TRENT UNIVERSITY

Dr Magda Havas, B.Sc., Ph.D., Professor Emeritus

TRENT SCHOOL OF THE ENVIRONMENT
1600 West Bank Drive Peterborough, ON Canada K9J 7B8
Phone: 1 705 748-1011 x 7882; Email: mhavas@trentu.ca; Website: www.magdahavas.com

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Open Letter: Need to Consider Health Effects Associated with Radio Frequency and Microwave Radiation before Deployment of 5G.

To Whom it May Concern,

I am a retired professor in a Canadian University where I do research on the biological effects of radio frequency radiation (RFR). For the past twenty years I have been working with people who have developed an intolerance to electromagnetic frequencies (commonly referred to as **electro-hyper-sensitivity** or EHS). These are people who become quite ill and are debilitated if they are exposed to levels of radio frequency radiation that are well below international guidelines established in 1998 by the International Commission on Non-Ionizing Radiation Protection (ICNIRP)[1]. My research involves determining how to diagnose those who have EHS using objective biophysical markers and sharing this information with medical doctors and health care providers. Belgium has a population of approximately 11.5 million people of which 345,000 (3%) are likely to have severe EHS and another 4 million (35%) are likely to have mild to moderate symptoms.

To those of you who are in positions of authority, I implore you to consider the scientific research and the requests from scientists and medical doctors around the world regarding our need **to reduce** rather than increase **public exposure to electromagnetic pollution**.

Since World War II, our exposure to manmade microwave radiation (300 MHz to 300 GHz) has increased exponentially. It started with RADAR; then mobile phones and powerful transmitting antennas; then Wi-Fi to connect to the Internet; then smart meters and smart appliances in some countries; and now 5th generation (5G) technology for "faster" service due to "space limitations" within the currently used part of the microwave spectrum (300 MHz to 5 GHz). The rapid

[1] https://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf

increase in European Wi-Fi networks is shown in Figure 1 and this is only one type of exposure common in most homes, schools and working environments.

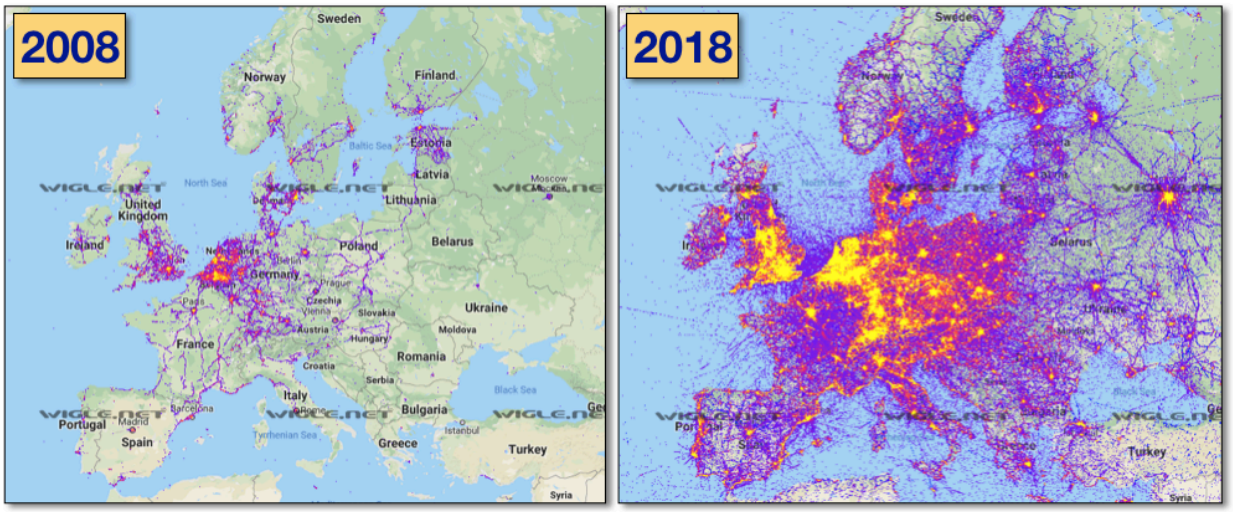

Figure 1. Wi-Fi networks in Europe in 2008 and 2018. Information obtained at https://wigle.net .

According to the Institute of Electrical and Electronics Engineers (IEEE)[2] and Tom Wheeler[3] (former president of the U.S. Federal Communication Commission) 5G will use millimetre waves (mmwaves) (above 25 GHz) that can transmit more information faster than lower microwave frequencies. These higher frequencies require numerous antennas at close proximity and within line of sight to function properly. The telecom industry views this as highly positive because it means billions of dollars of infrastructure revenue followed by users fees that will ultimately be paid for by the public whether or not they even want this service.

I have been informed that in Belgium 5G will use 700, 1400, and 3600 MHz frequencies. This is NOT 5G but rather companies using the 5G bandwagon so their frequencies/applications will be approved. The speed at these lower frequencies is going to be only marginally faster than current 4G technology. Furthermore, if these frequencies are available in Belgium then that part of the electromagnetic spectrum is obviously not full (as they claim in the U.S.).

Since we do not have information on the long-term health effects of exposure to mmwaves (5G and the Internet of Things), the absence of these waves in Belgium may turn out to be good from a health perspective. However, the frequencies that are being proposed (700 to 3600 MHz) and are currently in use are known to be biologically harmful. Consequently, it is imperative that **a moratorium be placed on additional involuntary exposure to microwave frequencies in Belgium and in other countries based on scientific studies documenting adverse biological and health effects.**

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[2] https://spectrum.ieee.org/video/telecom/wireless/everything-you-need-to-know-about-5g

[3] https://www.youtube.com/watch?v=22QlpjXR6DY

I want to keep this Open Letter as short as possible but still provide you with an accurate perspective that scientists and medical doctors have who work with EHS patients and who are familiar with the harmful effects of non-ionizing radiation (NIR) as it relates to cancer, reproductive problems and neurological disorders.

The scientific evidence that microwave radiation causes **cancer** is now overwhelmingly strong. We have evidence from carefully controlled **laboratory studies** with rats and from **epidemiological studies** with people that radio frequency radiation is associated with and causes cancer. Furthermore, we have **incidence data** from various countries that certain types of tumors in specific parts of the brain are increasing and the increase is concurrent with the increased use of mobile phones. In 2011, the International Agency for Research on Cancer (IARC) classified RFR (that includes microwaves and mmwaves) as *possibly carcinogenic* (Class 2b). This classification is likely to change to *probably carcinogen* (Class 2a) or *carcinogen* to humans (Class 1) based on recent studies, some of which are summarized below.

Scientific Evidence for Cancer, Reproductive Problems, and Electrohypersensitivity (EHS)

1. On November 1st, 2018 the U.S. National Toxicology Program (NTP) released their 10-year, $25 million report[4] showing that 900 MHz causes tumors of the heart, tumors of the brain and adrenal gland tumors in male rats. This is now the third well conducted *in vivo* laboratory study with rats showing an increase in cancer. Replication is an important part of the science method to verify results.

2. A similar study[5] released earlier this year by the Ramazzini Institute in Italy reported similar findings at 1.8 GHz frequency and at even lower exposures than that used in the NTP study. In this study, both male and female rats were affected (with heart and brain tumors), although the effect was more pronounced in male rats as in the NTP study.

3. The first study[6] conducted by the U.S. Air Force at a cost of $4.5 million was published in 1992, and reported an increase in primary and metastatic tumors in rats exposed to 2.45 GHz frequencies (same frequency used in Wi-Fi and microwave ovens).

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[4] NTP 2018, Toxicology and Carcinogenesis Studies in Hsd:Sprague Dawley SD Rats Exposed to Whole-Body Radio Frequency Radiation at a Frequency (900 MHz) and Modulations (GSM and CDMA) used by Cell Phones, NTP PR 595, 380 pages, https://ntp.niehs.nih.gov/ntp/htdocs/lt_rpts/tr595_508.pdf

[5] Falcioni et al. 2018. Report of Final Results regarding Brain and Heart Tumors in Sprague-Dawley Rats exposed from Prenatal Life until Natural Death to Mobile Phone Radio-Frequency Field Representative of 1.8 GHz GSM Base Station Environmental Emissions. Environmental Research, in press, https://ehtrust.org/wp-content/uploads/Belpoggi-Heart-and-Brain-Tumors-Base-Station-2018.pdf.

[6] Chou, et al. 1992. Long-Term, Low-Level Microwave Irradiation of Rats, Bioelectromagnetics 13:469–496. https://ecfsapi.fcc.gov/file/60002060833.pdf

4. In addition to well-controlled laboratory experiments that show a cause-effect relationship, we also have epidemiological studies (studies with human populations) that show an increase in various types of tumors (gliomas, meningiomas, acoustic neuromas, and salivary gland tumors) associated with long-term (10 plus years) cell phone use[7]. These ipsilateral tumors are found on the same side of the head closest to the cell phone.

5. A case report[8] documented multifocal breast cancer immediate beneath where a woman kept her cell phone in her bra for 10 plus years.

6. People who live within 300 to 500 m of cellular phone base stations[9] and within 2 km of radio/TV broadcast antennas[10] have a greater risk of developing and/or dying from cancer than those who live further away. Children are especially vulnerable to this radiation.

7. And finally, there is evidence from California[11] and from the U.K.[12], that the incidence of glioblastoma multiforme (GBM), a highly virulent brain tumor, is increasing (Figure 2A) and the greatest increase is in the frontal and temporal parts of the brain (Figure 2B) closest to where one holds a cell phone. Other types of brain tumors and tumors in other parts of the brain are either stable or decreasing.

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[7] Hardell and Carlsberg. 2017. Mobile phones, cordless phones and rates of brain tumors in different age groups in the Swedish National Inpatient Register and the Swedish Cancer Register during 1998-2015. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0185461

[8] West et al. 2013. Case Report: Multifocal Breast Cancer in Young Women with Prolonged Contact between their Breasts and Their Cellular Phones, Case Reports in Medicine 2013. Article ID 354682, 5 pages. https://www.ncbi.nlm.nih.gov/pubmed/24151509

[9] Yakymenko et al. 2011. Long-term exposure to Microwave Radiation provokes cancer growth: Evidences from Radars and Mobile Communication Systems. Exp Oncol 33(2):62–70. https://www.ncbi.nlm.nih.gov/pubmed/21716201 see also Dode et al. 2011. Mortality by neoplasia and cellular telephone base stations in the Belo Horizonte municipality, Minas Gerais state, Brazil. Science of the Total Environment 409 (2011) 3649–3665, https://www.ncbi.nlm.nih.gov/pubmed/21741680

[10] Hocking B, IR Gordon, HL Grain, and GE Hatfield. 1996. Cancer Incidence & Mortality & Proximity to TV Towers, Med. J. Aust. 165(11-12):601-605, http://www.teslabel.be/001/documents/Cancer%20incidence%20and%20mortality%20and%20proximity%20to%20TV%20towers.pdf

[11] Zada et al. 2011. Incidence Trends in the Anatomic Location of Primary Malignant Brain Tumors in the United States: 1992–2006. World Neurosurgery, 77(3–4): 528–524. https://www.sciencedirect.com/science/article/pii/S1878875011006863

[12] Philips et al. 2018. Brain Tumours: Rise in Glioblastoma Multiforme Incidence in England 1995–2015 Suggests an Adverse Environmental or Lifestyle Factor, Journal of Environmental and Public Health Volume 2018, Article ID 7910754, 10 pages, https://www.hindawi.com/journals/jeph/2018/7910754/

8. The increase in thyroid tumors[13], especially among women, is deeply disturbing, although some of that increase may be due to better diagnostic technology and thus being able to detect smaller tumors, earlier.

9. In addition to cancers, there is ample evidence that **sperm** are very sensitive to microwave radiation. To date, more than 24 studies have documented reduced sperm count and/or impaired sperm associated with RFR exposure. Generally the sperm exposed to RFR are deformed, swim more slowly, and die sooner than unexposed sperm[14].

10. And finally, people who are **intolerant of RFR** need to keep their exposure as low as possible in order to recover. For these individuals, having white–zone (electrosmog–free zones) is essential from a health perspective. Since microwave radiation penetrates walls, having antennas close to homes in a residential area will expose those people who live nearby.

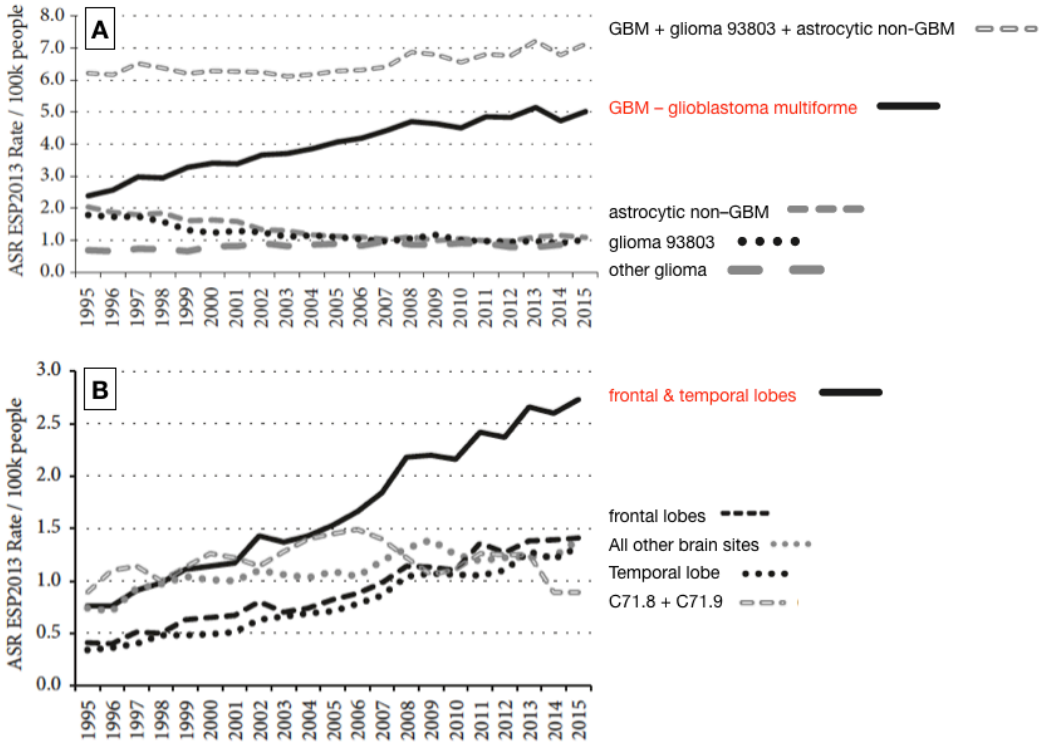

Figure 2. Age–standardized incidence rates (ASR) for all glioma cases diagnosed between 1995 and 2015 in U.K., analyzed by type [A], location [B] and year. Grouping are based on the International Classification of Diseases (ICD) code. (Source: Philips et al. 2018).

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[13] Hardell and Carlburg. 2019. 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, Intern J Oncology, in press https://www.spandidos-publications.com/10.3892/ijo.2018.4606

[14] Agarwall et al. 2008. Effect of cell phone usage on semen analysis in men attending infertility clinic: an observational study, Fertility and Sterility, 89 (1): 124–128. https://www.ncbi.nlm.nih.gov/pubmed/17482179

Appeals, Declarations, and Statements from Scientific and Health Authorities regarding Exposure to Electromagnetic Pollution

1. In 2011, the **Parliamentary Assembly Council of Europe (PACE)** released Resolution 1815[15] on the Potential Dangers of Electromagnetic Fields and their Effect on the Environment.

This is what they state about electromagnetic pollution and effects on the environment.

> *Item 6: The Assembly regrets that, despite calls for the respect of the precautionary principle and despite all the recommendations, declarations and a number of statutory and legislative advances, there is still a lack of reaction to known or emerging environmental and health risks and virtually systematic delays in adopting and implementing effective preventive measures. Waiting for high levels of scientific and clinical proof before taking action to prevent well-known risks can lead to very high health and economic costs, as was the case with asbestos, leaded petrol and tobacco.*

PACE makes a number of valuable recommendations, one of which is reproduced here:

> *8.1.4. pay particular attention to "electrosensitive" persons suffering from a syndrome of intolerance to electromagnetic fields and introduce special measures to protect them, including the creation of wave-free areas not covered by the wireless network.*

2. **The International Electromagnetic Field Alliance (IEMFA)**—consisting of an *international group of scientists—released the Seletun Statement*[16] *(Norway) 2010,* which states the following:

> *The Scientific Panel recognizes that the body of evidence on EMF requires a new approach to protection of public health; the growth and development of the fetus, and of children; and argues for strong preventative actions. New, biologically based public exposure standards are urgently needed to protect public health worldwide.*

3. The **American Academy of Environmental Medicine** (2012) recently requested a moratorium on smart meters[17] in their position paper on "Recommendations Regarding Electromagnetic and Radiofrequency Exposure." If a moratorium on smart meters is requested

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[15] http://www.next-up.org/pdf Council_Europe_Report_The_potential_dangers_of_electromagnetic_fields_and_their_effect_on_the_environment_06_05_2011.pdf

[16] http://www.magdahavas.com/international-experts'-perspective-onthehealth-effects-of-electromagnetic-fields-emf-and-electromagnetic-radiation-emr/

[17] https://www.aaemonline.org/pdf/AAEMEMFmedicalconditions.pdf

that should also apply to deployment of 4G technology posing as 5G with numerous antennas placed near homes especially since the power of these antennas is likely to be much higher than that of smart meters and hence is likely to travel further and expose a larger population.

4. In 2015, the **EMF International Scientists** presented an Appeal to the WHO and the UN that was signed by scientists and physicians who do research in this field from more than 40 countries asking for the following (see appeal at www.emfscientist.org):

> 1. *children and pregnant women be protected;*
> 2. *guidelines and regulatory standards be strengthened;*
> 3. *manufacturers be encouraged to develop safer technology;*
> 4. *utilities responsible for the generation, transmission, distribution, and monitoring of electricity maintain adequate power quality and ensure proper electrical wiring to minimize harmful ground current;*
> 5. *the public be fully informed about the potential health risks from electromagnetic energy and taught harm reduction strategies;*
> 6. *medical professionals be educated about the biological effects of electromagnetic energy and be provided training on treatment of patients with electromagnetic sensitivity;*
> 7. *governments fund training and research on electromagnetic fields and health that is independent of industry and mandate industry cooperation with researchers;*
> 8. *media disclose experts' financial relationships with industry when citing their opinions regarding health and safety aspects of EMF-emitting technologies; and*
> 9. *white-zones (radiation-free areas) be established.*

5. In 2015, an international group of medical doctors and scientists signed the **Brussels International Scientific Declaration on Electromagnetic Hypersensitivity and Multiple Chemical Sensitivity**[18], which stated the following:

> *We, physicians, acting in accordance with the Hippocratic Oath, we, scientists, acting in the name of scientific truth, we all, medical doctors and researchers working in different countries worldwide, hereby state in full independence of judgment,*
>
> - *that a high and growing number of persons are suffering from EHS and MCS worldwide;*
> - *that EHS and MCS affect women, men and children;*

[18] http://www.ehs-mcs.org/fichiers/1441982143_Statement_EN_DEFINITIF.pdf

- *that on the basis of the presently available peer-reviewed scientific evidence of adverse health effects of electromagnetic fields (EMFs) and various chemicals, and on the basis of clinical and biological investigations of patients, EHS is associated with exposure to EMFs and MCS with chemical exposure;*
- *that many frequencies of the electromagnetic spectrum (radio- and microwave frequencies as well as low and extremely low frequencies) and multiple chemicals are involved in the occurrence of EHS and MCS respectively;*
- *that the trigger for illness can be acute high intensity exposure or chronic very low intensity exposure and that reversibility can be obtained with a natural environment characterized by limited levels of anthropogenic EMFs and chemicals;*
- *that current case-control epidemiological studies and provocative studies aiming at reproducing EHS and/or MCS are scientifically difficult to construct and due to the present design flaws are in fact not suitable to prove or disprove causality; in particular because objective inclusion/exclusion criteria and endpoint evaluation criteria need to be more clearly defined; because responses to EMFs/chemicals are highly individual and depend on a variety of exposure parameters; and finally because test conditions are often reducing signal-to-noise ratio thereby obscuring evidence of a possible effect;*
- *that the nocebo effect is not a relevant nor a valid explanation when considering scientifically valuable blind provocation studies, since objective biological markers are detectable in patients as well as in animals;*
- *that new approaches are emerging for clinical and biological diagnosis and for monitoring of EHS and MCS including the use of reliable biomarkers;*
- *that EHS and MCS may be two faces of the same hypersensitivity associated pathological condition and that this condition is causing serious consequences to health, professional and family life;*
- *finally that EHS and MCS ought therefore to be fully recognized by international and national institutions with responsibility for human health.*

6. The **Austrian Medical Association**[19] (2016) released their guide for diagnosing and treating people who have electrosensitivity. As a larger population is exposed to electromagnetic pollution, more people will become sensitive to this radiation. One of the main recommendations is the reduction of EMF exposure. This is difficult if more transmitters are being erected near homes, schools, hospitals and parks.

How many scientific and medical warnings do we need before we begin to practice good

[19] https://ecfsapi.fcc.gov/file/10910251701394/EUROPAEM%20EMF%20Guideline%202016%20for%20the%20prevention%20and%20treatment%20of%20EMF-related%20health%20problems.pdf

electromagnetic hygiene? What if those who believe this radiation is safe . . . are wrong?

Who will take responsibility for the increase in neurological disorders, reproductive problems and cancers that will develop?

Is the convenience of wireless technology more important than human health?

Most people do not want to live near cell phone towers but they may not realize that exposure to transmitters on shorter poles near their home has the same effect as antennas on larger towers.

Are we willing to sacrifice health and limit the ability of those who have developed electrohypersensitivity to live in their own homes without being bombarded by microwave radiation because the wireless industry and some people want faster download speeds for their videos?

Is no place sacred?

As a research scientists who has been involved with the adverse biological effects of electrosmog for the past 20 years (and with the biological effects chemical pollutants for the previous 20 years), I find it deeply disturbing that decisions are made–that have the potential to adversely affect the health of citizens in an entire country–in the absence of good scientific research. While this area is highly technical and challenging to understand, it is my belief that governing bodies, authorities responsible for establishing public health guidelines, and the public at large are being provided with misleading information about speed, need, and the adequacy of existing exposure guidelines to protect public health.

What we need now, more than ever, is an informed governing body that will place health of the public and health of the environment as a priority above the financial health of the wireless industry. Just because information can be sent wirelessly does not mean that it should be send in this way. Most of the wireless transmissions are frivolous uses of this technology.

Placing information on *wires* (copper, Internet, cable, fibre optics, telephone lines) for *non-mobile applications* is the ideal way to proceed as this does not generate microwave radiation. Indeed, fibre optics is faster, more secure and safer than wireless transmissions. *Wireless technology* should be reserved for essential *mobile* technology like cell phones and GPS in cars. If transmission of information on all *non-mobile devices* (Internet access, smart meters, wireless printers, etc.) were placed onto wires, exposures would significantly decrease and some people would be able to recover resulting in a healthier population, reduced health care costs, less time off work and off school, and a healthier environment for other living species.

As I mentioned in the first paragraph, as many as 345,000 people in Belgium may have severe symptoms of EHS and another 4 million may have mild to moderate symptoms. These

individuals are likely to react adversely to increasingly levels of RFR should 5G be deployed and should guidelines be altered to allow for higher exposures.

We must not make the same mistakes that we made with asbestos, DDT, and smoking. The sooner safer guidelines are established; safer technology is manufactured with lower or no RF exposure; white-zones or electrosmog–free environments are designated; and people are not forced to be exposed to neighbouring RF transmitters ... the sooner society will begin to recover from chronic illness that is currently so prevalent. Conversely, the longer we wait to establish safer policy the more people who will become sick and die due to RF exposure. The time has come for those in positions of authority to make decisions that benefit society rather than the telecom industry.

The time for a moratorium on involuntary exposure to radio frequency radiation generated by wireless technology is long overdue. It is now time to act in an ethical manner placing health and well being of the public above the financial benefits of an already wealthy industry.

Respectfully submitted by Magda Havas, BSc, PhD, November 19, 2018.

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