

Health Risks of Non-thermal EM Fields & Planned 5G Antenna Densification



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Concord, MA Safe Technology Summit

Jan 12, 2020

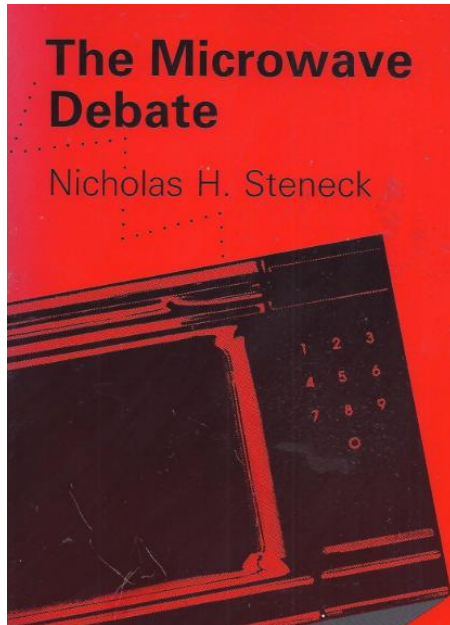
Early History of Health Effects of Radiofrequency and Microwave Radiation

- Microwave Auditory Effect (Frey, 1962)
- Microwave Blood Brain Barrier leak (Frey, 1970)
- MW bibliography for US Navy (Z. Glaser, 1971)
- MW form cataracts in eyes (Zaret to Congress, 1973)
- Massive Compilation by Bioinitiative Group (latest 2017)
- RF/ MW as 2B possible carcinogen (IARC, 2011)

Thousands of Scientific Studies have shown Adverse Health Effects for over 50 years but Economic Factors Predominate and Exposure Guidelines consider only Thermal (Heating) Effects

Check out : www.bioinitiative.org

Debate on Dangers of Microwaves



Allan Frey

Herman Schwan

- Goes back to the discoveries of Allen Frey's 1961 Microwave Hearing non-thermal effects. Also discovered Blood Brain Barrier Effects of MW
- Herman Schwan helped to define the currently used thermal health approach to microwave radiation. (Ref: HP Schwan , 1957, Electrical properties of cellular tissues and suspensions, Adv. Biol. Med. Phys., 5, 147-209)
- Nicholas Steneck also describes the Soviet microwave attacks on U.S. Embassy in Moscow

US Military reported Harmful Non-Thermal Radiation Effects already in 1970s

NAVAL MEDICAL RESEARCH INSTITUTE

BIBLIOGRAPHY OF REPORTED BIOLOGICAL PHENOMENA ('EFFECTS') AND CLINICAL MANIFESTATIONS ATTRIBUTED TO MICROWAVE AND RADIO-FREQUENCY RADIATION

RESEARCH REPORT

<http://tinyurl.com/NMRI-report>

- Zorach R Glaser
April 1972
- 2300 references

DEFENSE INTELLIGENCE AGENCY



**BIOLOGICAL EFFECTS OF
ELECTROMAGNETIC RADIATION
(RADIOWAVES AND MICROWAVES)
EURASIAN COMMUNIST COUNTRIES (U)**

<http://tinyurl.com/army-EMF-review-eurasian>

- Ronald Adams
- Dr R.A.Williams
- March 1976

Also available at www.magdahavas.com

Wireless Evolution

- **1G** – 1980s Principally Analog

Voice



- **2G** – 1991 Digital, GSM, Data:100kB/s

- Narrow Band

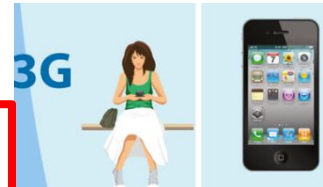
Voice & Text



- **3G** – 2001 UMTS, HSPA Data: 2 MB/s

- Broad Band

Browsing & Internet



- **4G** – 2010 LTE, LTE Advanced

- Mobile Broad Band, 1 HD movie in 6 minutes

Video



- **5G** – LTE on Steroids, > 6 GHz

Machines - IoT

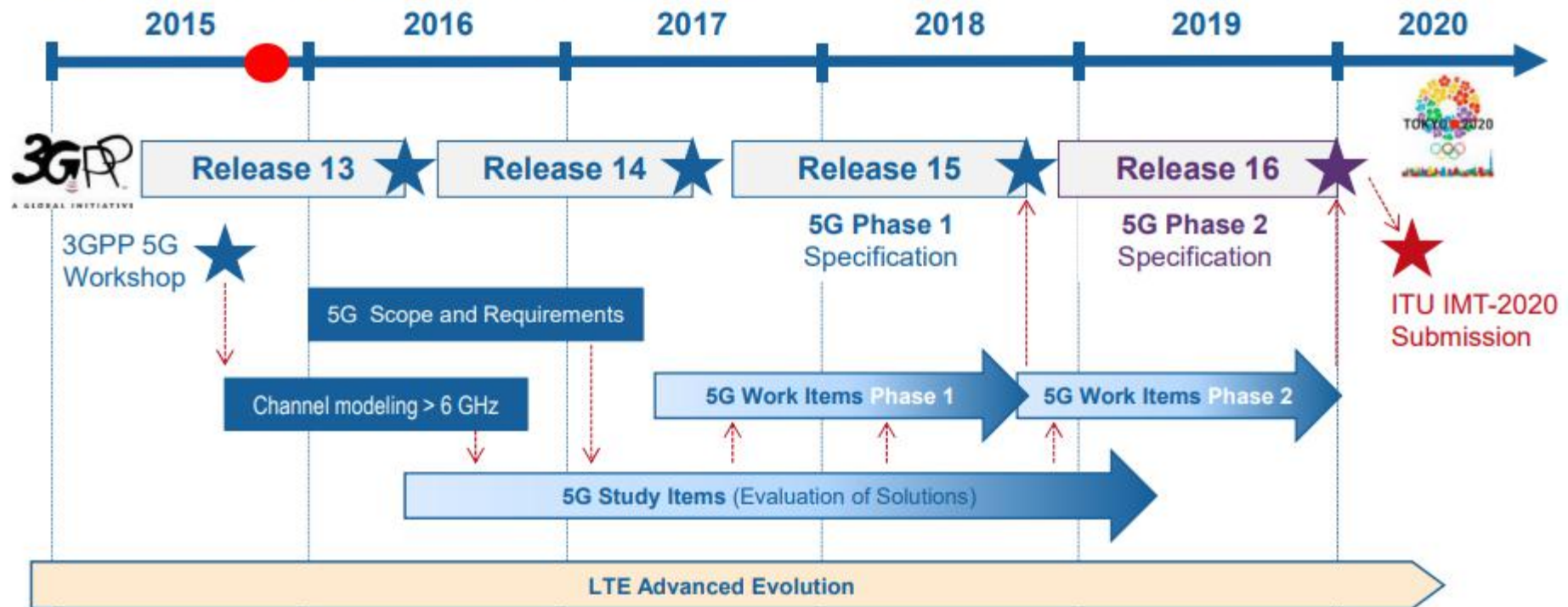
- Massive MIMO, Beamforming Technologies – Not Studied

 **What are the Expected Health Effects ?**

How German Rhode & Schwarz sees 5G

5G Standardization

3GPP 5G Standardization Schedule



Conclusion

Is 5G just the next generation? No: It is a paradigm shift!

This Technology has been Years in the Making !

Telecoms predict Massive Windfall



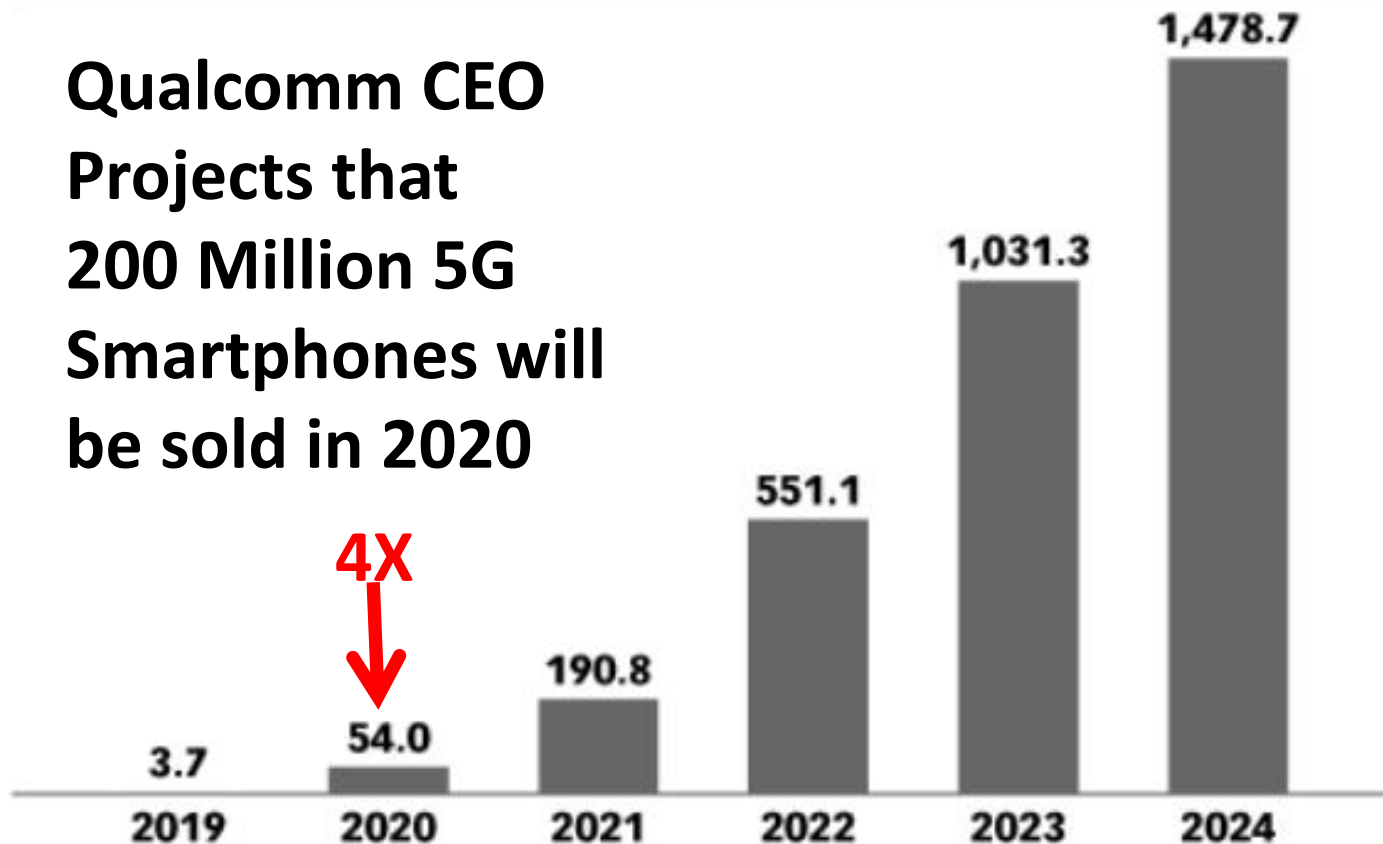
- **Telecom Ericsson Forecasts for 5G in 2024 :**
- 9 Billion Mobile Subscriptions
- 22 Billion IoT connections
- 1.9 Billion 5G subscriptions
- 45% Global Population covered by 5G

Ericsson Predicts 400% Increase in 5G Smartphone Connections in 5 Years

5G Smartphone Connections Worldwide, 2019-2024

millions

Qualcomm CEO
Projects that
200 Million 5G
Smartphones will
be sold in 2020



Source: Ericsson, "Mobility Report: November 2018," Nov 27, 2018

Insurance Companies REFUSE to Cover Wireless Industry for RFR Health Effects

- In a 2013 Emerging Risk Report, Zurich based ***Swiss Re***, the second-largest reinsurer in the world, listed electromagnetic fields (EMFs) in the highest category of casualty risk due to “unforeseen consequences” beyond 10 years.
- Most Wireless Service Providers cannot obtain insurance coverage for damages to health based on EM and MW radiation exposure.

2014 Verizon SEC Filing admits Health Risks



- “Our wireless business also faces personal injury and consumer class action lawsuits relating to health effects of wireless phones or radio frequency transmitters, and class action lawsuits that challenge marketing practices and disclosures relating to alleged adverse health effects of handheld wireless phones.”
- Part of Form 10-K and Annual Report Dec 31, 2014

Jan 2020: Digit Act passes Senate

S. 1611

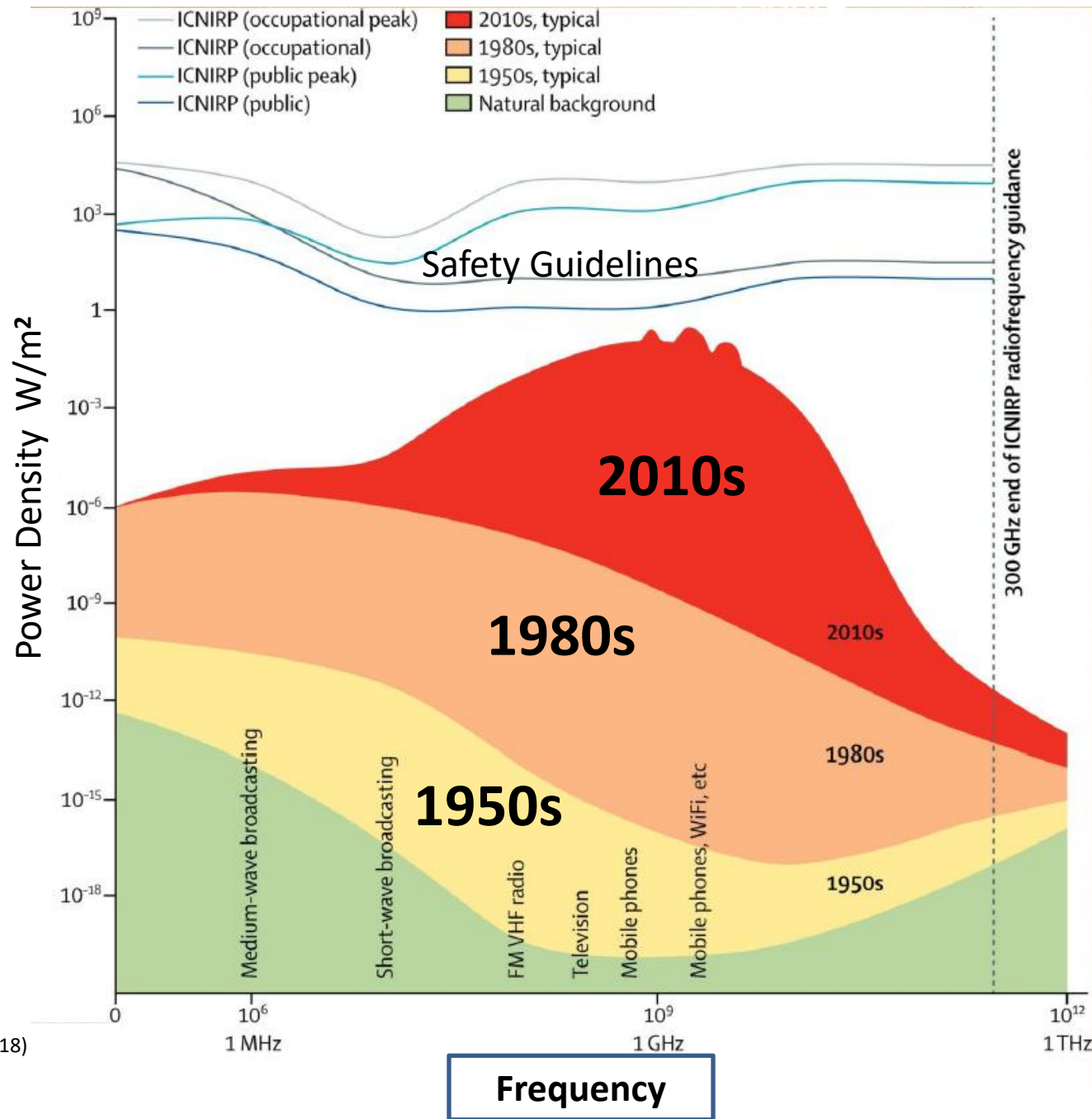
IN THE HOUSE OF REPRESENTATIVES

JANUARY 9, 2020

- Developing Innovation and Growing the Internet of Things D.I.G.I.T.
- Estimates indicate that more than 125 Trillion (125,000,000,000) devices will be connected to the internet by 2030
- Not yet Approved by House of Representatives

Daily Exposure

from man-made and natural power flux densities compared to Safety Guidelines of International Commission on Non-ionizing Radiation Protection (ICNIRP)

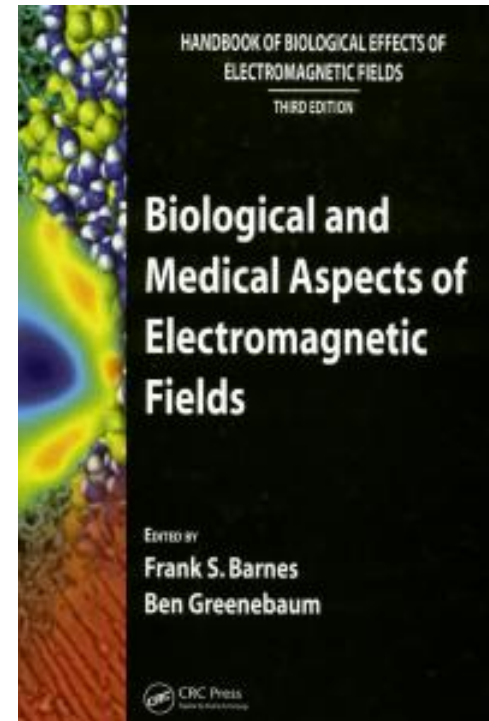




Prof. Arthur Pilla, PhD

Professor of Biomedical Engineering, Columbia Univ
From a Current Biophysics Textbook

“The biophysical lore prevailing until the late 1980s and lingering to this day is that, unless the amplitude and frequencies of an applied electric field were sufficient to produce tissue heating, there could be no effect. However, this position had to be changed as the evidence for weak (non-thermal) EMF bioeffects became overwhelming.”



Source: 2007 Textbook: Biological and Medical Aspects of Electromagnetic Fields. F. Barnes and B. Greenebaum eds. P. 377

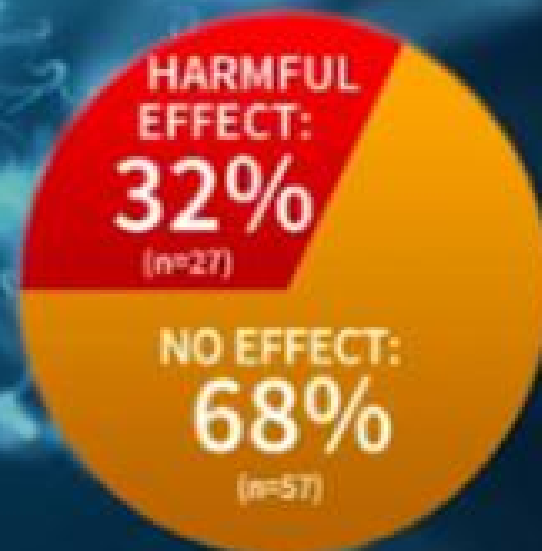
Industry Studies show Bias

Radiofrequency Research: Does Funding Matter?

Non-industry studies



Industry studies



Data Compiled by Dr. Henry Lai, University of Washington

Major Sources of RFR Exposure

- NEAR FIELD DEVICES

- Cell Phones



- DECT – Cordless Telephones



Concerns:

Duration of Usage

Proximity to Body

- FAR FIELD DEVICES

- Smart Meters – Home Area Networks



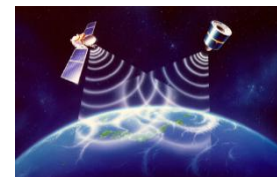
- Wi-Fi in Home & Office



- High Power Radio, TV & Cell Towers



- Satellites – Communication & 5G



Differences between Cell Towers and Handheld Mobile Devices (Phones)

Far Field (Cell Towers/ WiFi)

- Power Density in mW/m^2
- Transmit 24 hours /7 days
- Frequency dependent exposure levels
- WiFi Router also Far Field
- Health Effects related to Distance & Power ($1/d^2$)

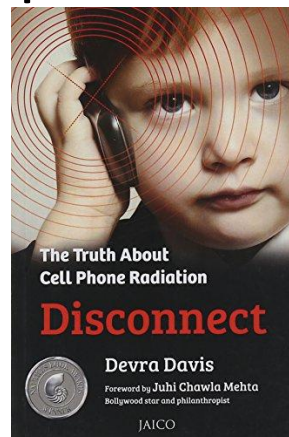
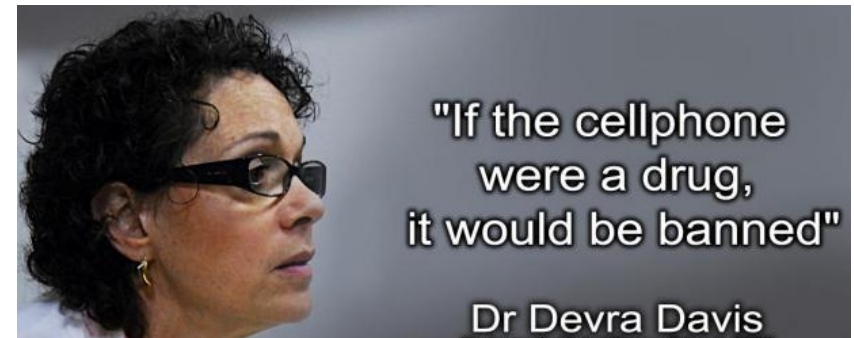
Near Field (Phones)

- Specific Absorption Rate W/kg
- Varying Exposure with use
- Frequencies depend on band being used for service
- Cordless Phones, as well
- Health Effects depend on Duration of Usage & Power

“Safety guidelines” are only for short-term thermal exposure: averaging for only 6 minutes (cell phone), 30 min (towers)
There are no LONG-TERM Exposure safety standards !

Cell Phones have been typically largest Individual Source of RFR Exposure

- Devra Davis PhD of Environmental Health Trust very active in alerting public to dangers of cell phones
- ehtrust.org/key-issues/
- Children especially vulnerable
- Pregnant women vulnerable
- Increasing rates brain cancer
- Multiple Antenna in phones
- WiFi 2.4 & 5 GHZ
- GSM (2G)
- UMTS (3G)
- LTE (4G)



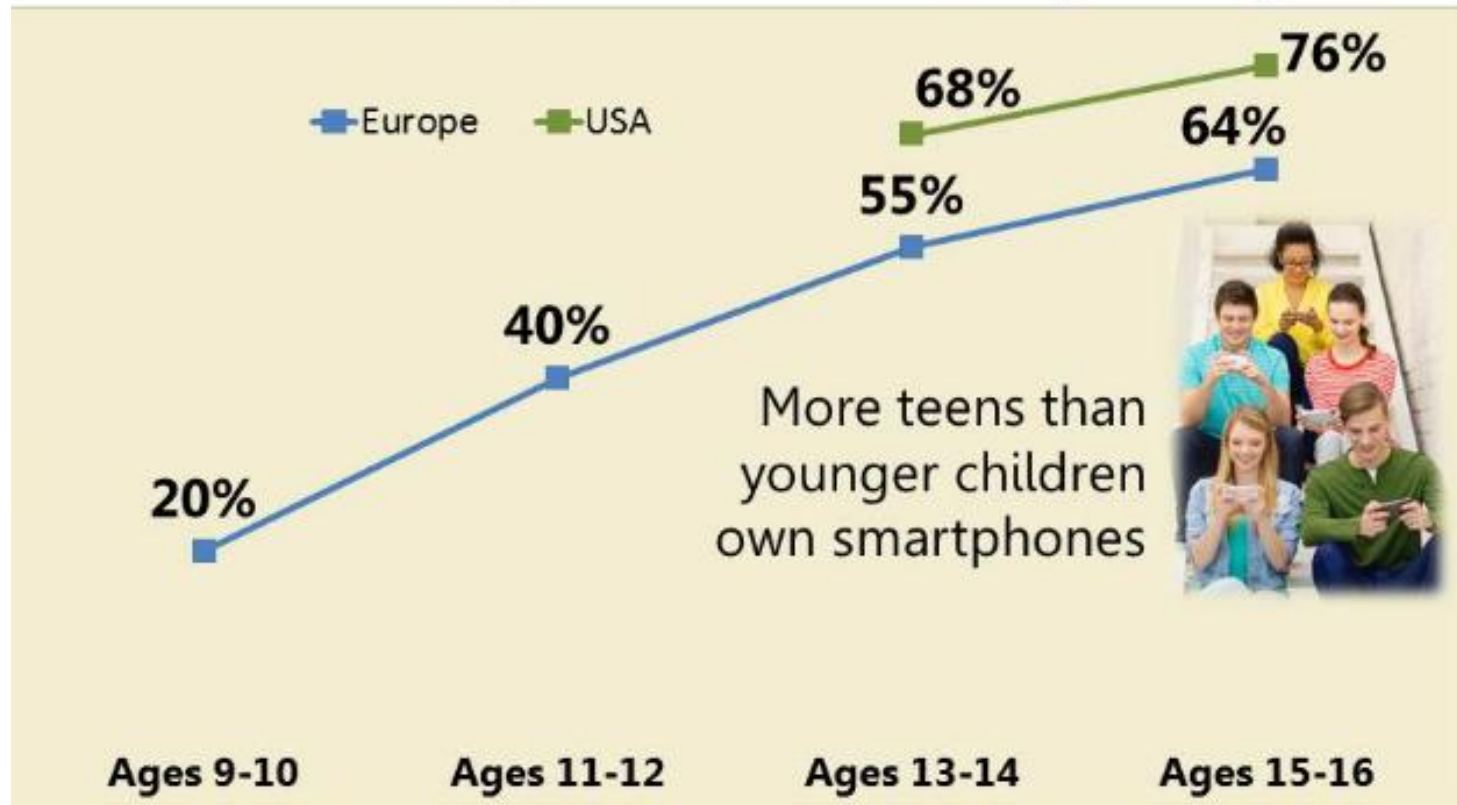
Images: Environmental Health Trust

What are we Doing to Our Children?



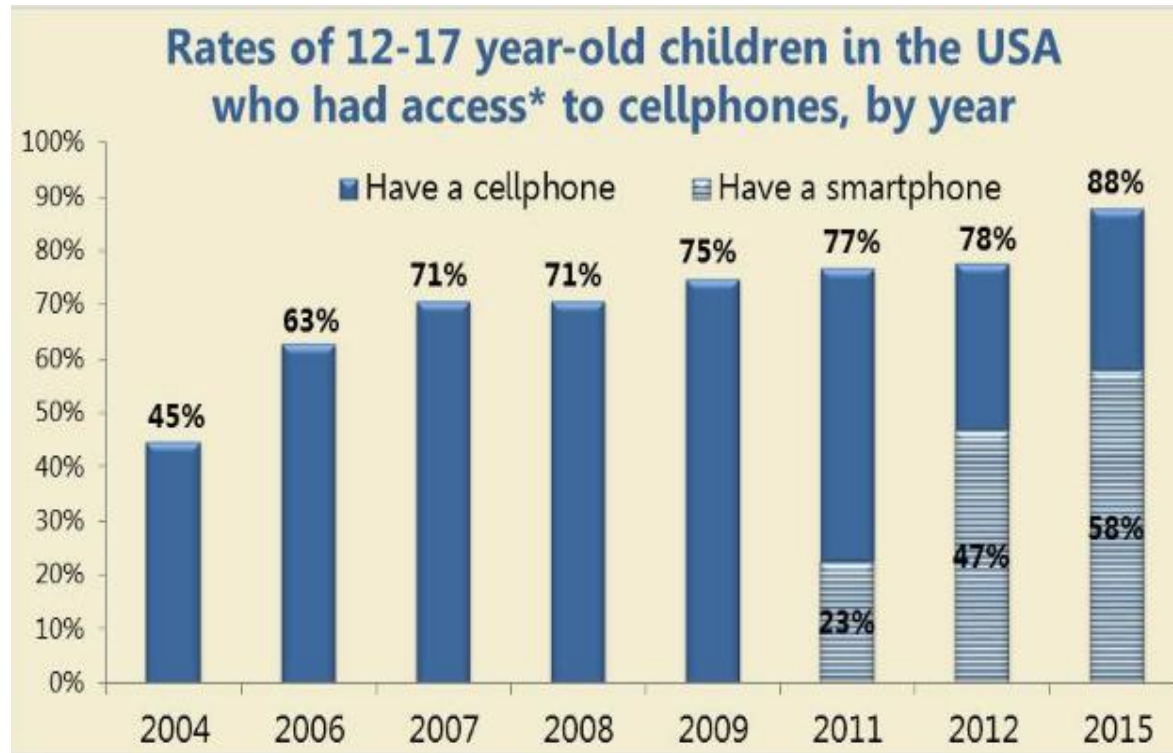
2015 Cell Phone Usage by Children

Percentage of children owning* smartphones in Europe and the USA (in 2013 and 2015, respectively)



*The question asked was, "Do you personally own or have for your private use any of these devices?"

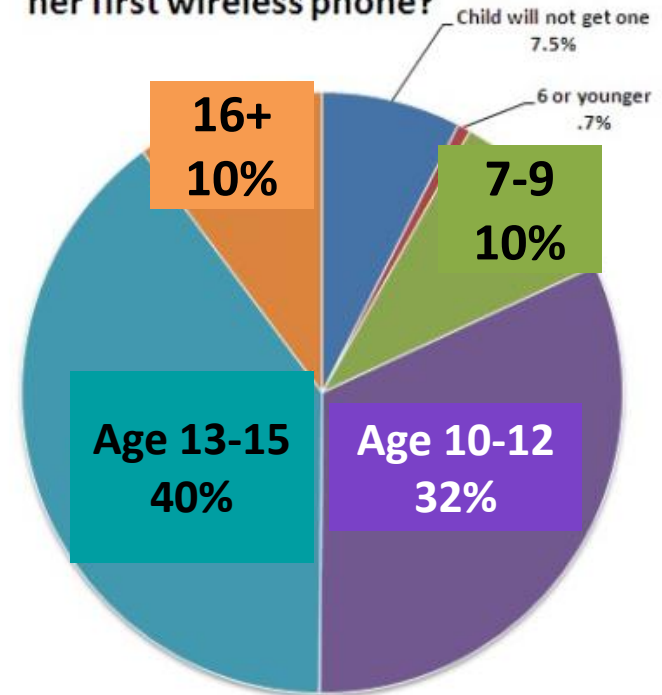
2015: U.S. Children Cell Phones Increasing



* 2012 –survey question: “Do you have a cellphone?”

2015 –survey question: “Do you have or have access to a mobile phone?”

At what age will you or did you get your child his or her first wireless phone?

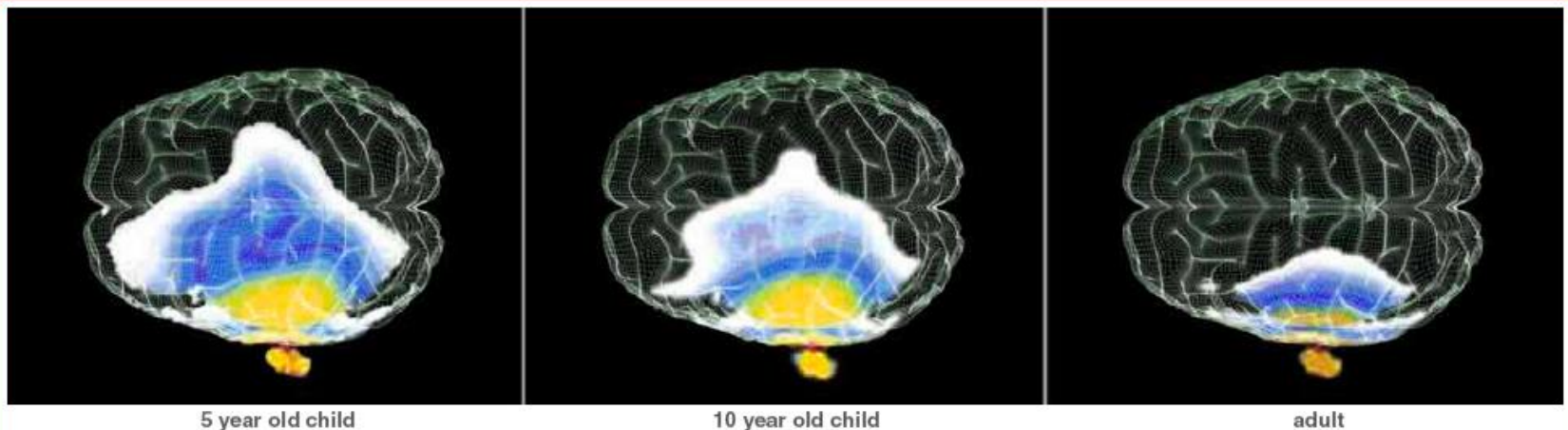


<https://www.tnuda.org.il/en/populations-risk/children-adolescents-%E2%80%93-introduction/extent-cellphone-usage-children-and-teens>

www.apps.startribune.com/blogs/user_images/edinajo_1316187825_Verizonchart.jpg

Too Many Children with Vulnerable Brains own Cell Phones in the US

- In US, 50% of all 8-year olds have Cell Phones
- By age 12, 75% of kids use Cell Phones
- Other countries have banned sale until Age 16
- 5 year old child absorbs 2.5 X radiation of adult



Electromagnetic fields from cell phones are estimated to penetrate the brain, especially in children. Model estimate of the absorption of electromagnetic radiation from a cell phone based on age (Frequency GSM 900 Mhz).

Digital Habits of Millennials

(Born between 1981 – 1996)



- 66 % of millennials live in a totally wireless home.
- 41% have no landline phone (that number would be higher, but many Internet and cable companies provide a landline for free)
- 83% of millennials sleep next to their cell phones.

Blue Cross Blue Shield

The Health of America Reports

- Examine the health of commercially insured Americans
- **Unprecedented deterioration in the health of younger Americans**



 REPORT April 24, 2019

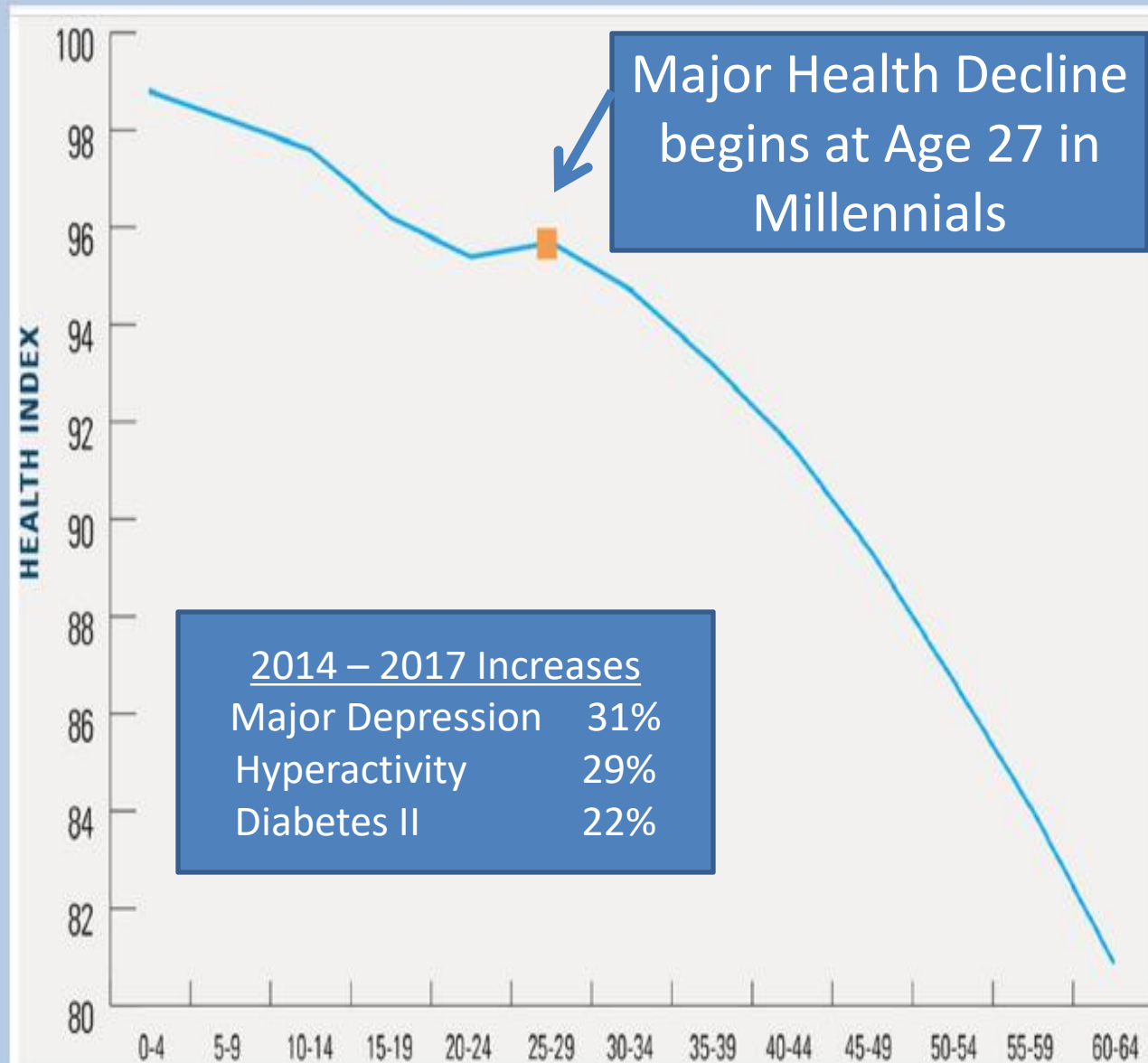
The Health of Millennials

SHARE READ →

<https://www.bcbs.com/the-health-of-america/reports>

Blue Cross Blue Shield Millennial Health Study

- Studied 55 Million commercially insured Millennial Americans (born between 1981 and 1996)
- Aged 21-36 in 2017
- **Severe impacts expected on U.S. Economy**



GROUNDBREAKING STUDY EXAMINES EFFECTS OF SCREEN TIME ON KIDS

60 Minutes goes inside a landmark government study of young minds to see if phones, tablets and other screens are impacting adolescent brain development

The New “iGen” Generation

2018

DEC 09

CORRESPONDENT

ANDERSON COOPER

FACEBOOK



TWITTER



REDDIT



FLIPBOARD



Teenagers now spend 4-1/2 hours a day on their phones many checking their social media compulsively every 15 minutes

GROUNDBREAKING STUDY EXAMINES EFFECTS OF SCREEN TIME ON KIDS

60 Minutes goes inside a landmark government study of young minds to see if phones, tablets and other screens are impacting adolescent brain development

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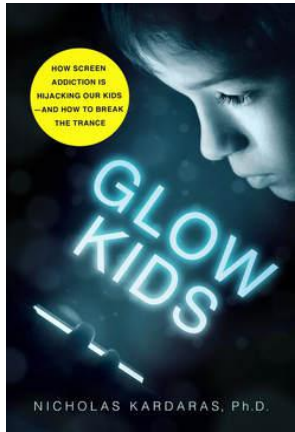


- Initial results of \$300 Million NIH study shows thinning of brain cortex in kids using screens 7 hours /day

Nicholas Kardaras: Tech Addiction Specialist

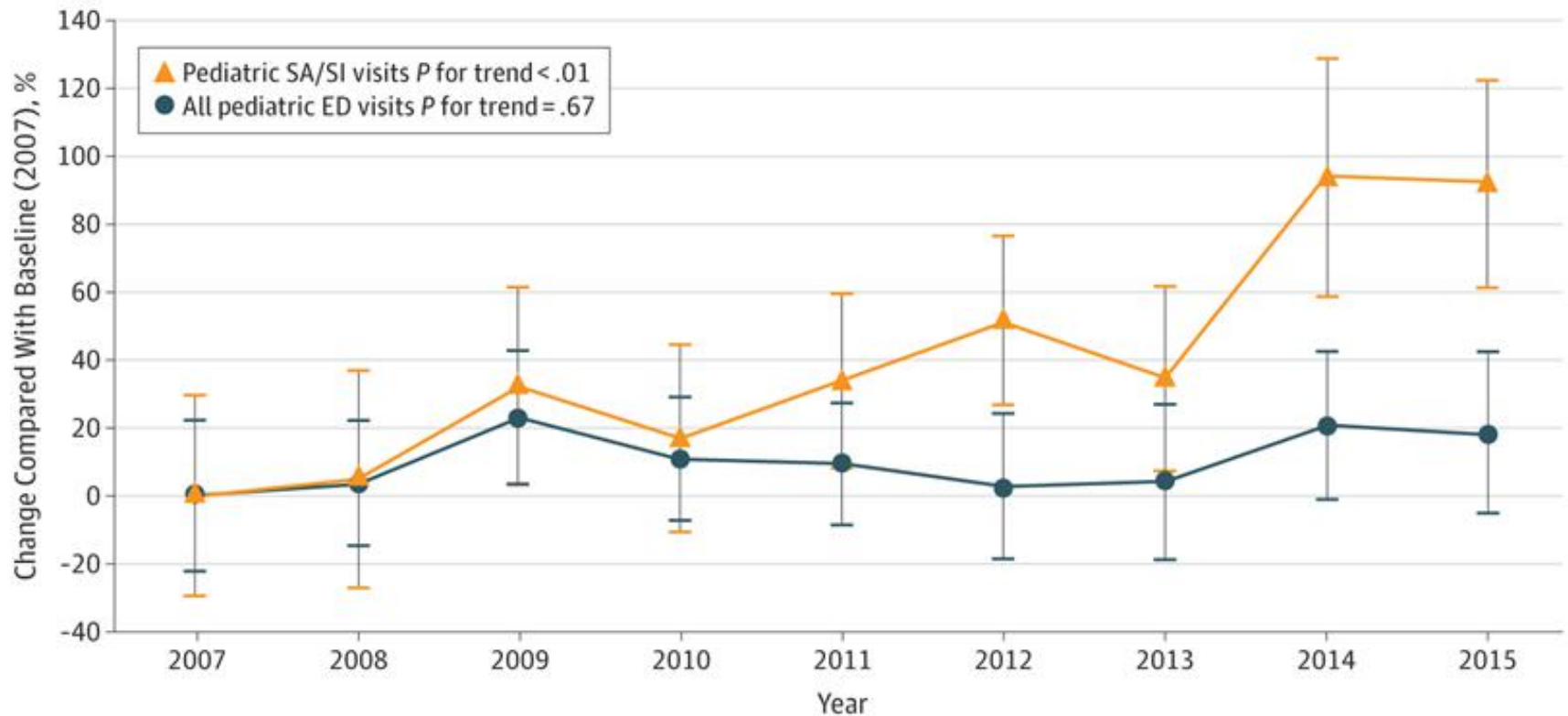


- Tech Addiction in Children is rampant
- Teenagers addicted to Social Media
- Stimulating glowing screens are as dopaminergic – dopamine-activating – to the brain's pleasure center as sex.
- Video games increase dopamine in the brain by 100%, as much as sex does
- Brain imaging studies have shown gray matter shrinkage or loss of tissue volume for internet/gaming addicts



<http://www.drkardaras.com/research.html>

Pediatric Suicide ER Visits have Doubled 2007 - 2015



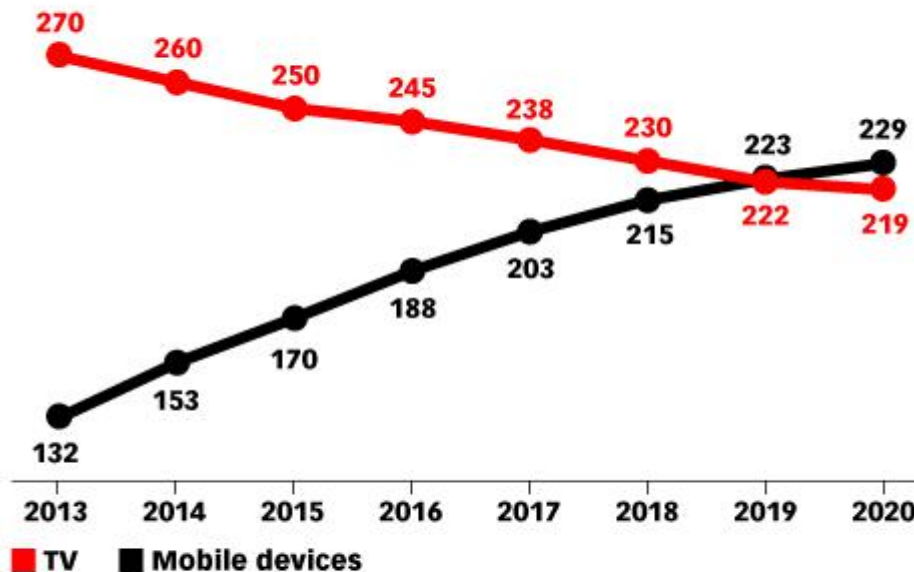
Associated Changes in Pediatric Emergency Department (ED) Visits for Suicide Attempts (SA) and Suicidal Ideation (SI)

For children age 5 to younger than 18 years and overall pediatric emergency department visits for all children age younger than 18 years over time. Error bars indicate 95% CI.

Americans 18+ spend now spend most time on Mobile Devices per day

Average Time Spent per Day with TV and Mobile Devices by US Adults, 2013-2020

minutes



Note: ages 18+; time spent with each medium includes all time spent with that medium, regardless of multitasking; for example, 1 hour of multitasking on a mobile device while watching TV is counted as 1 hour for TV and 1 hour for mobile device

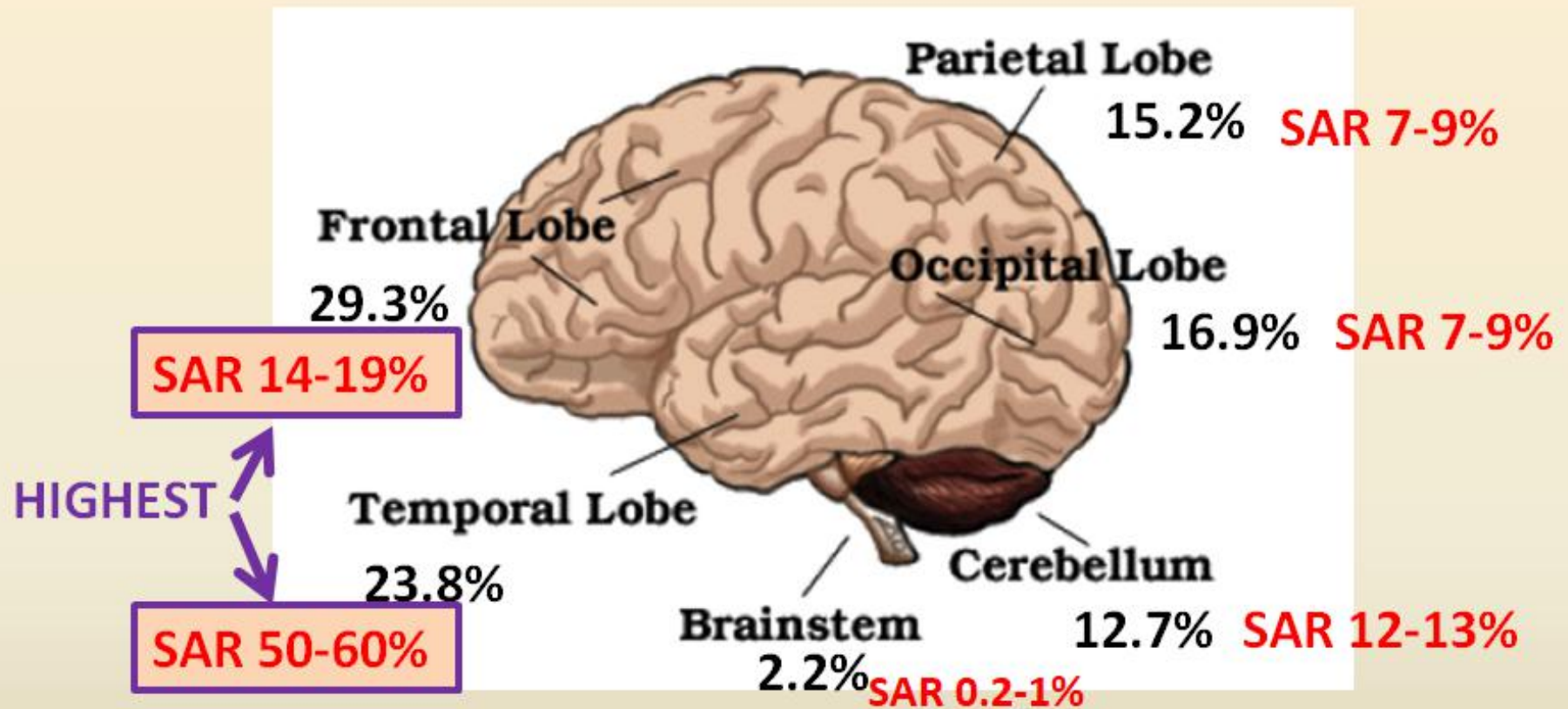
Source: eMarketer, April 2018

238500

www.eMarketer.com

- Source: www.eMarketer.com
- See also <https://www.emarketer.com/content/getting-ready-for-5g>

Frontal and Temporal Lobes are Largest Parts of the Brain (% in Black)



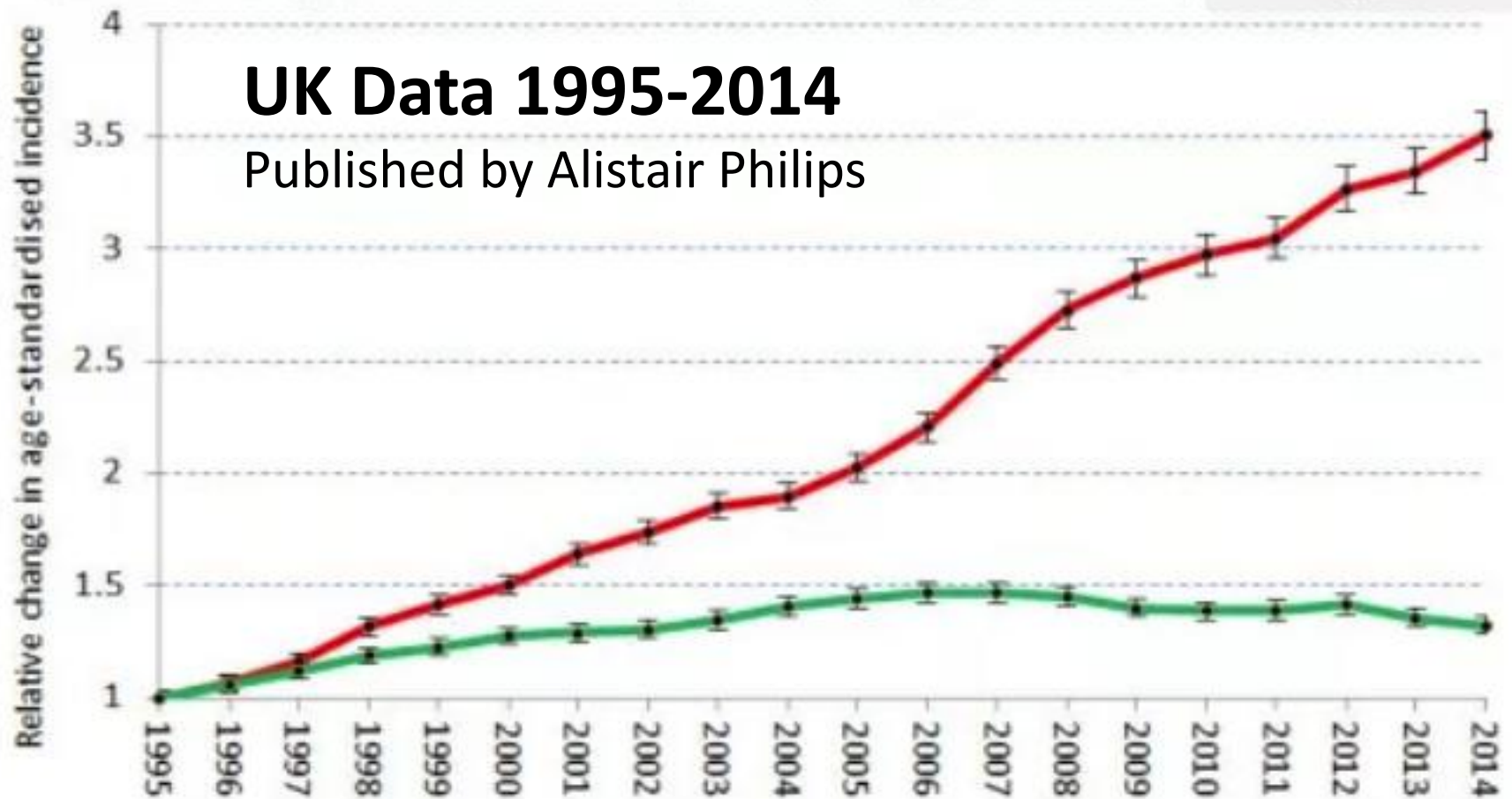
- Absorption of RF Radiation varies with frequency. Above Average relative SAR in each region (compared to whole brain absorption) is shown in RED. Data is for European phones tested at both 900 MHz and 1800 MHz. (Table 1 of paper)
- Incidence of brain tumors attributed to cell phone use is largest in the frontal and temporal lobes where Specific Absorption Rate (SAR) is highest.
- Reference: Cardis, E., et al. "Distribution of RF energy emitted by mobile phones in anatomical structures of the brain." *Physics in medicine and biology* 53.11 (2008): 2771.

Brain Tumor Incidence in UK

Change in Glioma-IV (GBM) age-standardised incidence rate (to ESP-2013) over all ages, in different regions of the brain, relative to 1995 incidence rate.

(Data source: UK Office for National Statistics. 3-year rolling averages, +/-3% error bars)

temporal and frontal lobes
other brain regions

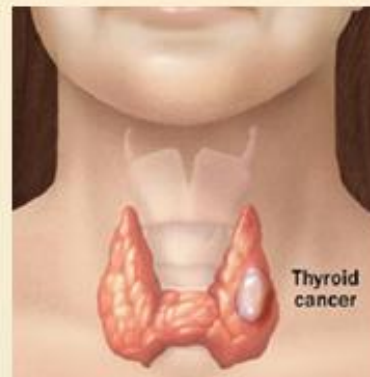
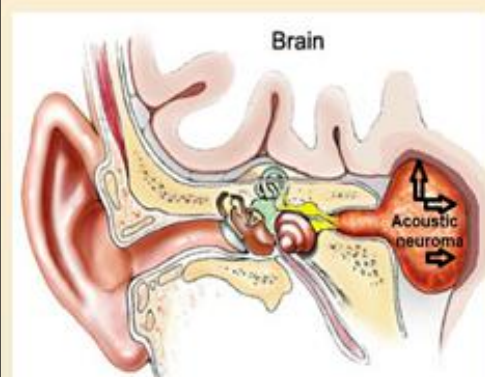


US National Toxicology Program study on mobile phone radiation and health



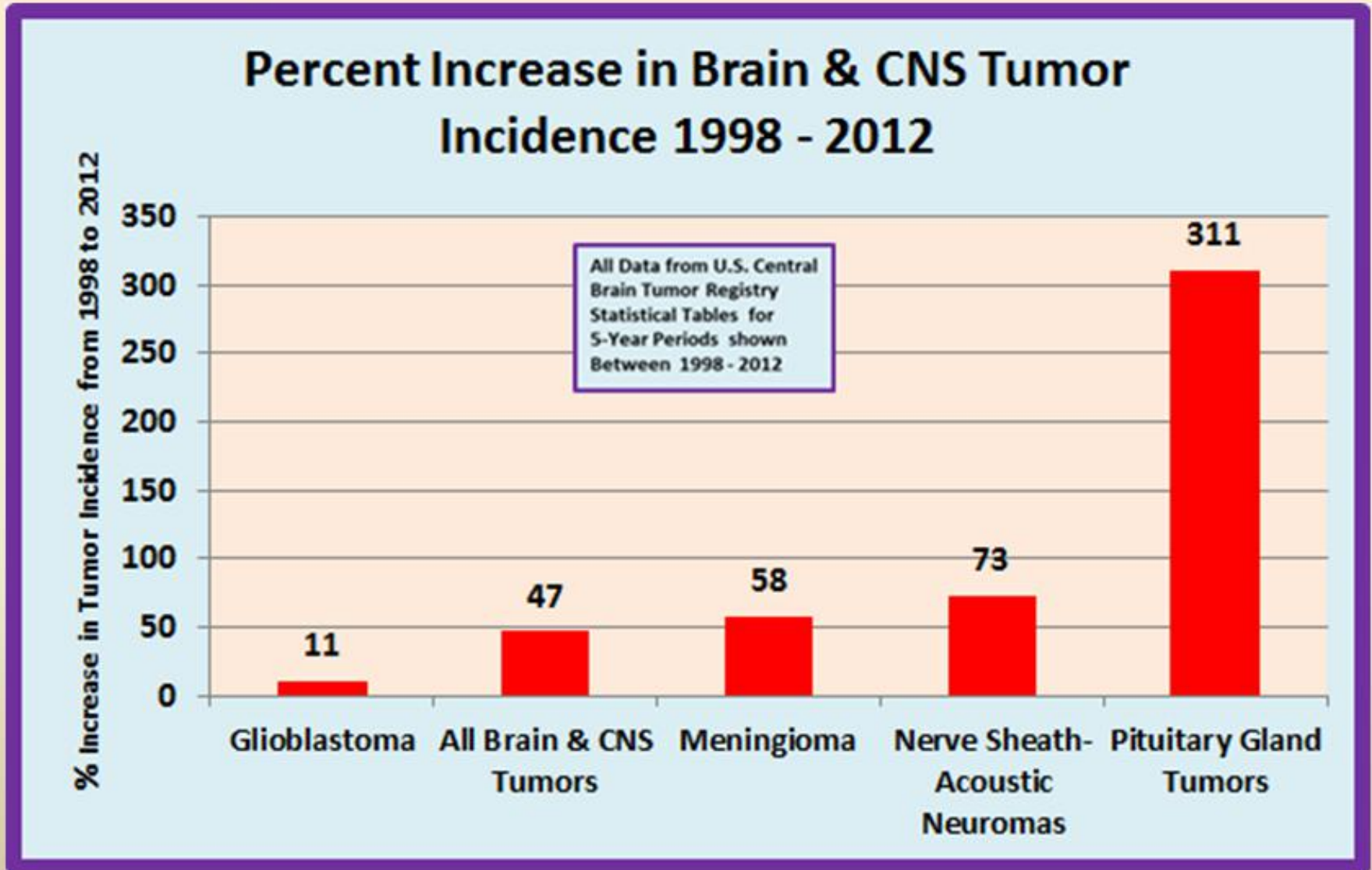
- “Clear evidence” that radiation from mobile phones causes cancer – specifically, a heart tissue cancer in rats, and “some evidence” of cancer in the brain and adrenal glands.

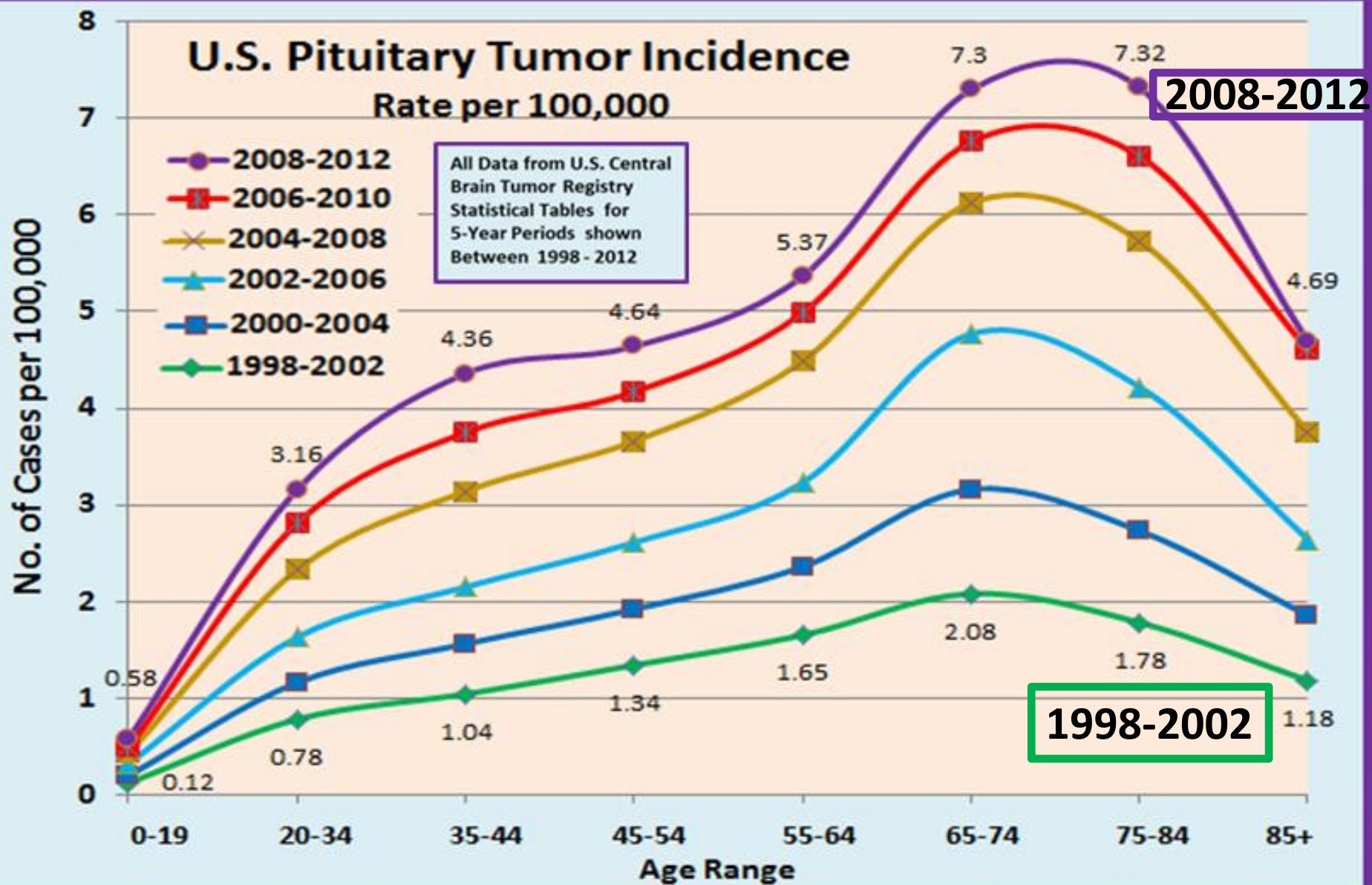
Other Cancers affected by EMF Radiation



- Acoustic Neuroma: slow growing but in tight spaces in ear region, cell phone radiation is highest when phone held to side of head. May cause facial paralysis.
- Parotid Gland Tumors in Cheek (Israeli study)
- Thyroid Cancer increasing Rapidly in U.S. and Korea
- Breast Cancer in Woman with Phones in Bras

Summary of Calculated Increases in Specific Brain & CNS Tumors





- Data Source: CENTRAL BRAIN TUMOR REGISTRY OF THE UNITED STATES, PRIMARY BRAIN TUMORS IN THE U.S. Statistical Reports 1998-2002: Table 12; 2000-2004: Table 16; 2002-2006: Table 16; 2004-2008: Table 16; 2006-2010: Table 13; 2008-2012: Table 12.

- Pituitary Tumor is the 2nd most common brain and CNS tumor in the U.S.

DECT Cordless Telephone Base Station: A Microwave Transmitter in the Home

NONSTOP PULSED 2.4 GHZ RADIATION INSIDE US HOMES

2nd International Workshop on Biological Effects of Electromagnetic Fields 7-11 Oct 2002

NONSTOP PULSED 2.4 GHZ RADIATION INSIDE US HOMES

THOMAS HAUMANN¹ AND PETER SIERCK²

¹Umweltanalytik und Baubiologie,
Meisenburgstrasse 25, D-45133 Essen, Germany

²Environmental Testing & Technology, Inc.,
1106 Second Street, Encinitas CA 92024, USA

Figure 3: Pulsed signal of 2.4 GHz DFHSS technology – ZERO SPAN
(GIGASET cordless phone base station)

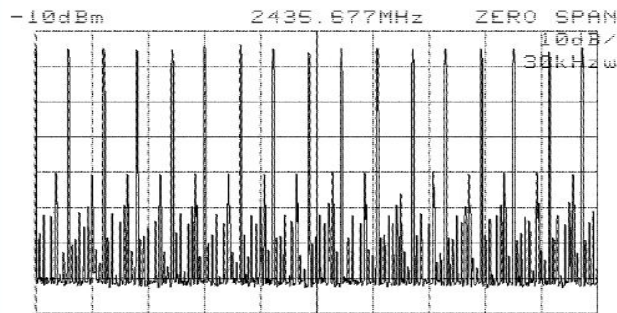
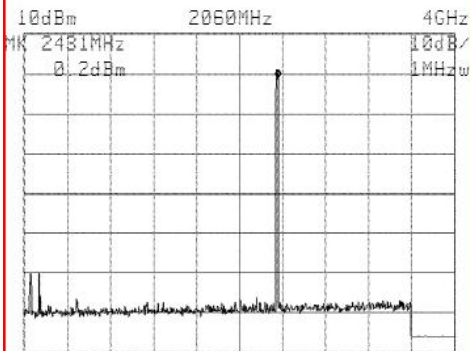


Figure 2: Spectrum analysis (with 2.4 GHz)



DECT oder Gigaset
Cordless Phones transmit
even when not in use.
Have Non-thermal Effects
on our Body and Blood

	US GIGASET (2.4 GHz)*
Distance	DFHSS (Digital Frequency Hopping Spread Spectrum) digital pulsed 100 Hz frequency range 2450 MHz
30 centimeter - 12.5"	673,000 $\mu\text{W}/\text{m}^2$
50 centimeter - 19.8"	280,000 $\mu\text{W}/\text{m}^2$
1 meter - 39.4"	72,000 $\mu\text{W}/\text{m}^2$
2 meter - 78.8"	23,000 $\mu\text{W}/\text{m}^2$

'Smart' Houses Saturated by Wireless

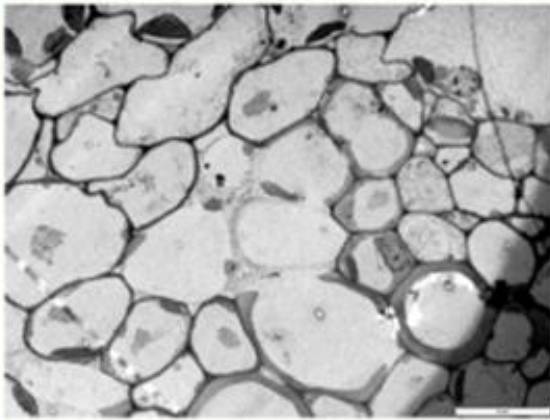


WiFi: 136 Studies showing Health Effects

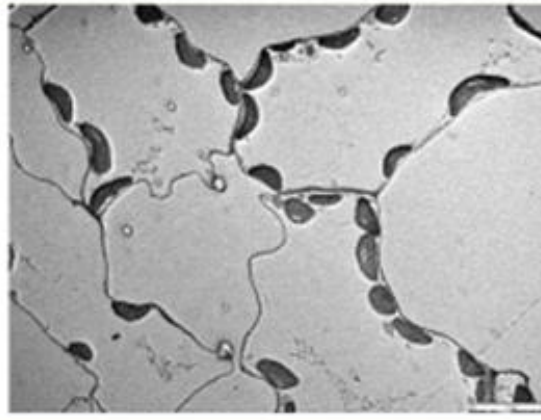
136 Studies Showing Health Effects from WiFi Radio Frequency Radiation

Health Effects	Pages
Effects on Brain and Neurons	Pages 2-18
Effects on Eyes	Pages 18-24
Effects on Fertility and Reproduction	Pages 24-28
Effects on Pregnancy	Pages 29-32
Cancer	Pages 32-35
Effects on Children	Pages 35-36
Effects on Hormones	Pages 36-37
DNA Damage	Pages 37-40
Effects on the Heart	Pages 40-41
Inflammation	Page 41
Effects on Blood	Pages 41-44
Oxidative Stress	Pages 44-46
Effects on Wellbeing	Pages 47-48
Effects on Whole Body	Page 48
Effects on Bone Marrow	Pages 48-51
Effects on Insulin	Page 52
Cell Effects	Pages 52-57
Effects on Behavior	Pages 57-59
Effects on Immune Function	Page 59-60
Effects on Protein	Page 60
Electromagnetic Hyper-Sensitivity	Pages 60-63
Effects on Critical Organs	Pages 63-65
Effects on Sleep	Page 65
Synergistic Health Effects- RF and Other Agents	Pages 66-68
Effects on the Environment	Page 68-69

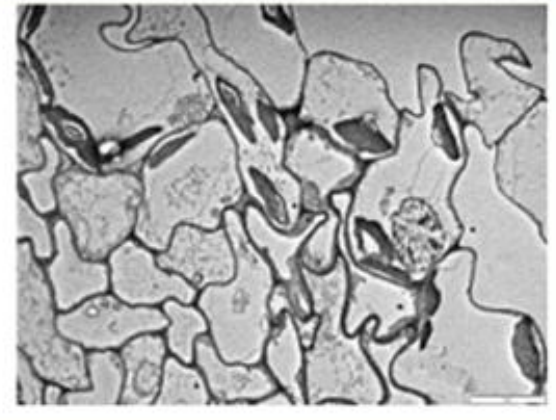
2014 Study: WiFi Effect on Parsley



Control



GSM irradiated



WiFi irradiated

- Note that WiFi (WLAN) irradiated plants created different effect on cell structure compared to 2G (GSM) cell phone.
- In study GSM was at -29dBm measured at 100 mW/m² at plants
- WLAN (WiFi) was at -19dBm measured as 70 mW/m² at plants
- All plants were irradiated for 3 weeks. WiFi effects were worse on plant
- Study performed in Romania
- Source: Soran M-L, et al. (2014): Influence of microwave frequency electromagnetic radiation on terpene emission and content in aromatic plants. J Plant Physiol. Jul 8;171(15):1436-1443.

Evaluation of the Effect of Radiofrequency Radiation Emitted From Wi-Fi Router and Mobile Phone Simulator on the Antibacterial Susceptibility of Pathogenic Bacteria *Listeria monocytogenes* and *Escherichia coli*

- *Listeria monocytogenes* and *Escherichia coli* were exposed to RF-EMFs generated either by a GSM 900 MHz mobile phone simulator and a common 2.4 GHz Wi-Fi router.
- It is also shown that exposure to RF-EMFs within a narrow level of irradiation (an exposure window) makes microorganisms resistant to antibiotics.

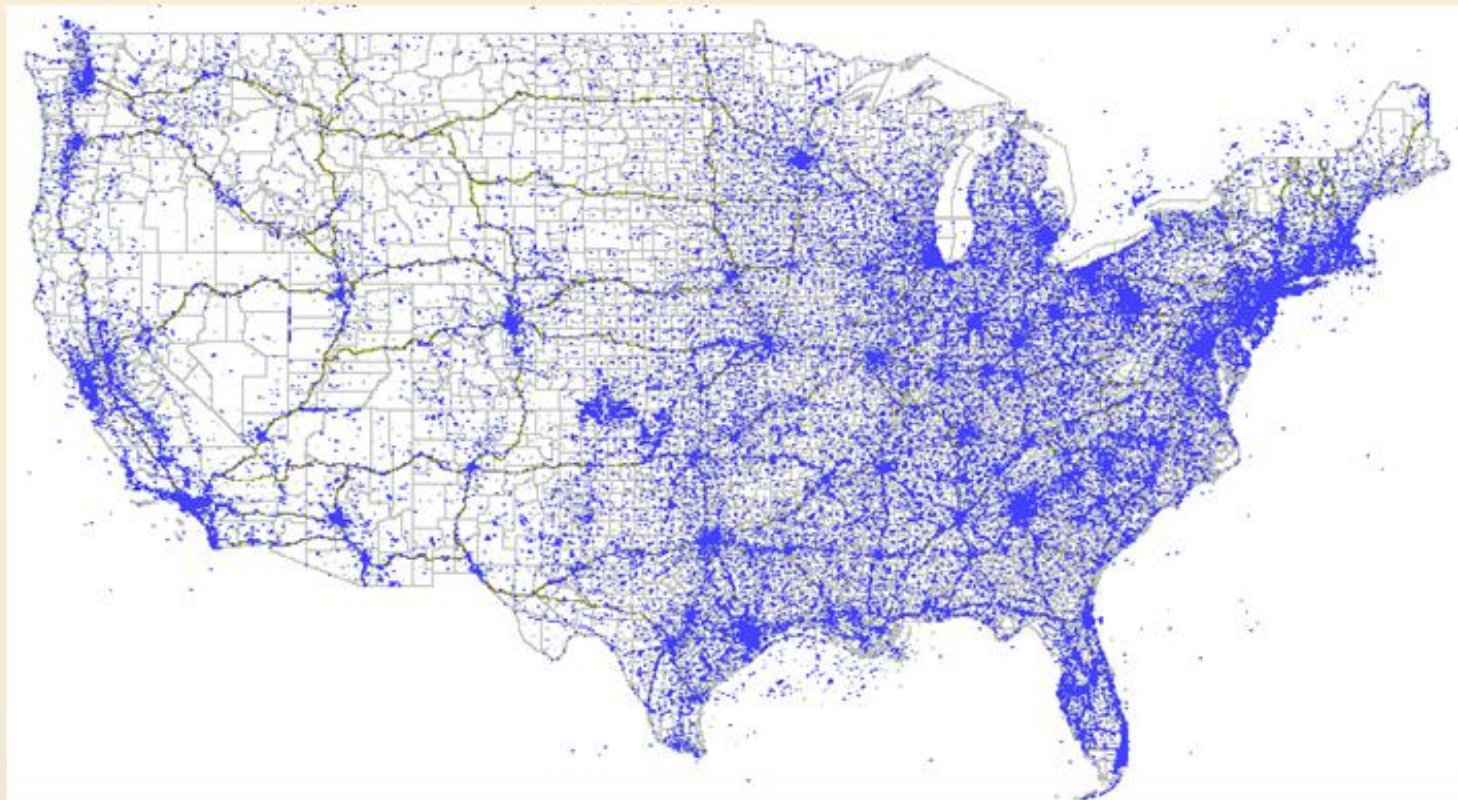


CELL TOWERS



- Biological and Health Effects from Cell Towers

Cell Tower Map in U.S.



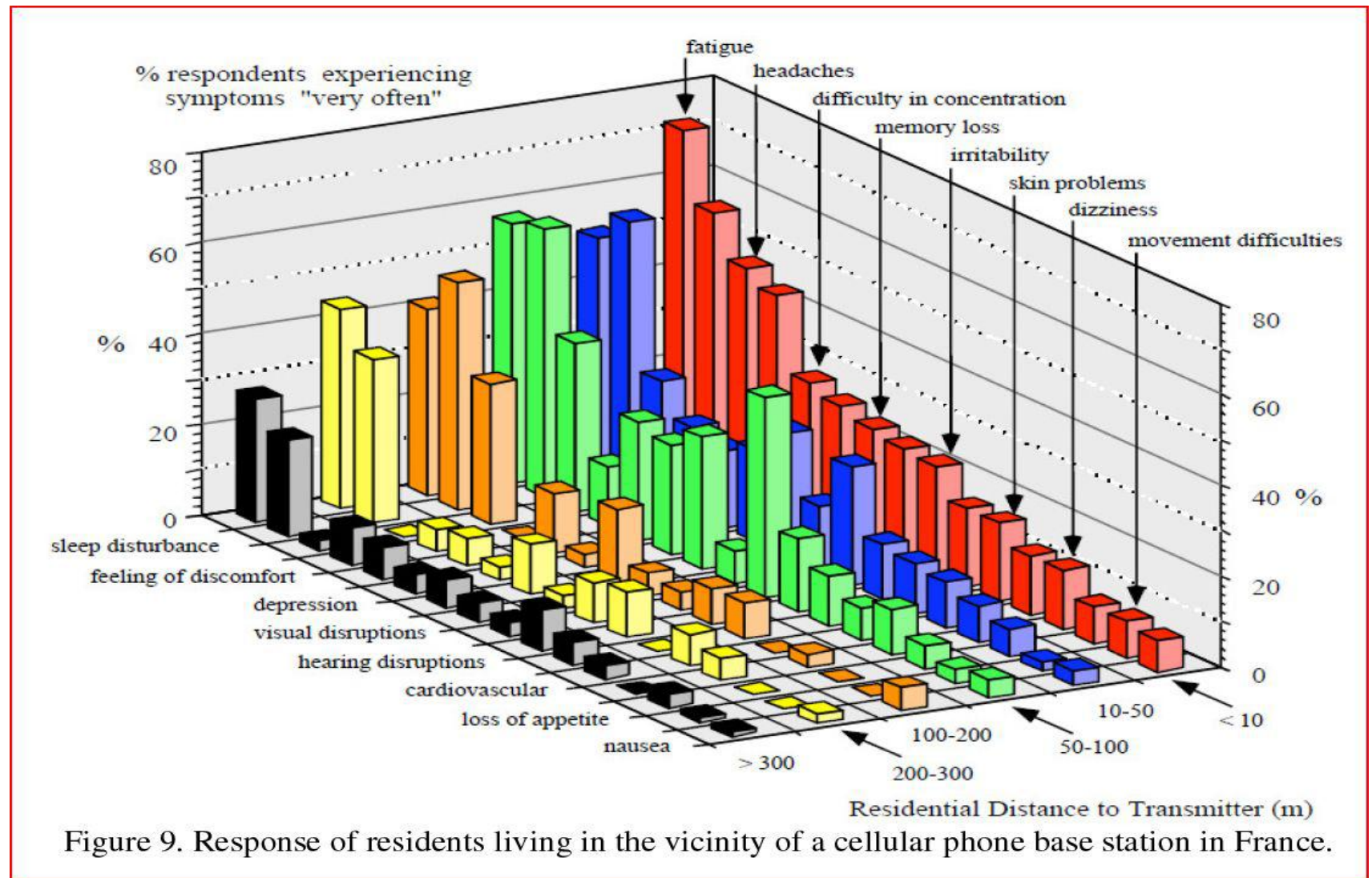
- **Number of Towers are poorly estimated: Between 117,022 and 242,130**
- **117,022** Towers in 2015 owned by 114 companies; only 900 towers in 1985
- CTIA says cell site totals given at the end of 2009 at 247,081
- Maximum range of a cell tower is 21.7 miles
- Largest Owners of towers: American Tower (39,928 towers); Crown Castle (39,739 towers); SBA Communications (14,873 towers)
- Source: <http://wirelessestimator.com/top-100-us-tower-companies-list/>

Living in Proximity to Cell Towers

- The closer to the towers people live (less than 300 meters) is accompanied by an increased incidence of reported symptoms including:
 - Headache,
 - Lack of concentration,
 - Memory loss,
 - Irritability,
 - Depression,
 - Insomnia,
 - Fatigue,
 - Loss of libido,
 - Nausea,
 - Lack of appetite.

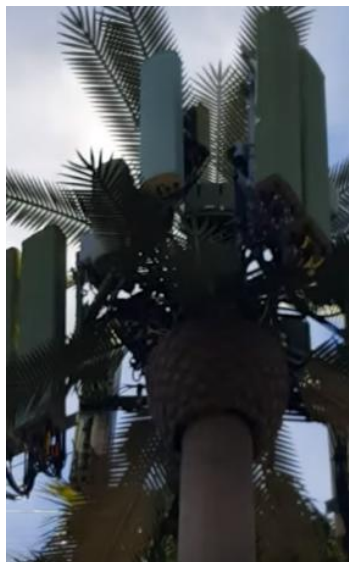


Symptoms associated with Proximity to Cell Towers



- Work from Santini published in 2002 in France

Bees Dying near Cell Tower Installations



- In Sierra Madre in Southern California hundred of bees documented falling dead to ground between 2 cell towers (5G?) 40 feet apart



- Video uploaded July 15, 2019
- www.youtube.com/watch?time_continue=1&v=X5lhKHGDKhM

What is Cumulative Effect of Meters ?

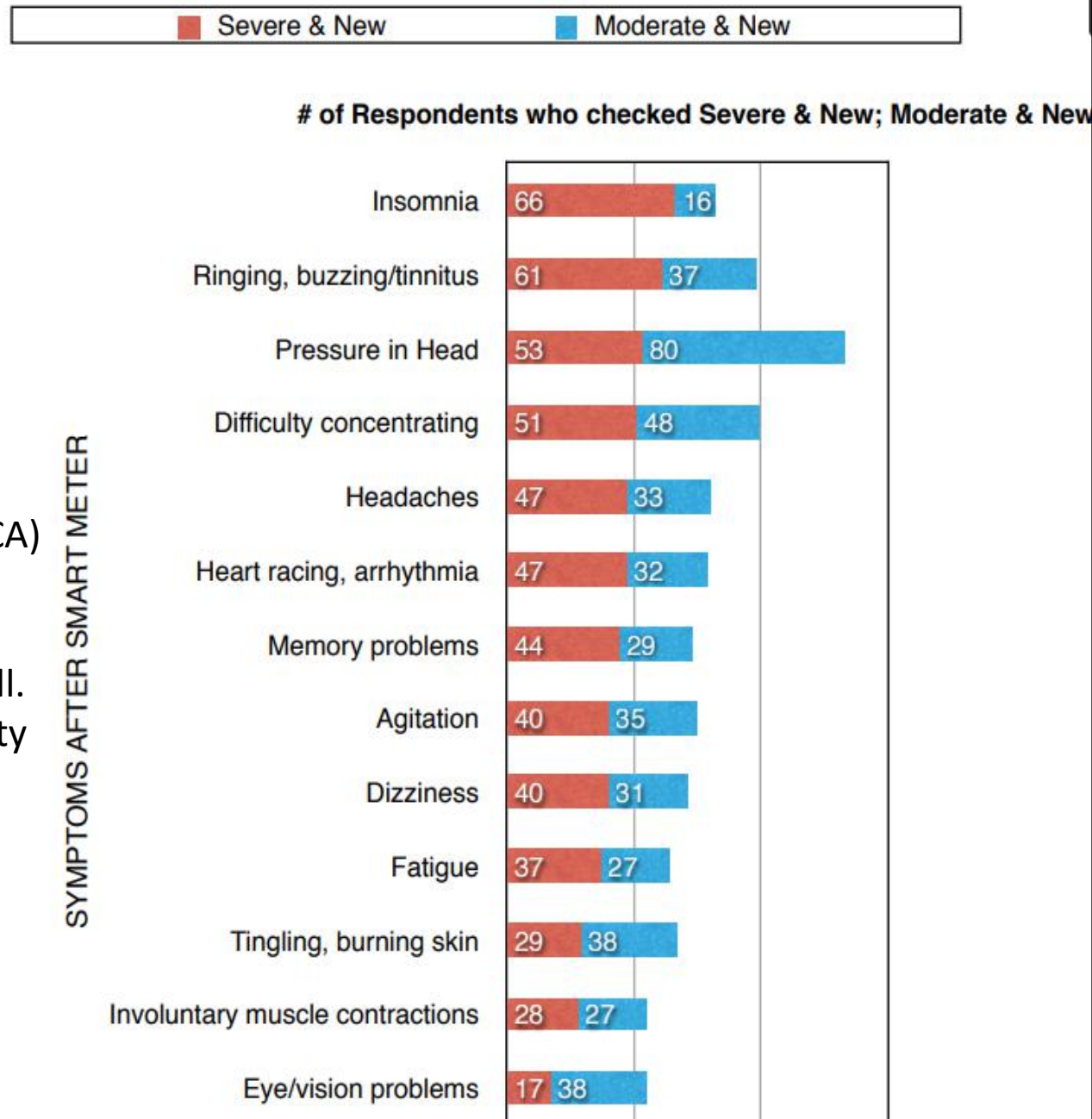


This could be especially problematic for apartment and city dwellers with high meter density

Symptoms after Smart Meter (2013)

210 Questionnaire collected
Dec 2012 to Jan 2013
Responses from 50 states (40% CA)
75% USA, 25% Canada/Australia
75% Female, 25% males
67% reported Smart Meter Install.
led to Electrical Hypersensitivity

www.mainecoalitiontostop-smartmeters.org/wp-content/uploads/2013/01/Exhibit-10-Smart-Meter-Health-Effects-Report-Survey2.pdf



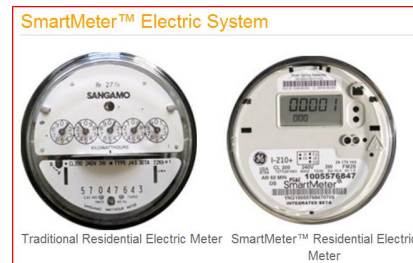
Smart Meter (SM) Wireless Effects (2014)

REVIEW ARTICLE

Self-Reporting of Symptom Development From Exposure to Radiofrequency Fields of Wireless Smart Meters in Victoria, Australia: A Case Series

Federica Lamech, MBBS

[Alternative Therapies in Health and Medicine](#); Aliso Viejo [Vol. 20, Iss. 6](#), (Nov/Dec 2014): 28-39.



- In 2013, in State of Victoria in Australia, 142 people reported adverse health effects after SM installation
- Symptoms included: (1) insomnia, (2) headaches, (3) tinnitus, (4) fatigue, (5) cognitive disturbances, (6) dysesthesias (abnormal sensation), and (7) dizziness.

5G and the FCC



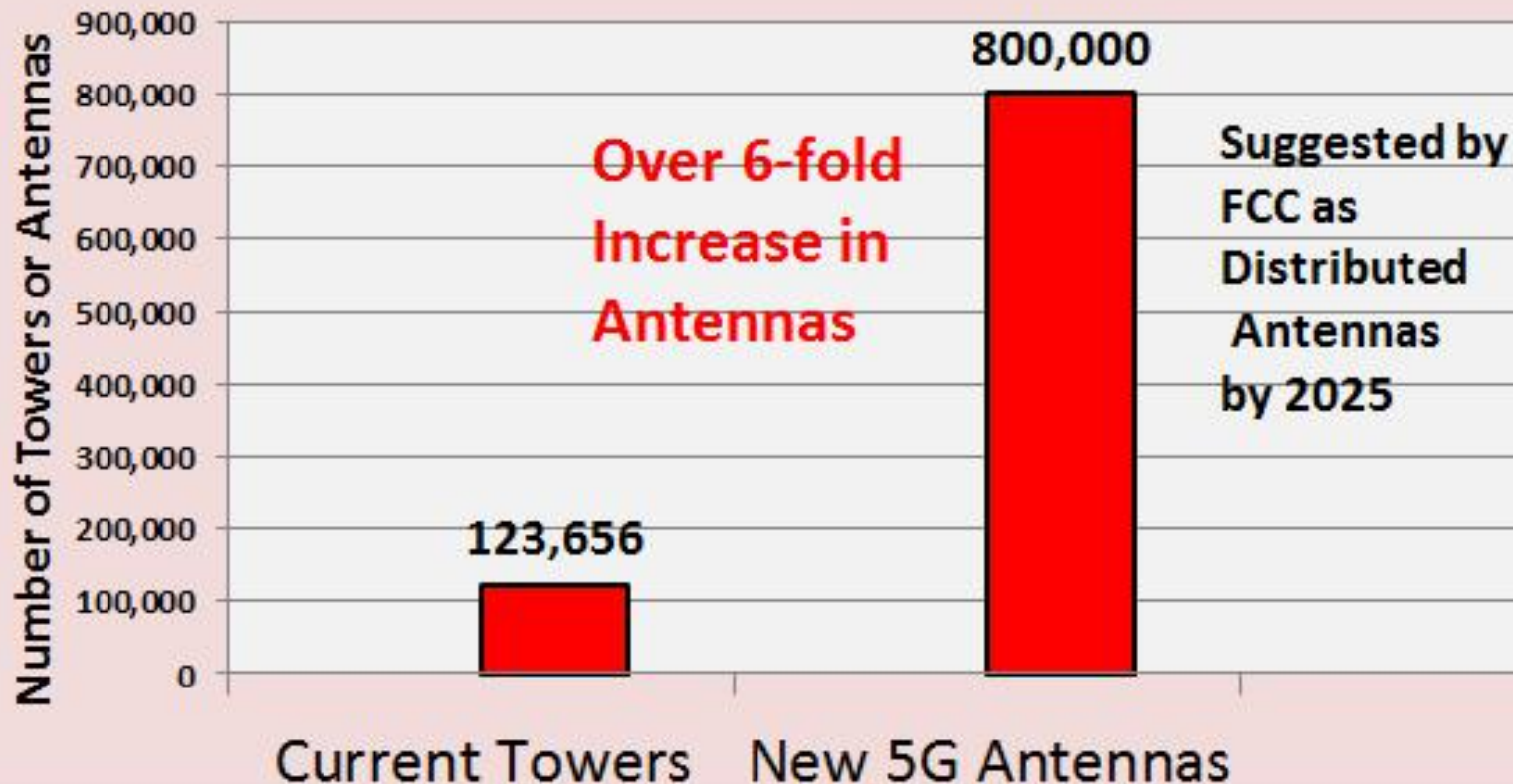
FCC Commissioners Jessica Rosenworcel and Michael O'Rielly, Chairman Ajit Pai and Commissioner Brendan Carr.
FCC



- Plan for 5G roll-out announced by Tom Wheeler, former chairman FCC, on June 20, 2016
- Wheeler tied to Telecom industry for decades; headed lobbying groups prior to appointment to FCC
- Wheeler suggested to put up 800,000 5G antennas by 2025; 6X more antennas than in previous 3 decades

5G Antenna Densification is Planned

Increases in Antennas with 5G



There may be Antennas every 100 meters (or 300 feet) on power poles and lamp posts including residential neighborhoods

FCC is beholden to Industry

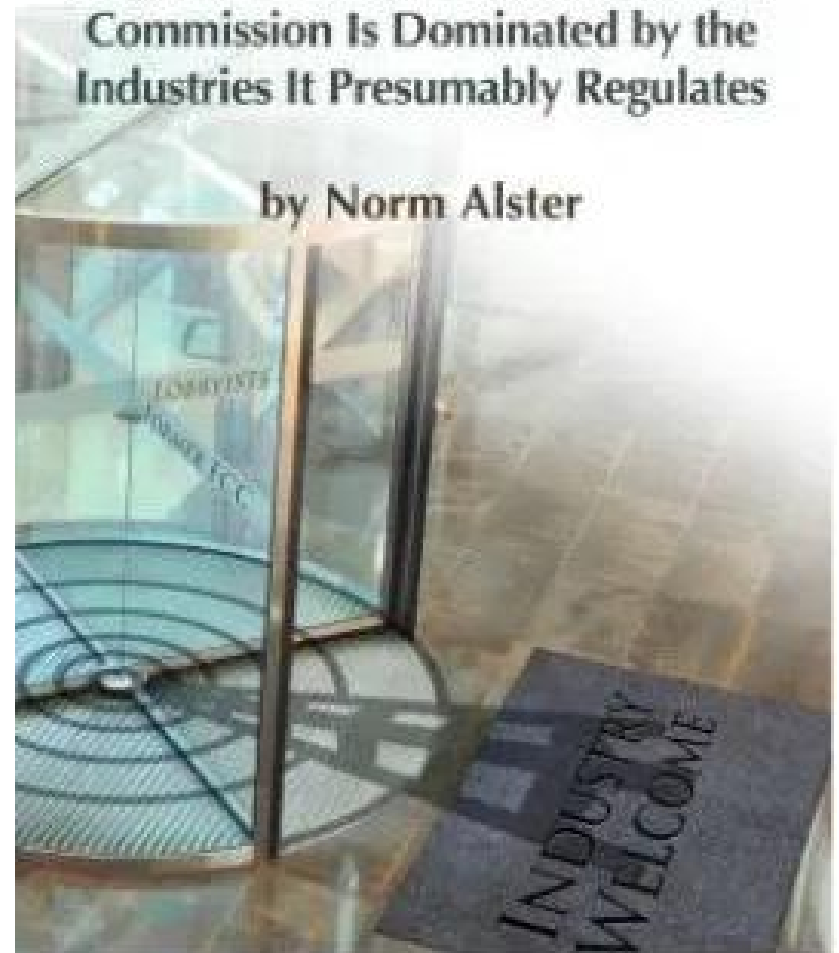
- Norm Alster from Harvard University shows that the FCC is heavily influenced by the Wireless Industry that it is supposed to regulate
- Download free e-book: ethics.harvard.edu/files/center-for-ethics/files/capturedagency_alster.pdf

WS

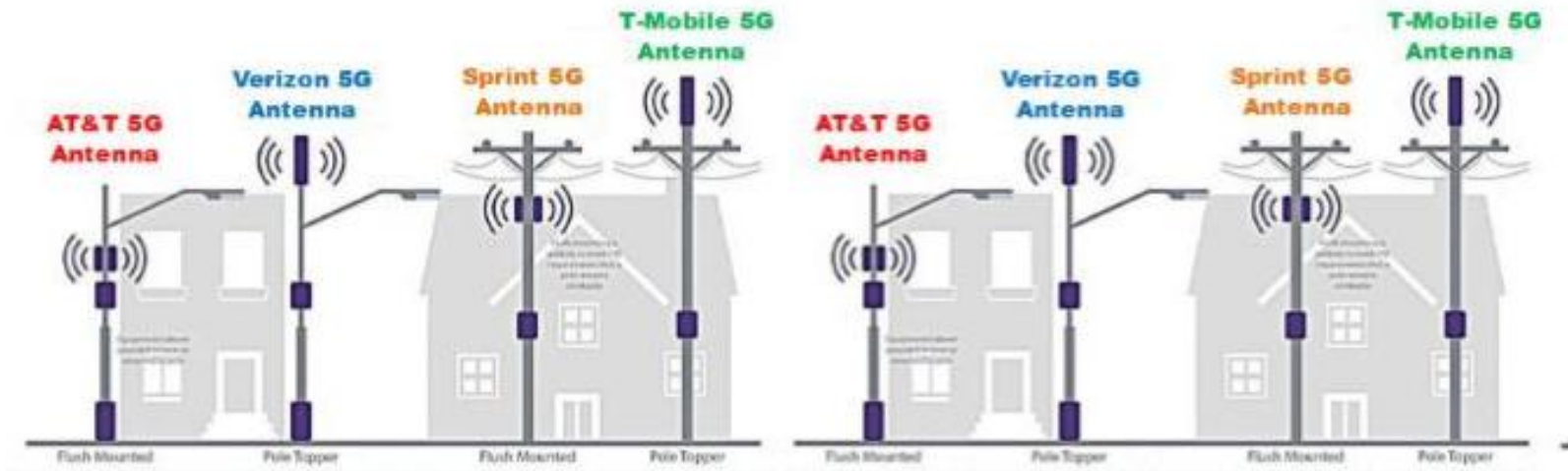
Captured Agency:

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

by Norm Alster



5G and Antenna Densification



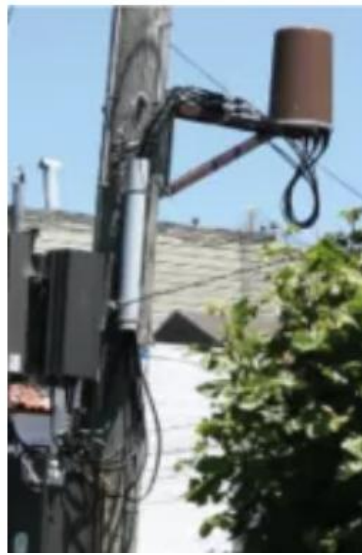
Neighborhood
With Multiple
Carriers (colors)

- Different carriers may have their own antennas possibly as dense as 10,000 antennas per square mile
- If each carrier needs an antenna every 800 feet, there may be an antenna every 300 feet (100 meters)

5G Installations



**Small Cell Mounted on
Telephone Pole**



Small Cell Near Window



Small Cell on Lamppost



**Small Cell on Pole with Power
Supply Cabinet and Equipment
on Ground**

Small Cell Antenna outside Bedroom in San Francisco, CA



5G Antennas may get as close as 300 feet



Utility Pole Mounted
Antenna above



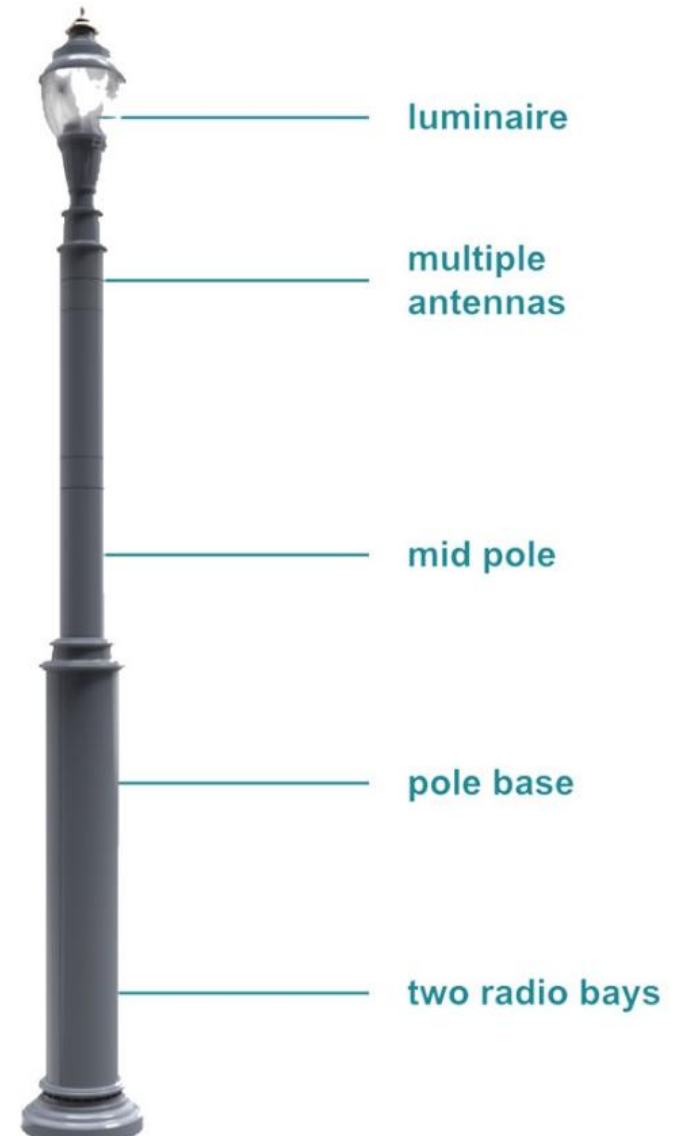
Many Antenna on
on block's utility poles

- Curbside lithium battery backup boxes could arc and explode if hit by vehicles. City ought to have veto rights for these installations



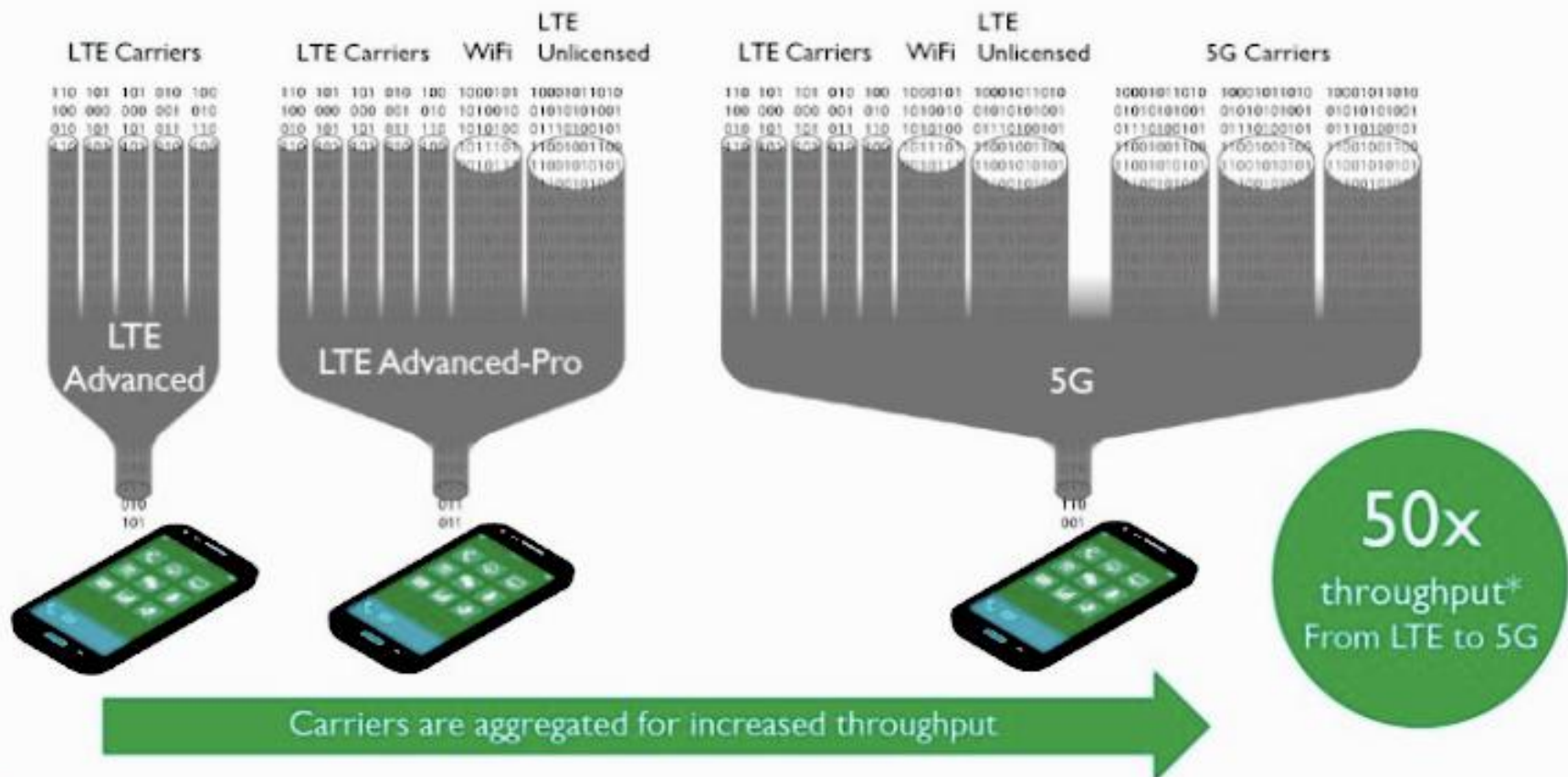
The New Face of Antennas

- Fusion Poles with embedded antennas and radio bays (right)
- Philips and American Tower the rights to as many as 200 existing street-light locations in Huntington Beach CA



Current 4G Long Term Evolution (LTE) is Advancing to become 5G

'LTE-Advanced Pro' – The Stepping Stone To 5G



Key Elements of 5G



Millimeter
Waves



Small Cell



Massive
MIMO



Beamforming



Full Duplex

- Small cell antennas capable of beam-forming;
- Phased arrays capable of directing the beam pattern thereby tracking target device and focusing on person with device linked to the beam
- Massive multiple inputs and outputs, known as massive MIMO; pose unique challenges for measuring exposures.
- Higher frequency Millimeter waves capable of interacting with skin and sweat glands and acupuncture meridians.
- Pulsed Signals can activate Gene expression

5G Millimeter Spectrum Opened For Sale

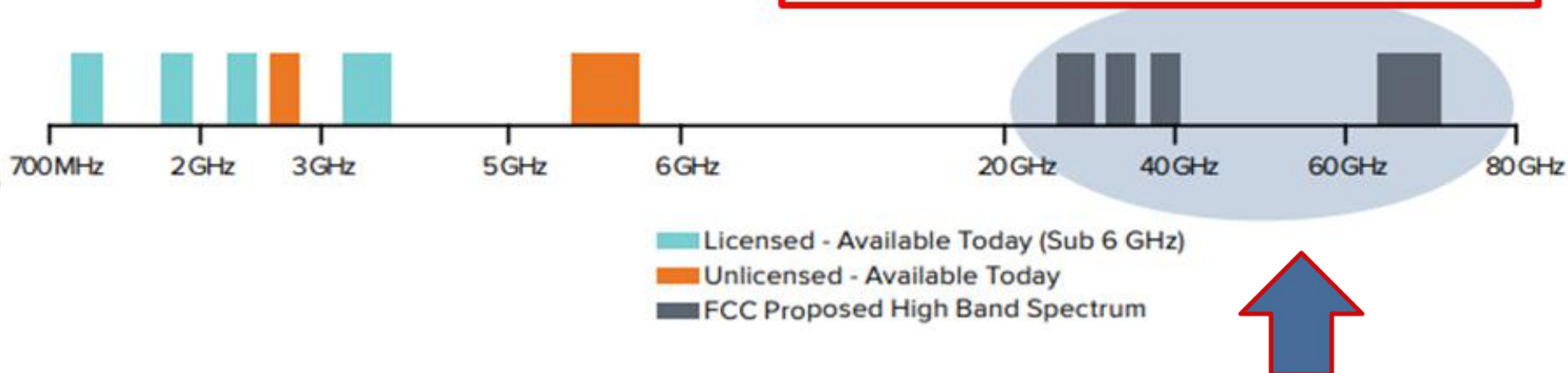
- FCC adds additional spectrum for 5G wireless by an anonymously vote on July 14, 2016
- Total of 10.85 GHz will be made available:
 - 28 GHz: 27.5 to 28.35 GHz
 - 37 GHz: 37.0 to 38.6 GHz
 - 39 GHz: 38.6 to 40 GHz
 - 64 to 71 GHz.

Licensed

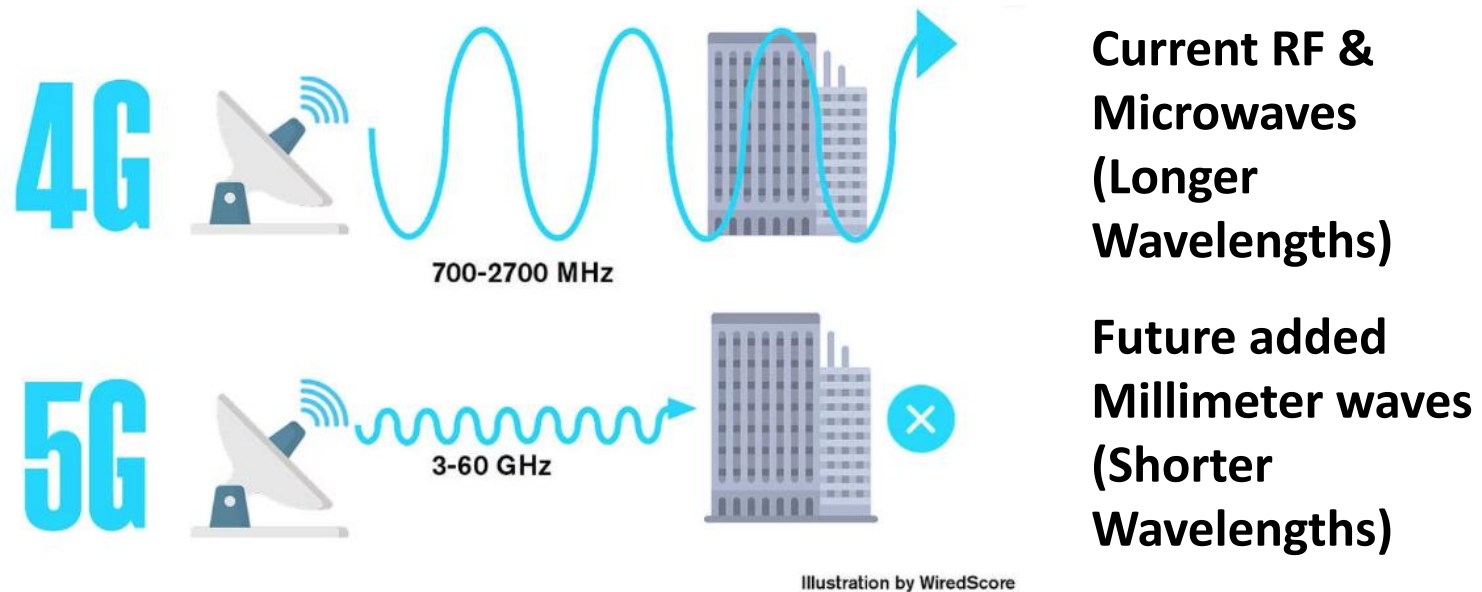
Unlicensed



Millimeter Waves in High Band



5G will also add Millimeter Waves



- 4G antennas use frequencies below 2700 MHz (2.7 GHz) have longer wavelengths, penetrate easily into buildings
- Future 5G antennas using higher frequencies 6+ to 60 GHz (millimeter waves) penetrate poorly, thus more small cell facilities are planned for installation
- Millimeter waves may affect sweat glands & acupuncture points involved with our energetic meridian system

Active Phased Array Antenna in 5G

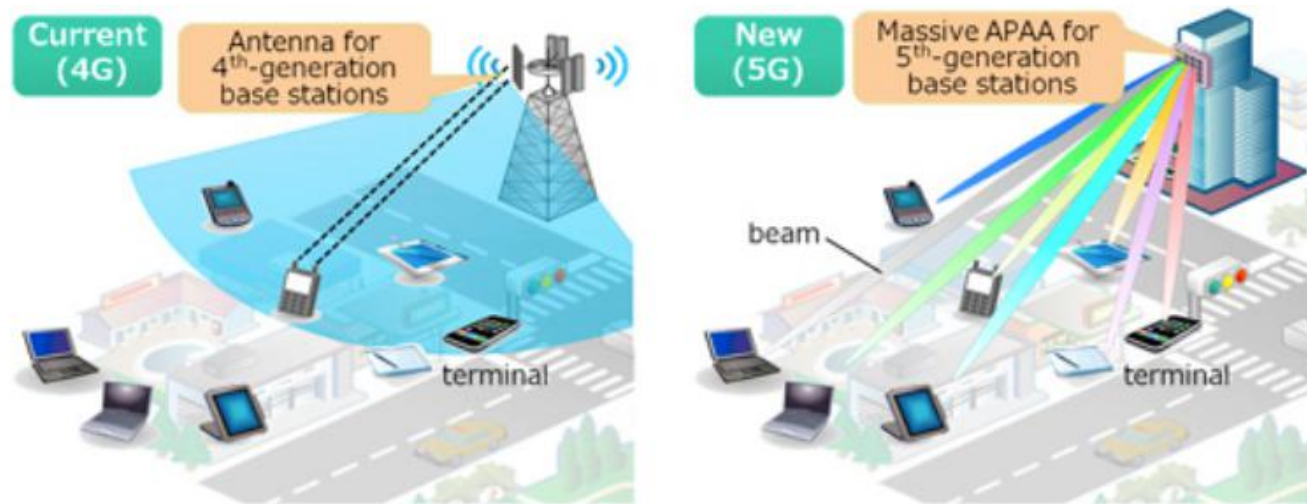


Figure 2. Active Phased Array Antenna (APAA) shown above right in 5G base stations. The combination of analog beam forming via APAA and digital *MIMO* signal processing for the multi-beam multiplexing is believed to be one of the promising approaches for reducing the complexity and power consumption of 5G base stations. However, that has yet to be proven in a commercial 5G deployment.

- What is planned are base stations that send out multiple beams simultaneously to service multiple devices with higher EMF density and steerable beams with side lobes

The Look of 5G Antenna Systems



Conventional
Sector Antenna
Currently in Use

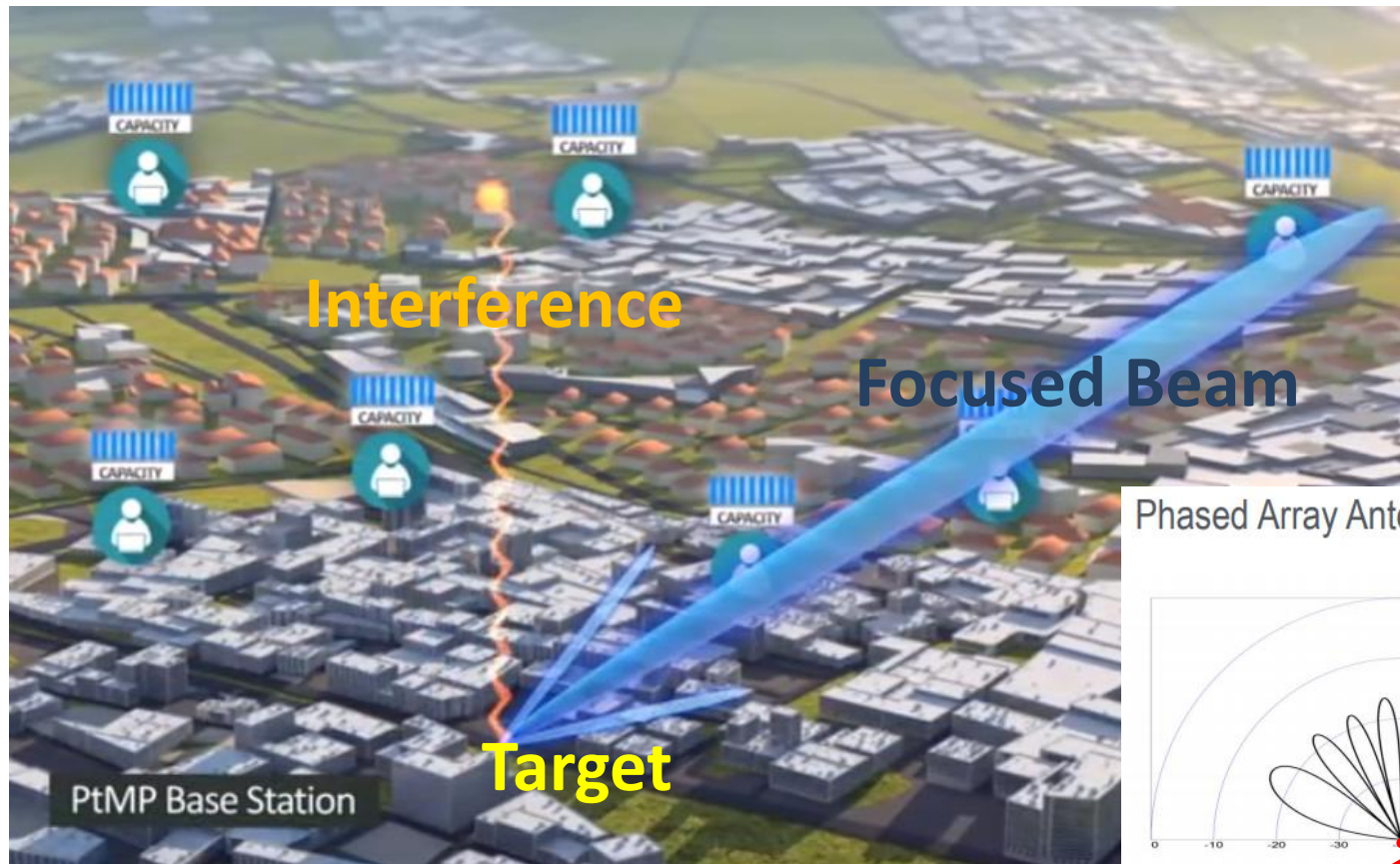
- 5G Antennas located in Oregon (above)

RADWIN 5000 Jet Beamforming Technology



- Multiple Antenna Arrays inside Antenna Box allow steerable narrow beams of focused radiation (somewhat similar to laser beams) that will track devices (phones, IoT etc) on or near people with targeted power
- Designed to make communication immune from interference from other RF sources
- **No health studies have been conducted**

RADWIN 5000 Jet Beamforming Technology



- Beams sweep across area but also have side lobes of pulsing information that may hit other bystanders

www.youtube.com/watch?v=5iFcS2igi64 See their Promotional Video

SpaceX's Starlink internet satellites could make astronomy on Earth 'impossible' and create a space-junk nightmare, some scientists warn

Morgan McFall-Johnsen Nov 16, 2019, 5:31 AM



SpaceX, the rocket company founded by Elon Musk, plans to surround Earth with Starlink satellites to provide global high-speed, low-latency internet. SpaceX; Kevork Djanseziar/Getty; Business Insider

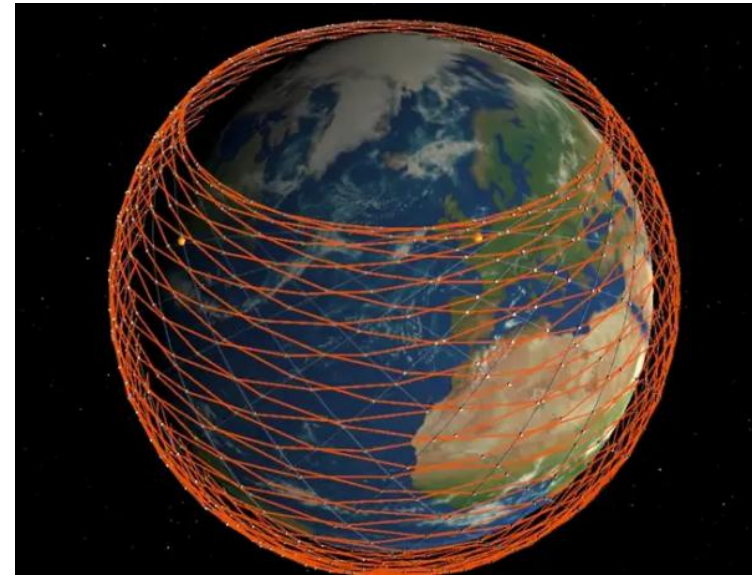
www.businessinsider.com/spacex-starlink-satellites-risks-astronomy-space-junk-2019-11

SpaceX Satellite 5G Network



60 Starlink internet satellites, each weighing about 500 pounds, flat-packed into a stack prior to their launch on May 23, 2019

- Currently 180 satellites in orbit
- Ultimately SpaceX wants to put 42,000 satellites in near Earth orbit
- These will also have beam forming technologies



SpaceX's planned Starlink network



SpaceX's planned Starlink satellite orbits around Earth in pattern

Valerann 5G Embedded Roadway IoT



- British company wants to implant road sensors for autonomous vehicles control and alert
- Vision is for Smart Roads with continuous 5G radiation coming from the roads you drive on

www.valerann.com

2018 Paper: 5G may Damage Tissue

[Health Phys.](#) 2018 Sep 21. doi: 10.1097/HP.0000000000000930. [Epub ahead of print]

Systematic Derivation of Safety Limits for Time-Varying 5G Radiofrequency Exposure Based on Analytical Models and Thermal Dose.

[Neufeld E](#)¹, [Kuster N](#)^{1,2}.

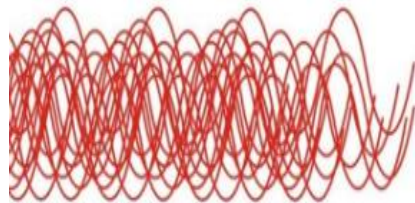
⊕ Author information

Abstract

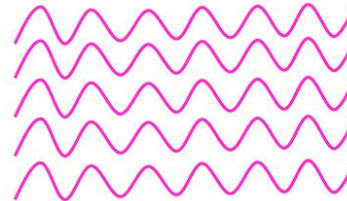
Extreme broadband wireless devices operating above 10 GHz may transmit data in bursts of a few milliseconds to seconds. Even though the time- and area-averaged power density values remain within the acceptable safety limits for continuous exposure, these bursts may lead to short temperature spikes in the skin of exposed people. In this paper, a novel analytical approach to pulsed heating is developed and applied

- 5G transmits info in bursts; can lead to tissue heating
- The results also show that the peak-to-average ratio of 1,000 tolerated by the International Council on Non-Ionizing Radiation Protection guidelines may lead to permanent tissue damage after even short exposures, highlighting the importance of revisiting existing exposure guidelines.

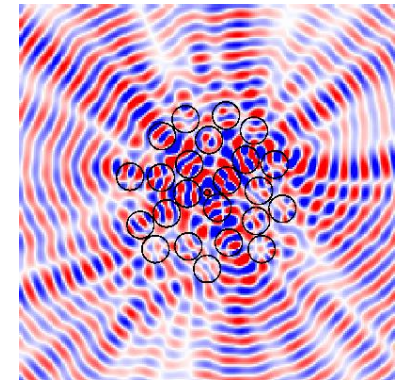
New EMF Radiation is Plane Polarized, Beam formed, similar to Laser Coherent Radiation



Incoherent Light
Waves not in phase



Coherent light waves
Coherent Light
Waves in phase

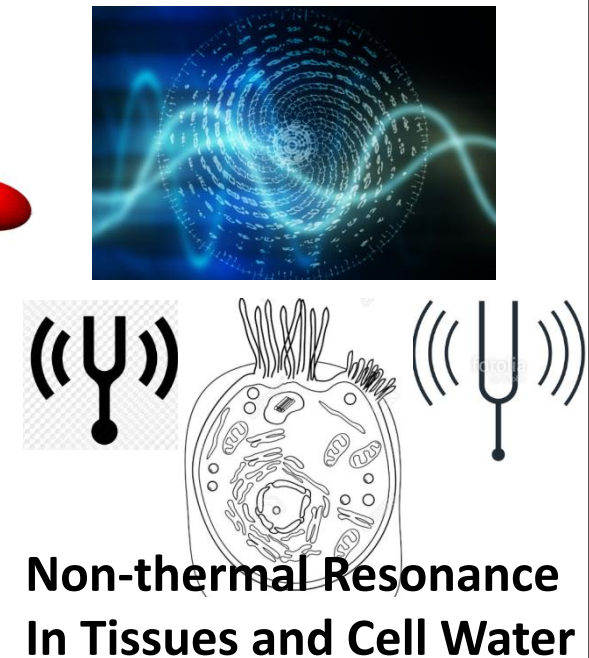
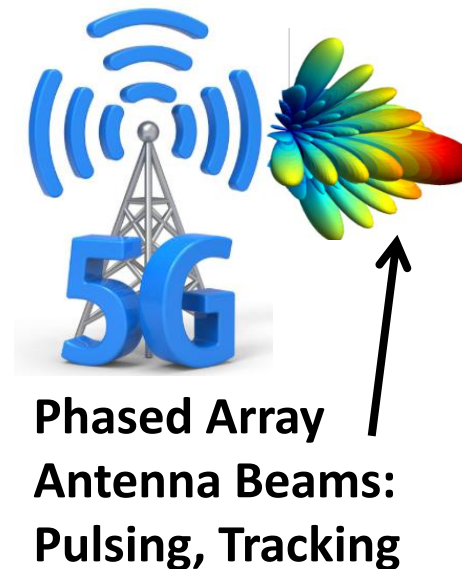
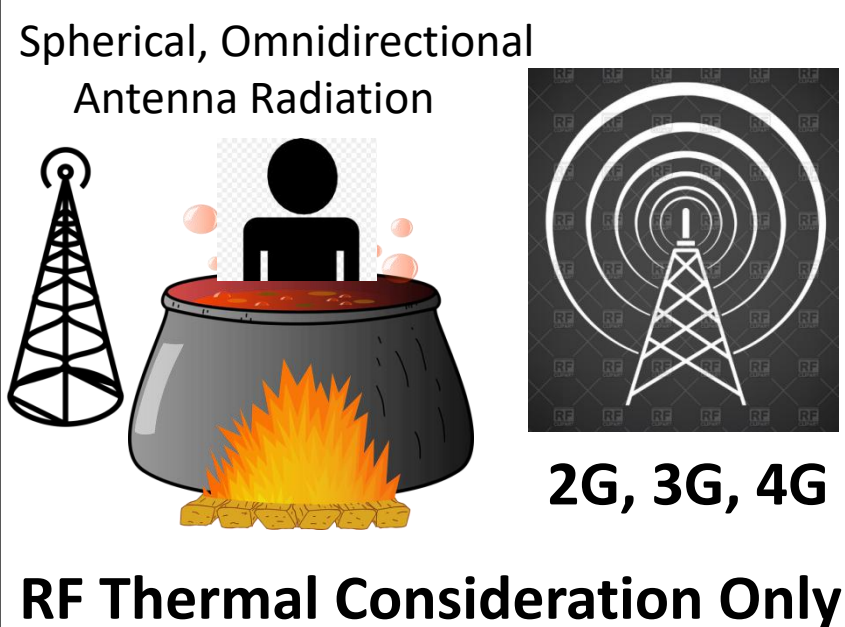


www.eng.yale.edu/stonegroup/cpa/cpa.html

- New EM radiation can use multiple antennas to shape narrow beams using phase controls that may interact differently with human tissue (not yet studied)

RF Exposure Guidelines not Protective

- Outdated, not been revised since 1996 by FCC
- Created by IEEE engineers not EMF Specialists
- Only consider Heating Effects, not Non-thermal
- Other countries (Russia, China) 10x-100x lower
- 5G has Phase Array, Beam-forming directed Radiation

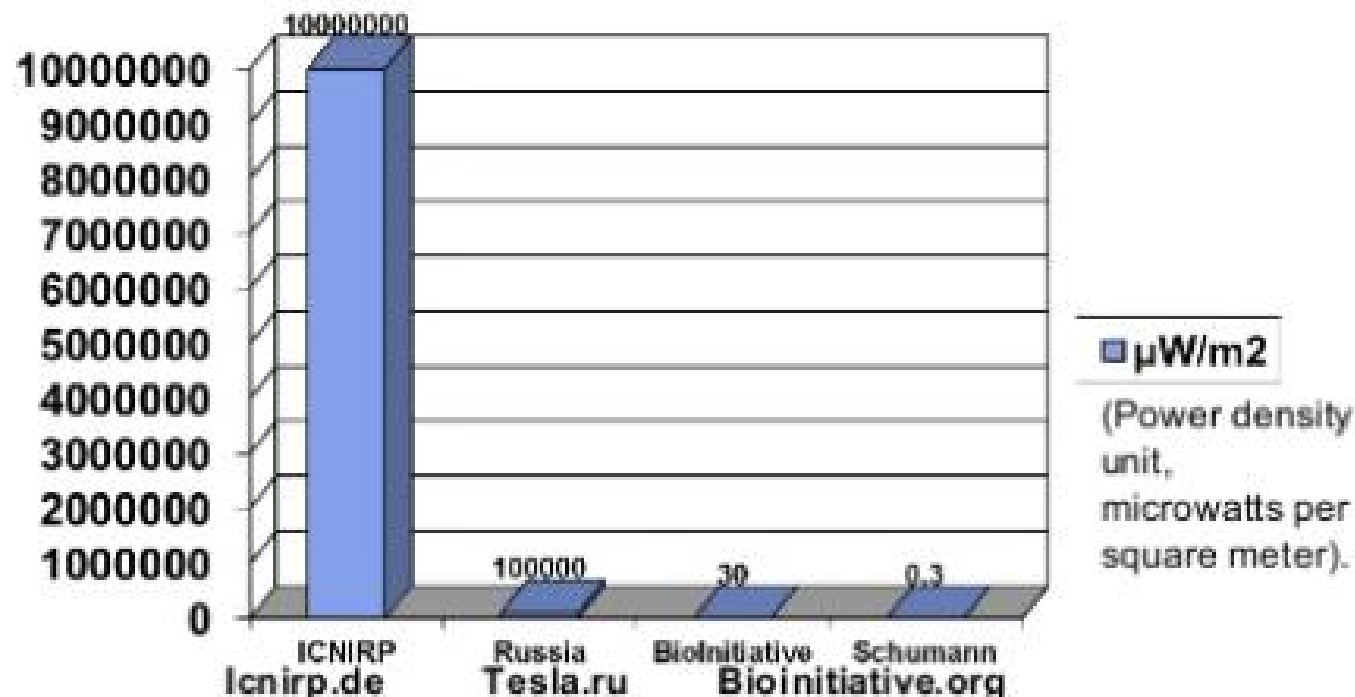


Thermal Guidelines are Too High

Thermal-only ICNIRP-guidelines (for 3G/UMTS)

vs.

Chronic-exposure non-thermal guidelines (Russia etc.) +
BioInitiative recommendations + RF levels in the nature



A note: ICNIRP/FCC-RF-guideline in many Western countries is million times higher than natural RF-level.

CT Senator Blumenthal Hearing on 5G



- Hearing held Feb 6, 2019 questioned several Wireless Industry Representatives
Blumenthal asked:

- How much money has the industry committed to support independent research?...has any been completed... on the biological effects of this new (5G) technology?”

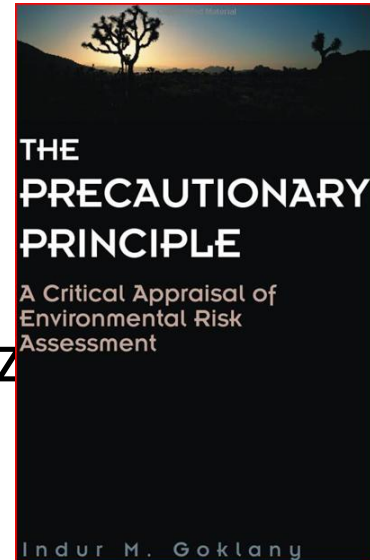
Industry representatives replied:

- ***“There are no industry backed studies to my knowledge right now.”***

Senator Blumenthal replied, **“ So, we are flying blind here on health and safety”**

Scientists sound Warning on 5G

- International Scientist Appeal about 5G deployment was signed by 261 scientists and doctors (as of Nov 4, 2019) from 41 countries
- 5G “constitutes a massive experiment on the health of all species.” states Dr. Joel Moskowitz UC Berkeley Emeritus on Public Health
- “We believe it should be unethical to ignore the available evidence of health damages
- www.5gappeal.eu/about/
- www.emfcall.org/
- www.isde.org/5G_appeal.pdf



Precautionary
Principle needs
To be invoked



Who is Taking Action? Belgium in 2019



2 April 2019

Originally published on www.akebackyourpower.net

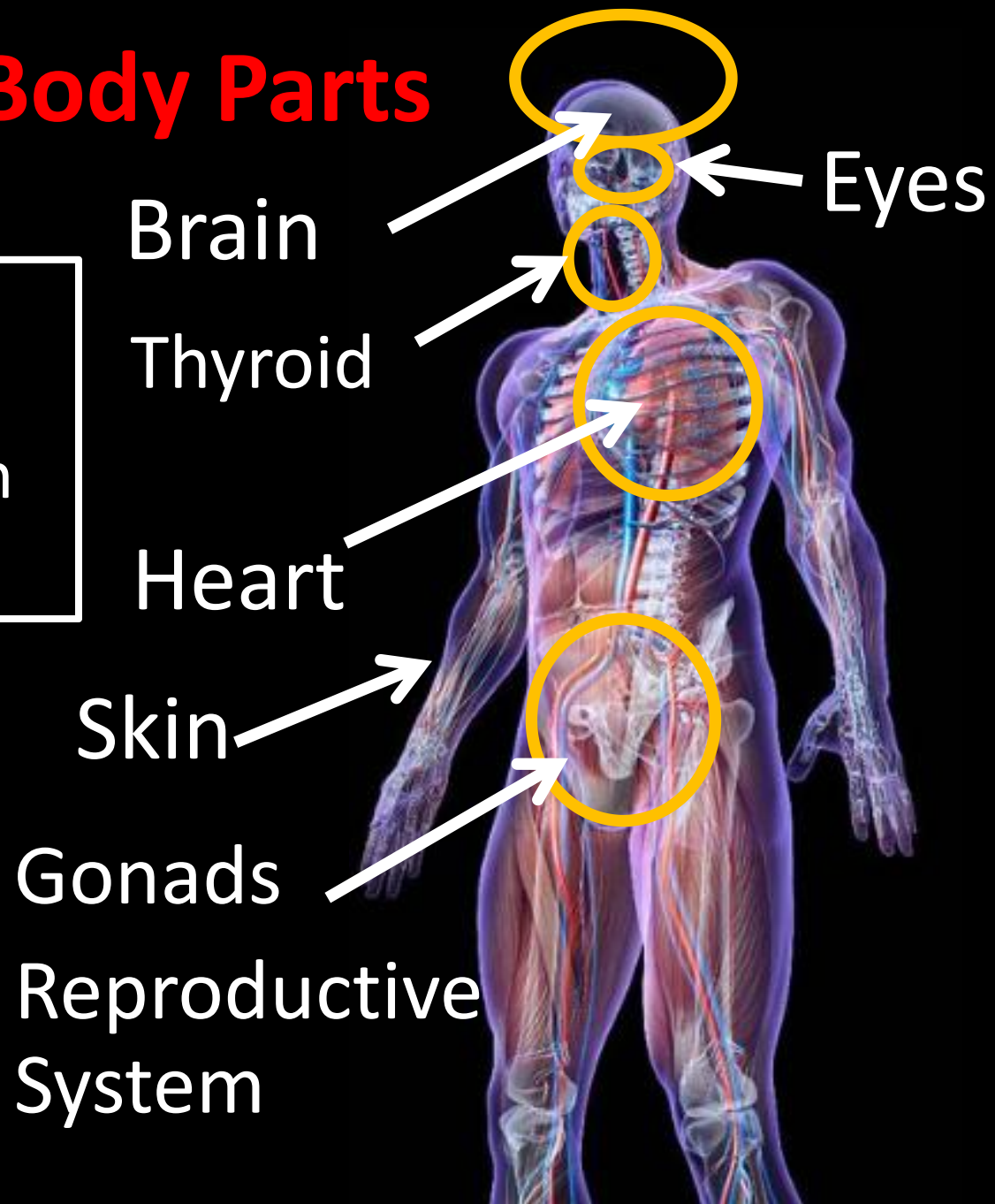
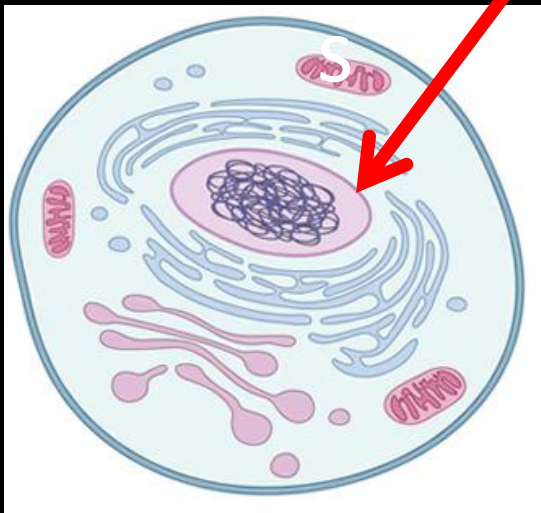
*Great news. A Belgian government minister has announced that Brussels is **halting its 5G plans** due to health effects*

- 5G pilot project is not compatible with Belgian radiation safety standards (9 V/m, or 95 mW/m²)
- U.S. permitted radiation guidelines are higher (64 V/m or 10,000 mW/m² , allowing about 105 x more power density)

5G Vulnerable Body Parts

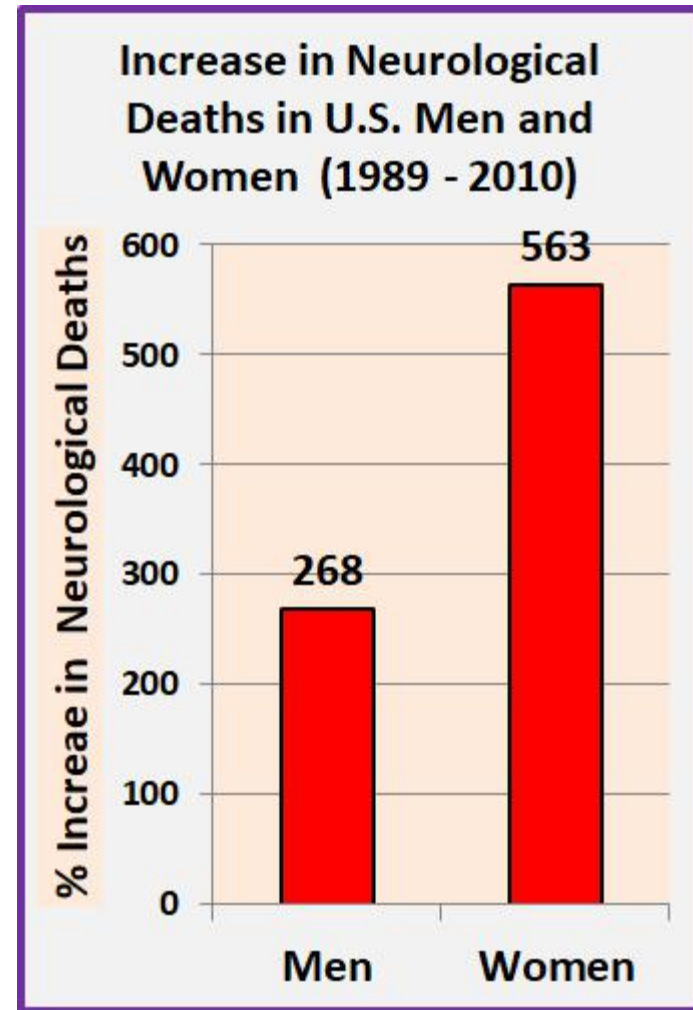
Oxidative Stress
DNA Damage
Apoptosis: Cell Death
Cancer

Cells Nucleus



Major Increase in Neurodegenerative Diseases and Deaths (1989 – 2010)

- Colin Pritchard from Bournemouth University reported on study that showed in the United States, where neurological deaths in men aged over 75 have nearly tripled, and in women risen more than fivefold, between 1989 to 2010.
- Pritchard: “We now face unprecedented levels of neurological disease, not just the early dementias.”



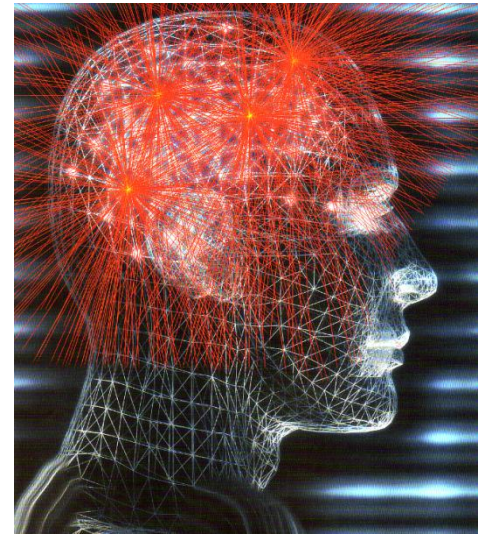
Source: Pritchard (2015): Neurological deaths of American Adults 1989-2010

[Surg Neurol Int.](#) 2015 Jul 23;6:123. doi: 10.4103/2152-7806.161420. eCollection 2015

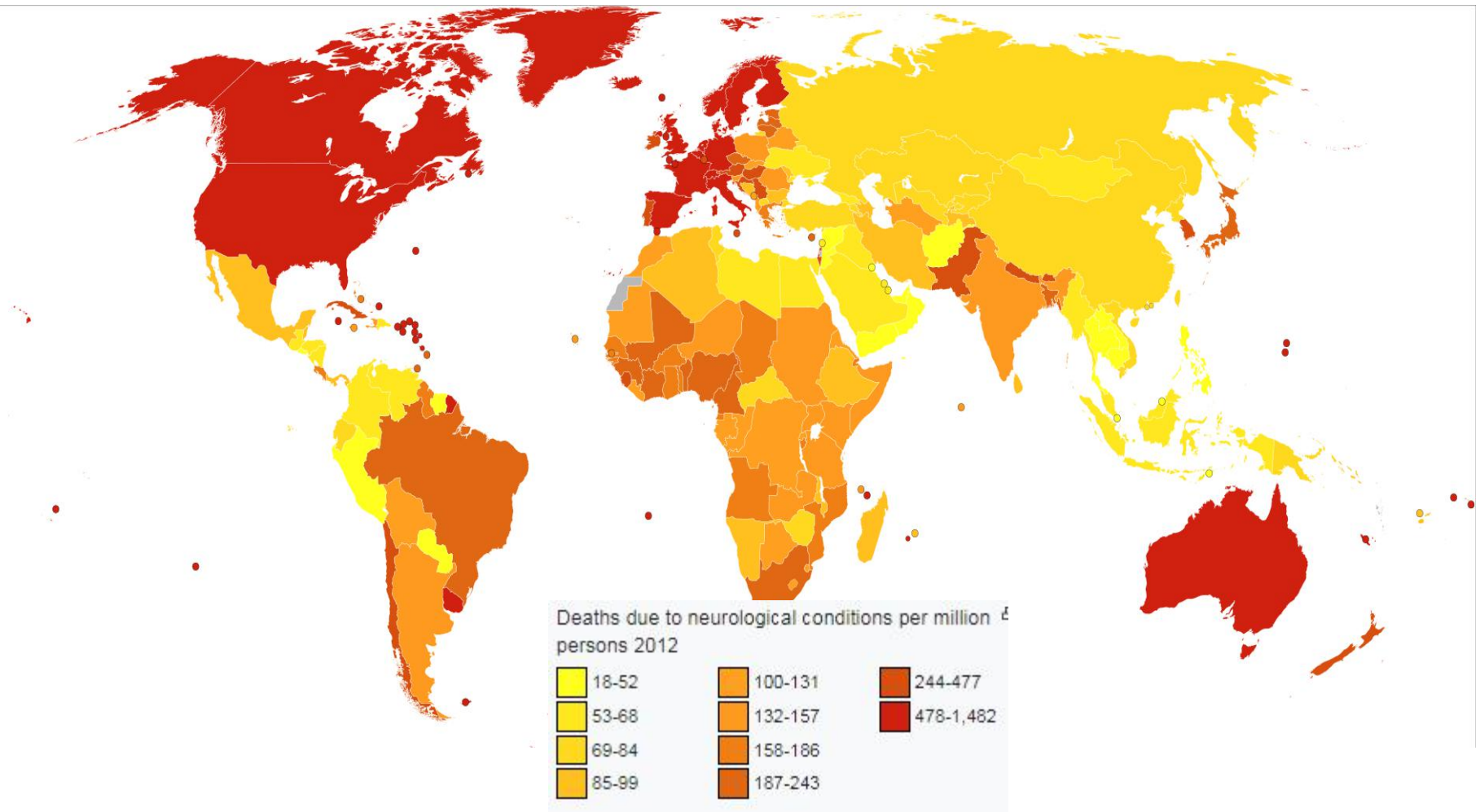
Neurodegenerative Diseases often related to Impaired Mitochondrial Function

These include:

- Bipolar disorder
- Major depressive disorder
- Panic Disorder and social anxiety
- Parkinson's disease
- Alzheimer's Disease
- Chronic fatigue syndrome
- Many are accompanied by Brain Inflammation



Deaths from Neurological Disorders 2012



- Highest Rates occurred in Western Technologically Advanced countries with Highly Developed Wireless Services

https://en.wikipedia.org/wiki/Neurological_disorder

Fire Stations have Opt-Out for Towers



INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS



- Firehouse stations were exempted from mandatory placement of antennas in California Bill SB649 which was vetoed by Gov. Brown on Oct 15, 2017
- A 2004 SPECT brain scan study of firefighters in Central California found brain abnormalities in all the men tested, as well as delayed reaction time, lack of impulse control and cognitive impairment.

FIREMEN Functional MRI Studies (Heuser, 2017)

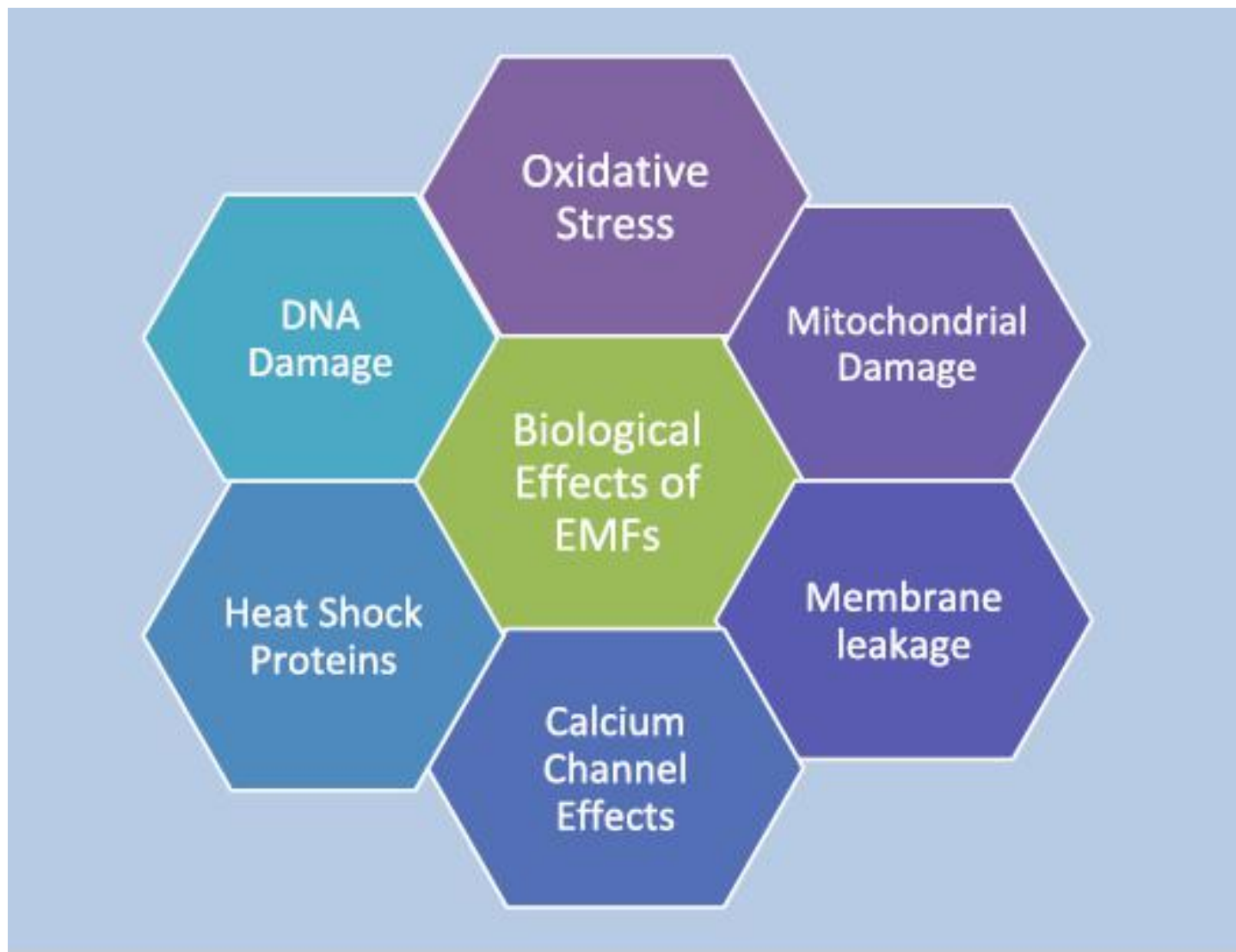


- Abnormal fMRI Brain Studies were found after firemen had been exposed to firehouse antenna radiation and had EHS
- Gunnar Heuser MD at the UCLA Brain Research Institute studied firemen who developed serious cognitive problems on the job
- Diagnosis: Toxic Encephalopathy

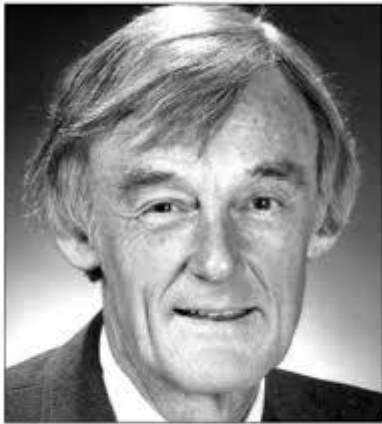
Heuser, G., Heuser, SA. Functional brain MRI in patients complaining of electrohypersensitivity after long term exposure to electromagnetic fields.

Reviews on Environmental Health. 2017; 32(3): 291–299 (July 5, 2017)

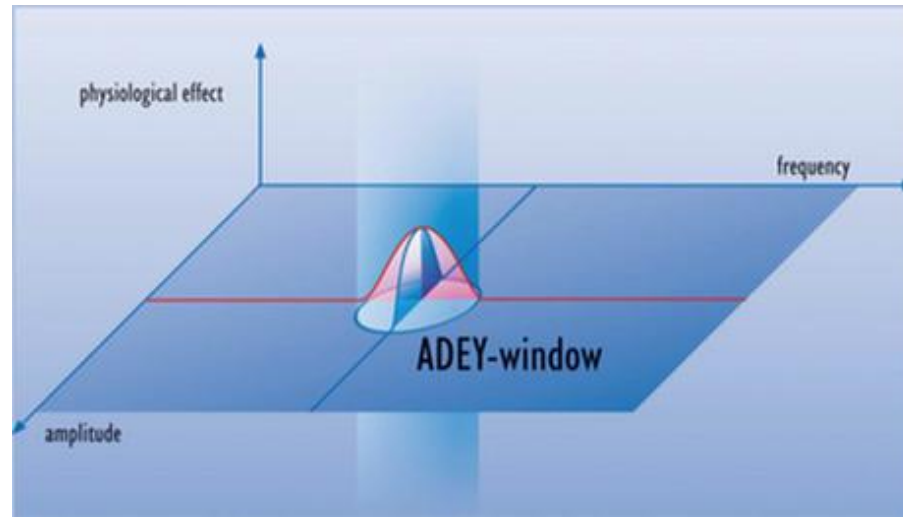
Toxic Biological Effects of Electromagnetic Fields



Adey Biological Windows



William Ross Adey



- Discovered by Ross Adey at Loma Linda University
- At the correct frequency and amplitude of Electromagnetic Fields you get a physiological response such as Calcium ion influx into cells which act as messenger molecules

Tissue interactions with nonionizing electromagnetic fields.

W R Adey

01 APR 1981 // <https://doi.org/10.1152/physrev.1981.61.2.435>

PHYSIOLOGICAL REVIEWS

Vol. 61, No. 2, April 1981

Oxidative Stress from RFR

Oxid Antioxid Med Sci 2014; 3(1):1-3

ISSN: 2146-8389

EDITORIAL

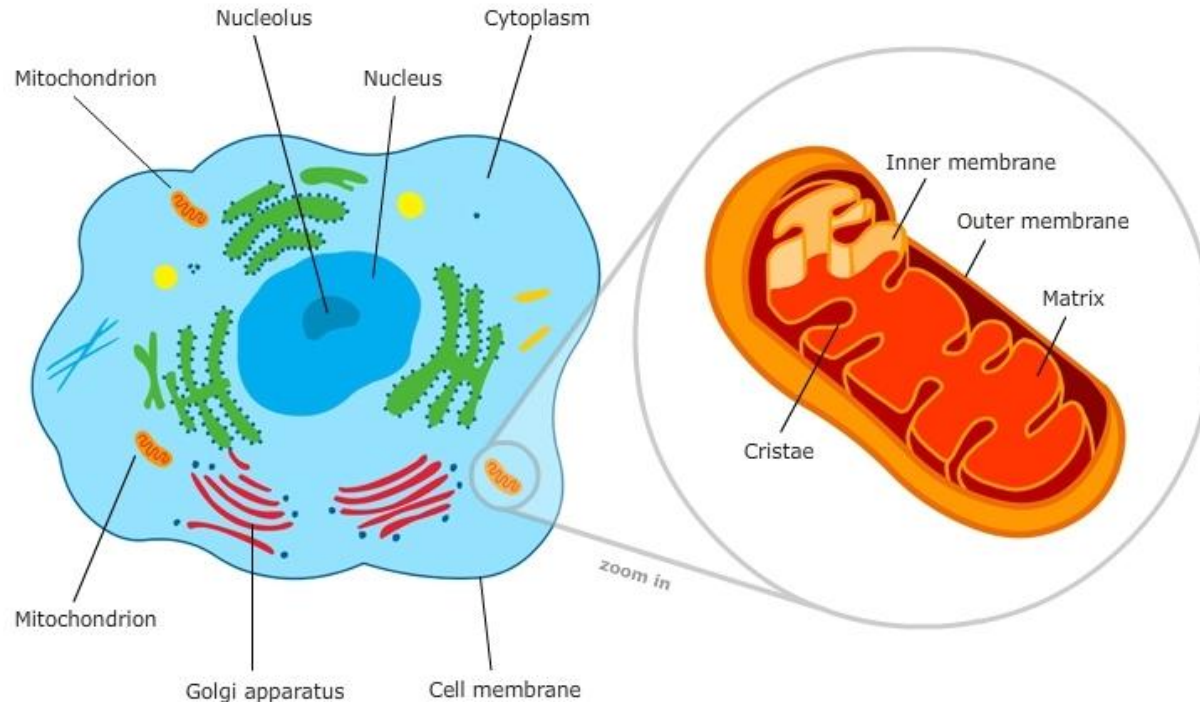
Low intensity radiofrequency radiation: a new oxidant for living cells

Igor Yakymenko¹, Evgeniy Sidorik¹, Diane Henshel², Sergiy Kyrylenko³



- Review of 80 papers on oxidative stress caused by RFR, 76 papers (92.5%) showed significant effects
- Published in journal: *Oxidants and Antioxidants in Medical Science* March 29, 2014

Mitochondria (Powerhouse of Cells)



**Produce ATP as
Energy Source
for the Cells**



- Mammalian somatic cells ranging from 80 to 2000, average 107 per cell; high in brain and heart
- Oocytes have 100,000 to millions of mitochondria
- Most are in Muscle tissue (40% of human body)
- Major source of free radicals in body = oxidative stress

EMFs cause these Effects on Health



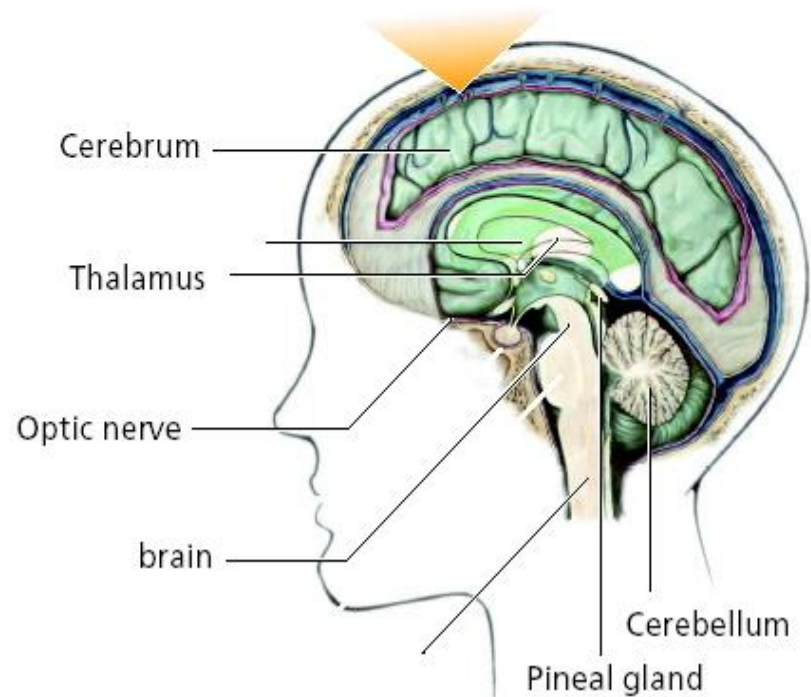
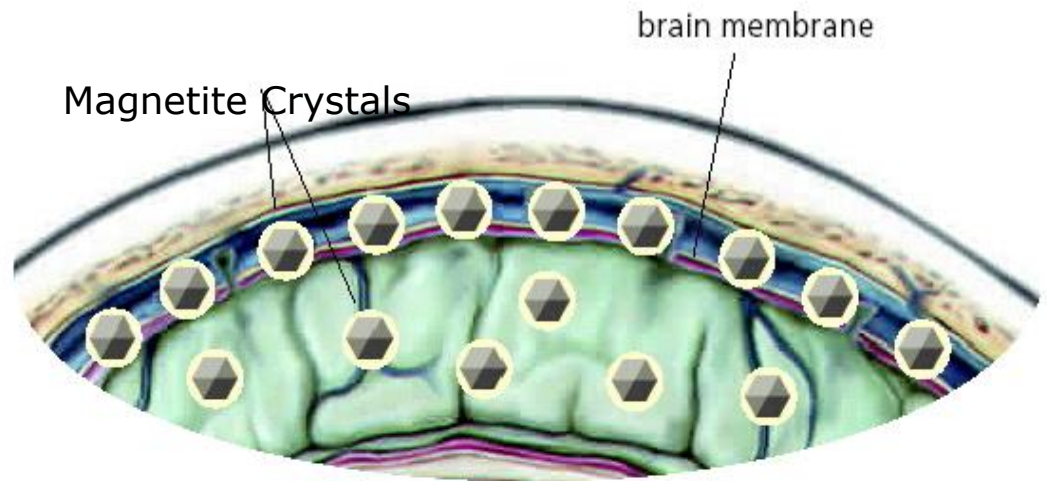
- Oxidative Stress = Excessive free radicals formation
- Fatigue, Headaches, Sleep Disturbances, Low Melatonin
- Cognitive & Neurobehavioral Effects, Memory Issues
- Reproductive Effects = Sperm & Oocyte (eggs) changes
- DNA Changes – Single & Double Strand Breaks
- Breaks in Blood Brain Barrier: Brain toxin exposure
- EMF = Type 2B Carcinogen = Long term Cancer Induction
- **These also correlate with Mitochondrial Damage**

Magnetite Crystals in Human Brain

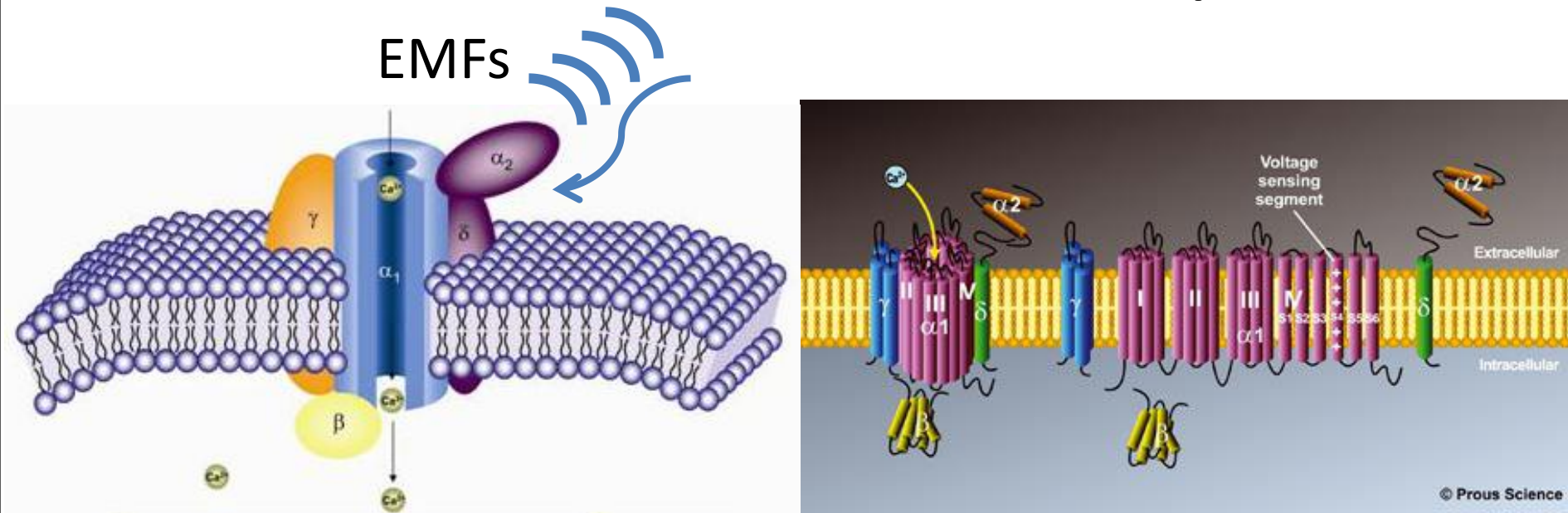
5 million crystals/gram
In Brain tissue

100 million crystals/gram
in brain membranes

Magnetite crystals
allows us to have a
magnetic sense and be
oriented to the earth's
magnetic field. Also
affected by artificial fields



Martin Pall Hypothesis: Voltage-Gated Calcium Channels are Culprit



- Various types are present in every Cell Membrane
- Respond to Low Level Electromagnetic Fields pulses
- Effects EMFs blocked by Ca^{++} Channel Blocker Drugs
- Based on literature review but no experiments

3 - 8% of general population in Europe &
California are now Very Electrosensitive
Dr D. Belpomme (Paris) estimates 35% are now
Moderately sensitive



Electromagnetic Hypersensitivity Syndrome (EHS)

Symptoms of EM Hypersensitivity

- Fatigue
- Headaches
- Depression
- Memory Loss
- Irritability
- Skin Problems
- Nausea
- Dizziness
- Sleep Disturbance
- Feeling of Discomfort
- Difficulty Concentrating
- Visual / Hearing Disruption
- Cardiovascular Problems
- Loss of Appetite
- Movement Difficulties

Water and Electromagnetic Fields

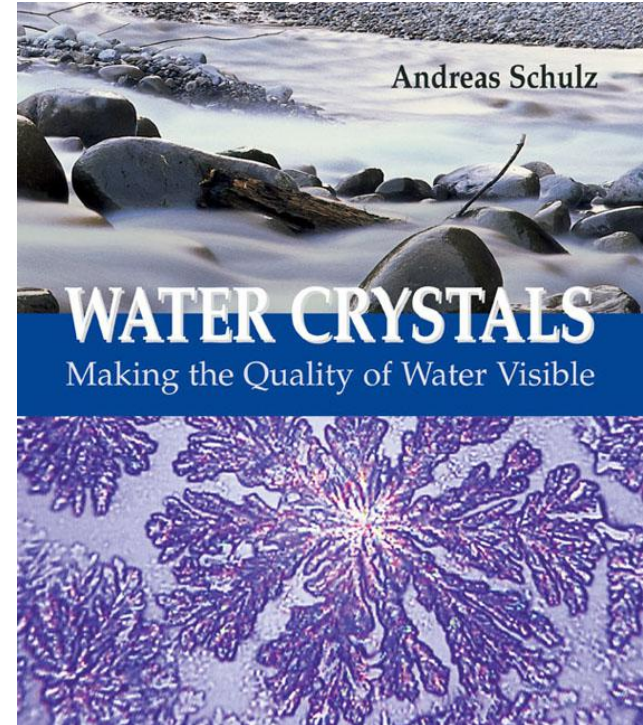
- Water absorbs around 70% of all the electromagnetic energy in our atmosphere, making water the most important electromagnetic energy carrier on Earth
- Water absorbs, and/or reacts to electromagnetic waves of 10^6 Hertz (Megahertz) with wavelengths of about 100 metres to waves of 10^{21} (Sextillion = Billion Trillion) Hertz with wavelength sizes of atomic nuclei.
- 5G radiation will likely seriously affect the “Quantum Coherent Water” in our cells and disturb the coherent water in our body’s acupuncture channels

Water is affected by EM Radiation



**Healthy Water has Branching
Organic Hexagonal Structure**

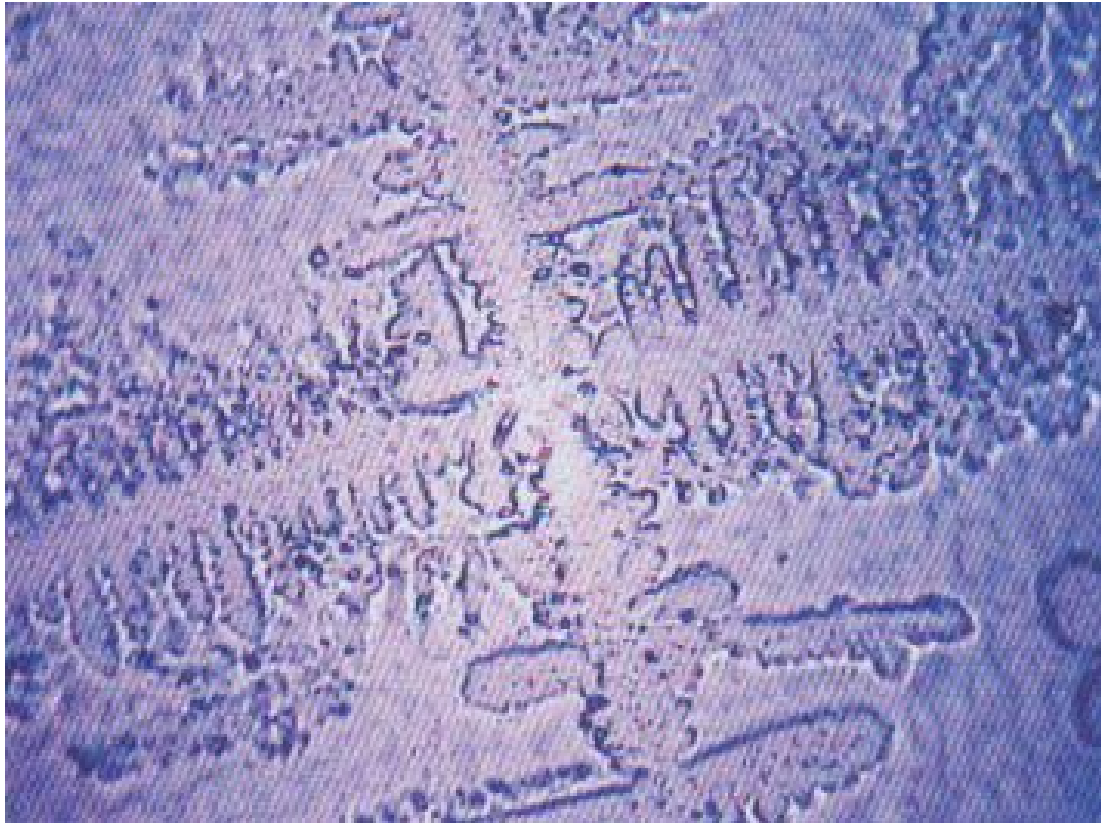
Magnification 400X



<http://hagalis.com/>

- Images from Water Crystallization Experiments
- Work of Andreas Schulz in Germany at Hagalis A.G.

Water from Water Tower with Cell Phone Mast on it

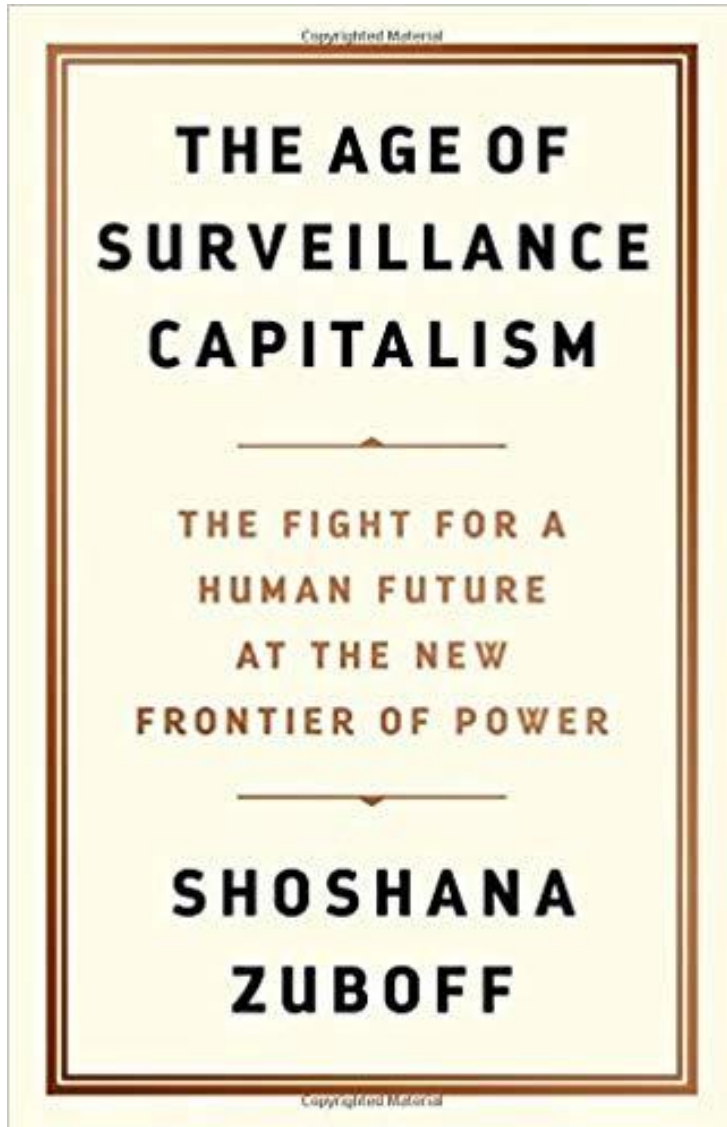


Studied by
Hagalis Method

90 degree type
Crystal pattern

- Square pattern seen in the Water – poor quality
- (100 X Magnification)

2019: Central Factors driving Tech



Harvard Professor describing what is driving tech today.

Wireless Technologies are especially being used to fulfill the need for Surveillance using Big Data.

Military takes Advantage of 5G



- Report available at:
https://media.defense.gov/2019/Apr/03/2002109302/-1/-1/0/DIB_5G_STUDY_04.03.19.PDF

Military takes Advantage of 5G



- “The emergence of 5G technology, now commercially available, offers the Department of Defense the opportunity to take advantage, at minimal cost, of the benefits of this system for its own operational requirements”.

<https://www.globalresearch.ca/hidden-military-use-5g-technology/5697848>

Military takes Advantage of 5G



- 5G system will play an essential role for the use of hypersonic weapons – missiles, including those bearing nuclear warheads, which travel at a speed superior to Mach 5 (five times the speed of sound).

2002 Patent shows how Microwave Hearing can be created inside Brain

US0064/0214B1


(12) **United States Patent**
O'Loughlin et al.

(10) **Patent No.:** **US 6,470,214 B1**
(45) **Date of Patent:** **Oct. 22, 2002**

(54) **METHOD AND DEVICE FOR
IMPLEMENTING THE RADIO FREQUENCY
HEARING EFFECT**

(75) **Inventors:** **James P. O'Loughlin**, Placitas; **Diana L. Loree**, Albuquerque, both of NM (US)

(73) **Assignee** **The United States of America as
represented by the Secretary of the
Air Force, Washington, DC (US)**



(56) **References Cited**
U.S. PATENT DOCUMENTS

3,563,246	A	*	2/1971	Puharick	128/422
3,629,521	A	*	12/1971	Puharick	179/107
4,835,791	A	*	5/1989	Daoud	375/61

* cited by examiner

Primary Examiner—Kennedy Schaetzle
(74) *Attorney, Agent, or Firm*—James M. Skorich; Kenneth E. Callahan

- Microwave hearing inside the head is achieved by transmitting a square root pre-processed voice or audio signal using power modulation of an RF carrier.
- It is reminiscent of Psychotronic Devices (Weapons) developed already during the Cold War Era.

Microwave Weapons Are Prime Suspect in Ills of U.S. Embassy Workers

<https://www.nytimes.com/2018/09/01/science/sonic-attack-cuba-microwave.html>

The New York Times

Sept 1, 2018 by William Broad

JAMA | Preliminary Communication

Online Feb 15, 2018

Neurological Manifestations Among US Government Personnel Reporting Directional Audible and Sensory Phenomena in Havana, Cuba

**JAMA. 2018;
319(11):1125-1133**

Randel L. Swanson II, DO, PhD; Stephen Hampton, MD; Judith Green-McKenzie, MD, MPH; Ramon Diaz-Arrastia, MD, PhD; M. Sean Grady, MD; Ragini Verma, PhD; Rosette Biester, PhD; Diana Duda, PT, DPT; Ronald L. Wolf, MD, PhD; Douglas H. Smith, MD

- Beatrice Golomb at UCSD alerted scientists and journalists about the possible use of Microwave Weapons involved in attacks which led to breaking off diplomatic relations with Cuba

2018: Beatrice Golomb MD, PhD UCSD



Diplomats' Mystery Illness and Pulsed Radiofrequency/Microwave Radiation

Beatrice Alexandra Golomb

Posted Online October 26, 2018

https://doi.org/10.1162/neco_a_01133

© 2018 Massachusetts Institute of Technology

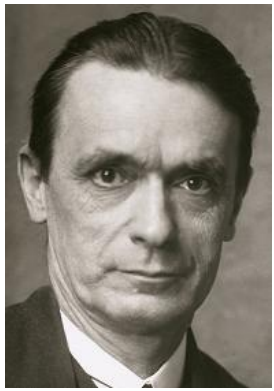
Neural Computation

Volume 30 | Issue 11 | November 2018

p.2882-2985



- Fact support that pulsed RF/MW as the source of injury in affected diplomats
- 565 references on EHS and adverse effects of Microwave Radiation



Rudolf Steiner on Radiation in 1923

- He inspired Anthroposophy, Biodynamic Farming, Waldorf Education and Anthroposophic Medicine
- “This life of men in the midst of electricity, notably radiant electricity, will presently affect them in such a way that they will no longer be able to understand the news which they receive so rapidly. The effect is to damp down their intelligence.”

Some Steps you can Take

- 1. Don't upgrade to a 5-G smartphone.
- 2. Minimize the use of cellphones. Don't carry them on your body. Turn them totally off at night.
- 3. Get rid of cordless phones – use corded phones. This includes wireless baby monitors.
- 4. Minimize or turn off Wi-Fi routers when not essential – replace with wired ethernet.
- 5. Replace smart meters with older style analog meters for electricity, gas, and water.

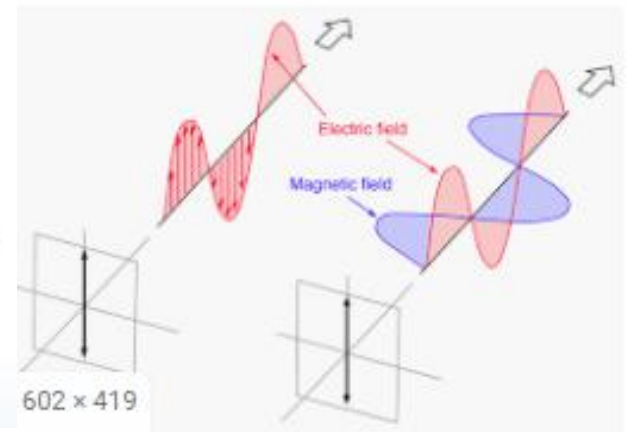
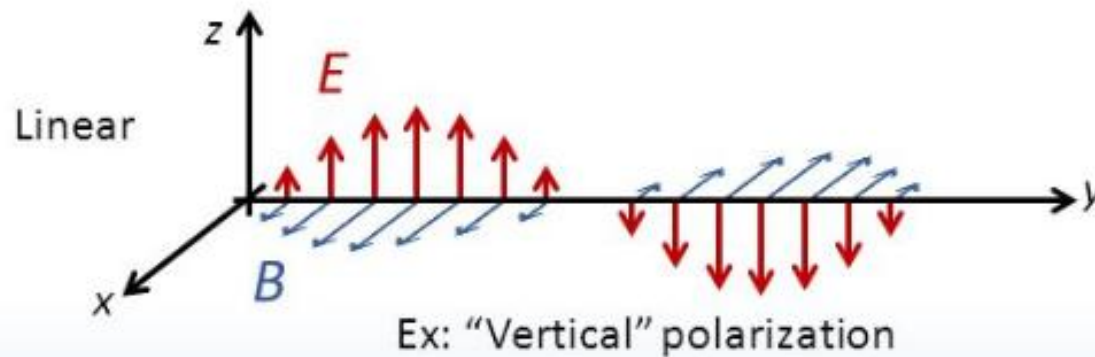
Thank You for Your Attention





Polarization of EM Waves

EM waves are transverse and have *polarization* – by convention, the direction of the E field oscillation



- Electric fields of all Polarized Wireless Radiation can create additive effects (constructive interference) making the radiation stronger at some places and having a larger biological effect at that point in space