

Technology Industry Perspective for the Regulatory Authority's Radiofrequency and 5G Safety Information Gathering Session



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Environmental Health Trust

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Bio and Organization's Focus

President of Microsoft Canada – Most recent position

- 40+ years in the technology industry



C4ST: Canadians for Safe Technology (CEO and Chairman)

- Not-for-profit, volunteer-based, national coalition of **parents, citizens and experts**
- To **educate & inform Canadians** – dangers of exposures to radiation from wireless technology and how to use technology safely
- To work with **all levels of government** to create healthier communities for children and families from coast to coast to coast.



Environmental Health Trust (Co-Chairman Business Advisory Group)

The only nonprofit in the world today that both:

- Carries out research on controllable environmental health hazards, and
- Works directly with local communities, teachers, parents & students as well as policy makers to understand & mitigate these hazards through research, education & advocacy.



Extremely brief summary of Scientific Evidence of harm

<https://www.emfscientist.org/> – 253 EMF scientists from 44 nations

- Call upon the United Nations, the WHO and UNEP, and all U.N. Member States, for greater health protection on EMF exposure especially for children.

<http://www.5gappeal.eu/> – 403 scientists and medical doctors from 47 nations

- Call for a moratorium on the roll-out of 5G.

Thousands of peer-reviewed studies have shown the following effects:

- Increased cancer risk
- Sperm damage and other reproductive harms
- DNA damage
- Neurological disorders (Alzheimer's, etc.)
- Learning and memory deficits (childhood development)
- Increase in harmful free radicals
- Please see Appendix for a more complete list of published studies

Technology Industry Perspective

- Don't say technology is safe. “We meet Federal Guidelines (if used correctly)”
- Bury warnings inside devices or their manuals so they are legally protected
- Introduce new technology while others monitor and pay for harmful effects
- Influence the legislative process to ensure the uncontrolled rollout of technology
- The penetration of 5G (and 6G) will drastically increase public awareness
- Industry credibility damage by security breaches will increase
- WHO International Agency for Research on Cancer will re-evaluate RF radiation
- Change in corporate responsibility expectations (carbon footprint) will expand
- Exert tremendous influence on key organizations:
 - International Commission on Non-Ionizing Radiation Protection (ICNIRP)
 - International EMF Project
 - United States Federal Communications Commission

Suggested Recommendations

Continue the moratorium on 5G until:

- A truly independent panel with appropriate expertise systematically reviews the scientific evidence of the effects of RF radiation. This review should meet international standards:¹
 - Every panel member shall declare all real and perceived conflicts of interest
 - Rigorous scientific methods
 - Transparency
 - Full public consultation from initial scoping throughout the process
 - Health-protective precautionary interpretation of findings.
- Established guidelines to protect wildlife and the environment from RF radiation
- Complete an economic analysis, by the end of 2021, of the incremental revenue from 5G versus the total potential economic burden. This would include, but not be limited to:
 - increased healthcare costs;
 - lost productivity arising from adverse health effects;
 - security and privacy breaches;
 - damage to the environment; and
 - risks to safety and property including those resulting from degraded weather forecast accuracy
- Immediately suspend the installation of new antennas, especially “small cell” antennas near homes, hospitals, schools, public buildings and sensitive wildlife habitats, until the above are completed

Suggested Recommendations (cont'd)

Make fibre-first and wired solutions a priority because they:

- Do not emit radiofrequency radiation that is harmful
- Are at least 100 times faster¹
- Are more secure, reliable and resilient²
- Are far more protective of privacy^{3,4}
- Can be less expensive in the long run⁵
- Protect our environment better with a lower carbon footprint⁶

Suggested Recommendations (cont'd)

- That the Government of Bermuda develop an awareness campaign relating to the safe use of wireless technologies. This should include:
 - The potential risks of chronic exposure to radiofrequency radiation .
 - The scientific reports demonstrating that radiofrequency radiation exposure causes or contributes to negative health effects.
 - Guidelines on how to use wireless devices more safely and reduce RF radiation exposure.
 - All appropriate government and ministry websites.
 - Run campaigns to generate awareness of this information.
- Ensure Bermudian's indoor and outdoor exposure to RF radiation from wireless technologies is kept as low as possible (ALARA or “as low as reasonably achievable”) through proper regulation, monitoring, enforcement and ongoing public education and technical device management. One of many examples would be to require that all wireless devices and antennas not transmit (i.e., not emit radiation) when not in use.

Suggested Recommendations for Schools

- Monitor schools for microwave radiation levels
- Every electronic device used for teaching is operated through a wired connection.
- Every classroom in an elementary school should have wired access points for all networking and data transmission within schools and for internet access.
- If wired connections cannot be provided in some locations, explore any and all techniques that provide adequate coverage with minimum radiofrequency radiation exposure.
- Wi-Fi shall not be available in any child care centre or in any area of an elementary school.
- Where Wi-Fi is available in a school, it shall be turned off as the default setting and shall only be turned on when a teacher requires it for instructional purposes.
- All new or renovated schools should adhere to the above actions

<https://www.sciencedirect.com/science/article/pii/S0360132319305347?via%3Dihub#!>
<https://phpa.health.maryland.gov/OEHFP/EH/Pages/WiFiCEHPAC.aspx>
<https://www.njea.org/minimize-health-risks-from-electronic-devices/>
<https://chps.net/us-chps-criteria>

Suggested Recommendations (cont'd)

Where wireless is necessary, implement solutions with minimal radiation exposure

- Canadian school reduced exposure by 90% with minor adjustments
- Warehouse installation with less radiation at less cost
- Many applications can be designed to store data and transmit through a wired network
- Many applications do not need a wireless 5G network

References

- ¹ Noam, E. (2011). Let them eat cellphones: why mobile wireless is no solution for broadband. In *Journal of Information Policy*, Vol. 1 (2011), pp. 470-485. Penn State University Press. Retrieved from <https://www.jstor.org/stable/pdf/10.5325/jinfopoli.1.2011.0470.pdf>
- ² Traditional copper wired phones work during a power outage, hence are more reliable. Wireless cell networks are constantly upgraded whereas cable or fibre is laid once.
- ³ Warzel, Charlie, & Thompson, Stuart A. (2019, December 19). Twelve Million Americans Were Tracked Through Their Phones. *New York Times*. Retrieved from <https://www.nytimes.com/2019/12/19/opinion/tracking-phone-data.html>
- ⁴ Zuboff, S. (2019). *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. New York: Public Affairs. <https://www.hbs.edu/faculty/Pages/item.aspx?num=56791>
- ⁵ Schoechle, Timothy. (2018). Re-Inventing Wires: The Future of Landlines and Networks. *National Institute for Science, Law & Public Policy*. Washington, DC, 156. <https://electromagnetichealth.org/wp-content/uploads/2018/02/ReInventing-Wires-1-25-18.pdf>
- ⁶ Baliga, J., Ayre, R., Hinton, K., and Tucker R. (2011).“Energy Consumption in Wired and Wireless Access Networks.” *IEEE Communications Magazine* 49, no. 6: 70–77. <https://doi.org/10.1109/MCOM.2011.5783987>

Appendix

Protect Yourself and Your Family

Distance is your friend

- Don't sleep with your cell phone.
- Keep cell phones away from your head and out of your pocket, bras, etc.
- Keep cell phones and tablets away from small children.
- Mothers to be: keep all wireless devices away from your abdomen.
- Do not use personal “wearable” wireless devices in transmitting mode.
- Select appliances/devices that have a wired option.

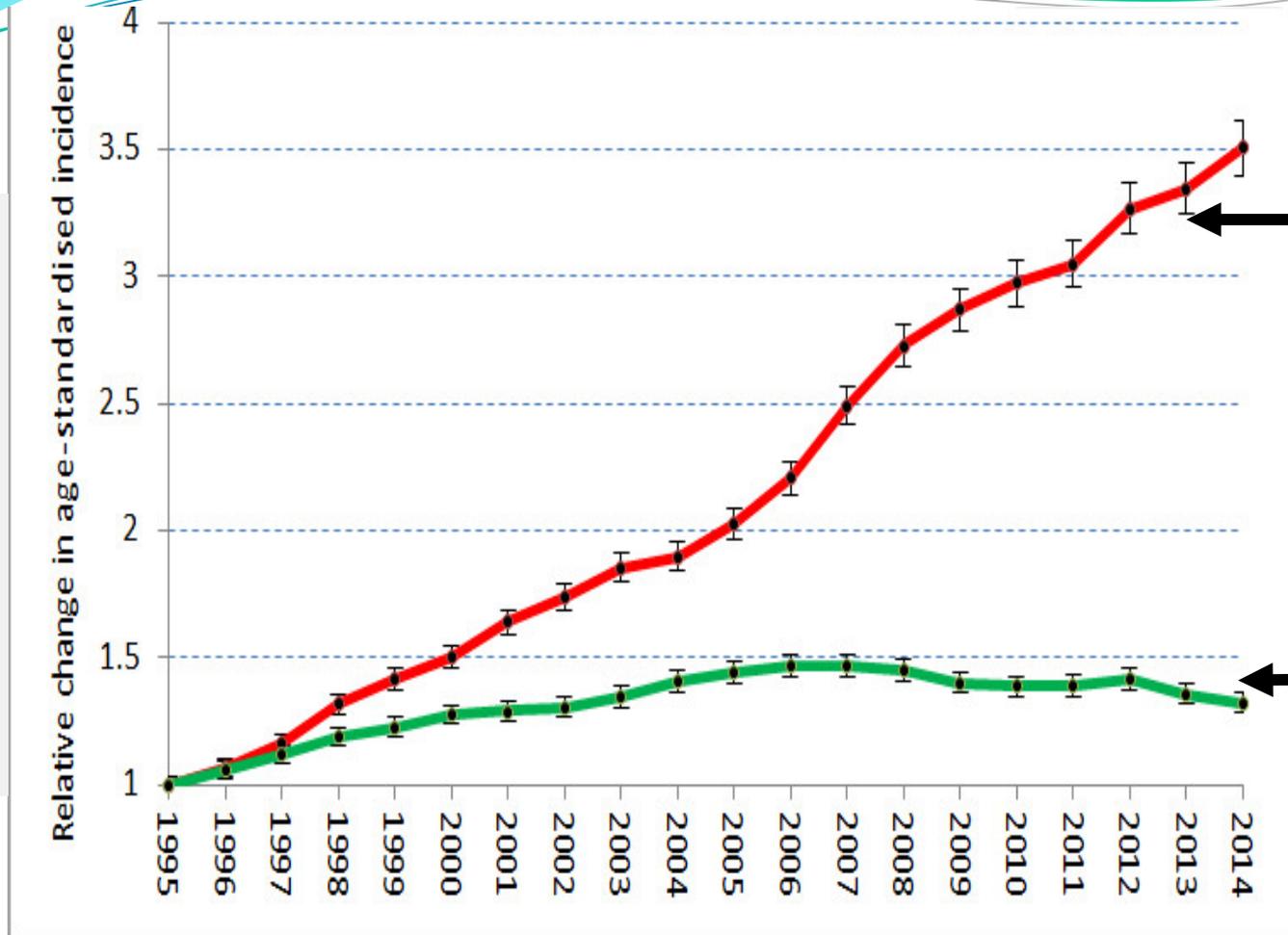
Create a safe-haven in your residence

- Remove all cordless phones.
- Opt out of continuously transmitting smart utility meters.
- Replace wireless home Wi-Fi with wired options.
If impossible, put the router on a timer to turn off at night.
Remove from high-use and sleeping areas.
- Replace a wireless baby monitor with a wired monitor.

**If you don't want a 5G antenna near you,
stop streaming videos wirelessly**

Brain Tumour Cancer Data from the United Kingdom

Relative changes



More tumours in the area of the head close to where cell phones were held

Incidence of tumours in other areas of the head

1995

Year

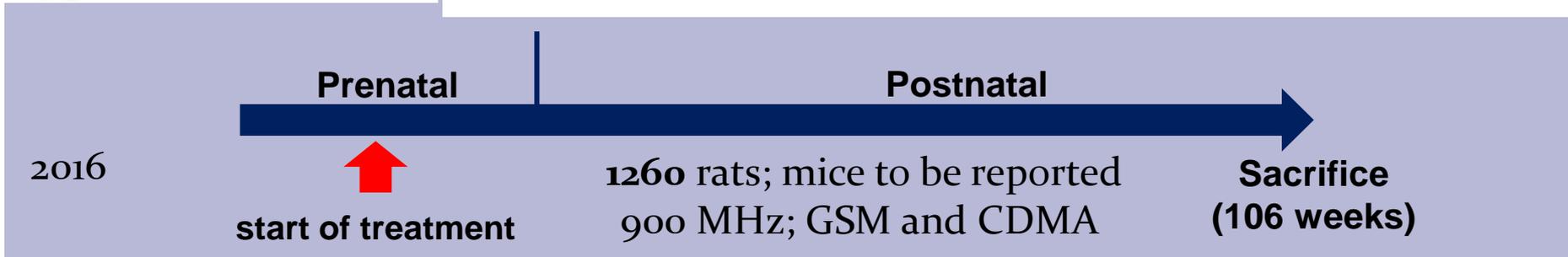
2014

Filling in THE Gaps: Numerous Human Studies Plus ...

Two large Animal research programs show cancers with RFR



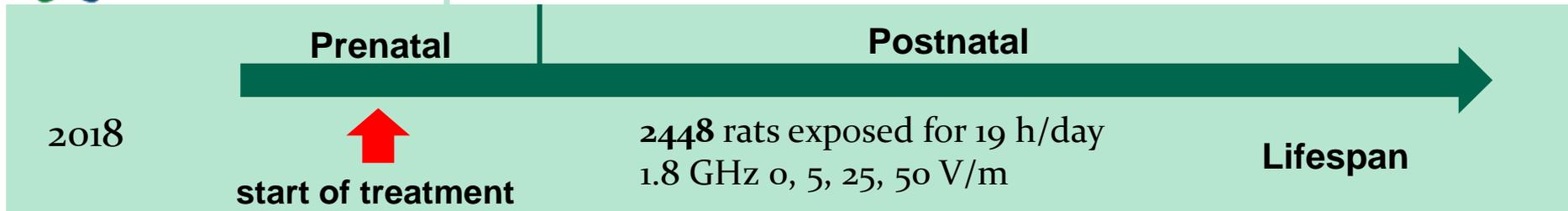
Frequencies and modulations that mimic cellular communications in the USA



Increased tumours of nerve sheath (Schwannoma in hearts), some evidence of increased gliomas, DNA damage in multiple organs



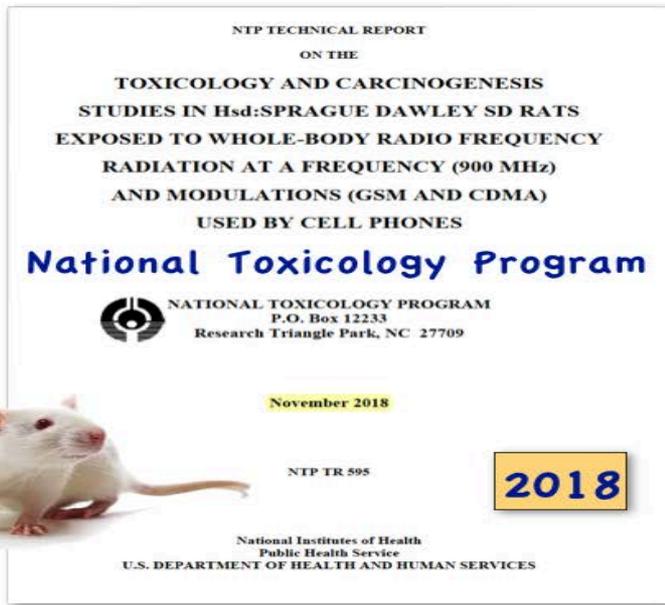
Frequencies and modulations that mimick common human exposures to base-station antennas globally



50 V/m - Statistically significant increase in nerve sheath tumours in males
 Increased nerve sheath pre-cancer (hyperplasia) in males
 Increased malignant glial tumours in females



Microwave radiation causes cancer



1 900 MHz

increase in gliomas (brain cancer) & heart schwannomas

NTP Study

- 10-year, \$25 million study
- cell phone radiation on 3,000 rodents was tested
- Peer reviewed by 11 experts
- Highest category “clear evidence of harm”

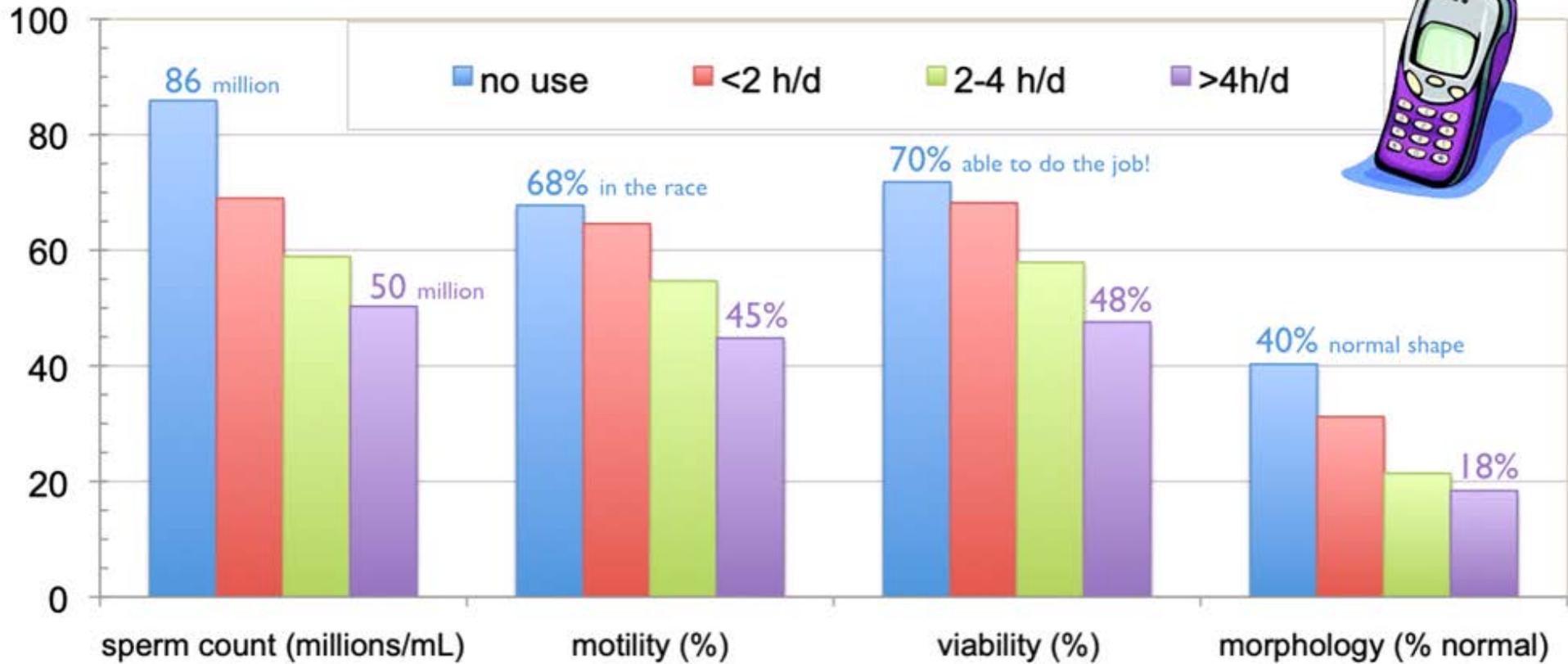


2 1800 MHz

Ramazzini Study

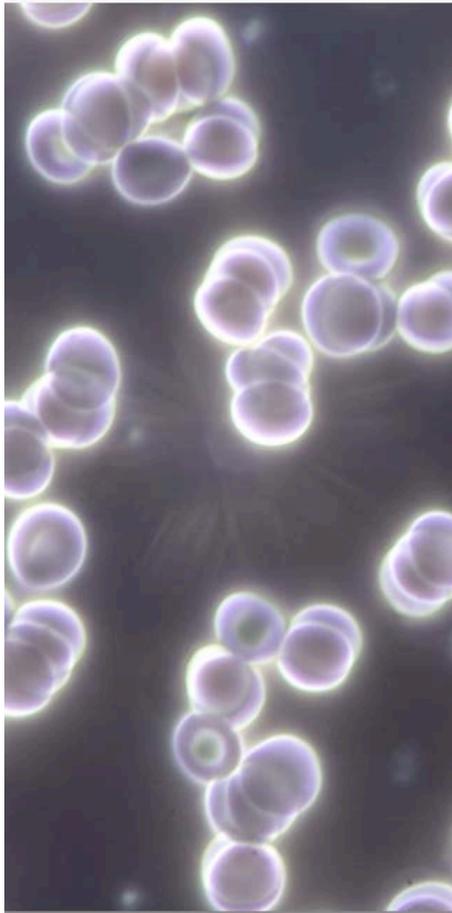
- cell phone radiation on 2,500 rodents was tested
- Peer reviewed
- Confirmed NTP findings

Agarwal et al. 2006: Cell Phone Use & Sperm Quality

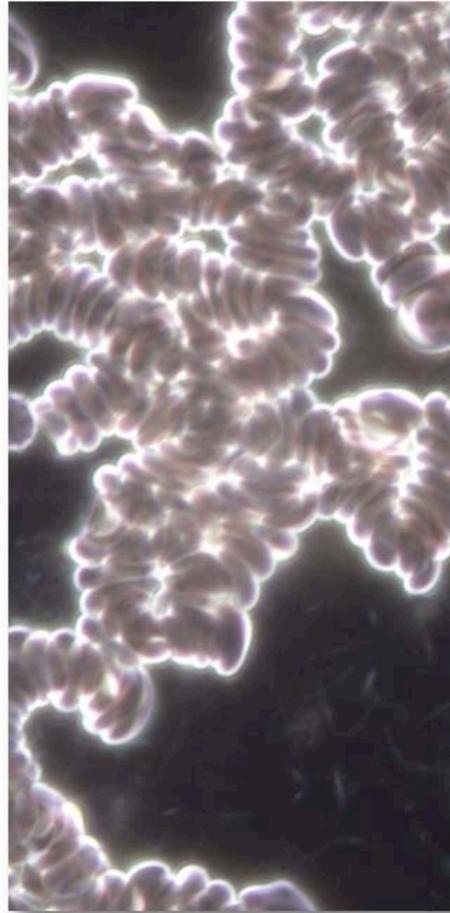


Membranes affected – e.g., live red blood cells

before Wi-fi



after Wi-fi (10 min)



Rouleau formation

Thick blood

- Clots
- Heart attack
- Stroke

Increasing in
younger Canadians

Occurs in some
people who are
**electro-hyper-
sensitive**

Health Effects from RF radiation

PUBLIC HEALTH RISKS (BOTH MILLER AND RUSSELL ARE MEDICAL DOCTORS)

Miller, A. B., Sears, M. E., Morgan, L. L., Davis, D. L., Hardell, L., Oremus, M., & Soskolne, C. L. (2019). **Risks to Health and Well-Being From Radio-Frequency Radiation Emitted by Cell Phones and Other Wireless Devices.** *Frontiers in Public Health*, 7.

<https://doi.org/10.3389/fpubh.2019.00223>

<https://www.frontiersin.org/articles/10.3389/fpubh.2019.00223/full>

Russell, C. L. (2018). **5 G wireless telecommunications expansion: Public health and environmental implications.** *Environmental Research*, 165, 484–495.

<https://doi.org/10.1016/j.envres.2018.01.016>

Website: Physicians for Safe Technology - <https://mdsafetech.org/>

M.L. Pall, **Wi-Fi is an important threat to human health**, *Environmental Research*. 164 (2018) 405–416, <https://doi.org/10.1016/j.envres.2018.01.035>

Clegg, F. M., Sears, M. E., Friesen, M., Scarato, T., Metzinger, R., Russell, C., Stadtner, A., Miller, A. B., **Building science and radiofrequency radiation: What makes smart and healthy buildings.** *Building and Environment*.

<https://www.sciencedirect.com/science/article/pii/S0360132319305347?via%3Dihub#!>

Health Effects from RF radiation - Cancer

EVIDENCE TO SUPPORT A GROUP 1 KNOWN HUMAN CARCINOGEN CLASSIFICATION (WORLD HEALTH ORGANIZATION, INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (WHO-IARC))

<https://doi.org/10.1016/j.envres.2018.06.043>

<https://www.ncbi.nlm.nih.gov/pubmed/30196934>

Comments on the US National Toxicology Program technical reports on toxicology and carcinogenesis study in rats exposed to whole-body radiofrequency radiation at 900 MHz and in mice exposed to whole-body radiofrequency radiation at 1,900 MHz.

<https://doi.org/10.3892/ijo.2018.4606>

<https://www.ncbi.nlm.nih.gov/pubmed/30365129>

2X RISK OF GLIOMAS WITH >558 HOURS OF CELL PHONE USE

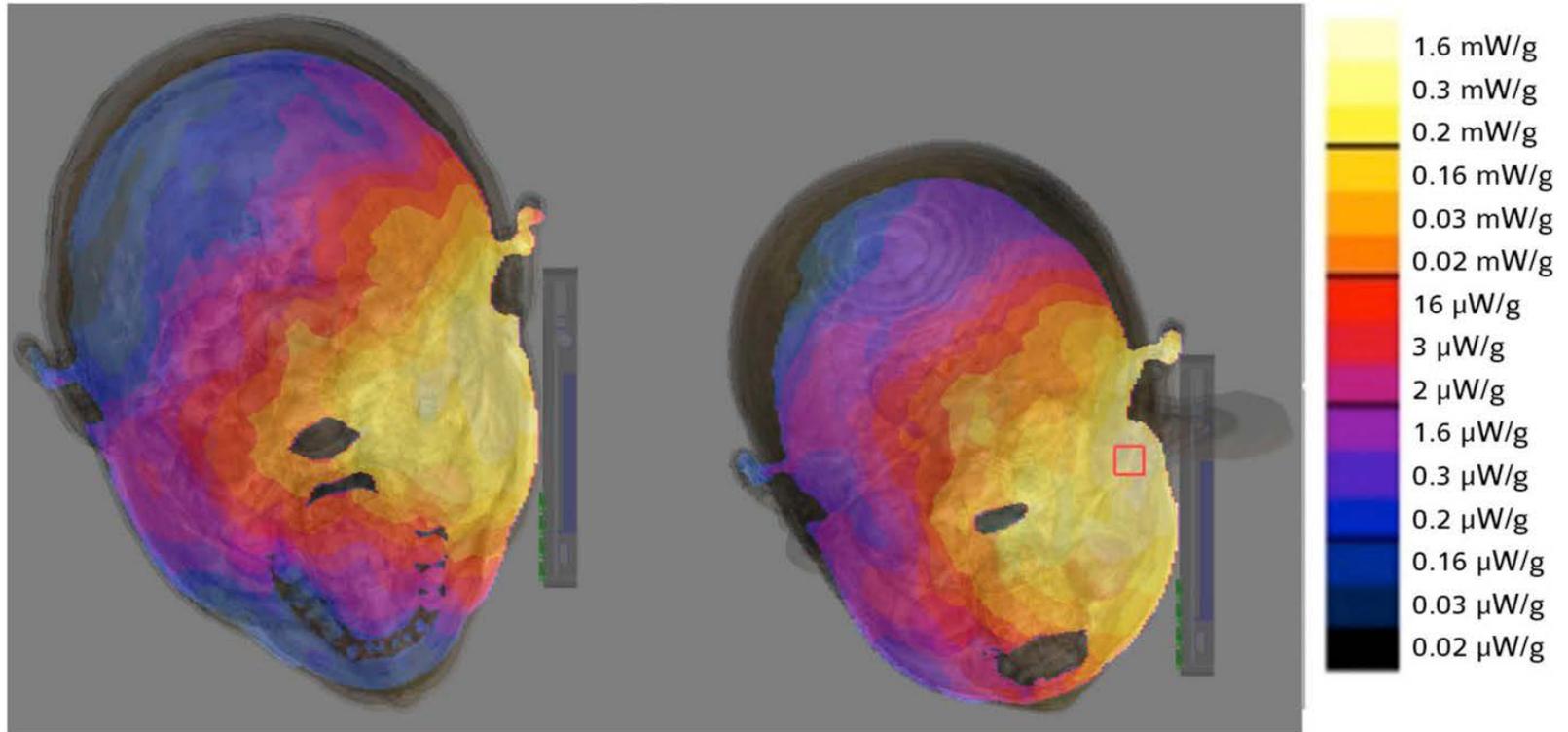
<https://doi.org/10.1093/aje/kwx157>; <https://www.ncbi.nlm.nih.gov/pubmed/28535174>

INCREASES IN ADULTS YOUNGER (LESS THAN 50 YEARS IN AGE) BUT NOT OLDER ADULTS (OVER 50 YEARS IN AGE) <https://doi.org/10.1001/jamanetworkopen.2019.8090>

Brain tumours: rise in Glioblastoma Muliforme incidence in England 1995-2015 suggests an adverse environmental or lifestyle factor.

<https://www.hindawi.com/journals/jeph/2018/7910754/>

Children Receive Higher Doses of Cell Phone Radiation Than Adults



Radiation absorption in adult and child (age 6 years) male heads with phone in talk position

- Thinner skulls, smaller heads (shorter distance to brain centers)
- Different dielectric properties (higher liquid content)

Brains are less myelinated and still developing.

Health Effects from RF radiation - Children

INCREASED ABSORPTION OF RADIOFREQUENCY ENERGY IN CHILDREN

Fernández, C., de Salles, A. A., Sears, M. E., Morris, R. D., & Davis, D. L. (2018). **Absorption of wireless radiation in the child versus adult brain and eye from cell phone conversation or virtual reality.** *Environmental Research*, 167, 694–699. <https://doi.org/10.1016/j.envres.2018.05.013>
<https://www.sciencedirect.com/science/article/pii/S0013935118302561>

Morgan, L., Kesarib, S., Davis, D. (2014).

Why children absorb more microwave radiation than adults: The consequences

<https://doi.org/10.1016/j.jmau.2014.06.005>

<https://www.sciencedirect.com/science/article/pii/S2213879X14000583>

BEHAVIOURAL PROBLEMS IN CHILDREN

Birks, L., Guxens, M., Papadopoulou, E., Alexander, J., Ballester, F., Estarlich, M., ... Vrijheid, M. (2017). **Maternal cell phone use during pregnancy and child behavioral problems in five birth cohorts.** *Environment International*, 104, 122–131. <https://doi.org/10.1016/j.envint.2017.03.024>
<https://www.ncbi.nlm.nih.gov/pubmed/28392066>

Health Effects from RF radiation – Sperm and DNA Damage

ADVERSE EFFECTS ON SPERM QUALITY (ONE OF SEVERAL REVIEWS WITH SIMILAR CONCLUSIONS)

Houston, B. J., Nixon, B., King, B. V., De Iuliis, G. N., & Aitken, R. J. (2016). **The effects of radiofrequency electromagnetic radiation on sperm function.** *Reproduction (Cambridge, England)*, 152(6), R263–R276. <https://doi.org/10.1530/REP-16-0126>
<https://www.ncbi.nlm.nih.gov/pubmed/27601711>

DNA DAMAGE – OVER 30 STUDIES SHOWING DAMAGE AT UNDER SAFETY LEVEL EXPOSURES

Panagopoulos, D. J. (2019). **Comparing DNA damage induced by mobile telephony and other types of man-made electromagnetic fields.** *Mutation Research/Reviews in Mutation Research*, 781, 53–62. <https://doi.org/10.1016/j.mrrev.2019.03.003>
<https://www.sciencedirect.com/science/article/pii/S1383574218300991>

OXIDATIVE STRESS (CAN LEAD TO MANY HEALTH CONDITIONS INCLUDING CANCER, ALZHEIMER'S AND PARKINSON'S DISEASE)

Yakymenko, I., Tsybulin, O., Sidorik, E., Henshel, D., Kyrylenko, O., & Kyrylenko, S. (2016). **Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation.** *Electromagnetic Biology and Medicine*, 35(2), 186–202.
<https://doi.org/10.3109/15368378.2015.1043557>
<https://www.ncbi.nlm.nih.gov/pubmed/26151230>

Other scientific publications and literature

Pall, M. L. (2015). **Scientific evidence contradicts findings and assumptions of Canadian Safety Panel 6: microwaves act through voltage-gated calcium channel activation to induce biological impacts at non-thermal levels, supporting a paradigm shift for microwave/lower frequency electromagnetic field action.** *Reviews on Environmental Health*, 30(2), 99–116. <https://doi.org/10.1515/reveh-2015-0001>

Canadian scientists urge more research into safety of wireless technology, saying recent report downgrades cancer risk. *The National Post*. April 15, 2014. <https://nationalpost.com/health/canadian-scientists-urge-more-research-into-safety-of-wireless-technology-saying-recent-report-downgrades-cancer-risk>

Belpomme, D., et al. (2018). Thermal and non-thermal health effects of low intensity non-ionizing radiation: An international perspective. *Environmental Pollution*, 242, 643–658. <https://doi.org/10.1016/j.envpol.2018.07.019>
<https://www.ncbi.nlm.nih.gov/pubmed/30025338>

Smith-Roe, S. L., et al. (2019). **Evaluation of the genotoxicity of cell phone radiofrequency radiation in male and female rats and mice following subchronic exposure.** *Environmental and Molecular Mutagenesis*. <https://doi.org/10.1002/em.22343>
<https://www.ncbi.nlm.nih.gov/pubmed/31633839>

Rooney, A. A., et al.(2014). **Systematic Review and Evidence Integration for Literature-Based Environmental Health Science Assessments.** *Environmental Health Perspectives*. <https://doi.org/10.1289/ehp.1307972> Abstract:
<https://www.ncbi.nlm.nih.gov/pubmed/24755067>

Canadians for Safe Technology (C4ST) , 2017.

200 Scientific Studies Reporting Potential Harm at Non-Thermal Levels Below Safety Code 6 Exposure Limits
<http://c4st.org/wp-content/uploads/2017/04/original-references-of-over-200-scientific-studies-showing-potential-harm-at-levels-below-safety-code-6.pdf>

International Authorities regarding EMF

International Commission on Non-Ionizing Radiation Protection (ICNIRP)

- Reference entity for WHO, Health Canada and most other governing bodies
- Conflict of interest concerns with panel members
- No publication of results

International EMF Project

- Established by the WHO in 1996
- Assess the health and environmental effects of exposure to electric and magnetic fields in the frequency range 0 - 300 GHz.
- Concerns have been raised about the panel member's conflict of interest due to industry ties
- No monographs published

United States Federal Communications Commission

- Harvard University press "Captured Agency - How the Federal Communications Commission Is Dominated by the Industries It Presumably Regulates", Norm Alster outlines how the inordinate influence of corporate interests led to errors of commission and omission at the FCC

<https://klaus-buchner.eu/wp-content/uploads/2020/06/ICNIRP-report-FINAL-19-JUNE-2020.pdf>

<https://www.saferemr.com/2018/07/icnirps-exposure-guidelines-for-radio.html>

<https://www.spandidos-publications.com/10.3892/ijo.2017.4046>

<https://onlinelibrary.wiley.com/doi/full/10.1002/bem.22225>

<https://ehtrust.org/?s=icnirp>

<https://ehtrust.org/scientists-call-for-transparency-at-the-world-health-organization-emf-project/>

<https://betweenrockandhardplace.wordpress.com/2014/12/05/epidemiology-icnirp-hijacked-who-emf-project/>