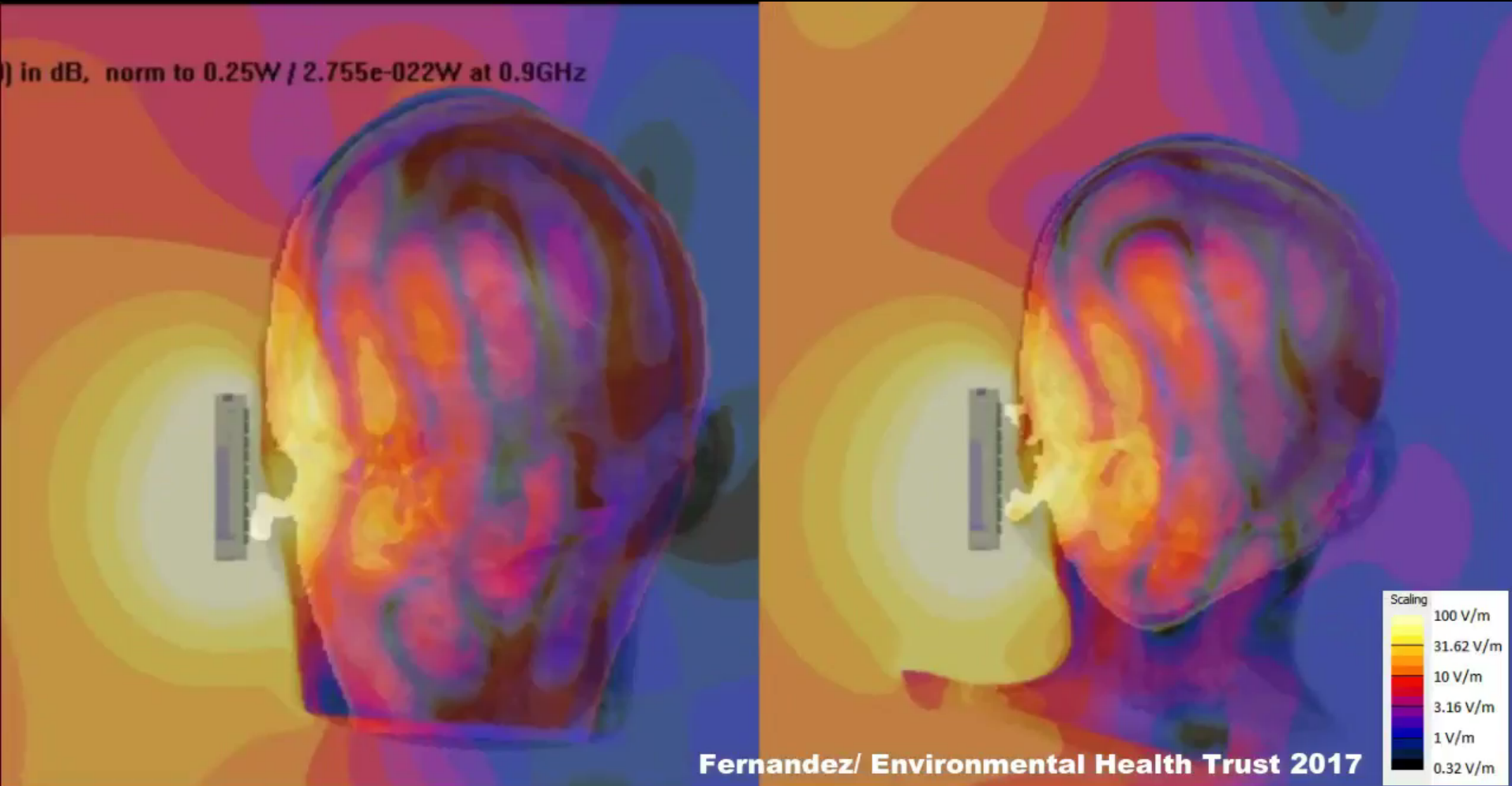
6 Year old



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

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

Cell Phone Radiation Penetrates The Brain

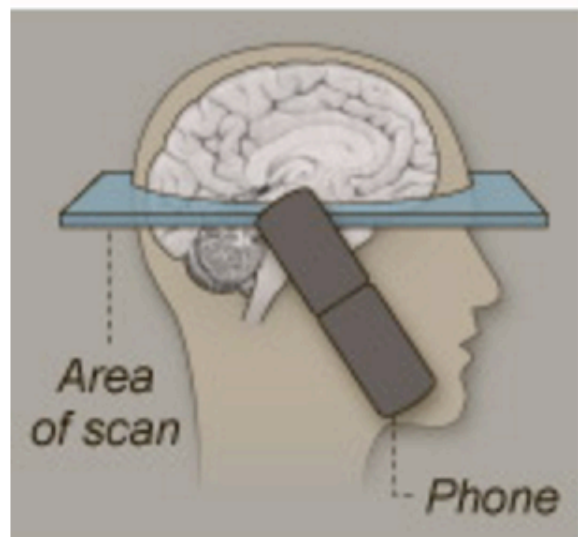


Adult Male

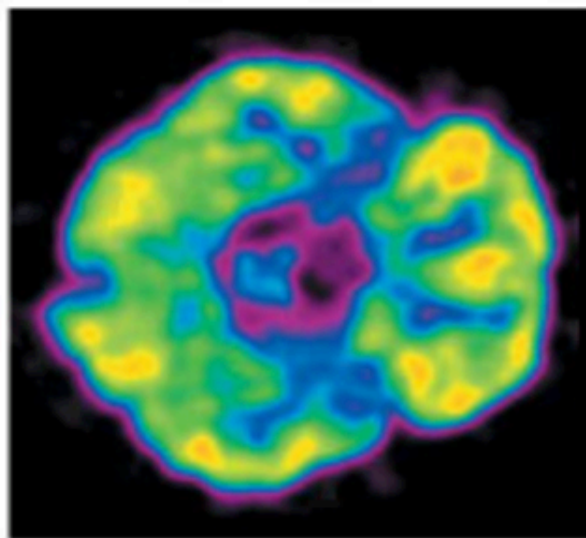
Six Year Old Child

50 min on Cell Phone Significantly Alters Glucose Metabolism (Volkow et al 2011, JAMA)

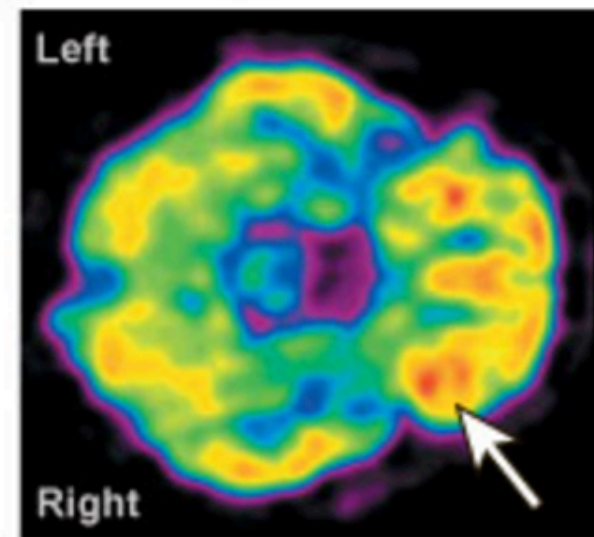
BRAIN SCAN



BOTH CELLPHONES OFF



RIGHT CELLPHONE ON



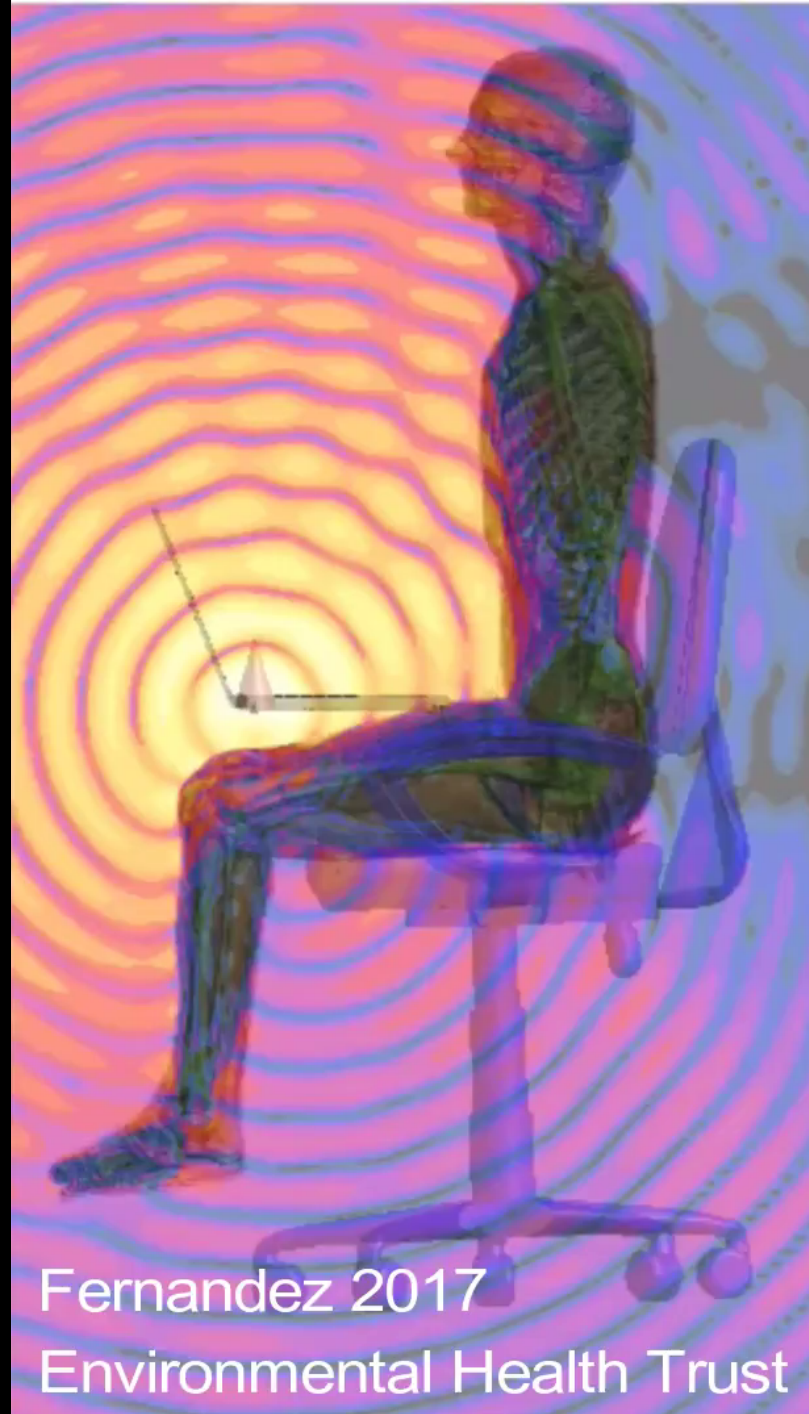
Rate of brain glucose metabolism LOW  HIGH

Source: JAMA

Note: images are from a single participant.

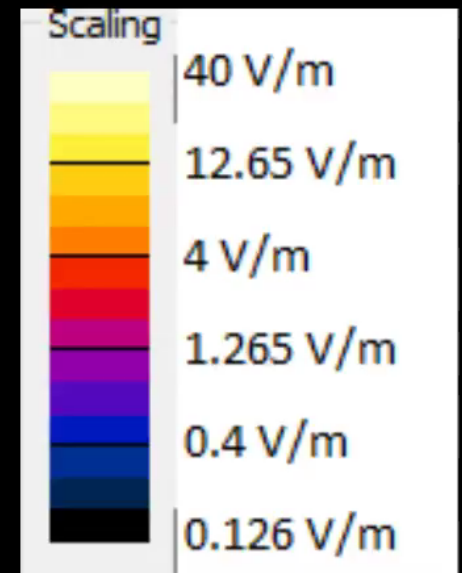
THE NEW YORK TIMES; IMAGES BY JAMA

Wi-Fi Radiation Penetrates the Body

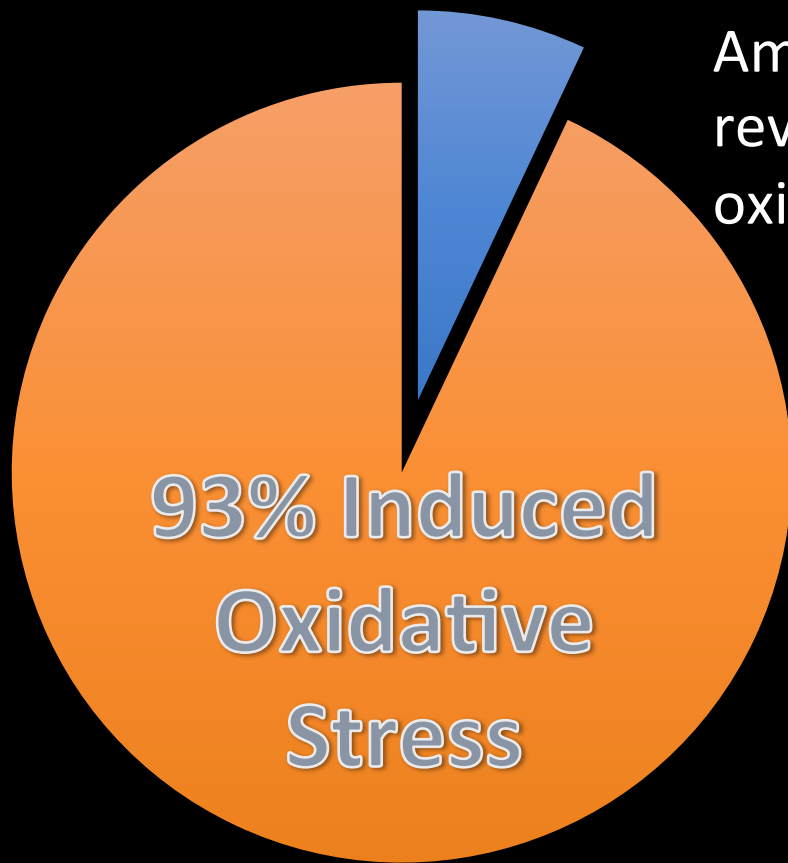


Fernandez 2017

Environmental Health Trust



Increased Oxidative Stress After Radiofrequency Radiation Exposure



Among 100 currently available peer-reviewed studies dealing with RFR and oxidative effects:

- 93% did induced oxidative stress
- 7% RFR did not induce oxidative stress



Real versus Simulated Mobile Phone Exposures in Experimental Studies

“Real mobile phone emissions are constantly and unpredictably varying and thus are very different from simulated emissions which employ fixed parameters and no variability. “

“This variability is an important parameter that makes real emissions more bioactive”

“Living organisms seem to have decreased defense against environmental stressors of high variability “

[Dimitris J. Panagopoulos, Olle Johansson, and George L. Carlo, Biomed Research International \(2015\)](#)



World Wide Precautionary Action



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



Belgium: Banned cell phones for children.



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



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

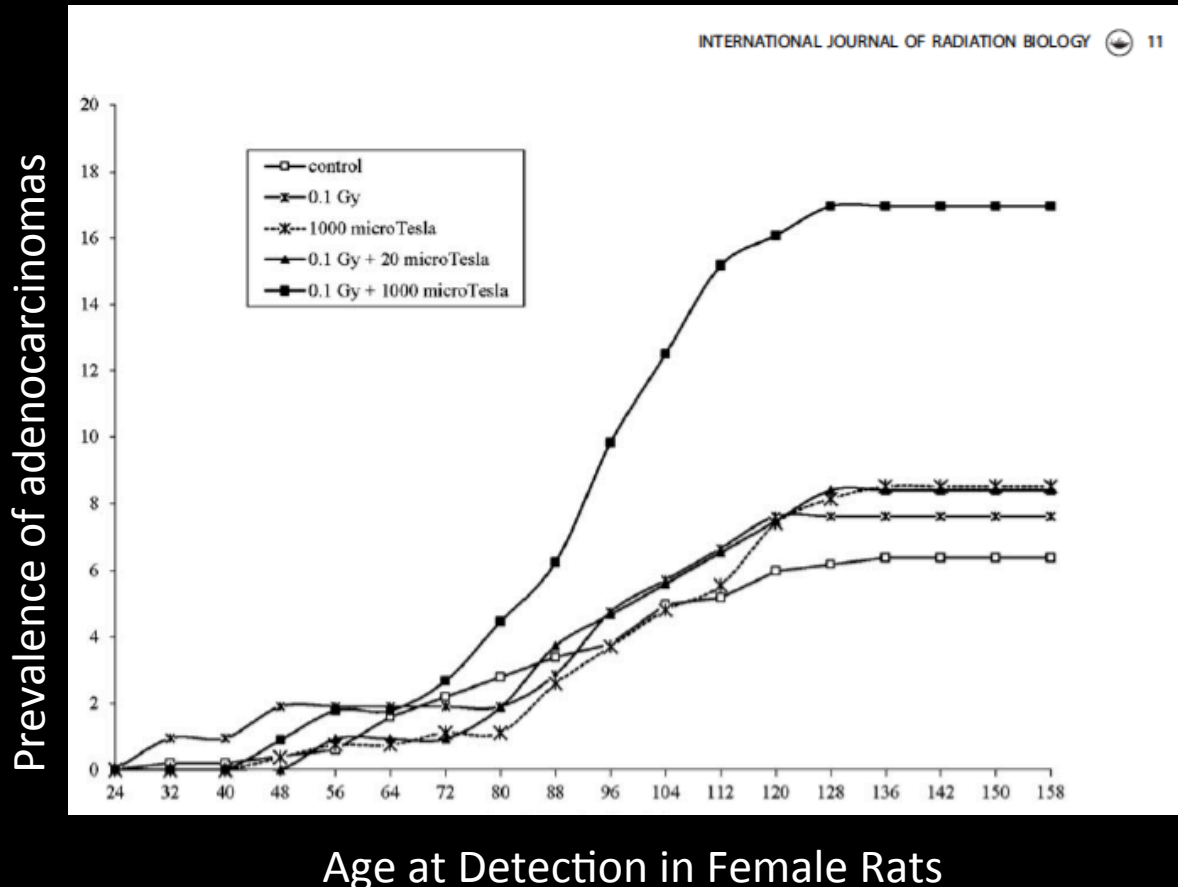


UK, Switzerland, Australia, Germany, Canada: Health agencies recommend reduced cell phone exposures.



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

In lifetime cancer study EMF creates synergistic effects with ionizing radiation



650 Exposed / 1,001 controls

- Lifespan exposure from in Utero
- 50 Hz EMF (200 mG or 10 G)
- One time dose 0.1Gy at 6 wk

Results = Increased

- mammary adenocarcinomas (both sexes)
- incidence of heart malignant schwannomas (males)
- hematopoietic neoplasias [leukemia and lymphoma] in males treated at 1,000 μ T plus 0.1 Gy.

(Soffritti et al., 2016)

“These results call for a reevaluation of the safety of non-ionizing radiation.”

Relatively Greater Absorption Into Faster Growing Brain Tissues of Children

- Thinner skulls
- Smaller heads (shorter distance to brain centers)
- Different dielectric properties (higher liquid content)
- Their brains are less myelinated and still developing.

“The average RF radiation energy deposition for children exposed to mobile phone RF is two times higher in the brain and 10 times higher in the bone marrow of the skull compared with mobile phone use by adults.”

- International Agency for the Research on Cancer Monograph on Radio Frequency Fields as a Class 2 B Carcinogen

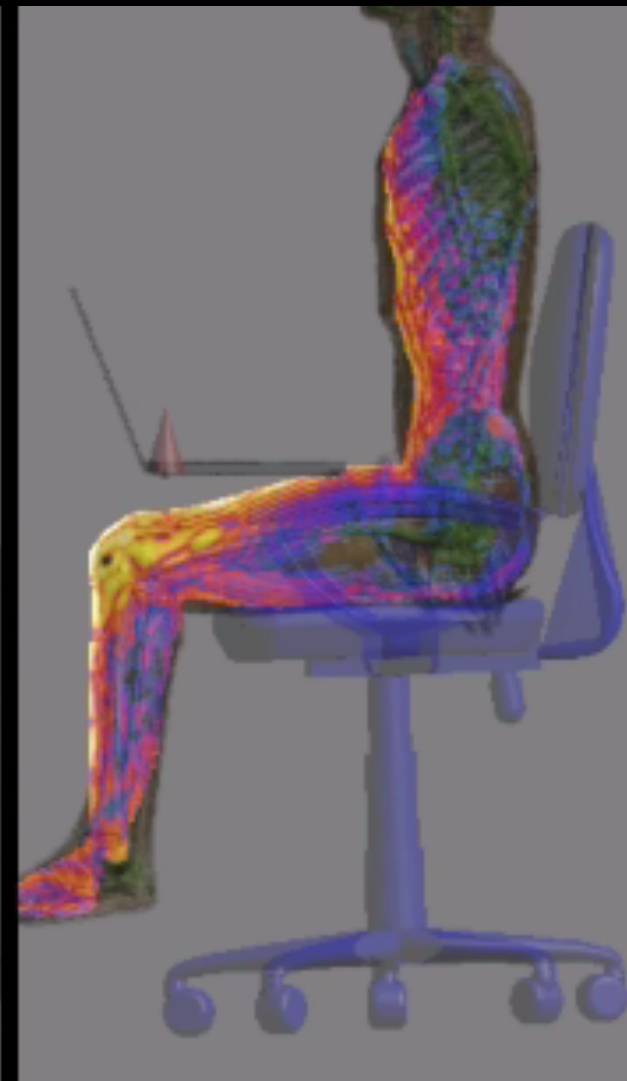
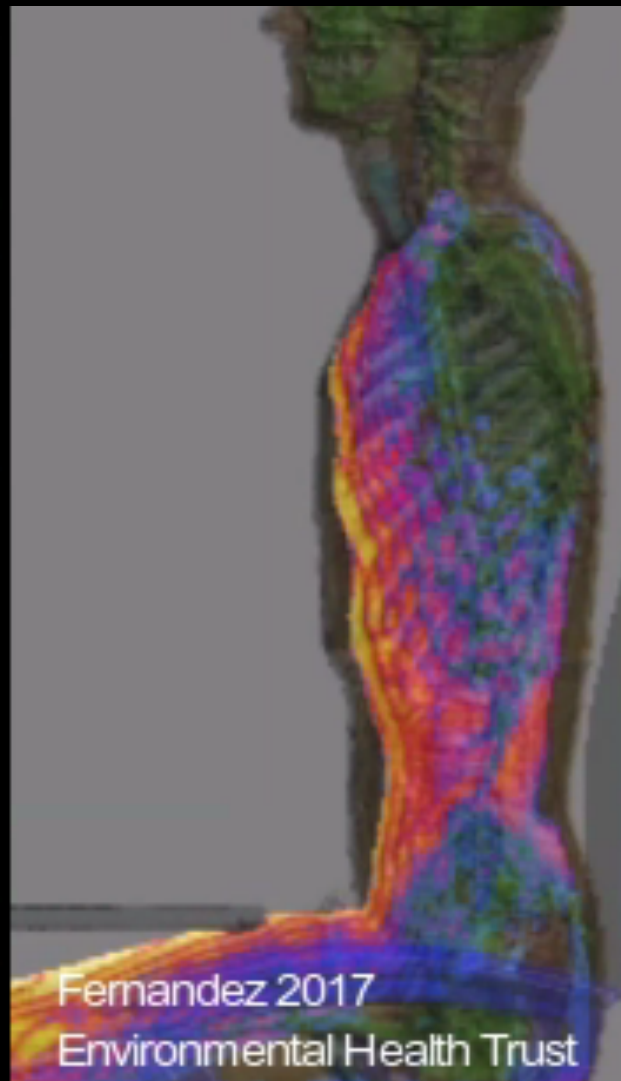
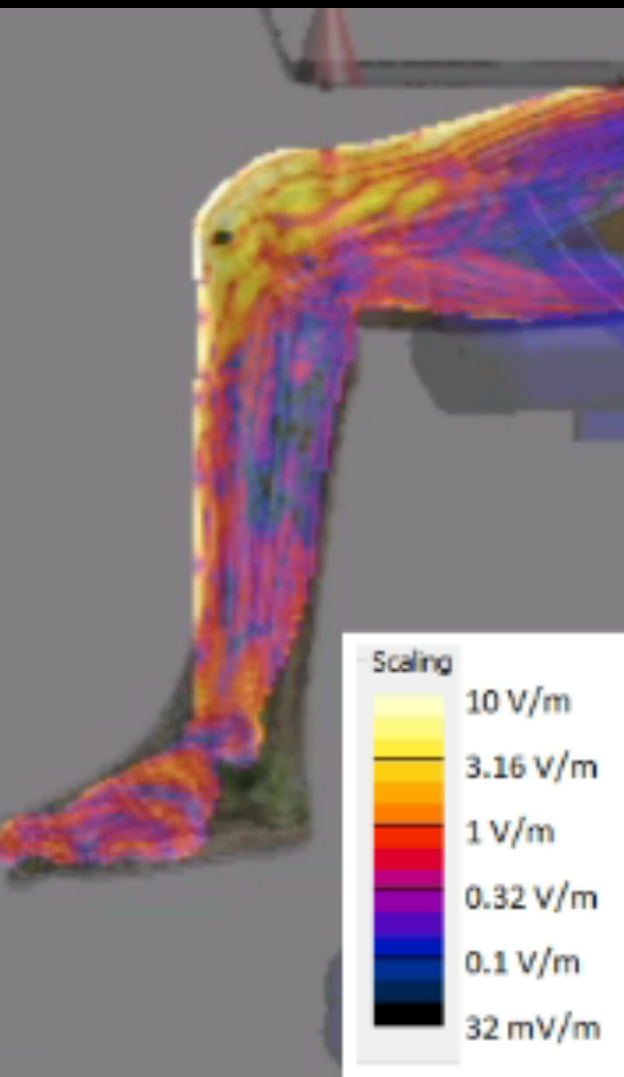


Out of date

“Radiofrequency energy, unlike ionizing radiation, does not cause DNA damage that can lead to cancer. Its only consistently observed biological effect in humans is tissue heating. In animal studies, it has not been found to cause cancer or to enhance the cancer-causing effects of known chemical carcinogens.” [references studies published in 2006-2008]

[NCI Factsheet](#)

Wi-Fi Radiation Penetrates The Body



Synergistic effects of electromagnetic fields and chemicals

Medical applications to treat cancer are relying on interactions

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

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

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



United States

Los Angeles Public Schools: Cell Towers on Schools Banned

**Maryland State Children and Environmental Health protection
Advisory Council :** Reduce radiofrequency in classrooms.
Looking at Cell Towers now.

Walnut California: Parents and Homeowners had the City
Council pass a “Setback” requirement.

California: Cell Towers are taken down near schools.

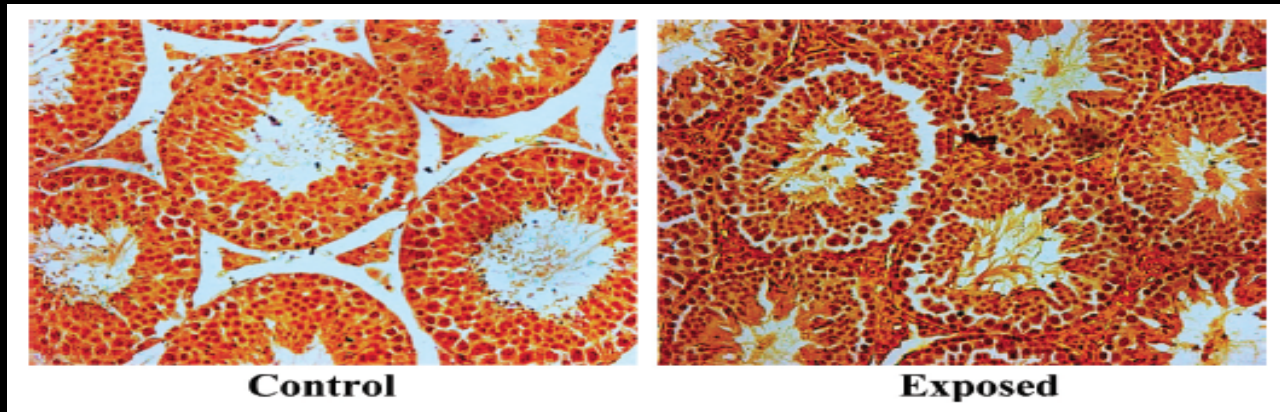
Montgomery Countywide group to stop small cells in yards.

Cell Phones and Wi-Fi Devices Expose Your Body to Radiation

Fernandez 2016

Microwave radiation impairs male reproduction

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



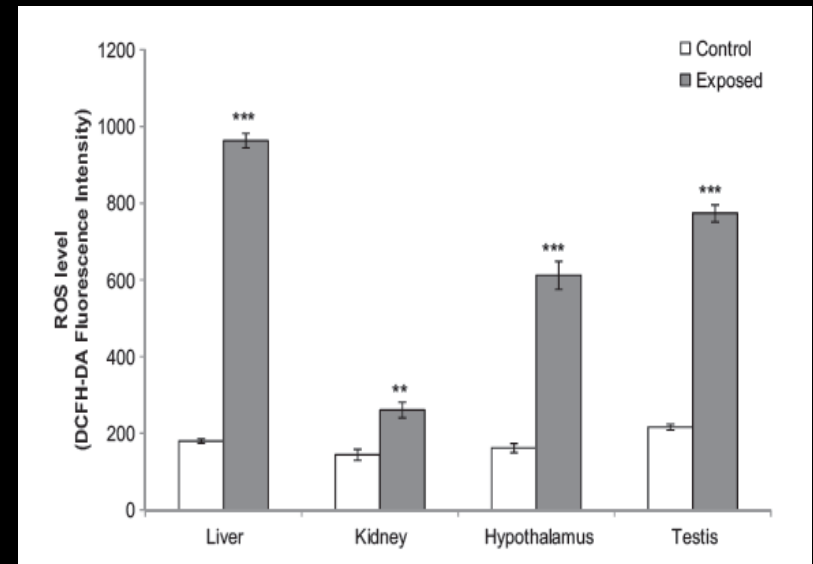
[Shahin et al. 2014](#)

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

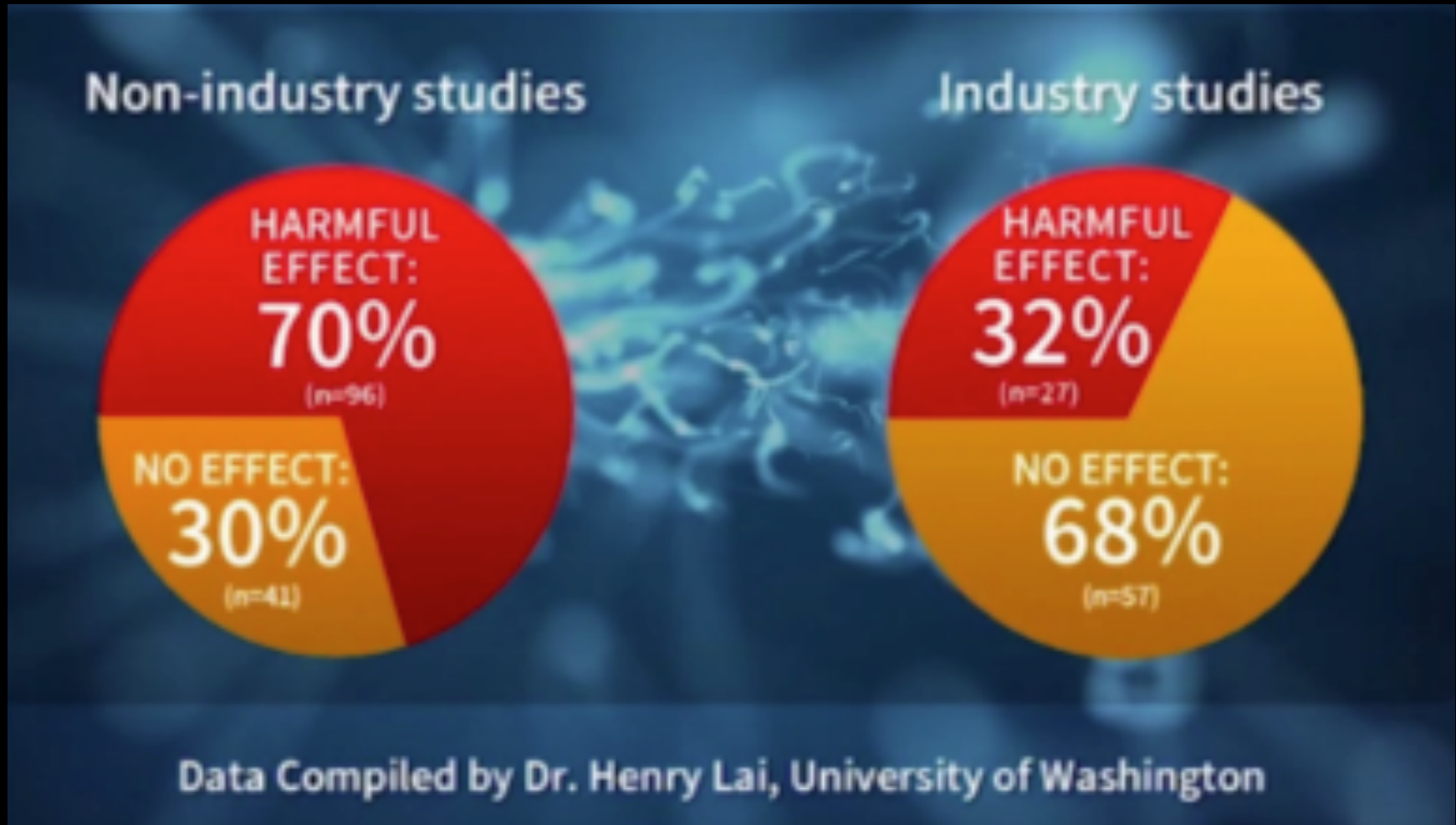
↑ ROS in liver, kidney, hypothalamus, and
testis

↑ RNS, lipid peroxidation

↑ Antioxidant capacity, % viable sperm



Industry Funded Studies Find Few Effects



Huss 2007 Valentini 2011



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

Purpose: To identify environmental hazards that may affect children's health and recommend solutions/guidelines to reduce and eliminate hazards.

Council is considering the safety risks of cell towers now.

“The Council recommends limiting exposures as much as feasibly practical.”

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

The United States Department of Health and Human Services to formally petition the FCC to ensure the FCC exposure limit is protective of children’s health and that it relies on current science”.

Myth:

Cell Tower Radiation is like the Sun

Fact:

Cell tower radiation is man made -
polarized- radiation.

Information carrying waves are not
sunlight.

Cell Phone Calls and ADHD

Potential of Lead Toxicity in Korean Children



“combined or cooperative toxic action of RF and lead on the developing brain.”

Byun et al. 2013 PLoS

2,422 children - 27 schools - 10 Korean cities - 2 y follow up
ADHD symptoms associated with voice calls, *only among children with higher blood lead values ($>2.35\mu\text{g/dL}$; comparable to U.S. BLLs)*

[Byun et al. 2013](#)

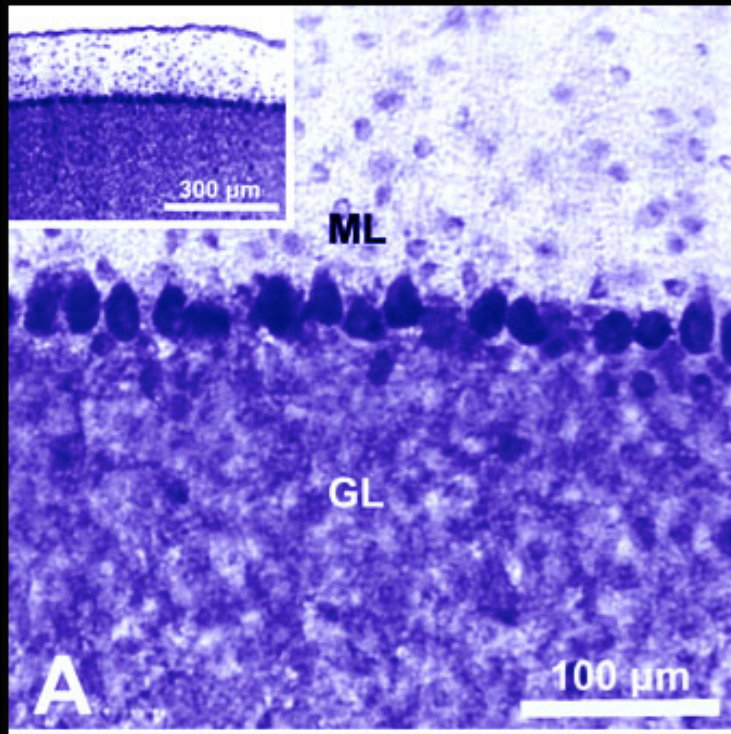
Cross-sectional case control study on genetic damage in individuals living near cell towers. (Ghandi 2014)

- Genetic damage parameters of DNA were significantly elevated.

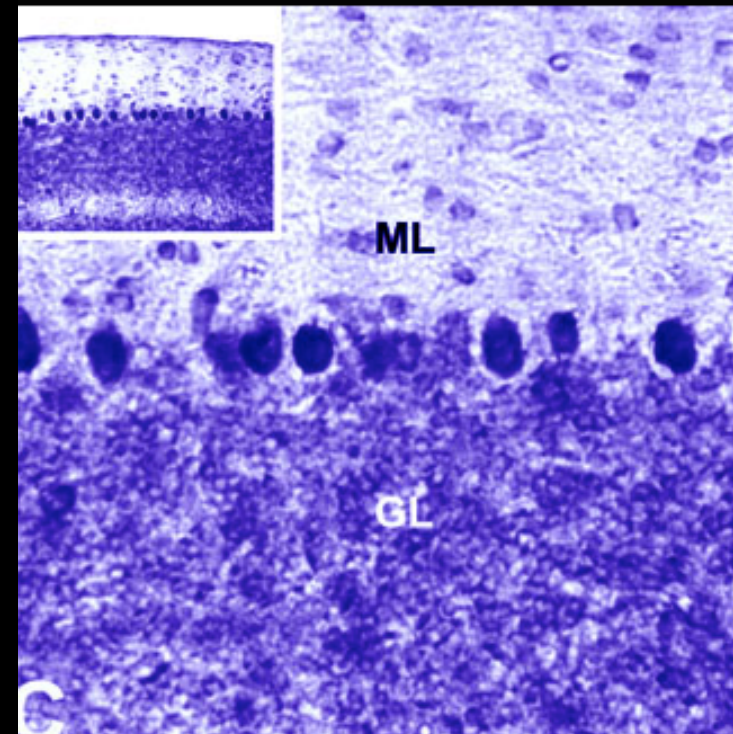
“The genetic damage evident in the participants of this study needs to be addressed against future disease-risk, which in addition to neurodegenerative disorders, may lead to cancer.”

900 MHz EMF induced Purkinje cell loss in the cerebellum of adult female rats

Control



Exposed



Conclusion: One month exposure /1 hour a day to Cell Phone radiation decreased Purkinje cell numbers in the female rat brain (cerebellum). Arrow heads show cell loss in the Purkinje cell layer. Cresyl violet staining. Sonmez OF, Odaci E, Bas O, Kaplan S., 2010

Cell Towers on School Grounds

Maintenance Crews in Trucks
Hazardous Materials on Site
Telecommunications Equipment
Microwave Radiation Exposure



Daly Elementary School Cell Tower

Fact

Cell towers can be hazardous.



Cell tower fire
Rocky River High School , Ohio , February 2017

Fact

Cell towers emit radiation.

Continuous full body .





India

2012 Exposure Limits at 1/10 of ICNIRP

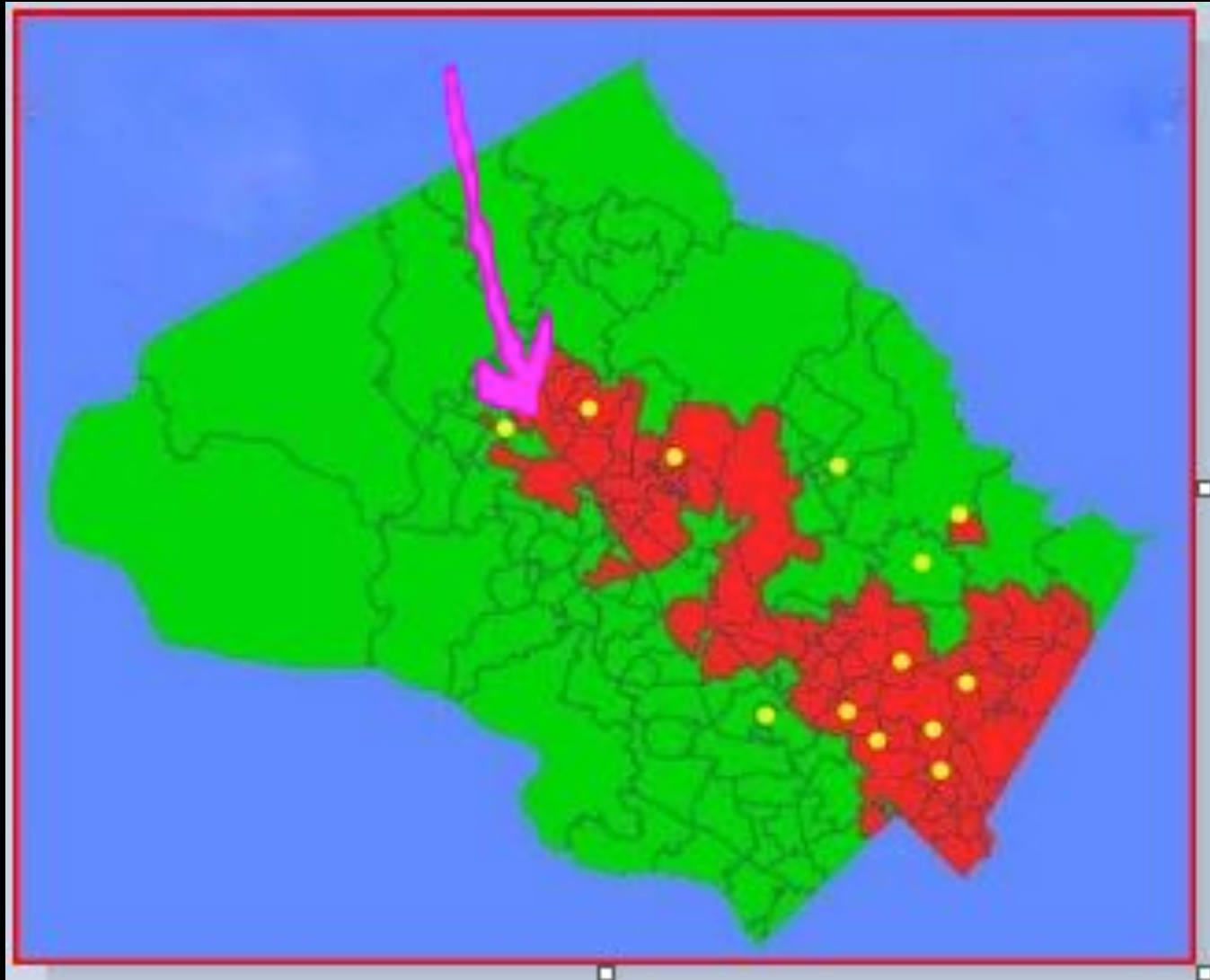
2013: Supreme Court of India upheld the High Court of the State of Rajasthan decision to remove all cell towers from the vicinity of schools, hospitals and playgrounds because of radiation “hazardous to life.”

Zilla Parishad: removal of all cellphone towers near schools

Municipal Corporation of Greater Mumbai, no cell towers on playgrounds, recreational grounds, gardens and parks.

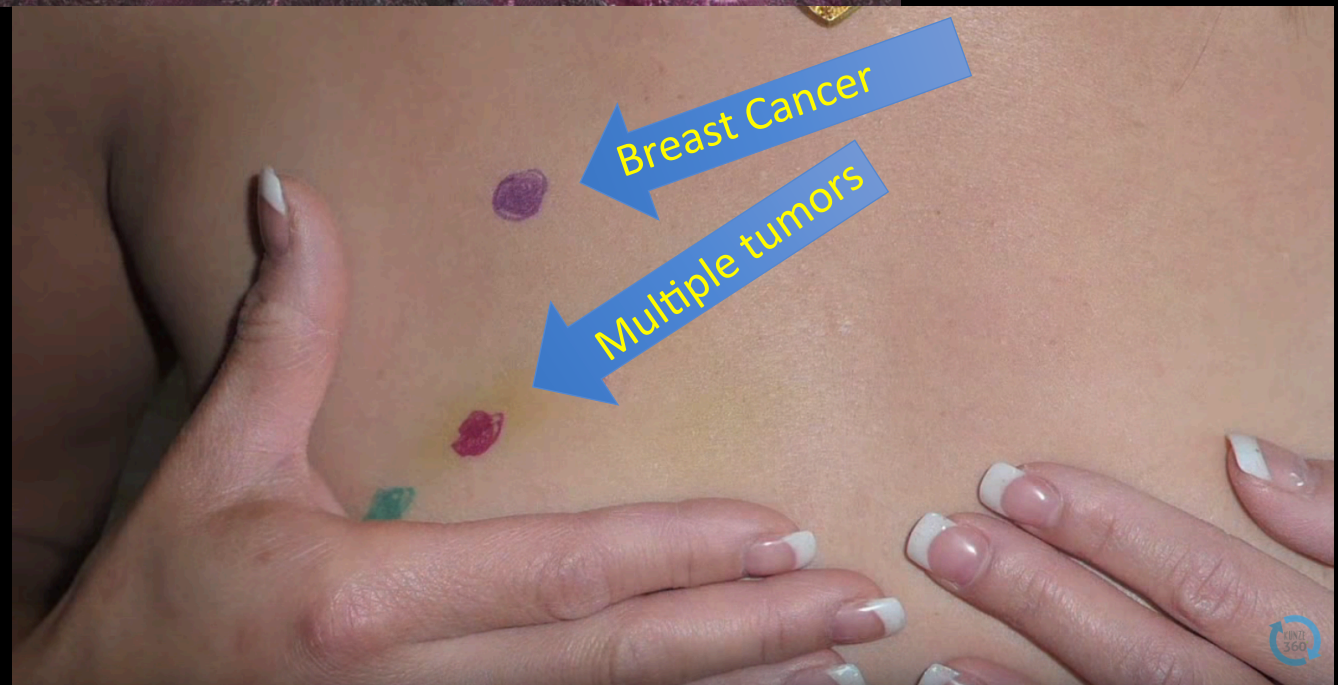
Juhi Chawla Received the Indira Gandhi Award for Cell Tower Awareness

Montgomery County MD Cell towers are more often placed on schools with higher minority/higher poverty rates.



Red = Higher Poverty/Minority Areas

Breast Cancers From Cell Phone in Bra



Published Case Reports
No Genetic Predisp
No Risk Factors
Unusual Tumors
Multifocal
Directly at antennae
location