

Brief to Property Development, Heritage, Downtown Development Committee. City of Winnipeg, City Hall.

Monday January 6th, 2020 9:30 am

By Margaret Friesen on behalf of 5G Winnipeg Awareness

Item 22: Review of the Winnipeg Antenna Systems Policy - 5G Network

Good morning Councillors - Thank you for the opportunity to present on this important topic of 5G technologies and associated so-called “small cell” antenna infrastructure.

My name is Margaret Friesen. Today I am representing a newly formed group named “5G Winnipeg Awareness.” We are residents from all parts of the City of Winnipeg who are deeply concerned about the pervasive expansion of radiofrequency emitting antennas installed close to where people spend much of their lives. My background: Master of Science in Entomology/Toxicology and a Bachelor of Science (Honours) degree in Zoology. Most of my 30+ years career in the federal government and University of Manitoba was in original research projects including ecosystem toxicology and DNA population genetics of marine mammals. I have published in peer-reviewed literature, including most recently a paper on radiofrequency radiation and smart and healthy buildings¹. I presented to City committees in 2015 about the proposed *Winnipeg Antenna Systems Policy* (passed) 27 May 2015: Winnipeg.ca/ppd/planning/AntennaSystemsPolicy/pdfs/WinnipegAntennaSystemsPolicy.pdf

5G uses newer frequencies – different wave sizes and with higher energy than existing 1G, 2G, 3G and 4G. It will be in addition to the other frequencies already in use AND because the newer wave size cannot as easily penetrate objects (e.g. tree leaves and water droplets), these small cells would be located close to our homes – possibly every 2 to 3 homes in residential areas (see picture from Mission BC). Also, network coverage signal areas are designed to overlap, therefore many, if not all, residences will be swamped by the emissions from more than one nearby small cell. We will be exposed, whether we want to be or not, to radiation emitted from so-called “small cell” antennas installed close to our homes.



Based on what is happening in other parts of Canada, there could be more than one antenna on each lamp pole or hydro pole installation. The actual 5G technology is not yet widely rolled out (there are pilot projects) but antennas emitting the 4G and other frequencies are already being installed close to homes – frequencies where the science has shown potential harm such as cancers and DNA damage. 5G rollouts plan to require more towers and more antennas on existing towers. Based on information from European countries, such installations increase radiofrequency emissions levels.

¹ Clegg et al. (2019) Building science and radiofrequency radiation: What makes smart and healthy buildings. Building and Environment. <https://www.sciencedirect.com/science/article/pii/S0360132319305347>

1. There is an urgent need to delay 5G and 4G antenna installations in residential areas

Health concerns alone are enough to put the brakes on the rollout of 5G and the 4G antenna installations but there are also serious privacy and cyber-security issues.

2. The fundamental problem: *Safety Code 6 (2015), Health Canada's guidelines for safe human exposure* are not protective of human health

Safety Code 6 (2015) for the frequencies used for common telecommunications, relies only on the adverse effects of the heating of tissue for its guidelines [which had been adopted as its standards by Innovation, Science and Economic Development (ISED)]. This has been shown in many studies to be a false assumption. There are many hundreds of studies showing adverse effects at levels that do not cause heating.

- During the last revision of Safety Code 6 (2015) more than 100 international scientists and Canadian medical doctors wrote to the Minister of Health stating that Safety Code 6 limits were not protective enough.

- The so-called independent review by an expert panel of Safety Code 6 that recommended only minor changes seem to be a rubber-stamp exercise. Some of the controversy was described in several articles in the *Canadian Medical Association Journal*².

- More recently, the EMF (electromagnetic field) Scientists and MDs Appeal <https://www.emfscientist.org/> (as of August 25th, 2019 signed by 250 specialists from 42 nations) asks for more protective standards.

Speeding analogy:

Modified from Powerwatch <https://www.powerwatch.org.uk/science/intguidance.asp>

1800 MHz Public Exposure Guidelines	Intensity (mW/m ²)	Speed Analogy in km/hour
Safety Code 6	10,000	4,800
Belgium, parts of Italy	100	480
Austrian Sustainable Building Council	1	50
EUROPAEM* (MDs)	0.1	15
Natural (all frequencies)	0.001	< 1
Cosmic background	0.00000001	< 1

* Belyaev, et al. (2016). EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses. *Reviews on Environmental Health*, 31(3). <https://doi.org/10.1515/reveh-2016-0011>

² 1) Webster, Paul Christopher. (2013). **Federal Wi-Fi panel criticized for undisclosed conflict**. *CMAJ: Canadian Medical Association Journal = Journal de l'Association Medicale Canadienne*, 185(11), E515-516. <https://doi.org/10.1503/cmaj.109-4523>

2) Webster, P. (2013). **Chair of Wi-Fi safety panel steps down**. *CMAJ*, 185(12), E573. <https://www.cmaj.ca/content/185/12/E573>

3) Webster, Paul Christopher. (2014). **Federal Wi-Fi safety report is deeply flawed, say experts**. *CMAJ: Canadian Medical Association Journal = Journal de l'Association Medicale Canadienne*, 186(9), E300. <https://doi.org/10.1503/cmaj.109-4785>

4) Webster, Paul Christopher. (2015). **Scientists decry Canada's outdated Wi-Fi safety rules**. *Canadian Medical Association Journal*, 187(9), 639–640. <https://doi.org/10.1503/cmaj.109-5061>

- Health Canada has a number of links that go to the World Health Organization (WHO) website.

There are at least 2 bodies that have studied health effects of radiofrequency radiation:

1. International EMF Project. Most of the information on this site is not very recent. This project has put a call out for systematic reviews of the health literature on radiofrequency radiation (RFR). This came after much controversy after an earlier review was heavily criticized for bias and conflict of interest. It is heavily influenced by industry friendly scientists.

2. International Agency for Research on Cancer (IARC). In 2011, IARC classified RFR, which would include 5G, as a *possible* carcinogen. RFR is on the list to be re-evaluated based on more recent evidence showing harm. Many scientists, independent of industry influence, consider the scientific evidence to warrant a *known* carcinogen classification, along with asbestos and cigarette smoking.

- Evidence for radiofrequency radiation as a *known* carcinogen. Canadian MD and cancer epidemiologist Dr. Anthony B. Miller published that there is now enough evidence for the upgrading of radiofrequency radiation as a *known* human carcinogen (same category as asbestos and cigarette smoking). In 2011, radiofrequency radiation was classified as a *possible* human carcinogen by the World Health Organization’s International Agency for Research on Cancer (IARC). An Advisory Group of 29 scientists from 18 countries met at IARC on 25–27 March 2019 to recommend priorities for the IARC Monographs Programme during 2020–2024.³

○ **There is no scientific evidence to support any claim of safety for long term 5G exposures.**

- Strong evidence of cancer, DNA damage and sperm damage from 2G, 3G and 4G frequencies (Appendix 1).
- Public health issue is described by Cindy Russel MD. (Appendix 1, Russell 2018).
- Electrosensitivity (EHS) – Article by Magda Havas PhD (see Appendix 1). Press release: *Ontario Doctors Warn of Rising Health Care Costs after 5G Roll Out* (see below).
- We plan to write to the Chief Provincial Public Health Officer (Dr. Brent Roussin) with this and other information.
- *Winnipeg Free Press* article: “Winnipeg should be cautious about 5G antennas”
<https://www.winnipegfreepress.com/opinion/analysis/winnipeg-should-be-cautious-about-5g-antennas-564489772.html>
- *Common Ground* article: “Better health safety guidelines imperative before exposing public to 5G”
<https://commonground.ca/better-health-safety-guidelines-imperative-before-exposing-public-to-5g/>
- Property Development, Heritage and Downtown Development (PDHDD) Committee passed a motion – May 27th. City staff working on a report. MB Hydro in discussions with providers.

³ The Lancet. [https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(19\)30246-3/fulltext](https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(19)30246-3/fulltext)

3. City of Winnipeg and small cell antennas close to homes and schools, etc.

- Federation of Canadian Municipalities – Press Release June 16, 2019: *Statement by FCM on Supreme Court of Canada decision on telecommunications*
<https://fcm.ca/en/news-media/news-release/statement-fcm-supreme-court-canada-decision-telecommunications>.
- Some municipalities have said no: a citizen who attended the Maple Ridge BC council meeting emailed to Margaret, “Maple Ridge in 2018 had been approached by TELUS and they [Council] said we need to think about it, need evidence its safe. No small cell antennas were installed.”
- Installation of at least 2 cell towers in Winnipeg halted after letters of non-concurrence were written by Councillors for those Wards. Another was halted after the City Councillor followed up on residents’ complaints and found that the area was not zoned for a tower.
- Sutton, Quebec unanimously passed a resolution in December 2019: TO REQUEST the federal government, following the precautionary principle, to decree a moratorium on the deployment of the 5G cellular network, until the various studies reach a consensus on the absence of risk and impact of 5G cell technology on health and the environment. TO TRANSMIT a copy of this resolution to the Minister of Health, the Minister of Innovation, Science and Economic Development, and the federal member for Brome-Missisquoi.
- [Original wording in French: “DE DEMANDER au gouvernement fédéral, en suivant le principe de précaution, qu’il décrète un moratoire sur le déploiement du réseau cellulaire 5G, et ce, jusqu’à ce que les diverses études dégagent un consensus quant à l’absence de risque et d’impact de la technologie cellulaire 5G sur la santé et l’environnement.”]
- The Bloc Québécois in October 2019: *“in favor of a moratorium on the establishment of the 5G network ... that scientific studies be entrusted to an independent and autonomous commission ... respecting the precautionary principle.”*
- The Green Party of Canada in its 2019 platform stated: *“A green government will strike a parliamentary committee to examine the implications of introducing 5G technologies...”*
- Highly controversial in parts of the USA. New Hampshire, USA has ...

4. If small cells may be installed in homes and near schools, need “fulsome” public consultation held by the City of Winnipeg.

Currently can be exempted. In Winnipeg, *“if these antenna installations would be on new towers, public consultation would be required. But most, if not all, 5G antennas, will be exempt from consultation. The Winnipeg Antenna Systems Policy allows the exemption of “antennas on buildings, water towers, lamp posts, etc. ... provided the height above ground of the non-tower structure ... is not increased by more than 25%.”* This loophole is possible because of the federal Innovation, Science and Economic Development’s policy CPC-2-0-03.

5. Alternatives must be investigated with full public consultations:

1. Copper and ethernet (widely used now) to and through the premises – one non-wireless alternative (slower transmission speeds than fiber optics).
2. Fiber optics to and through the premises (FTTP) – Community-owned wired fiber-to-the-premises
 - Community Broadband – Municipal Broadband - Canadian success stories <https://community-broadband.ca/>
 - Site from BC: *Connected Communities. Wired Networks for Crossing the Digital Divide:*
<https://connected-communities.ca/>
 - Wired Smart Cities: <https://connected-communities.ca/wired-smart-cities>

- In Manitoba:
 - St. Frances Xavier (in progress)
 - Maybe Thompson and Hamiota

6. Our Requests:

1) Put a “pause” on future plans for rollout of 5G and the 4G small antennas that pave the way for 5G.

2) Help us get answers to questions to clarify the situation, for example:

- a) On Sept. 4th, 2019, Margaret asked in an email to the Mayor’s office: “Can you tell me if the City of Winnipeg is legally obligated to accept 5G technology or other radiofrequency emitting installations on its facilities or utilities such as lamp posts, by Manitoba Hydro or telecommunications providers?” As of today, there has been no response. Any suggestions on how to get an answer to this?
- b) Have any legal commitments been made? If so, what are they?
- c) Manitoba Hydro owns the lamp posts on Winnipeg’s streets. Who has say on what they are used for?
- d) Can new poles for small cell placement be erected without Council consent?
- e) Public Rights of Way agreements, what access do the telecommunications companies have?
- f) What are the relevant “Joint Pole” agreements?
- g) Need full scale public consultations (not by the telecommunications providers) if small cell are installed close to homes, daycares and schools. How can the City of Winnipeg do this?
- h) Have alternatives such as fiber-optic networks been fully investigated? For health and cyber-security aspects?

3) Provide us with guidance in preparing a report to send to the City of Winnipeg – to whom?

Some questions (still in draft form):

- a) Cost/benefit analysis: Is there a cost/benefit analysis? If so, is it available to the public?
- b) Legal aspects/Liability/ Insurance. London, Ontario has required \$5 million insurance. Insurance policy? What are the monetary factors? Has the subject of compensation been considered? Require proof of liability insurance against harmful effects of RFR on health from all telecommunications companies deploying wireless technologies.
- c) Pedestrian safety
Who is measuring (pedestrians may be exposed to a high levels of RF radiation)
- d) Monitoring exposure levels/tracking health effects
 - a. ISED (formerly Industry Canada) requires that each wireless system owner comply with Safety Code 6. In the case of a structure with cells from more than one provider, (a multiparty structure for 5G) who is calculating the cumulative exposure of having all these antennas active at the same time? Each company files for their system....do the site owners compile the cumulative exposure report?
 - b. Will Manitoba Public Health start monitoring and reporting on the exposure to, and related health effects, of RF radiation.

4) Assist in increasing awareness of Electromagnetic hypersensitivity (EHS), also commonly called electrosensitivity and electrohypersensitivity. Surveys conducted in Sweden, Taiwan, the United Kingdom and the U.S. (California) have found that approximately **3 to 13.3% of the population** reported symptoms (Eltiti et al., 2007) (Johansson, 2006) (Levallois, Neutra, Lee, & Hristova, 2002) (Tseng M, Lin, & Cheng, 2011). It is likely that Canada would be within this range because the same

wireless technologies (e.g. cell phones, computers, wireless routers, etc.) are commonly used in all of these countries.

In Canada, the Canadian Human Rights Commission has a policy with EHS classified under environmental sensitivities (Canadian Human Rights Commission, 2007) (Sears, 2007) – a health condition that is a consequence of the environment. It must be accommodated under the *Canadian Human Rights Act*. EHS is recognized as a disability in the United States under the *Americans with Disabilities Act*.⁴ Sweden recognizes EHS as a functional impairment (Johansson, 2010). Legal cases for compensation and disability pensions have been successful in Australia,⁵ France,⁶ Spain⁷ and U.S.⁸

Symptoms often reported include headaches, concentration difficulties, sleep problems, dizziness, depression, fatigue, skin rashes, tinnitus and flu-like symptoms (Genuis & Lipp, 2012) (Johansson, Hilliges, Björnhagen, & Hall, 1994). Adverse reactions to emissions from wireless equipment range from mild and readily reversible to severe, when individuals must greatly reduce their exposures to sources of electromagnetic radiation (Carpenter, 2015) (Hedendahl, Carlberg, & Hardell, 2015) (Sears, 2007).

Provocation studies have been uneven in their findings. The need for changing the approach is discussed by Dr. Darius Leszczynski, Adjunct Professor of Biochemistry, University of Helsinki, Finland.⁹ Dr. Magda Havas, recently retired from Trent University, Ontario has reviewed the topic in a paper titled “*Electrohypersensitivity (EHS) is an Environmentally-Induced Disability that Requires Immediate Attention*” (Havas, 2019).

On May 31st, 2019, Women’s College Hospital (in Toronto) hosted a symposium, approved for various medical credits for physicians: “*Impacts of Wireless Technology on Health: a symposium for Ontario’s medical community.*” This covered a wide range of topics as described in their media release:

Extract from Press Release of May 30, 2019:¹⁰

“Ontario Doctors Warn of Rising Health Care Costs after 5G Roll Out

Doctors treating patients from over-exposure to wireless radiation will join scientists at Queen’s Park today to recommend the Ontario Government take steps to protect public health before the roll-out of 5G – the next generation of cell phone technology.

“My clinic is already assessing patients from across Ontario who are sensitive to microwave radiation from their wireless devices including cell phones, Wi-Fi, and an increasing number of smart appliances,” said Dr. Riina Bray, Medical Director of the Environmental Health Clinic at Women’s College Hospital in Toronto. “We expect 5G to add to this burden.”

⁴ <https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/background/ada-accessibility-guidelines-for-recreation-facilities/general-issues>

⁵ <https://www.news.com.au/technology/csiro-scientist-dr-david-mcdonald-wins-compensation-for-wifi-pain/news-story/0a2abc1814dca200d9e54b05f810c8f5>

⁶ <http://www.journaldelenvironnement.net/article/dans-l-essonne-l-electrosensibilite-reconnue-comme-un-handicap,45060>

⁷ <https://www.portalesmedicos.com/publicaciones/>

⁸ <https://www.prlog.org/12381499-los-angeles-unified-school-district-accommodates-teacher-who-fell-ill-after-wireless-installation.html>

⁹ The end of the road for EHS (IEI-EMF) provocation studies

<https://betweenrockandhardplace.files.wordpress.com/2018/02/open-letter-on-the-ehs-research-dated.pdf>

¹⁰ Video of media briefing: <http://c4st.org/ontario-doctors-warn-of-rising-health-care-costs-after-5g-roll-out/>

Scientists from 42 countries are now warning their governments about the emerging health problems associated wireless radiation. The initial 5G infrastructure is planned to begin in the Toronto to Montreal corridor. Daily human exposure to microwave radiation is already more than a trillion times higher than it was before cell phones.

Dr. Anthony Miller, Professor Emeritus with the University of Toronto, and adviser to the International Agency for Research on Cancer says, "Many scientists worldwide now believe that radiofrequency radiation should be elevated to a Class One human carcinogen, on the same list as Cigarettes, X-Rays, and Asbestos."

The doctors will advise the Province that increased health care costs can be avoided, if the government takes precautions to protect the public from exposure to 5G technology."

International Classification of Diseases (ICD) now has codes for health effects caused by non-ionizing radiation. This was a request from Electromagnetic Hypersensitivity (EHS) Resolution adopted in Belgium in 2015. Doctors can now use this code to characterize health effects associated with radiofrequency radiation and other types of non-ionizing radiation. <https://icd.codes/icd10cm/W90>

It is not only people who are adversely affected. Environmental implications and aspects of public health related to 5G have been recently reviewed by Cindy Russell MD (11, Russell, 2018). This review includes studies showing wildlife, including birds and pollinators, are affected by ambient levels of radiofrequency radiation.

7. Possible Actions by the City of Winnipeg:

1. As our elected officials, you have a responsibility to make the city as healthy and safe as possible for its residents.
2. Please invest the time to learn about 5G and other technologies. How can we get the benefits as safely as possible?
3. It is our understanding that municipal governments can say "no" to the placement of antennas on public property, although this can be overruled by the federal minister of ISED (IC).
4. What is the City's, and your, liability should a definitive link be made to harm from radiofrequency such as that emitted from City-approved antennas in the future?
5. Some municipalities have requested¹¹:
 - a) Annual renewal of contracts for small cell antenna installations.
 - b) Ability to have small cell antennas removed with no legal penalty to the City should a link between harm to human health and radiofrequency be made.
 - c) Regular monitoring of exposure to radiofrequency emissions before installation and after the antennas are activated, and thereafter at regular intervals.) Establishment of a health registry for reporting adverse biological and health effects associated with 5G antennas. Establishment of a process that investigates each complaint/report in a timely manner.

¹¹ Modified from a presentation by Dr. Magda Havas.

e) Request to the appropriate public health authorities to contact the physicians at the Environmental Health Clinic, Women's College Hospital, Toronto for detailed information on their concerns about increased health care costs and appropriate care for persons reporting adverse effects from exposure to radiofrequency radiation from these antennas and other sources.

f) If the city cannot put a "pause" on 5G, then it should hold "fulsome" public consultations.

8. References cited above:

1. Canadian Human Rights Commission. (2007). **Policy on Environmental Sensitivities. Reviewed 2014.** *Canadian Human Rights Commission*. Retrieved from https://www.chrc-ccdp.gc.ca/sites/default/files/policy_sensitivity_0.pdf
2. Carpenter, D. O. (2015). **The microwave syndrome or electro-hypersensitivity: historical background.** *Reviews on Environmental Health*, 30(4), 217–222. <https://doi.org/10.1515/reveh-2015-0016>
3. Eltiti, S., Wallace, D., Zougkou, K., Russo, R., Joseph, S., Rasor, P., & Fox, E. (2007). **Development and evaluation of the electromagnetic hypersensitivity questionnaire.** *Bioelectromagnetics*, 28(2), 137–151. <https://doi.org/10.1002/bem.20279>
4. Genuis, S. J., & Lipp, C. T. (2012). **Electromagnetic hypersensitivity: fact or fiction?** *The Science of the Total Environment*, 414, 103–112. <https://doi.org/10.1016/j.scitotenv.2011.11.008>
5. Havas, M. (2019). **Electrohypersensitivity (EHS) is an Environmentally-Induced Disability that Requires Immediate Attention.** *J. Sci. Discov.*, 3(1), 20. <https://doi.org/jsd18020>
6. Hedendahl, L., Carlberg, M., & Hardell, L. (2015). **Electromagnetic hypersensitivity-an increasing challenge to the medical profession.** *Reviews on Environmental Health*, 30(4), 209–215. <https://doi.org/10.1515/reveh-2015-0012>
7. Johansson. (2006). **Electrohypersensitivity: State-of-the-Art of a Functional Impairment.** *Electromagnetic Biology and Medicine*, 25(4), 245–258. <https://doi.org/10.1080/15368370601044150>
8. Johansson, O., Hilliges, M., Björnhagen, V., & Hall, K. (1994). **Skin changes in patients claiming to suffer from "screen dermatitis": a two-case open-field provocation study.** *Experimental Dermatology*, 3(5), 234–238.
9. Johansson, Olle. (2010). **Aspects of studies on the functional impairment electrohypersensitivity.** *IOP Conference Series: Earth and Environmental Science*, 10(1), 012005. <https://doi.org/10.1088/1755-1315/10/1/012005>
10. Levallois, P., Neutra, R., Lee, G., & Hristova, L. (2002). **Study of self-reported hypersensitivity to electromagnetic fields in California.** *Environmental Health Perspectives*, 110(Suppl 4), 619–623.
11. 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>
12. Sears, M. E. (2007). **The medical perspective on environmental sensitivities.** *Canadian Human Rights Commission Ottawa, Canada*, <https://www.chrc-ccdp.gc.ca/eng/content/medical-perspective-environmental-sensitivities>, 79.

13. Tseng M, M.-C., Lin, Y.-P., & Cheng, T.-J. (2011). **Prevalence and psychiatric comorbidity of self-reported electromagnetic field sensitivity in Taiwan: A population-based study.** *Journal of the Formosan Medical Association*, 110(10), 634–641. <https://doi.org/10.1016/j.jfma.2011.08.005>

APPENDIX 1. Wireless radiation in the radiofrequency range and adverse health effects: Key peer-reviewed papers and videos

PAPERS IN PEER-REVIEWED JOURNALS:

- A. CANCER – EVIDENCE TO SUPPORT A GROUP 1 KNOWN HUMAN CARCINOGEN CLASSIFICATION (WORLD HEALTH ORGANIZATION, INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (WHO-IARC))**
- Miller, A. B.¹², Morgan, L. L., Udasin, I., & Davis, D. L. (2018). **Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102).** *Environmental Research*, 167, 673–683. <https://doi.org/10.1016/j.envres.2018.06.043>
<https://www.ncbi.nlm.nih.gov/pubmed/30196934>
 - Hardell, L., & Carlberg, M. (2018). **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.** *International Journal of Oncology*. <https://doi.org/10.3892/ijo.2018.4606>
<https://www.ncbi.nlm.nih.gov/pubmed/30365129>
- B. CANADIAN BRAIN CANCER DATA – 2X RISK OF GLIOMAS WITH >558 HOURS OF CELL PHONE USE**
- Momoli, F., Siemiatycki, J., McBride, M. L., Parent, M.-É., Richardson, L., Bedard, D., ... Krewski, D. (2017). **Probabilistic Multiple-Bias Modeling Applied to the Canadian Data From the Interphone Study of Mobile Phone Use and Risk of Glioma, Meningioma, Acoustic Neuroma, and Parotid Gland Tumors.** *American Journal of Epidemiology*, 186(7), 885–893. <https://doi.org/10.1093/aje/kwx157>
<https://www.ncbi.nlm.nih.gov/pubmed/28535174>

¹² Anthony B. Miller, MD, FRCP, FRCP(C), FFPH, FACE. Professor Emeritus, Dalla Lana School of Public Health, University of Toronto. A physician-epidemiologist, he was trained in internal medicine, and was a member of the scientific staff of the Tuberculosis and Chest Diseases Research Unit, UK Medical Research Council, 1962-71. He was Director of the Epidemiology Unit of the National Cancer Institute of Canada 1971-86 and Chair of the Department of Preventive Medicine and Biostatistics, University of Toronto, 1992-96. He served as a special expert in the Division of Cancer Prevention, US National Cancer Institute, 1997, Senior Epidemiologist, International Agency for Research on Cancer 1998-99, Head, Division of Epidemiology, German Cancer Research Centre, Heidelberg, 2000-03, Associate Director, Research, Dalla Lana School of Public Health, University of Toronto, 2008-10. He has been a consultant to the World Health Organization. He is Scientific Lead of the OncoSim microsimulation modelling initiative of the Canadian Partnership Against Cancer. His research encompasses cancer etiology, prevention and screening.

C. BRAIN CANCER INCIDENCE IN ENGLAND

- Philips, Alisdair, Henshaw, Denis L., Lamburn, Graham, & O'Carroll, Michael. (2018). **Brain tumours: rise in Glioblastoma Muliforme incidence in England 1995-2015 suggests an adverse environmental or lifestyle factor.** *Journal of Environmental and Public Health*, 20.
<https://www.hindawi.com/journals/jep/2018/7910754/>

D. CANADIAN COLORECTAL CANCER INCIDENCE IN YOUNGER ADULTS IS “CONTINUING AND POSSIBLY ACCELERATING”

- Brenner, D. R., Heer, E., Sutherland, R. L., Ruan, Y., Tinmouth, J., Heitman, S. J., & Hilsden, R. J. (2019). **National Trends in Colorectal Cancer Incidence Among Older and Younger Adults in Canada.** *JAMA Network Open*, 2(7), e198090–e198090.
<https://doi.org/10.1001/jamanetworkopen.2019.8090>

E. 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>

F. 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/>

G. 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>

H. 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>

I. 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>

J. 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>

K. ELECTROHYPERSENSITIVITY (EHS)

- Belyaev, I., Dean, A., Eger, H., Hubmann, G., Jandrisovits, R., Kern, M., ... Thill, R. (2016). **EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses.** *Reviews on Environmental Health*, 31(3).
<https://doi.org/10.1515/reveh-2016-0011>
- Havas, M. (2019). **Electrohypersensitivity (EHS) is an Environmentally-Induced Disability that Requires Immediate Attention.** *J. Sci. Discov.*, 3(1), 20.
<https://doi.org/jsd18020>

L. CELL TOWER EXPOSURE STUDY (DNA DAMAGE, OXIDATIVE STRESS)

- Zothansiana, null, Zosangzuali, M., Lalramdinpuui, M., & Jagetia, G. C. (2017). **Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations.** *Electromagnetic Biology and Medicine*, 1–11.
<https://doi.org/10.1080/15368378.2017.1350584>
<https://www.ncbi.nlm.nih.gov/pubmed/28777669>

VIDEOS:

1. Less than 5 minutes: Dr. Anthony B. Miller: **Radio Frequency Radiation, Cancer and Cell Towers Statement to School District. Statement that wireless radiation should be classified as a Class 1 *known* carcinogen.**

<https://www.youtube.com/watch?v=LPS6PAG1H6c>

2. Approximately 24 minutes (2017): Dr. Anthony B. Miller: **Epidemiology of Cell Phones and Other Wireless Transmitting Devices – An Update (describes the evidence supporting an IARC Class 2A *probable* human carcinogen classification).** Expert Forum: Wireless Radiation and Human Health. Hebrew University Medical School, January 23-26, 2017

<https://ehtrust.org/science/key-scientific-lectures/2017-expert-forum-wireless-radiation-human-health/>

3. Approximately 1 hour: Devra Davis PhD, MPH. (2015) **The truth about mobile phone and wireless radiation.** Dean's Lecture at University of Melbourne, School of Engineering

<https://ehtrust.org/science/key-scientific-lectures/dr-davis-delivered-the-deans-lecture-at-melbourne-school-of-engineering/>

SUPPLEMENTAL INFORMATION: A SAMPLE OF CELL TOWER STUDIES

1. Abdel-Rassoul, G., El-Fateh, O. A., Salem, M. A., Michael, A., Farahat, F., El-Batanouny, M., & Salem, E. (2007). **Neurobehavioral effects among inhabitants around mobile phone base stations.** *Neurotoxicology*, 28(2), 434–440. <https://doi.org/10.1016/j.neuro.2006.07.012>
2. Bortkiewicz, A., Gadzicka, E., Szyjkowska, A., Politański, P., Mamrot, P., Szymczak, W., & Zmysłony, M. (2012). **Subjective complaints of people living near mobile phone base stations in Poland.** *International Journal of Occupational Medicine and Environmental Health*, 25(1), 31–40. <https://doi.org/10.2478/s13382-012-0007-9>
3. Eger, H., Hagen, K. U., Lucas, B., Vogel, P., & Voit, H. (2004). **[The influence of being physically near to a cell phone transmission mast on the incidence of cancer] Einfluss der räumlichen Nähe von Mobilfunksendeanlagen auf die Krebsinzidenz (in German).** *Umwelt Medizin Gesellschaft -Verlag-Ges.*, 17(4), 1–7.
4. Hutter, H.-P., Moshammer, H., Wallner, P., & Kundi, M. (2006). **Subjective symptoms, sleeping problems, and cognitive performance in subjects living near mobile phone base stations.** *Occupational and Environmental Medicine*, 63(5), 307–313. <https://doi.org/10.1136/oem.2005.020784>
5. Levitt, Blake, & Lai, Henry. (2010). **Biological effects from exposure to electromagnetic radiation emitted by cell tower base stations and other antenna arrays.** *NRC Press*.
6. Santini, R., Santini, P., Danze, J. M., Le Ruz, P., & Seigne, M. (2003). **[Symptoms experienced by people in vicinity of base stations: II/ Incidences of age, duration of exposure, location of subjects in relation to the antennas and other electromagnetic factors].** *Pathologie-Biologie*, 51(7), 412–415.
7. Santini, Roger. (2002). **Study of The Health of People Living in The Vicinity of Mobile Phone Base Stations.** *Pathol Biol*, 50, 369–73.
8. Wolf, R., & Wolf, D. (2004). **Increased incidence of cancer near a cell-phone transmitter station.** *International Journal of Cancer*, 1(2). Retrieved from http://www.powerwatch.org.uk/news/20050207_israel.pdf
9. Zothansiana, Zosangzuali, M., Lalramdinpuii, M., & Jagetia, G. C. (2017). **Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations.** *Electromagnetic Biology and Medicine*, 1–11. <https://doi.org/10.1080/15368378.2017.1350584>
