

SCIENTISTS STATEMENT

**IN THE SUPREME COURT OF PENNSYLVANIA
MIDDLE DISTRICT**

RE: No. 34 MAP 2021, *Povacz, M, et al. v. PUC*

Associated Case(s):

35 MAP 2021 Consolidated
36 MAP 2021 Consolidated
37 MAP 2021 Consolidated
38 MAP 2021 Consolidated
39 MAP 2021 Consolidated
40 MAP 2021 Consolidated
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SCIENTISTS' STATEMENT

RF/EMF & SMART METERS HARM

**THE EFFECTS OF PULSED RADIOFREQUENCY AND
ELECTROMAGNETIC RADIATION EMISSIONS OF SMART METERS;
ESPECIALLY AS IT PERTAINS TO THOSE ADVERSELY AFFECTED**

General Statement

We, the undersigned scientists, have cumulatively published hundreds of peer-reviewed papers on biological effects of pulsed electromagnetic fields (EMFs) and radiofrequency (RF) radiation and reviewed thousands more. For all of us the study of the effects of pulsed RF/EMFs is one of our main areas of study; for some, it is the main one. (A short bio for each of the undersigned is attached.)

We are filing this statement to clarify the state of the current science regarding RF/EMF-based wireless technology adverse health effect and to explain why smart meters can be harmful, at least to some people. Pulsed RF/EMF-based wireless technology harms are not hypothetical. They are scientifically established, and a significant number of people have already been seriously injured. Therefore, we cannot stand by and allow the science to be misrepresented, especially in a case of such importance involving public safety, where lives are at stake, the harms are irreparable, and people are injured and could die.

RF Basics

1. Wireless technology uses electromagnetic waves to carry information.¹ A wave “frequency” is the number of wave cycles per second. Each cycle per second equals a “Hertz” (“Hz”).² Example: A 60 Hz frequency used for home electricity has 60 wave cycles per second. The smart meter antenna that

¹ An electromagnetic field (EMF”) is created by electric and magnetic components emitted by moving charges and propagated through “waves” at the speed of light. The interaction between the electric and magnetic fields “radiates” energy (“radiation”). The electromagnetic spectrum is divided into classes: Extremely Low Frequencies (ELFs), radio frequencies (microwaves are a subgroup of RFs), infrared, visible light, ultraviolet, X-rays and gamma rays. RFs have a wave-cycle between 3 kilohertz and 300 gigahertz

² 1,000 Hz is a kilohertz (“KHz”). 1,000,000 Hz is a megahertz (“MHz”). 1,000,000,000 Hz is a gigahertz (“GHz”).

transmits the usage data uses frequencies around 900 MHz, or about 900 million wave cycles per second.

2. The Radio-Frequency (“RF”) “signal” is the “carrier wave.” But communications require carrier wave manipulation to “encode” the data. Two main techniques are used: “pulsation” and “modulation.” Modulation places additional “mini”-waves on the RF. Pulsation injects “bursts” or turns the signal on/off. Different technologies have their own protocols or “code.” Two devices using the same code can “communicate” and exchange information.

3. Smart meters operate in the same way. They contain an RF antenna that wirelessly transmits the usage data to the utility company. The antenna’s carrier wave is around 900 MHz, but the data usage is transferred by modulating the carrier wave. Furthermore, the communications occur every few seconds, so the transmissions alternate between “silent” and “active.” This leads to an intensely pulsed signal that has a jarring “on/off” effect on the body.

4. RFs emit “non-ionizing” radiation. Non-ionizing radiation does not have sufficient energy to directly pull electrons from atoms and molecules to create “ionization.” The FCC guidelines assume that non-ionizing radiation is not harmful, unless it has high intensity power that causes tissue to heat as it absorbs the radiated energy. This is called the “thermal effect.” The FCC’s regulations

acknowledge only thermal effects. Considering many thousands of studies have proven non-thermal effects, this assumption cannot be defended.

CHD v. FCC and FCC Admission of Harm

5. On August 13, 2021, in a case amici Children’s Health Defense brought against the FCC, the US Court of Appeals for the DC Circuit ruled that the FCC failed to adequately consider and address the scientific and medical evidence showing that its 1996 thermally-based guidelines do not sufficiently protect the public. The Court held the FCC did not fully consider non-thermal harms other than cancer effects, and as a result failed to engage in reasoned decision making.³

6. The FCC will have a hard time sticking to its current “no non-thermal harm” construct on remand since it recently admitted there are neurological harms from RF exposures, at least in the range between 3 Hz and 10 MHz.⁴ The FCC noted “[a]dverse neural stimulation effects ...such as perception of tingling, shock, pain, or altered behavior due to excitation of tissue in the body’s peripheral nervous system.” It also admitted that these harms occur *instantaneously*, which

³ *Envtl. Health Tr., et al v. FCC*, Nos. 20-1025, 20-1138, 2021 U.S. App. LEXIS 24138 (D.C. Cir. Aug. 13, 2021).

⁴ *Proposed Changes in the Commission’s Rule Regarding Human Exposure to Radiofrequency Electromagnetic Fields; Reassessment of Federal Communication Commission Radiofrequency Exposure Limits and Policies*, ¶¶122-124 & nn. 322-335, 34 FCC Rcd 11687, 11743-11745 (2019).

means the FCC's current method of averaging exposure levels over 30 minutes – which completely obscures pulsation effects – is entirely inappropriate.⁵

The Scientific Consensus of Non-Thermal Harms

7. Some of the scientists who signed below published the evidence presented in the DC Circuit court case, including the BioInitiative Report (BioInitiative).⁶ The Bioinitiative is the most comprehensive scientific review on the biological and health effects of Electromagnetic Fields (EMF) and RF-based wireless technology by independent scientists (those with no conflict of interests). The Bioinitiative concluded that bioeffects are established and can occur within minutes of exposure to even very low levels of RF, including those emitted by smart meters. With chronic exposures the biological effects can become adverse effects and result in illness.⁷

8. Humans are bioelectrical beings. Our bodies use internally-generated non-thermal EMFs to function. Our physiology is dependent on very sensitive bioelectric systems, especially the heart, brain, nervous system, and intercellular

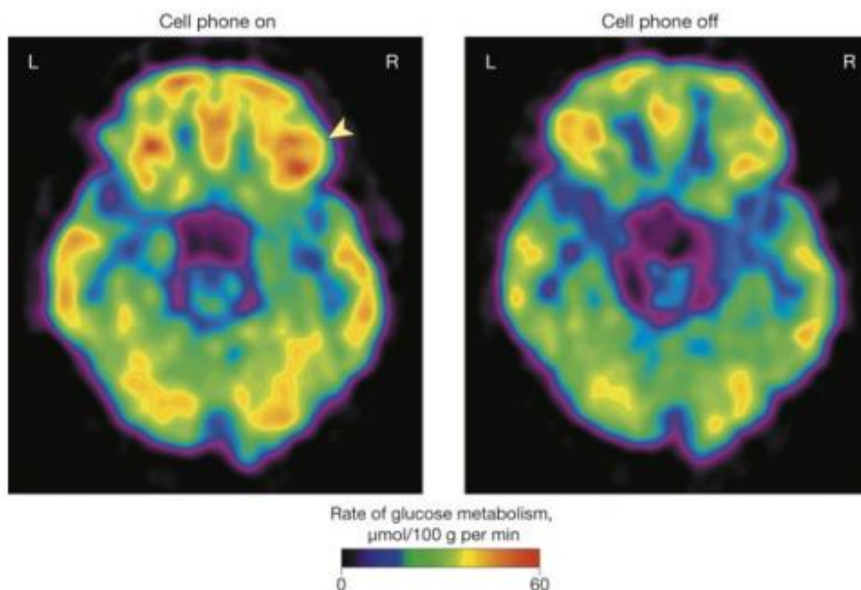
⁵ The Engineer's Report attached to the amicus brief reveals that smart meters pulse RF frequencies within this range (3 kHz – 50 KHz). The utility's evidence below relied in part on the FCC's 30-minute averaging as the basis to deny any negative pulsation effects.

⁶ <https://bioinitiative.org/participants/>.

⁷ <https://bioinitiative.org/conclusions/>.

communication.⁸ As the FCC stated in its admission, externally generated EMF interferes with humans' internal electrical communications system, and evokes internal biological responses. These responses have nothing to do with power level or tissue heating. The direct effect of pulsed RF/EMFs on humans' physiology are indisputable.

9. A 2011 National Institutes of Health ("NIH") study⁹ is sufficient by itself to destroy any denial of RF biological effects. Brain scans of 47 human participants revealed that pulsed non-thermal RF radiation induced biological brain glucose metabolism changes in every subject. See image below.



⁸ <https://childrenshealthdefense.org/wp-content/uploads/rf-martin-blank.pdf>.

⁹ <https://pubmed.ncbi.nlm.nih.gov/21343580/>.

10. Denial of biological effects of RF/EMFs cannot co-exist with the fact that physicians routinely use FDA-approved, non-thermal pulsed EMF devices to treat diseases, bone fractures¹⁰ and chronic pain,¹¹ or that RF/EMF is used to treat cancer.¹²

11. The only question is whether the biological responses can be adverse. Numerous studies show indisputable evidence of adverse responses to pulsed RF/EMF exposure on various bodily functions, especially when the RF exposure is chronic and pulsed (like the exposure to smart meters).

12. Biological and even positive effects can become adverse effects. RF signals affect living tissue and stimulate biochemical and bioelectrical changes, which can generate biological effects which then, with chronic exposure, can become adverse effects and cause various symptoms and may lead to sickness.¹³ A good example of this mixed effect comes from the immune system: “short-term exposure... may temporarily stimulate certain humoral or cellular immune functions, while prolonged irradiation inhibits the same functions.”¹⁴

¹⁰ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3441225/>.

¹¹ https://www.accessdata.fda.gov/cdrh_docs/pdf19/K190251.pdf “the application of electromagnetic energy to non-thermally treat pain.”

¹² <https://childrenshealthdefense.org/wp-content/uploads/rf-medical-treat-cancer.pdf>.

¹³ <https://bioinitiative.org/conclusions/>.

¹⁴ <https://www.sciencedirect.com/science/article/abs/pii/S0048969713003276>.

Scientific Consensus

13. Numerous scientists,¹⁵ doctors, and medical and scientific organizations from the US and around the world have warned of the negative non-thermal effects of RF/EMF and the growing sickness it has been causing. They include the EMF Scientist organization (250 scientists who combined published over 2,000 peer-reviewed papers on the effects of RF/EMF);¹⁶ the American Academy of Pediatrics;¹⁷ the Austrian Medical Association;¹⁸ and doctors' appeals from the US;¹⁹ Belgium;²⁰ and Germany.²¹ In 2021, close to 200 physicians participated in a medical conference about RF/EMF effects, for which they received medical continuing education credits.²²

¹⁵ <https://childrenshealthdefense.org/wp-content/uploads/2017-expert-letters-compilation.pdf>.

¹⁶ <https://www.emfscientist.org>; https://ecfsapi.fcc.gov/file/10916233196437/International_EMF_Scientist-Appeal%208-25-2019.pdf.

¹⁷ <https://childrenshealthdefense.org/wp-content/uploads/2013-american-academy-of-pediatrics.pdf>.

¹⁸ <https://childrenshealthdefense.org/wp-content/uploads/2011-austrian-medical-association-guidelines.pdf>.

¹⁹ Baby Safe Project: <https://www.babysafeproject.org/joint-statement>.

²⁰ Appeal of 539 Belgium Doctors: <https://en.hippocrates-electrosmog-appeal.be/medical>.

²¹ Appeal of 1,000 German doctors http://freiburger-appell-2012.info/media/International_Doctors_Appeal_2012_Nov.pdf.

²² <https://emfconference2021.com/faculty/>.

14. A California Medical Association resolution²³ concludes that the peer-reviewed research demonstrates wireless RF/EMF adverse effects, including “single and double stranded DNA breaks, creation of reactive oxygen species, immune dysfunction, cognitive processing effects, stress protein synthesis in the brain, altered brain development, sleep and memory disturbances, ADHD, abnormal behavior, sperm dysfunction, and brain tumors.”

15. Causal mechanisms of harms have been established. Oxidative Stress is one such mechanism. Over 90% of studies on RF and oxidative stress^{24, 25} have established that indeed exposure to RF/EMFs induces an increase in free radicals, and chronic exposure causes oxidative stress which leads to several adverse health effects: disease, dysfunction, including electro-sensitivity, cancer, and DNA damage.

16. Even though RF does not have the energy to directly break chemical bonds (the way ionizing radiation does), there is strong scientific evidence that this energy can indirectly cause DNA damage.²⁶ Dr. Ron Melnick PhD, a retired

²³ <https://childrenshealthdefense.org/wp-content/uploads/rf-2014-ca-medical-association-resolution.pdf>.

²⁴ <https://bioinitiative.org/wp-content/uploads/2020/09/3-RFR-Free-Radical-Oxidative-Damage-Abstracts-2020.pdf>.

²⁵ <https://childrenshealthdefense.org/wp-content/uploads/rf-2015-yakymenko-oxidative-stress.pdf>.

²⁶ <https://bioinitiative.org/wp-content/uploads/2020/09/10.-Comet-Assay-Studies-Percent-Comparison-2020.pdf>.

National Institute of Environmental Health Science (NIEHS) scientist, was the Senior Toxicologist and Director of Special Programs in the National Toxicology Program (NTP).²⁷ He stated that the old notion that non-ionizing RF cannot break DNA “should [be] put to rest.”²⁸

17. Many thousands of studies, including US government and military studies and reports, show the biological and adverse effects of pulsed RF/EMFs.²⁹ In 2014 the US Department of Interior concluded that the FCC’s thermally-based guidelines are “nearly 30 years out of date and inapplicable today.”³⁰

18. The clear majority of studies show adverse effects.³¹ For example, 244 of the 335 total studies (73%) published on neurological effects of RF Radiation between 2007 and 2020 found effects.³² Of the 261 total studies on RF radiation

²⁷ <https://emfconference2021.com/speaker/ronald-l-melnick-phd/>.

²⁸ <https://microwavenews.com/news-center/ntp-comet-assay>.

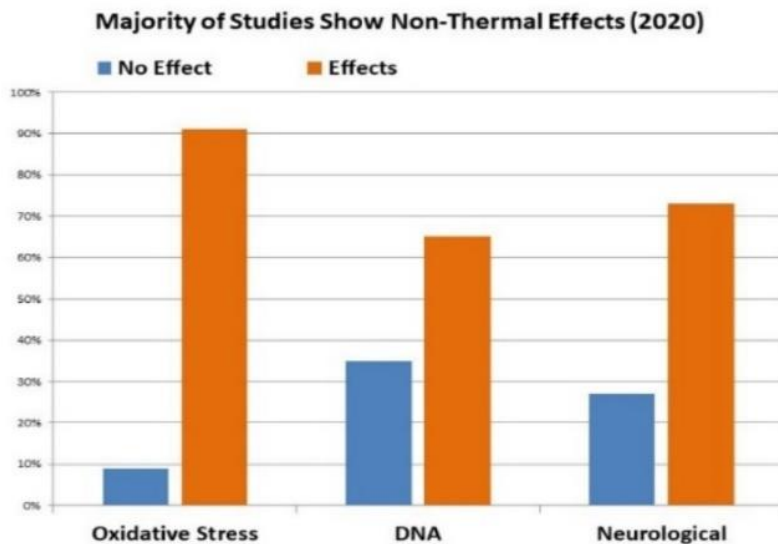
²⁹ Navy report includes 2,300 studies. Pages 10-14 list the RF effects found. <https://childrenshealthdefense.org/wp-content/uploads/rf-1971-navy-2300-studies.pdf>; Air-Force: <https://electroplague.files.wordpress.com/2014/09/rf-microwave-radiation-biological-effects-rome-labs.pdf>; NASA https://www.orsaa.org/uploads/6/7/7/9/67791943/nasa_emf_field_interactions_-_observed_effects_theories_1981.pdf.

³⁰ <https://drive.google.com/file/d/1XqbMLFUkVNUZIB5AFJAjr6KWqL6vK8ud/view>.

³¹ <https://bioinitiative.org/research-summaries/>.

³² <https://bioinitiative.org/wp-content/uploads/2020/10/13-Neurological-Effects-Studies-Percent-Comparison-2020.pdf>.

and oxidative stress, 240 (91%) show effects.³³ 224 of 346 total studies (65%) show DNA damage. See image below.^{34, 35}



19. The evidence is getting even stronger. Since 2016, when the evidentiary record in this case was generated, hundreds more published peer-reviewed studies, including by the US government, have established RF/EMF effects.³⁶

³³ <https://bioinitiative.org/wp-content/uploads/2020/09/9.-Free-Radical-Studies-Percent-Comparison-2020.pdf>.

³⁴ <https://bioinitiative.org/wp-content/uploads/2020/09/11-Genetics-Percent-Graphic-Sept-1-2020.pdf>.

³⁵ <https://bioinitiative.org/wp-content/uploads/2020/09/10.-Comet-Assay-Studies-Percent-Comparison-2020.pdf>.

³⁶ Abstract of over 700 papers (positive and negative published 2016-2019) <https://childrenshealthdefense.org/wp-content/uploads/rf-jmm-2016-2019-studies.pdf>; US Government NTP DNA Study <https://onlinelibrary.wiley.com/doi/full/10.1002/em.22343>.

20. For example, in 2021 the Swiss government expert advisory group on electromagnetic fields and non-ionizing radiation, BERENIS,³⁷ evaluated the scientific literature on non-thermal RF/EMF.³⁸ The committee published a preliminary paper which concludes that exposure could cause or worsen several chronic illnesses, and that children, the elderly and people with immune deficiencies or diseases are especially at risk. It also acknowledged that oxidative stress is the underlying causal mechanism of harm.

21. In 2019, the New-Hampshire (NH) legislature voted unanimously to establish a committee to learn the effects of 5G and wireless radiation. The committee included scientists, public representatives, and representatives of the wireless industry (through CTIA, the wireless industry lobby association). After a year of hearing experts on both sides and reviewing the science, in October 2020, the committee's report was published. It concluded that wireless radiation non-thermal harms are established. The committee recognized Electro-sensitivity and the right for accommodation of those who suffer and emphasized the need to

³⁷ <https://www.bafu.admin.ch/bafu/en/home/topics/electrosmog/newsletter-of-the-swiss-expert-group-on-electromagnetic-fields-a/beratende-expertengruppe-nis-berenis.html>.

³⁸ <https://childrenshealthdefense.org/wp-content/uploads/rf-swiss-berenis-2021-report.pdf>.

educate doctors. NH is the only state in the US that has conducted an independent full-scale investigation as to the harms of these technologies.

22. Former senior experts from government agencies responsible for this issue are also part of the consensus on non-thermal harms. In addition to Dr. Melnick, they also include: *Dr. Linda Birnbaum*, the former director (2009-2019) of the National Institute of Environmental and Health Sciences (NIEHS);³⁹ *Dr. Christopher Portier*,⁴⁰ former director of the National Center for Environment Health at the Centers for Disease Control and Prevention (CDC), who also carried various senior positions in the NIEHS, including Associate Director of the National Toxicology Program (NTP). He wrote: “Most scientists consider non-thermal effects as well established;”⁴¹ *Dr. Carl Blackman*,⁴² a biophysicist who worked as a research scientist for the EPA from 1970 until his recent retirement. Dr. Blackman’s research on RF/EMF resulted in several discoveries including

³⁹ <https://childrenshealthdefense.org/wp-content/uploads/sandri-birnbaum-amicus-motion-and-brief-correct-final-8-6-2020.pdf#page=20>.

⁴⁰ https://www.iarc.who.int/wp-content/uploads/2018/07/PORTIER_Bio.pdf; <https://pubmed.ncbi.nlm.nih.gov/27656641/>.

⁴¹ <https://childrenshealthdefense.org/wp-content/uploads/2016-portier-consensus.pdf#page=1>.

⁴² http://www.icems.eu/docs/Bios_Blackman.pdf.

multiple pulsation effects⁴³ and treatment using RF/EMF.⁴⁴ He is part of the BioInitiative Working Group and wrote the 2007 Report's section on pulsation and modulation;⁴⁵ *Dr. Alan Frey*,⁴⁶ a US navy funded scientist was the first to show non-thermal auditory effects and blood-brain barrier leakage. His studies tie pulsation to the aggravating effects of RF signals.

Electro-Sensitivity

23. Electro-sensitivity is the earliest reported and likely the most direct manifestation of RF/EMF-induced sickness. The condition, described by the appearance of mostly neurological symptoms caused by RF/EMF exposure, has been documented in the scientific literature for many decades, including by many US government and military studies and reports.⁴⁷ Many hundreds of studies

⁴³ <https://www.emfanalysis.com/wp-content/uploads/2015/06/blackman-modulation-2009.pdf>.

⁴⁴ <https://pubmed.ncbi.nlm.nih.gov/28930547/>.

⁴⁵ https://bioinitiative.org/wp-content/uploads/pdfs/sec15_2007_Modulation_Blackman.pdf.

⁴⁶ <https://www.cellphonetaskforce.org/the-work-of-allan-h-frey/>.

⁴⁷ <https://childrenshealthdefense.org/rf-1971-navy-2300-studies/>;
<https://electroplague.files.wordpress.com/2014/09/rf-microwave-radiation-biological-effects-rome-labs.pdf>;
https://www.orsaa.org/uploads/6/7/7/9/67791943/nasa_emf_field_interactions_-_observed_effects_theories_1981.pdf.

confirm the neurological effects and other symptoms⁴⁸ reported by those who suffer from the condition, and they have identified a genetic predisposition.⁴⁹

24. The understanding of etiology, mechanisms and underlying injuries involved with this condition has significantly progressed since 2016. New diagnosis guidelines by leading EMF scientists and medical doctors have been developed and published^{50,51} There are more known biomarkers for diagnosis.⁵²

25. Professor Beatrice Golomb, MD PhD was to the first to show compelling evidence in a 2018 paper that the “mystery illness” (aka “Havana Syndrome”) suffered by some US diplomats in Cuba and China was likely caused by pulsed RF/EMF.⁵³ She concluded that the diplomats suffer from Electro-sensitivity, which she refers to as Microwave Illness.⁵⁴

⁴⁸<https://childrenshealthdefense.org/wp-content/uploads/rf-2018-neurological-lai-book-chapter.pdf>.

⁴⁹ <https://pubmed.ncbi.nlm.nih.gov/24812443/>.

⁵⁰ <https://www.degruyter.com/document/doi/10.1515/reveh-2016-0011/html>.

⁵¹ <https://www.womenscollegetherospital.ca/assets/pdf/environmental/Preliminary%20Clinical%20Guidelines%20%20for%20EHS.pdf>.

⁵² <https://emf-experts.news/wp-content/uploads/2020/09/Belpomme-EHSdiagnosis-Study2020.pdf>.

⁵³ <https://pubmed.ncbi.nlm.nih.gov/30183509/>.

⁵⁴ “Microwave” is a subclass of RF, and generally comprises frequencies between 300 MHz and 300 GHz. From an FCC nomenclature perspective, the “microwave” portion is anything above 890 MHz.

26. The US State Department asked the National Academy of Sciences, Engineering and Medicine (NAS) to analyze and provide input on the diplomats' "mystery illness." Prof. Golomb was invited to present to the committee.⁵⁵ In December 2020, The NAS report was published.⁵⁶ It concluded that many of the observed symptoms are consistent with the scientific literature on the effects of pulsed RF exposure, and that it is likely the cause of the diplomats' sickness.

27. Not all the diplomats became ill, only some, similar to Electro-sensitivity in the general population. Human physiology varies, and as with other stressors, some people get sick sooner than others or at lower levels of exposure than others, and some will never become ill.

28. Prof. Golomb's paper shows Electro-sensitivity can occur as the byproduct of wireless technology, whether the result of an intentional assault through a pulsed RF/EMF weapon or by commercial wireless technology. The harm caused by these weapons comes primarily from the pulsation, not the intensity of the RF/EMF. Indeed, it would be possible for RF/EMF weapons to operate entirely within FCC guidelines and still cause harm from pulsation. Pulsation is also a driver of the harm flowing from commercial RF/EMF-emitting

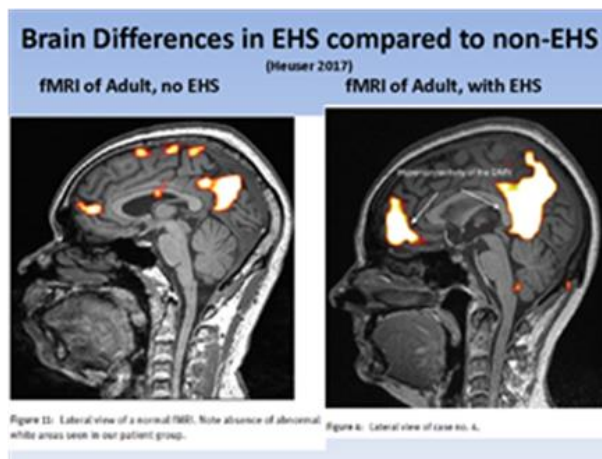
⁵⁵ <https://childrenshealthdefense.org/wp-content/uploads/rf-2018-golomb-diplomats-3.pdf>; <https://childrenshealthdefense.org/wp-content/uploads/rf-nas-golomb-email.pdf>.

⁵⁶ <https://www.nap.edu/read/25889/chapter/1>.

technology, including smart meters. Nevertheless, FCC rules regarding wireless technology ignore their effects.

29. Electro-sensitivity is not a mere “sensitivity.” Studies have shown that the symptoms indicate severe physiological injuries associated with exposure to RF/EMF.⁵⁷

30. A 2017 functional MRI study observed brain injury in persons with Electro-sensitivity.⁵⁸ The scans for each of the 10 subjects had similar abnormalities, all resembling those flowing from traumatic brain injury. The diplomats had the same abnormalities. This injury indicates impaired blood flow in certain regions of the brain.



⁵⁷ <https://pubmed.ncbi.nlm.nih.gov/26613326/>.

⁵⁸ <https://pubmed.ncbi.nlm.nih.gov/28678737/>.

31. A 2020⁵⁹ and a 2015⁶⁰ papers confirm the blood flow effects and show additional injuries. They are based on a study of 700 people with electro-sensitivity showing the subjects suffered from permeability of the blood-brain barrier, depressed melatonin levels, oxidative stress and aggravated auto-immune response. These effects were shown to be connected to RF exposure⁶¹. In CHD's case against the FCC, the court specifically mentioned that the FCC failed to respond to the evidence showing these effects.⁶²

32. Those who want to propagate this technology have consistently generated perceived "controversy" as a method to deny Electro-sensitivity. They do so by funding negative subjective-perception provocation studies so they can claim that it is psychological or fear-induced (the "nocebo effect"). These studies suffer from numerous fatal design flaws.⁶³

33. The most ironic design flaw in these studies is that they do not control for the nocebo effect, which is a prerequisite to the validity of any provocation

⁵⁹ <https://emf-experts.news/wp-content/uploads/2020/09/Belpomme-EHSdiagnosis-Study2020.pdf>.

⁶⁰ <https://pubmed.ncbi.nlm.nih.gov/26613326/>.

⁶¹ [https://bioinitiative.org/wp-content/uploads/pdfs/sec01_2012_summary_for_public.pdf#page=10](https://bioinitiative.org/wp-content/uploads/pdfs/sec01_2012_summary_for_public.pdf#page=10;);
<https://bioinitiative.org/table-of-contents/>.

⁶² *Envtl. Health Tr. v. FCC*, Nos. 20-1025, 20-1138, 2021 U.S. App. LEXIS 24138, at *12-*16 (D.C. Cir. Aug. 13, 2021).

⁶³ Many of those provocation studies were heavily funded by mobile phone carriers and led by James Rubin PhD, a psychologist (not EMF expert).

study. Then they conclude that the symptoms are likely a result of a nocebo effect.⁶⁴

34. Another primary flaw in these studies is the illogical assumption that all people with Electro-sensitivity should be able to immediately “detect” when the RF signal is on/off. But those affected do not typically “sense” radiation. They develop symptoms that take time to appear and subside. There are many other flaws. Nevertheless, properly conducted studies without predetermined agenda show that some sufferers can detect the signal.⁶⁵

35. Subjective-perception provocation studies are considered the worst science because they can be easily manipulated.⁶⁶ Industry uses these studies to produce the required results to divert attention from hundreds of high-quality peer-reviewed credible studies that do not depend on subjective-perception and confirm the symptoms people develop, the corresponding physiological injuries and established causal mechanisms.^{67, 68}

⁶⁴ <https://www.bmj.com/content/bmj/332/7546/886.full.pdf>.

⁶⁵ For example, a large scale study by the Dutch government, known as the TNO study: <https://childrenshealthdefense.org/wp-content/uploads/rf-electrosensitivity-provocation-tno.pdf>.

⁶⁶ <https://ecfsapi.fcc.gov/file/7520940903.pdf#page=25>.

⁶⁷ <https://childrenshealthdefense.org/rf-2018-Golomb-Diplomats-2/#page=9>.

⁶⁸ <https://childrenshealthdefense.org/rf-2014-electrosensitivity-dr-blythe/>.

36. It is important to emphasize that while widely quoted and used to deny Electro- sensitivity, subjective-provocation studies are not used to diagnose any condition and are definitely “not suitable to disprove causality.”⁶⁹ A person’s inability to detect the pathogen that causes the reaction does not mean the individual is unaffected by the pathogen. “Human RF-detector” is not a mandatory symptom for Electro-sensitivity.

Smart Meters’ Effects

37. Beyond individual predisposition, the appearance of adverse effects can depend on signal intensity, exposure duration; specific frequencies involved; exposure to multiple frequencies and sources which create high exposure variability; on-off pulsation and sharp “peaks and valleys.”

38. Expert smart meter testing indicates there are three primary RF exposure issues.^{70, 71, 72,73} First, the RF antennas within the meter send usage data and communicate with other meters and smart devices. They wirelessly emit

⁶⁹ <https://childrenshealthdefense.org/wp-content/uploads/rf-2016-europaem-guidelines.pdf#page=11>.

⁷⁰ <https://childrenshealthdefense.org/wp-content/uploads/pa-amicus-sage-smart-meters.pdf>.

⁷¹ <https://childrenshealthdefense.org/wp-content/uploads/rf-pa-amicus-engineer-expert-erik-anderson-report.pdf>.

⁷² <https://childrenshealthdefense.org/wp-content/uploads/pa-amicus-isotope.pdf>.

⁷³ <https://childrenshealthdefense.org/wp-content/uploads/pa-amicus-bathgate-pa-smart-meters.pdf>.

intensely pulsed RF/EMF. Second, these antennas' RF emissions also conduct over the home electric wiring,⁷⁴ transforming the entire house into a “repeater” antenna.

39. Finally, the switch mode power supply (SMPS) creates RF frequencies as a byproduct of the AC/DC conversion process. The traditional analog meters used for decades do not have SMPS and do not create these emissions. SMPS-generated emissions are typically in the range of 2-150 KHz. They enter the house's electric wiring and then radiate RF in various parts of the house. Digital meters also use SMPS; therefore, they too create RF frequencies, even though they do not have transmitting RF antennas.

40. As noted, the FCC admitted there are neurological effects from non-thermal RF emissions⁷⁵ and its admission applies to frequencies in the kilohertz range created by the SMPS. The symptoms the FCC recites are similar to those reported by those who assert adverse effects from smart meters including tingling, shock, pain, or altered behavior due to excitation of tissue in the body's peripheral nervous system.⁷⁶ The FCC explained that the presence of these frequencies outside the body induce “internal electric fields” within the human body.

⁷⁴ <https://childrenshealthdefense.org/wp-content/uploads/pa-amicus-isotrope.pdf>.

⁷⁵ *Proposed Changes in the Commission's Rule Regarding Human Exposure to Radiofrequency Electromagnetic Fields; Reassessment of Federal Communication Commission Radiofrequency Exposure Limits and Policies*, ¶¶122-124 & nn. 322-335, 34 FCC Rcd 11687, 11743-11745 (2019).

⁷⁶ FN. 328, p.58.

41. A single smart meter antenna can emit up to 190,000 short but intense RF pulses (bursts/spikes) each day to transmit the usage data to the utility. These bursts can be two and a half times above the FCC's limits, if you do not apply the 30-minute "averaging" used in the FCC testing. The D.C. Circuit questioned⁷⁷ this averaging and the FCC proposes to abandon it, at least in part.⁷⁸ Depending on how close the meter is to occupied space within a home, a smart meter can cause very high intensity RF/EMF exposures.

42. People in proximity to a smart meter are at risk of significantly high aggregate whole-body exposure to RF/EMF. This is especially true regarding people living near multiple meters mounted together in an apartment complex or those who have a utility collector meter installed on their home which relays RF signals of up to 5,000 homes.⁷⁹ The cumulative 24/7 exposure is never measured but undoubtedly harmful, at least to some.

43. Studies have consistently shown that the pulsing is a major element in the creation and/or aggravation of effects from RF exposure. It is possibly more

⁷⁷ *Env'tl. Health Tr. v. FCC*, Nos. 20-1025, 20-1138, 2021 U.S. App. LEXIS 24138, at *12 (D.C. Cir. Aug. 13, 2021).

⁷⁸ *Proposed Changes in the Commission's Rule Regarding Human Exposure to Radiofrequency Electromagnetic Fields; Reassessment of Federal Communication Commission Radiofrequency Exposure Limits and Policies*, ¶¶122-124 & nn. 322-335, 34 FCC Rcd 11687, 11743-11745 (2019).

⁷⁹ <https://childrenshealthdefense.org/pa-amicus-sage-smart-meters/#page=3>.

important than the radiation levels.⁸⁰ EMF-based medical treatments, for example, recognize the higher bio-active nature of pulsation; they purposefully pulse the signal to obtain a higher biological response.

44. The effects of continuous exposure and the on/off pulsation effects were shown in a 2011 study.⁸¹ The study tested a physician with Electro-sensitivity. She developed temporal pain, headache, muscle twitching, and skipped heartbeats within 100 seconds after each signal exposure. The study showed that the symptoms appeared in response to the on-off pulsing of the signal rather than the presence of a continuous EMF field or its intensity. “EMF hypersensitivity can occur as a bona fide environmentally inducible neurological syndrome.”

45. The energy emitted by the RF antennas and from the operation of the SMPS enters the wiring system through “high variability” spikes in various RF frequencies. This has an on/off effect on the body. Studies have shown that the body is especially sensitive to “high variability” emissions.⁸²

⁸⁰ https://bioinitiative.org/wp-content/uploads/pdfs/sec15_2007_Modulation_Blackman.pdf;
https://bioinitiative.org/wp-content/uploads/pdfs/sec15_2012_Evidence_Disruption_Modulation.pdf.

⁸¹ <https://www.stopumts.nl/pdf/McCarty%20Marino%202011%20EMF%20ES%20&%20neurological%20syndrome%20Int%20J%20Neurosci%20July.pdf>.

⁸² <https://childrenshealthdefense.org/wp-content/uploads/rf-2015-Panagopoulos-variability-effects.pdf>.

Conclusion

46. Anyone who claims smart meters cannot produce the symptoms described by the customers is ignorant of the FCC's recent admission. They either do not understand or are misrepresenting the science on biological and adverse effects from pulsed RF/EMF. Many have reported getting ill following the installation of these smart meters. Considering the way smart meters operate and the multitude of complex emissions they create, it is no wonder. Forcing these meters on people who have become affected by RF/EMF is unconscionable. Those with Electro-sensitivity and others who are affected by RF/EMF must be allowed to secure analog meters because it is the only type of meter that does not cause or worsen their condition.

Respectfully Submitted,

Scientists Statement Signatories

Professor David O. Carpenter, MD, Professor of Environmental Health Sciences, and Director, Institute for Health and the Environment at the University of Albany, a collaborating center for the World Health Organization (WHO). Dr. Carpenter is a Harvard trained public health expert who focuses on the study of environmental causes of human disease with expertise in electrophysiology, low-frequency electromagnetic field and radiofrequency (RF) radiation bioeffects. He was Chairman of the Neurobiology Department of

Armed Forces Radiobiology Research Institute at the Defense Nuclear Agency in Washington DC; the Director of Wadsworth Center for Laboratories and Research of the New York State Department of Health; and Executive Secretary of the NY State Power Line Project regarding health effects associated with exposure to EMFs. After the project concluded, he became spokesperson for NY state on all matters associated with EMFs. He is the Co-Editor of the *BioInitiative: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields*. Dr. Carpenter has authored more than 400 scientific papers.

Professor Igor Belyaev, DSc, Head, Department of Radiobiology; Cancer Research Institute, Biomedical Research Center, Slovak Republic. He has an MSc. Degree in Radiation Physics and Dosimetry; PhD in Radiobiology; and DSc. degree in Genetics. He was an Associate Professor of Toxicological Genetics at the Stockholm University, Sweden, as well as a senior research scientist and group leader in the departments of Radiobiology, Molecular Genome Research, Genetic and Cellular Toxicology, Genetics, Toxicology and Microbiology. He is now or formerly a member of: The Working Group of the International EMF Project of the World Health Organization; the Working Group for the evaluation of RF carcinogenicity of the International Agency on Research in Cancer (IARC); the Swedish National Committee for Radio-Science; the Russian National Committee on Non-Ionizing Radiation Protection; the EMF Working Group of the European Academy for Environmental Medicine (EUROPAEM). He serves as Associate Editor for the *International Journal of Radiation Biology* and on the Editorial Board of *Electromagnetic Biology and Medicine*. He published over 100 scientific papers and was awarded by the Bioelectromagnetics Society for the most influential

paper in Bioelectromagnetics 2006-2010. He is a member of the BioInitiative Working Group and authored the BioInitiative's 2012 Section on the effects of Pulsation and Modulation.

Professor Beatrice Golomb, MD, PhD, Professor of Medicine at the University of California, San Diego. She also leads a research group which focuses on the relation of oxidative stress and mitochondrial function to health, aging, behavior, illness, environmental and medication effects, nutrition, and bioenergetics. She served as a primary care doctor of veteran patients for over 15 years. She is known for her work on Gulf War Illness, statins and placebos and for her 2018 paper "*Diplomats' Mystery Illness and Pulsed Radiofrequency/Microwave Radiation*" which concludes, "Reported facts appear consistent with pulsed RF/MW as the source of injury in affected diplomats." She was invited to present to the National Academy of Sciences about these findings. She has published 136 scientific papers.

Professor Reba Goodman, PhD, Professor Emeritus in Clinical Pathology at Columbia University. Dr. Goodman received an MA and a PhD in Developmental Genetics from Columbia University. She has authored a great many studies, including at least 76 studies on effects of electromagnetic fields. Early on, in her paper in Science entitled "*Pulsed electromagnetic fields induce cellular transcription*," (1983), she showed how even weak, pulsing electromagnetic fields could modify biological processes.

Professor Lennart Hardell, MD, PhD, is a retired Professor of Oncology and Cancer Epidemiology, from Örebro University Hospital in Sweden. Dr. Hardell continues his work through his involvement with the Environment and Cancer Research Foundation. His research focus has been the environmental

risk factors for cancer. Prof. Hardell has been awarded several scientific prizes for his research. In recent decades his research focused on the effects of RFR exposure, especially on mobile phones and the risk of brain tumours. The research by the Hardell group influenced IARC's 2011 classification of radiofrequency radiation as a possible 2B carcinogen. Dr. Hardell was also a member of IARC's evaluating group. He has published more than 350 peer-reviewed scientific papers, including many on the biological effects of electromagnetic radiation.

Professor Paul Héroux, PhD, Director of the Occupational Health Program, Faculty of Medicine, McGill University, Canada. Dr. Héroux is a toxicologist with a PhD in Physics. He teaches courses at McGill University about the adverse health effects of EMFs. He has published 42 scientific papers, 27 of them on the effects of EMFs. He also authored several text books. His most recent paper is "*Adverse health effects of 5G mobile networking technology under real-life conditions.*" (Toxicol. Let 2020). He is a member of the BioInitiative Working Group and was a member of the committee appointed by the New Hampshire legislature to review the effects of 5g and wireless technologies.

Professor Olle Johansson, PhD, retired associate professor at the Karolinska Institute, Department of Neuroscience, and head of The Experimental Dermatology Unit from the Karolinska Institute, and the Royal Institute of Technology, Stockholm, Sweden. He has published more than 800 papers, conference reports, book chapters, commentaries, and debate articles. His main focus was basic and applied neuroscience. Starting in 1977, his research focused on the adverse health and biological effects of man-made pulsed RF-

based wireless technologies. He has published more than 330 papers in that field, many with a focus on the effects on the skin.

Professor Anthony B. Miller, MD, CM, FRCP, FRCP(C), Professor Emeritus, Dalla Lana School of Public Health, University of Toronto. He was the Director, Epidemiology Unit, National Cancer Institute of Canada; Professor, and Chair of the Department of Preventive Medicine and Biostatistics, University of Toronto; Special Expert in the Division of Cancer Prevention, US National Cancer Institute; Senior Epidemiologist, International Agency for Research on Cancer; Head, Division of Epidemiology, German Cancer Research Centre; Associate Director Research, Dalla Lana School of Public Health, University of Toronto. In 2019 he was elected a Member of the Order of Canada for his work on Cancer Control. He has published 354 peer-reviewed papers. In the past few years he has focused on RF/EMF effects. He has published six papers on the topic of RF/EMF and has presented in many conferences on this issue.

Professor Martin Pall, PhD, Professor Emeritus of Biochemistry and Basic Medical Sciences at Washington State University. Dr. Pall is a published and widely cited scientist on the biological effects of electromagnetic fields and speaks internationally on this topic. His expertise includes how RF/EMF impacts the electrical systems in our bodies with a focus on the VGCC injury mechanism. He published seven papers showing that pulsed RF/EMF interferes with the operation of the voltage-gated calcium channel, a sensor that is responsible for the entry of calcium into our cells.

Alfonso Balmori, BSc, M.S.Ed, is a world renowned biologist, with a master in environmental education. He has published more than 50 scientific papers published in peer-reviewed journals on environment, ecology, and biodiversity conservation issues. He is known worldwide for his work on the effects of electromagnetic RF radiation on animals and plants, mainly on the effects of cell towers. His papers were quoted in the US Department of the Interior 2014 letter concluding that cell towers harm migratory birds and that the FCC guidelines are 30 years out of date. This letter was referenced by the Court in the Remand Guidelines decision.

Professor Kent Chamberlin, PhD, Past Chair and Professor Emeritus, Department of Electrical and Computer Engineering, University of New Hampshire. The focus of his research has been Computational Electromagnetics. He also investigated the interaction of electromagnetic fields and the human body, which resulted in seven publications. He was appointed by the Chancellor to the New Hampshire Commission to Study the Environmental and Health Effects of Evolving 5G Technology, which concluded that 5G and pulsed RF-based wireless technologies are harmful to health.

Dr. Priyanka Bandara, PhD, is a scientist with a PhD in Biochemistry and Molecular Genetics. She served as senior manager of a research team and a clinical team at Westmead Children's Hospital, Australia. She then became involved in environmental health and disease prevention. Her current focus is the impact of pulsed RF-based wireless technologies on health. Dr. Bandara has published 13 papers on the effects of electromagnetic radiation in international scientific journals, and has presented at major conferences and academic institutions. She serves as Associate Editor of the Journal of the Australasian

College of Nutritional and Environmental Medicine and as peer-reviewer for several international medical journals.

Dr. Frédéric Greco, MD, is a practitioner in the neuro-intensive care unit at the University Hospital of Montpellier, France, and teaches at the university's Faculty of Medicine. He is a member of the working group set up by the French government's health department to implement national recommendations for the medical care of electrosensitive people. He is the principal investigator of the ongoing clinical study "*Migraine in Electrohypersensitive Patients*."

Dr. Yael Stein, MD, is head of the Electromagnetic Radiation Research Clinic at Hadassah Medical Center, Jerusalem, Israel, focusing on electro-sensitivity diagnosis and treatment. She is a certified Anesthesiologist at Hadassah Medical Center and researcher at the Hebrew University Medical School. She also specializes in Pain Medicine and is currently completing an MPH at the Hebrew University School of Public Health. She has extensive experience in research on the health effects of electromagnetic fields on humans from the epidemiologic and biological/medical points of view, and has worked in this field since 2007.

Cindy Sage, MA, is an environmental sciences consultant and researcher on electromagnetic fields and radiofrequency radiation. She is the founder of the international BioInitiative Working Group, and the co-editor of the BioInitiative Reports (2007 and 2012). Ms. Sage has provided expert testimony and scientific testimony on non-ionizing radiation to the Federal Communications Commission, the US Food and Drug Administration, the California Public Utility Commission, the European Commission's Directorate of Public Health - Scientific Committee on Emerging and Newly Identified Health Risks

(SCENIHR). She has advised numerous state and federal agencies on wireless health risks, smart meter emissions and safety limit inadequacies. She has published 24 peer-reviewed papers on the evidence of health risks from electromagnetic fields and radiofrequency radiation, and she studies the effects of smart meters.

Dr. Cindy Russell, MD, is a surgeon and Executive Director of Physicians for Safe Technology. Since 1995, she has been a member of the Santa Clara County Medical Association Environmental Health Committee. Dr. Russell has published several peer-reviewed papers on the impacts of wireless technology on human health and the environment with hundreds of scientific references. Her focus continues to be disease prevention and environmental health through toxics reduction.

Dr. Mary Redmayne, PhD, is a researcher, educator and consultant with Adjunct Research Fellowships at Victoria University of Wellington and at Monash University, Melbourne. Her research interests and experience include children's use of wireless devices and their effect on health and well-being. She has many peer-reviewed papers, with at least 22 on health and electromagnetic fields and RF radiation. She lectures on these issues both in New Zealand and internationally. Dr. Redmayne is a Participating Member of Standards Australia Committee on Human Exposure to Electromagnetic Fields, a technical committee responsible for standards settings. She is a scientific advisor for the Oceania Radiofrequency Scientific Advisory Association, and for the Building Biology and Ecology Institute, NZ.