#### Impacts on Children of Wireless Radiation

Devra Davis PhD, MPH
President Environmental Health Trust
October 16, 2021

17th Educational Seminar: The Dynamics of the Impact of the Environment on the Child: Developments, Emerging Risks and Prevention Cyprus Pediatric Society



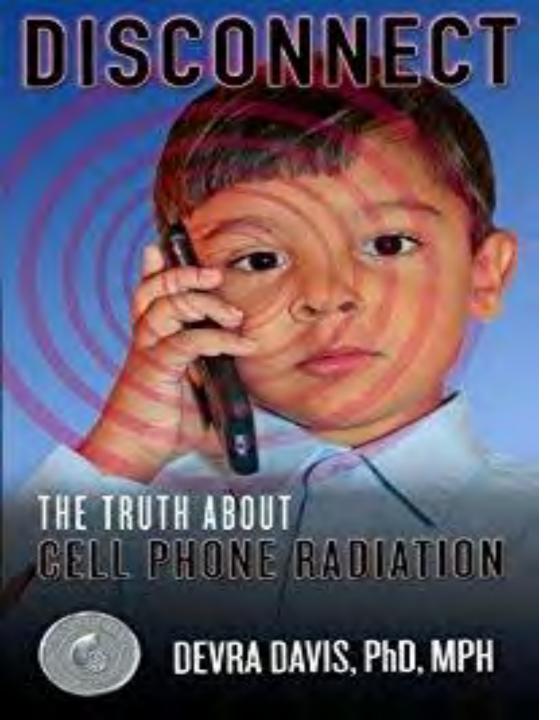




#### Devra Davis, PhD, MPH

- Founding Director Board on Environmental Studies and Toxicology, National Research Council, National Academy of Sciences 1983-93 (group advising bans on indoor smoking)
- Member of Team Awarded Nobel Peace Prize with Al Gore as a Lead Author of the Intergovernmental Panel on Climate Change, 2007
- Bi-partisan Senate confirmation as Presidential Appointee 1994-99, numerous testimonies to U.S. Congress
- Advisor to Centers for Disease Control, World Health Organization, World Bank,
   London School of Hygiene and Tropical Medicine
- More than 220 technical publications, 11 edited monographs, 3 popular books
- University of Chicago, 1967-71, PhD in Science Studies, Johns Hopkins University, 1981-82, MPH





- Decades of research documented serious biological effects, 2010
- Government limits
   are quarter of a century old
   and not protective, 2021



# Types of Evidence Relevant to Establishing Biological Impacts of EMF

Exposure models with computer simulations

Experiments with cell cultures and whole animals

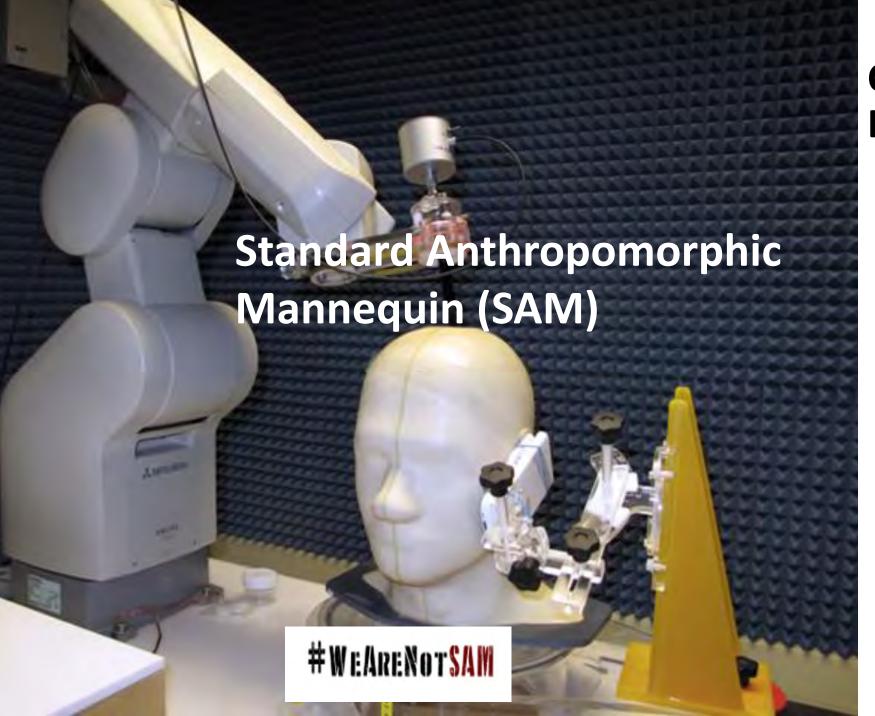
Human clinical & epidemiological studies:

Case reports

Case control studies

- Prospective studies
- Cross sectional analyses
- •Time Trends





## Cell Phone Radiation Limits set in 1996

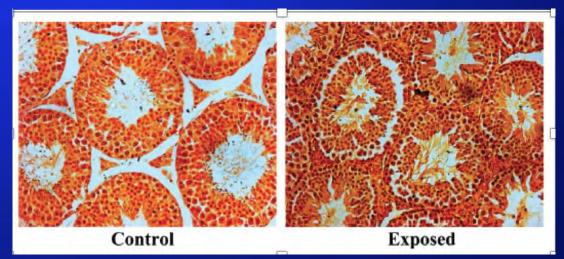
- Account only for short term heating effects.
- Tests use a large male plastic dummy NOT relevant to children or smaller adults.
- Developing brain/body not considered
- No consideration of environmental impacts



# Fernandez 2018

# RF Phone Radiation Exposes Male Reproductive System to Highest Exposures

"It's best to keep your cell phone as far from the testes as you can,"
- Cleveland Clinic, 2016



#### Children's Greater Absorption of Cell Phone Microwaves

Thinner skulls, smaller heads/ears and higher dialectical properties result in proportionately higher exposures.

(Gandhi 2012, Christ 2010, WHO/IARC 2013, Mohammed 2017, Fernandez 2015,2018)



RF energy deposition is 2 x in brain and 10x higher in skull bone marrow skull

in children, compared

to adults.

American Academy
 Pediatrics Letter to the FCC
 (2012)

Fernandez 2018:

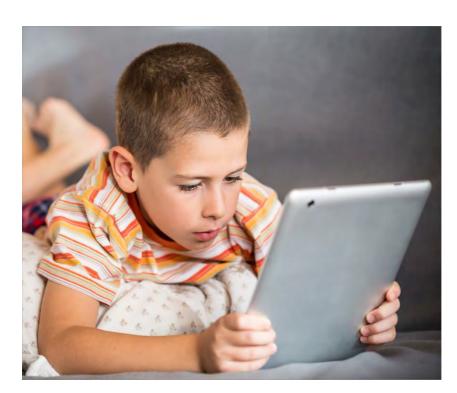
Younger models absorb proportionally more radiation in eyes and brain – gray matter, cerebellum and hippocampus.

- Eyes 2 to 5 fold higher
- Up to 30 fold greater hippocampus

Yellow = Highest intensity of absorption rate.



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



Tablet at 150 mm (5.9 inches) from eye lens

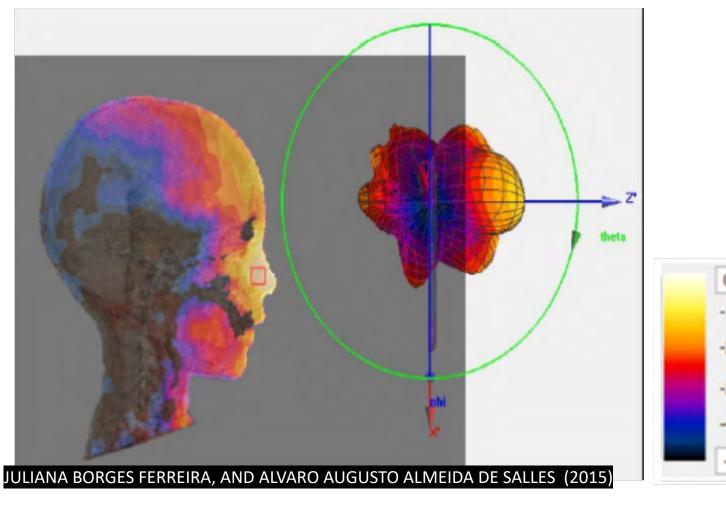


Fig. 7. Radiation pattern normalized to 0.0132 W/g = 0 dB, with a 30 dB color scale, and SAR averaged over 1g cube tissue.

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



#### Cell Phones Violate Radiation Limits When Phones Are in Body

**Contact Positions** 

French Government Tests found the majority of tested phones exceeded limits in 2016.

#### **Phonegate Alerte**

Manufacturer separation distance	O mm  Body Contact simulation
1.05 w/kg	7.42 W/kg
0.366 w/kg	7.18 W/kg
0.934 w/kg	6.80 W/kg
0.86 w/kg	6.57 W/kg
1.11 w/kg	3.11 W/kg
	separation distance 1.05 w/kg 0.366 w/kg 0.934 w/kg 0.86 w/kg

#### IEEE Access

Received February 16, 2019, accepted March 12, 2019, date of current version April 18, 2019.

Digital Object Identifier 10.1109/ACCESS.2019.2906017

#### Microwave Emissions From Cell Phones Exceed Safety Limits in Europe and the US When Touching the Body

OM P. GANDHI<sup>©</sup> (Life Fellow, IEEE)
Department of Electrical and Computer Engineering. The University of Utah, Salt Lake City, UT 84112, USA e-mail: gandhi@ecc.utah.edu





#### **2021 Swiss Government Expert Report**

Evidence for oxidative stress caused by electromagnetic fields: A summary of animal and cell experiments related to health effects.

"In summary, the majority of the animal and more than half of the cell studies provided evidence of increased oxidative stress caused by RF-EMF or ELF-MF."

"In addition, the studies show that **very young and elderly individuals can react less efficiently to oxidative stress induced by EMF,** which of course also applies to other stressors that cause oxidative stress."



# Biolitiative 2012

A Rationale for Biologically-based Exposure Standards for Low-Intensity Electromagnetic Radiation

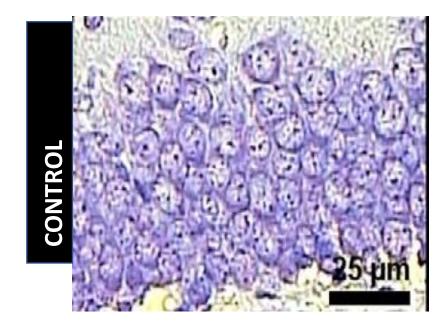


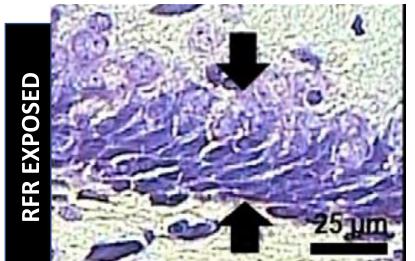
Numerous Older Studies Showing Brain Damage

- Destructive and repair processes in the hippocampus after prolonged exposure to nonionizing microwave radiation
  - V. S. Belokrinitskii
  - <u>Bulletin of Experimental Biology and</u>
     <u>Medicine</u> volume 93, 337–340 (1982)



## Wireless Radiation Impacts the Developing Brain, Odaci, Bas & Kaplan et al, 2008





- Decreased and damaged brain cells in animals exposed as adults and prenatally
- (Suleyman et al, 2016, Sonmez et a 2010, Bas et al.2009, 2009)
- Altered brain activity NIH (Volkow et al. 2011).
- Decreased memory in teens (Foerster et al. 2018).
- Decreased memory and hyperactivity after prenatal exposure- Yale (Aldad et al., 2011).
- Behavioral problems after pre/post natal -University of California School of Public Health

(Divan et al., 2008, 2012).

Hyperactivity/inattention problems in child after prenatal exposure

(Birks et al., 2017)

# Wireless Radiation 2400 MHz Damages Rodent Brain Hasan et al 2021

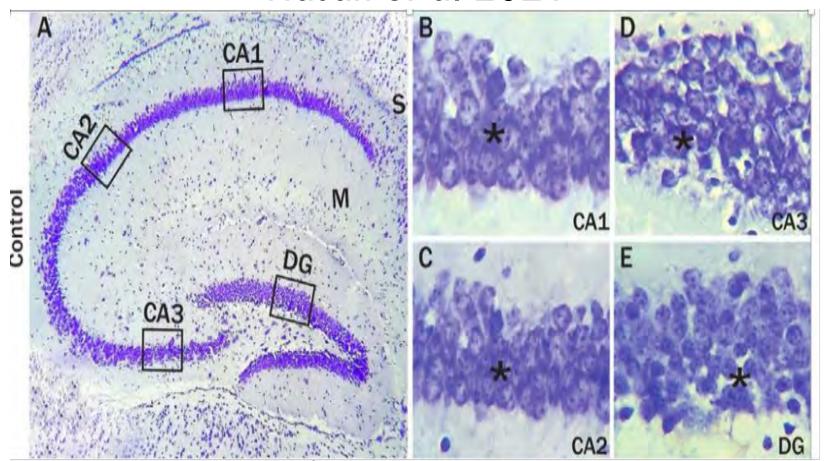


Fig. 3. Cresyl violet stained sections hippocampus of control "Effect of 2400 MHz mobile phone radiation exposure on the behavior and hippocampus morphology in Swiss mouse model" 8/25/2021

#### Wireless Radiation 2400 MHz Damages Rodent Brain

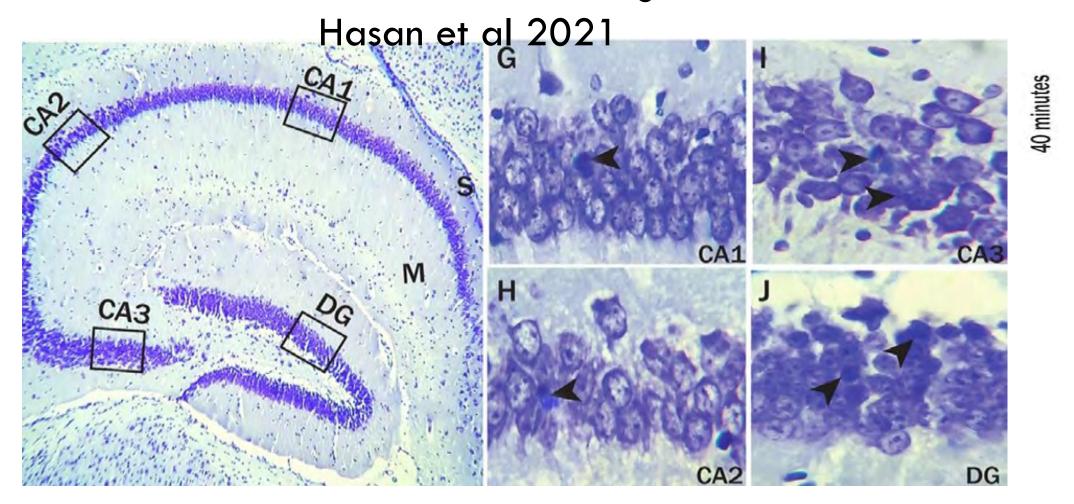


Fig. 3. Cresyl violet stained sections hippocampus of Exposed at 40 minutes "Effect of 2400 MHz mobile phone radiation exposure on the behavior and hippocampus morphology in Swiss mouse model" 8/25/2021

# Wireless Radiation 2400 MHz Damages Rodent Brain Hasan et al 2021

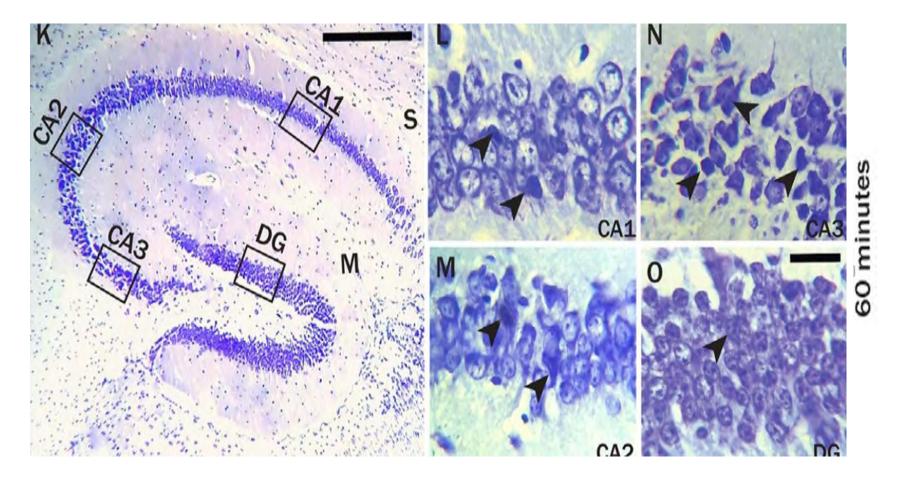
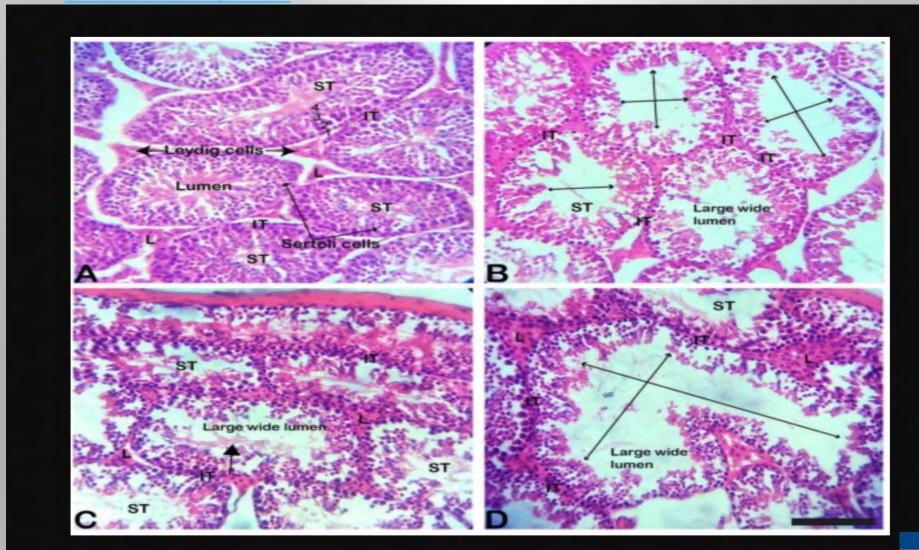


Fig. 3. Cresyl violet stained sections hippocampus of Exposed at 60 Minutes "Effect of 2400 MHz mobile phone radiation exposure on the behavior and hippocampus morphology in Swiss mouse model" 8/25/2021

#### Damage to Testis from 4G Mobile Phone Radiation

(Hasan et al., 2021

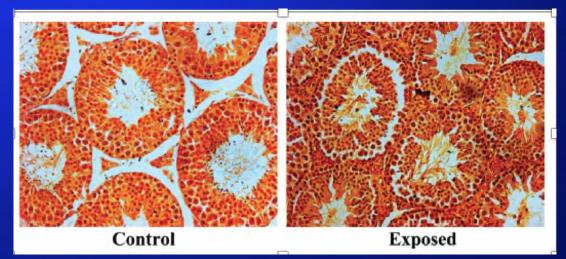


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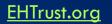


#### RF Below Safety Limits Promotes Tumors

Mice: 24/7 RF Exposure, In Utero (A Replication Study)



- Higher liver and lung tumors
- 2.5 fold increases in lymphoma
- Nonlinear effect "may be due to metabolic changes"
   "Our findings may help to understand the
   repeatedly reported increased incidences of
   brain tumors in heavy users of mobile phones"

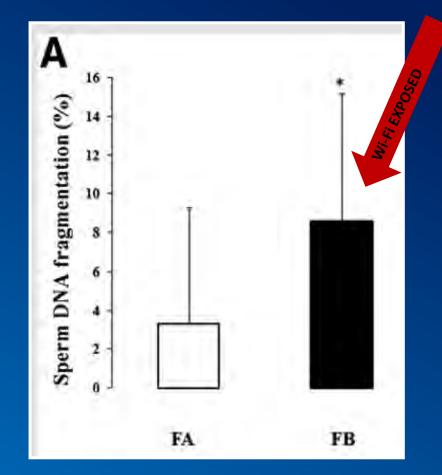




#### "Use of laptop computers connected to internet through Wi-Fi decreases human sperm motility and increases sperm DNA fragmentation." Fertility and Sterility (Avendado et al., 2012)

Sperm samples exposed ex vivo to a wireless internet-connected laptop (at non thermal RFR levels) for 4 hours showed a significant decrease in progressive sperm motility and an increase in sperm DNA. fragmentation.

Numerous studies on RFR have shown impacts to sperm, testes and ovaries.







#### Microwaves Can Damage Blood Brain Barrier and Other Membranes

Every cell has a membrane that is vulnerable to EMF exposure-including those in the reproductive system.

> Control RF Exposed



Several Research Studies:

Tang 2015, Nittby 2009, Nittby 2008, Belyaev 2006, Salford 1994, EHTrust.org Allan Frey-Annals of the New York Academy of Sciences 1975

Dr. Leif Salford, 2009



#### A Meta-Analysis of In Vitro Exposures to Weak Radiofrequency Radiation Exposure from Mobile Phones (1990–2015)

Environmental Research, (Halgamuge, et al., 2019)

- 300 peer-reviewed scientific publications (1990–2015) describing 1127 experimental observations in cell-based in vitro models
- Out of 746 human cell experiments, 45.3% indicated cell changes, whereas 54.7% indicated no changes (p 0.001)
- Higher impacts among faster-growing less differentiated cell types such as human spermatozoa and human epithelial cells
- 74.4% of faster-growing cells from other species (chicken, rabbit, pig, frog, snail) undergo significant changes from RF
- Study confirms observations of REFLEX project, Belyaev, and others that cellular response varies with signal properties





# Brain, Liver And Thyroid Cancers Increased in US Children 2001-2014

"The overall pediatric cancer incidence rates increased (AAPC=0.7, 95% CI, 0.5–0.8) during 2001–2014

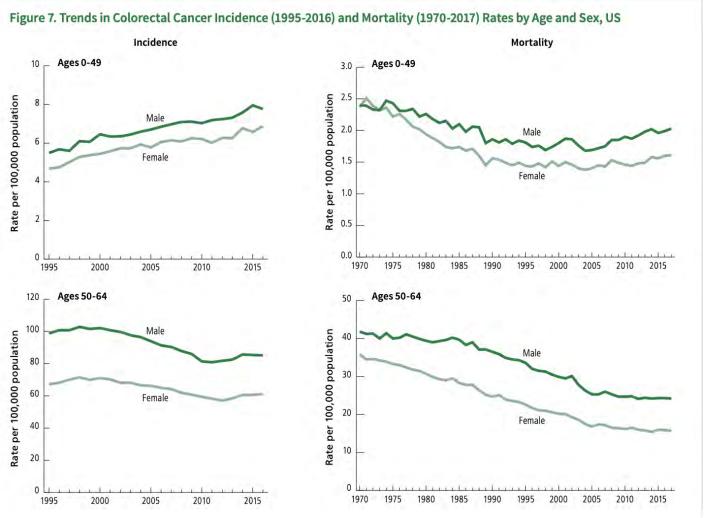
"Conclusions: "Increased overall rates of brain and hepatic cancer and decreased rates of melanoma ...since 2010."

"Incidence Rates and Trends of Pediatric Cancer United States, 2001–2014"

David Siegel, J. Li, S.J. Henley, R. Wilson, N. Buchanan Lunsford, E. Tai, E.A. Van Dyne

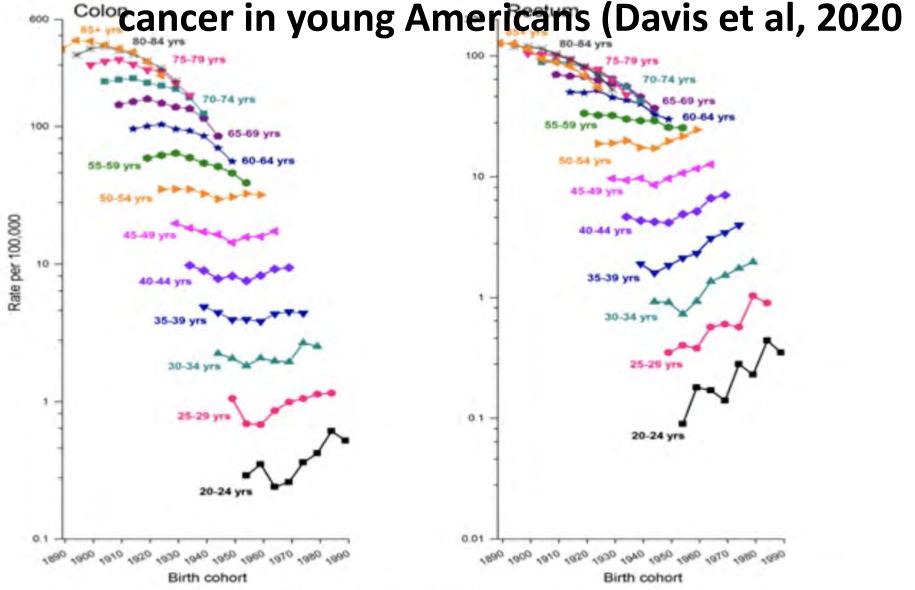


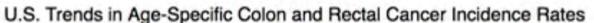
# Unexplained increases in colorectal cancer in young adults in U.S., Iran, UK, Brazil & elsewhere





#### Unexplained growth in colon and rectal





Source: R.L. Siegel, et al., JNCI, Vol. 109, 2017 - Supplementary Figure 4



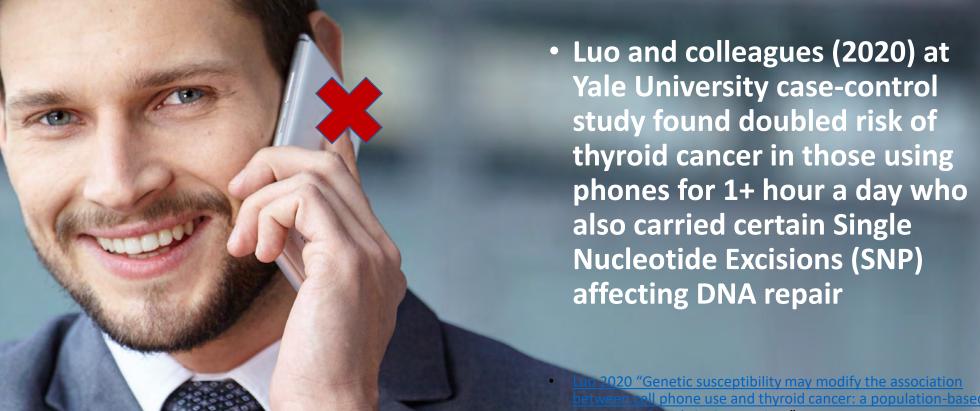
# Could the Increases in Colo-rectal Cancer in Young Adults be Tied to Cell Phone Radiation?



- 4-fold increase in rectal cancer in last decade in American young adults
- Colo-rectal cancer cells are exquisitely sensitive to RF
- Phones are 'on' and radiating into the abdomen unless turned to airplane mode or off
- Research has found that the effect of exposure to mobile phone radiation and 3Gy gamma radiation have similar impacts on treated colon tissues of rats compared to the controls

Davis et al., 2020 Increased Generational Risk of Colon and Rectal Cancer in Recent Birth Cohorts under Age 40 - the Hypothetical Role of Radiofrequency Radiation from Cell Phones *Annals of Gastroenterology and Digestive Disorders* 





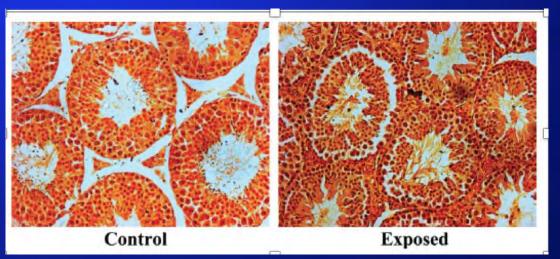
between cell phone use and thyroid cancer: a population-based case-control study in Connecticut"





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Contents lists available at ScienceDirect



#### **Environmental Research**

journal homepage: www.elsevier.com/locate/envres



Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102)<sup>★</sup>

Anthony B. Miller<sup>a,\*</sup>, L. Lloyd Morgan<sup>b</sup>, Iris Udasin<sup>c</sup>, Devra Lee Davis<sup>d,e</sup>

# The Scientific Evidence Indicates Wireless Radiofrequency Radiation is a Human Carcinogen

#### ARTICLEINFO

Keywords:
Brain cancer
Vestibular schwannoma
Salivary gland tumor
Electric hypersensitivity
Glioma
Meningioma
Radio frequency fields
Cell phones
Mobile phones

#### ABSTRACT

Epidemiology studies (case-control, cohort, time trend and case studies) published since the International Agency for Research on Cancer (IARC) 2011 categorization of radiofrequency radiation (RFR) from mobile phones and other wireless devices as a possible human carcinogen (Group 2B) are reviewed and summarized. Glioma is an important human cancer found to be associated with RFR in 9 case-control studies conducted in Sweden and France, as well as in some other countries. Increasing glioma incidence trends have been reported in the UK and other countries. Non-malignant endpoints linked include acoustic neuroma (vestibular Schwannoma) and meningioma. Because they allow more detailed consideration of exposure, case-control studies can be superior to cohort studies or other methods in evaluating potential risks for brain cancer. When considered with recent animal experimental evidence, the recent epidemiological studies strengthen and support the conclusion that RFR should be categorized as carcinogenic to humans (IARC Group 1). Opportunistic epidemiological studies are proposed that can be carried out through cross-sectional analyses of high medium and low mobile

a Dalla Lana School of Public Health, University of Toronto, Canada

<sup>&</sup>lt;sup>b</sup> Environmental Health Trust, Berkeley, CA, United States

<sup>&</sup>lt;sup>c</sup> Rutgers University School of Public Health, United States

d Environmental Health Trust, Teton Village, WY, United States

e Hebrew University of Jerusalem, Israel

### **Experimental Studies Repeatedly Show Damage to Brain & Reproductive Systems from RFR and Wi-Fi**

#### **US National Toxicology Program**

 Significant increases in DNA damage in the frontal cortex of the brain in male mice and in the blood cells of female mice (1,900 MHz) and hippocampus of male rats (900 MHz). (Smith Roe et al., 2020)

#### Ramazzini Institute, Bologna

. Parallel findings to NTP at significantly lower levels of RF exposure (base-station) Falcioni et al, 2018

#### Medical School of Dicle University, Ondokuz Mayis University, Gazi University, Turkey:

- Increased sperm head defects and decreased weight of reproductive organ tissues.

  (Dasdag 2015)
- Altered expression of some miRNAs (miR-106b-5p and miR-107)
   (Dasdag 2015)

Damage to brain, testis, and reproductive organs (Seyhan, Kaplan & others)

#### Afe Babalola University, Nigeria

 Vascular congestion, DNA damage in brain tissue, decrease in AChE activity and increase in anxiety levels

(Ibitayo et al 2017, Obajuluwa et al. 2017)

• Alterations in hematological and biochemical parameters (Bamikole et al. 2019)



# Impact of RFR on DNA damage & antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations\*



- Study evaluated the effect of radiofrequency radiation from mobile phone base stations. Compared residents- matched for demographics.
- Exposed group: Within 80 meters
- Control group: Over 300 meters

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

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

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



# Memory Problems in Teens One Year of Cell Phone Use to Head -Replicated



Swiss Tropical and Public Health Institute study

- Seventh through ninth-grade teenagers.
- Follow up study with double sample size to 2015 study that found cumulative call duration associated with a decrease in figural memory performance (Schoeni 2015)

Key Findings: Decreased memory performance in adolescents from cumulative exposure to cell phone radiation. (Foerster 2018)





#### Published research on EMFs

- Cancer
- DNA damage
- Memory/Brain damage
- Sperm/Reproduction damage
- Synergistic effects
- Headaches
- Oxidative Stress
- Bees and insects
- Trees



#### **Reduce Cell Phone Radiation**

American Academy of Pediatrics, Vienna Medical Association, Athens Medical Association, Pancyprian Medical Association, Cyprus National Committee on the Environment and Child Health, Swiss Physicians Association, Israel Pediatrics Society, and many others

- Keep the cell phone away from your head and body.
- •Use speakerphone or wired airtube headset
- Avoid carrying your phone against the body like in a pocket, sock, bra or spandex pants.
- Minimize cell phone use.
- Choose corded phones rather than wireless or cordless.
- •Be aware of how close children are to you when you are using a cell phone.
- •Turn phone on airplane mode with Bluetooth, Siri, location apps OFF.
- Prefer hardwired computers for social media, streaming etc.





## Hundreds of Scientists Call To Halt 5G, Reduce Public Health Exposure and Enact Environmental Protections



2020 Consensus Statement of UK/International Medical & Scientific Experts

5G Appeal to the European Union

**EMF Scientist Appeal** 

International Society of Doctors for Environment

American Academy of Pediatrics

Alliance of Nurses for Healthy Environments

**US Doctors Letter National 5G Resolution** 

60 Officials in France - Chile Medical Doctors - German Doctors Delegation

Vienna Medical Association - Athens Medical Association

Hippocrates Electrosmog Appeal of Belgium Doctors

Pancyprian Medical Association

Cyprus National Committee on the Environment and Child Health

Swiss Physicians Association of Doctors for Environmental Protection

And more at EHTRUST.org





January 28-31, 2021
A Virtual Conference

Pre-Conference Prep Course Oct 23-24, 2020

# Prevention, Diagnosis and Treatment of EMF Associated Illness

EMFConference2021.com





#### **International Policies to Reduce EMF**

Several countries consider schools and hospitals "sensitive areas" with lower EMF limits in place.















**France:** Cell Phone SAR radiation labeling mandatory. Ban on sale/advertising of cell phones for children, Wi-Fi Banned in kindergarten. Elementary school Wi-Fi off setting as default.

**Belgium:** Ban on sale/advertising of cell phones for children. Wi-Fi banned in Ghent nursery schools.

**Israel**: Mandatory SAR labeling, Wi-Fi banned in nurseries. Wi-Fi removed/ minimized in elem schools. Health Ministry recommends reducing exposure. Precautionary ELF-EMF limits result in mitigation near schools.

India: Mandatory phone SAR labeling, Recommendations to reduce cell phone exposure, Exposure limits lowered to 1/10 of the ICNIRP level, some municipalities ban towers near schools.

**Cyprus:** Awareness campaign directed at parents, teens and pregnant women, directorate to remove Wi-Fi from elementary classrooms & Archbishop Makarios pediatric intensive care units 2019

French Polynesia: Banned advertising cell phones to children under 14. Children should not use phones under 14. Public health recommendations RF & ELF-EMF. Italy: 2017 Decree of the Environment Minister to reduce EMF.

Chile's "Antennae Law" prohibits cell antennae/towers in "sensitive areas."

Several countries have precautionary ELF limits for new building.

<u>Database on International policy with links at ehtrust.org</u>





#### **Educate Clients**

Ask about their device use and wireless exposures in the homeand school.

Educate them on how to reduce exposure to phones and all wireless devices.

Clinical training at EMF Conference 2021



#### American Academy of Pediatrics Recommends: REDUCE CELL PHONE AND WIRELESS RADIATION

- Do not hold the cell phone up to your head. Use speaker mode or hands
- Avoid carrying your phone against the body like in a pocket, sock, or bra. Cell phone manufacturers can't guarantee that the amount of radiation you're absorbing will be at a safe level.
- Make only short or essential calls on cell phones.
- If you plan to watch a movie on your device, download it first, then switch to airplane mode while you watch in order to avoid unnecessary radiation exposure.
- Keep an eye on your signal strength (i.e. how many bars you have). The weaker your signal, the harder your phone has to work and the more radiation it gives off.
- Avoid making calls in cars, elevators, trains, and buses. The cell phone works harder (and emits more radiation) to get a signal through metal
- Remember that cell phones are not toys or teething items.

from AAP's HealthyChildren.org

#### name a new consessa

Cell phone/Wi-Fi radiation can damage the developing brain, sperin, and slesp. Research indicates increased cancer risk, headsches, hyperactivity, and memory problems from cell phone

All wireless devices emit the same type of radiation as cell phones.

#### AT DIGINER

Easily reduce wireless radiation at home. Get a corded landline phone

100% SAFETY = CORDED ETHERNET

ise non-wireless corded connections or printers, mouse, computers, laptops, ablets, video game systems, e-readers, buters, keyboards, headphones, peakers, and other accessories—with

#### More at EHTrust.org



#### CELL PHONES EXPOSE YOUR BODY TO RADIATION

#### Research links this

- microwave radiation to:
- · Damaged sperm
- · Reduced sperm count
- Management
- Cancar

All cell phones and wireless devices have fine print warnings hidden deep in manuals advising the device not be in contact with the body.

#### More at EHTrust.org



#### **DOCTORS' RECOMMENDATIONS**

#### 1. PROTECT YOUR BODY

Do not carry cell phones in your pockets or bra. No lap tops or tablets on your lap.

#### SPOTECT VOLID PRAIN

Protect Yourself

Prefer a corded landline phone. Hold cell phones away

#### 3. PROTECT YOUR FERTILITY

No wireless devices near reproductive organs or near a pregnant woman's abdomen.

#### 4. REDUCE WIRELESS

Turn off Wi-Fi and use cords to connect routers, phones, computers and other devices. Airplane Mode ON with Wi-Fi OFF turns off wireless.

#### 5. DO NOT SLEEP WITH YOUR CELL PHONE

Cell phones and Wi-Fi devices are radiating even when not in use. Power off all devices at night, and keep them out of the bedroom.





Parent Campaigns
Needed: Reduce
Exposure
to Children and
Babies.



# The BabySafe Project Over 270 Doctors/Educators

"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



#### 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/

EHTrust.org



# New Hampshire State Commission on 5G Health and Environmental Effects



## Final Report - 15 Recommendations to the State including:

- Wired networks instead of Wi-Fi in Schools & Libraries.
- Establish RF-radiation free zones in commercial/public buildings.
- Health agencies to educate on minimizing RF exposure with multimedia public relations campaign— especially for pregnant women and babies.
- Cell tower setbacks for schools and homes



# New Hampshire Commission on 5G Health and the Environment, 2020

#### Final Report after one year of investigation

Presentations by expert scientists & National Institute of Health 15 Recommendations to the state to protect the public and environment.

- Support an independent study of 5G health effects.
- Cell antenna should be distanced from schools and homes.
- An educational campaign to reduce exposure, especially for children, and require software changes to reduce radiation exposure into the body.
- Replace Wi-Fi with hardwired connections in schools and libraries.





 Use radio equipment in good reception conditions to reduce radiation received.

Use a hands-free kit or a loudspeaker

- Children and adolescents should limit calls
- Keep radio equipment away from the stomachs of pregnant women & adolescents.





## Belgium bans sale of mobile phones designed for children

by Andy Furniere, journalist

Recent articles: Open Business Day puts green entrepreneurs in the spotlight, A rocky road: deep geothermal energy arrives at pivotal point in Flanders, Belgium Remembers: Wealth of exhibitions shed light on stories of liberation

#### SUMMARY

From 1 March, mobile phones designed to attract young children can no longer be sold in Belgium because of radiation levels considered dangerous







Ban on sale of phones designed for children under 7 Ban on advertising cell phones to this age group.

#### 'INCREASES THE RISK OF BRAIN CANCER." SAYS RADIATION EXPERT

rom 1 March, it will be illegal in Belgium to sell mobile phones designed specifically for children below the age of seven. The government is banning the sale of and advertisements for mobile phones in the form of a toy, such as a cuddly bear, meant for children younger than seven.









#### Learn more at EHTrust.org

