

The Honorable Tony Evers
Governor of Wisconsin
115 East, State Capitol
Madison, WI 53702

January 13, 2019

Dear Governor Evers:

Environmental Health Trust (EHT) is a nonprofit Think Tank and policy organization dedicated to identifying and reducing environmental health hazards. EHT provides independent scientific research and advice on controllable environmental hazards to local, state and national governments.¹ We brief policymakers nationally and internationally and most recently our scientists were invited to present at the first 5G Wireless Forum in Michigan by State Senator Patrick Colbeck². We hope you will watch the presentations now online of Dr. Ronald Melnick presenting the findings of the National Toxicology Program cell phone radiation study, Dr. Anthony Miller presenting the scientific evidence on cancer, and Theodora Scarato presenting on the groundswell of protective policy nationwide. I presented on the unique vulnerability of children and impacts to DNA and brain development.

Wisconsin's 2013 Mobile Siting Regulations were passed removing a significant amount of local municipal control over cellular antennas installations. Today, we write to advise you of scientific grounds for major health and environmental concerns about the densification of 4G "small" cells and 5G cellular antennas installations.

There are numerous problems with the densification of cellular antennas, such as:

- Wireless installations would result in a significant aesthetic blight that will take away the character of neighborhoods and wreak havoc on property values. Studies show property values drop up to 20% on homes located near cell towers.³
- "Small cells" are not small; each installation would increase the height of the pole, could include up to 1,000 antennas simultaneously sending and receiving signals and a large equipment cabinet.
- The cellular antennas would emit microwave radiofrequency radiation, which is an environmental pollutant known to cause cancer and other adverse health and environmental effects (e.g., on birds, bees, trees) according to internationally recognized authoritative research, including studies conducted by the U.S. National Toxicology Program, which is the nation's premiere testing program.
- Antenna installations will impact the tree canopy due to necessary tree trimming and radiation [effects](#).

In light of the scientific documentation, EHT writes today to:

- *Share technical information explaining why more than 200 expert scientists are urging a moratorium^{4,5} on the 5G rollout until companies prove its safety.*
- *Request that government officials halt the deployment of 5G "small cells" in Wisconsin.*

¹ For example, at the invitation of the Israel Institute for Advanced Study (IIAS) of the Hebrew University of Jerusalem, EHT organized and chaired the 2017 [Expert Forum on Wireless Radiation and Health](#), bringing together scientists and engineers from more than ten high tech nations.

² [5G Wireless Forum](#), Michigan December 2018

³ [Cell Phone Towers Lower Property Values: Documentation And Research on Cellular Base Stations Near Homes](#), Environmental Health Trust.

⁴ Lerchl, Alexander, et al. "[Tumor promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans.](#)" *Biochemical and Biophysical Research Communications*, vol. 459, no. 4, 2015, pp. 585-90.

⁵ Tillmann, Thomas, et al. "[Indication of cocarcinogenic potential of chronic UMTS-modulated radiofrequency exposure in an ethylnitrosourea mouse model.](#)" *International Journal of Radiation Biology*, vol. 86, no. 7, 2010, pp. 529-41.

- Request that government officials support the implementation of wired systems using fiber optic cables to connect premises. As explained in more detail below, wired systems are faster, cheaper and safer than wireless systems.

5G: An Untested Application of a Technology Known to Harm Humans and Wildlife

Peer reviewed [research](#) links EMF emissions to myriad adverse environmental and health effects. Environmental effects include disruptions to reproduction, development, orientation and migration of animals,⁶ and damage to plants and crops.⁷ Human health effects include impaired reproduction, increased incidence of brain cancer, DNA breaks, oxidative stress and immune dysfunction, altered brain development, sleep changes, hyperactivity, and memory and cognitive problems.⁸ Since the WHO/IARC [classified EMF as a Group 2B Possible Carcinogen](#) in 2011, the peer reviewed research connecting wireless exposure to cancer has significantly strengthened. For example:

- The 10 year \$30 million National Institute of Environmental Health Sciences National Toxicology Program's (NTP) Studies of the Toxicology and Carcinogenicity of Cell Phone Radiation found that RFR was associated with "clear evidence" of cancer due to the increased malignant schwannomas found in RFR-exposed male rats. The brain (glioma) cancers and tumors in the adrenal glands were also considered evidence of an association with cancer. In addition, exposed animals had significantly more DNA damage, heart damage and low birth weight.
- The Ramazzini Institute published its [findings](#) that animals exposed to very low-level RFR developed the same types of cancers as reported by the NTP.
- Long-term [research](#) on humans who have used cell phones has found increased tumors—schwannomas and glioblastomas—the same cell type as found in the NTP and Ramazzini Institute studies. Persons who started using cell phones under age 20 had the highest risk.⁹

⁶ See, e.g., Kimmel, Stefan, et al. ["Electromagnetic radiation: influences on honeybees \(*Apis mellifera*\)."](#) *IIAS-InterSymp Conference*, 2007 (finding that 39.7% of the non-irradiated bees had returned to their hives while only 7.3% of the irradiated bees had); Cucurachi, C., et al. ["A review of the ecological effects of radiofrequency electromagnetic fields \(RF-EMF\)."](#) *Environment International*, vol. 51, 2013, pp. 116–40; ["Briefing Paper on the Need for Research into the Cumulative Impacts of Communication Towers on Migratory Birds and Other Wildlife in the United States."](#) *Division of Migratory Bird Management (DMBM)*, U.S. Fish & Wildlife Service, 2009; Balmori, A. ["Mobile phone mast effects on common frog \(*Rana temporaria*\) tadpoles."](#) *Electromagnetic Biology and Medicine*, vol. 29, no. 1-2, 2010, pp. 31-5; Harkless, Ryan, Muntather Al-Quraishi and Mary C. Vagula. ["Radiation hazards of radio frequency waves on the early embryonic development of Zebrafish."](#) *SPIE Proceedings*, vol. 9112, 2014.

⁷ See, e.g., Waldmann-Selsam, C., et al. ["Radiofrequency radiation injures trees around mobile phone base stations."](#) *Science of the Total Environment*, vol. 572, 2016, pp. 554-69; Halgamuge, M.N. ["Weak radiofrequency radiation exposure from mobile phone radiation on plants."](#) *Electromagnetic Biology and Medicine*, vol. 36, no. 2, 2017, pp. 213-235; Halgamuge, Malka N., See Kye Yak and Jacob L. Eberhardt. ["Reduced growth of soybean seedlings after exposure to weak microwave radiation from GSM 900 mobile phone and base station."](#) *Bioelectromagnetics*, vol. 36, no. 2, 2015, pp. 87-95; Haggerty, Katie. ["Adverse Influence of Radio Frequency Background on Trembling Aspen Seedlings."](#) *International Journal of Forestry Research*, vol 2010, no. 836278, 2010.

⁸ For more information on acute health symptoms, see, e.g., Martin Pall, *Microwave Frequency Electromagnetic Fields (EMFs) Produce Widespread Neuropsychiatric Effects Including Depression*, 75 *J. Chemical Neuroanatomy* 43-51 (Sept. 2016); [Response of residents living in the vicinity of a cellular phone base station in France](#) ; [Electromagnetic Fields: A Hazard to Your Health?](#), Healthy Children.

⁹ [Mobile phone and cordless phone use and the risk for glioma – Analysis of pooled case-control studies in Sweden, 1997–2003 and 2007–2009](#)

- A 2015 Jacobs University [study](#) (replicating a [2010 study](#)) found that weak cell phone signals significantly promote the growth of tumors in mice, and that combining a toxic chemical exposure with RF more than doubled the tumor response.^{10,11}

Due to these findings, several scientists are of the opinion that the weight of current peer reviewed evidence supports the conclusion that radiofrequency radiation should be regarded as a human carcinogen.^{12,13,14}

Published research on wireless frequencies has found impacts on [reproduction](#) and [brain development](#) in addition to a myriad of other adverse effects.^{15,16,17,18} 5G would use today's wireless frequencies while adding new, higher frequencies to transmit data at faster speeds. These higher frequency millimeter waves uniquely penetrate the eyes and skin,^{19,20,21,22} and have been shown to accelerate bacterial and viral cell growth.²⁰ Millimeter waves were originally developed as a military weapon to create the sensation that the skin is burning.²¹ Currently accepted standards are not sophisticated enough to measure effects on sweat glands or quantify the risks of cumulative exposure.^{22,23} Any future applications of these technologies must consider the biological effect of cumulative exposures to these frequencies.

Children are more vulnerable.

¹⁰ Lerchl, Alexander, et al. "[Tumor promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans.](#)" *Biochemical and Biophysical Research Communications*, vol. 459, no. 4, 2015, pp. 585-90.

¹¹ Tillmann, Thomas, et al. "[Indication of cocarcinogenic potential of chronic UMTS-modulated radiofrequency exposure in an ethylnitrosourea mouse model.](#)" *International Journal of Radiation Biology*, vol. 86, no. 7, 2010, pp. 529-41.

¹² Adams, Jessica A., et al. "[Effect of mobile telephones on sperm quality: a systematic review and meta-analysis.](#)" *Environment International*, 70, 2014, pp. 106-112.

¹³ Deshmukh, P.S., et al. "[Cognitive impairment and neurogenotoxic effects in rats exposed to low-intensity microwave radiation.](#)" *International Journal of Toxicology*, vol. 34, no. 3, 2015, pp. 284-90.

¹⁴ Aldad, T.S., et al. "[Fetal Radiofrequency Radiation Exposure From 800-1900 MHz-Rated Cellular Telephones Affects Neurodevelopment and Behavior in Mice.](#)" *Scientific Reports*, vol. 2, no. 312, 2012.

¹⁵ Adams, Jessica A., et al. "[Effect of mobile telephones on sperm quality: a systematic review and meta-analysis.](#)" *Environment International*, 70, 2014, pp. 106-112.

¹⁶ Deshmukh, P.S., et al. "[Cognitive impairment and neurogenotoxic effects in rats exposed to low-intensity microwave radiation.](#)" *International Journal of Toxicology*, vol. 34, no. 3, 2015, pp. 284-90.

¹⁷ Aldad, T.S., et al. "[Fetal Radiofrequency Radiation Exposure From 800-1900 MHz-Rated Cellular Telephones Affects Neurodevelopment and Behavior in Mice.](#)" *Scientific Reports*, vol. 2, no. 312, 2012.

¹⁸ Sonmez, O.F., et al. "[Purkinje cell number decreases in the adult female rat cerebellum following exposure to 900 MHz electromagnetic field.](#)" *Brain Research*, vol. 1356, 2010, pp. 95-101.

¹⁹ A [lecture](#) by Paul Ben-Ishai, PhD at the Israel Institute for Advanced Studies on this finding can be found on the [2017 IIAS Conference website](#). Feldman, Yuri and Paul Ben-Ishai. "[Potential Risks to Human Health Originating from Future Sub-MM Communication Systems.](#)" *Conference on Wireless and Health*, 2017.

²⁰ Cindy L. Russell, [5G Wireless Telecommunications Expansion: Public Health and Environmental Implications](#), 165 *Env't'l Res.* 484 (2018).

²¹ For information on Active Denial Systems, see, e.g., [Vehicle-Mounted Active Denial System \(V-MADS\)](#) ; [Active Denial System FAQs](#).

²² A [lecture](#) by Paul Ben-Ishai, PhD at the Israel Institute for Advanced Studies on this finding can be found on the [2017 IIAS Conference website](#). Feldman, Yuri and Paul Ben-Ishai. "[Potential Risks to Human Health Originating from Future Sub-MM Communication Systems.](#)" *Conference on Wireless and Health*, 2017.

²³ Hayut, Itai, Paul Ben Ishai, Aharon J. Agranat and Yuri Feldman. "[Circular polarization induced by the three-dimensional chiral structure of human sweat ducts.](#)" *Physical Review E*, vol. 89, no. 042715, 2014.

Children's skulls are thinner, their heads are smaller, and the radiation penetrates deeper into their brain. Research has found that a child's head's absorption can be over two times greater, and absorption of the skull's bone marrow can be ten times greater, than adults.^{24,25} The American Academy of Pediatrics, which is the largest organization of U.S. pediatricians, has repeatedly [written](#) to the U.S. government documenting children's vulnerabilities and recommends reducing children's and pregnant women's exposure.²⁶

The [California Department of Health](#), the [Connecticut Department of Health](#), many international health [organizations](#) and medical associations, and more than 20 [governments](#) are recommending wireless exposure reduction, especially for children.²⁷

Several countries have allowable public exposure limits lower than ICNIRP levels with limits that are even more protective for kindergartens, schools and hospitals. In addition, some governments' regulatory actions include banning cell phones or removing Wi-Fi and cell towers in or near schools.²⁸ For example:

- Belgium and France have banned the sale of cell phones designed for young children and made it illegal to market cell phones to children less than 14 years of age.
- France has banned cell phones in elementary and middle schools, and playgrounds.²⁹
- The Supreme Court of India upheld the High Court of the State of Rajasthan's decision to remove all cell towers from the vicinity of schools, hospitals and playgrounds because this radiation is "hazardous" and causes cancer, brain tumour, digestive disorder and tachycardia.³⁰
- The Environment Minister of Italy has decreed to reduce as much as possible indoor exposure to both ELF-EMF and RF-EMF.
- Cyprus has banned Wi-Fi from kindergartens and elementary classrooms.
- In Chile, the 2012 "[Antenna Law](#)" prohibits cell antennas/towers in "sensitive areas" such as "educational institutions, nurseries, kindergartens, hospitals, clinics, nursing homes or other institutions of similar nature."³¹

Children will have a lifetime of exposure to wireless radiation; in order to protect their healthy future, public health authorities must limit this exposure as much as possible.

The Public: Not Protected, Not Warned

²⁴ A [lecture](#) by Paul Ben-Ishai, PhD at the Israel Institute for Advanced Studies on this finding can be found on the [2017 IIAS Conference website](#). Feldman, Yuri and Paul Ben-Ishai. "[Potential Risks to Human Health Originating from Future Sub-MM Communication Systems.](#)" *Conference on Wireless and Health*, 2017.

²⁵ Hayut, Itai, Paul Ben Ishai, Aharon J. Agranat and Yuri Feldman. "[Circular polarization induced by the three-dimensional chiral structure of human sweat ducts.](#)" *Physical Review E*, vol. 89, no. 042715, 2014.

²⁶ <https://ehtrust.org/wp-content/uploads/American-Academy-of-Pediatrics-Letters-.pdf>

²⁷ For more on international policy actions, see our [online briefing](#). "[International Policy Briefing: Cautionary Policy on Radiofrequency Radiation Actions by Governments, Health Authorities and Schools Worldwide.](#)" Environmental Health Trust, 2017.

²⁸ See [Database of Worldwide Policies on Cell Phones, Wireless and Health](#), Environmental Health Trust.

²⁹ [« Plus de téléphones portables dans les écoles et collèges à la rentrée 2018 », annonce Jean-Michel Blanquer](#), Le Monde (Dec. 10, 2017).

³⁰ Abhinav Sharma, [Rajasthan HC orders relocation of mobile towers from schools, hospitals](#), Economic Times (Nov. 28, 2012).

³¹ [New communications antenna law in Chile](#), 20 Communications Law: Newsletter of the International Bar Association Legal Practice Division 14-16 (2013).

In the United States, RFR radiation regulatory limits were set by the FCC more than two decades ago in 1996. However the FCC limits are not safety standards. Although the EPA was actively researching this issue and tasked to develop proper safety limits,^{32,33} the EPA was abruptly defunded in 1996 and the FCC adopted guidelines developed by industry-connected non-independent groups.³⁴ Experts from U.S. government agencies (including the EPA and NIOSH) have repeatedly documented issues concerning the inadequacy of these limits but their letters have gone unanswered.^{35,36} The EPA has clarified that the FCC limits do not protect against effects from long-term low-level exposures.³⁷ In 2008, the National Academy of Sciences released a [Report](#) on research needs that included recommending research on the impacts to brain development and exposures to children and pregnant women.³⁸ In 2012, the Government Accountability Office issued a [Report](#) calling for RFR standards to be updated with current research and consideration of today's commonplace exposures from an escalating number of sources.

Moreover, [recent cell phone radiation tests](#) released by the French government found that nine out of ten cell phones exceed regulatory limits for radiofrequency radiation when tested in body contact positions (simulating a phone in pants pocket, bra or resting on chest). Despite this documentation, U.S. radiation limits have still not been revised. To this date, there has been no public record of independent systematic review of the research by any U.S. health agency in order to set proper safety standards. The current outdated regulations are inadequate to protect public health.

Since 1997, insurance companies have refused to insure wireless companies and “[electromagnetic field exclusions](#)” in insurance policies are an industry standard. EMFs are deemed as “high-risk” in insurance [white papers](#), and EMFs are [defined](#) as a “pollutant” by many insurance companies alongside smoke, chemicals and asbestos. Some companies will only cover liability from EMFs under additional “[Pollution Liability](#)” policy enhancement coverage. Some policies not only exclude damages from EMFs but also exclude paying for the defense of “*any supervision, instruction, recommendation, warning or advice given or which should have been given in connection with bodily injury, property damage, abatement and/or mitigation etc.*”

Wireless companies [warn](#) their shareholders—in mandated annual [10k filings](#)—that they may incur financial losses from lawsuits related to EMF radiation emissions of their products. For example:

- AT&T [states](#), “*We may incur significant expenses defending such suits or government charges and may be required to pay amounts or otherwise change our operations in ways that could materially adversely affect our operations or financial results.*”

³² A [lecture](#) by Paul Ben-Ishai, PhD at the Israel Institute for Advanced Studies on this finding can be found on the [2017 IIAS Conference website](#). Feldman, Yuri and Paul Ben-Ishai. “[Potential Risks to Human Health Originating from Future Sub-MM Communication Systems](#).” *Conference on Wireless and Health*, 2017.

³³ Hayut, Itai, Paul Ben Ishai, Aharon J. Agranat and Yuri Feldman. “[Circular polarization induced by the three-dimensional chiral structure of human sweat ducts](#).” *Physical Review E*, vol. 89, no. 042715, 2014.

³⁴ <https://www.fcc.gov/general/fcc-policy-human-exposure#block-menu-block-4>

³⁵ A [lecture](#) by Paul Ben-Ishai, PhD at the Israel Institute for Advanced Studies on this finding can be found on the [2017 IIAS Conference website](#). Feldman, Yuri and Paul Ben-Ishai. “[Potential Risks to Human Health Originating from Future Sub-MM Communication Systems](#).” *Conference on Wireless and Health*, 2017.

³⁶ Hayut, Itai, Paul Ben Ishai, Aharon J. Agranat and Yuri Feldman. “[Circular polarization induced by the three-dimensional chiral structure of human sweat ducts](#).” *Physical Review E*, vol. 89, no. 042715, 2014.

³⁷ <https://ehtrust.org/wp-content/uploads/4c0f61dc30c3d6bb27d90f53a57c616e.pdf>

³⁸

<https://www.nap.edu/catalog/12036/identification-of-research-needs-relating-to-potential-biological-or-adverse-health-effects-of-wireless-communication-devices>

- Crown Castle’s [2016 10-K ANNUAL REPORT](#), states that, *“If radio frequency emissions from wireless handsets or equipment on our wireless infrastructure are demonstrated to cause negative health effects, potential future claims could adversely affect our operations, costs or revenues. The potential connection between radio frequency emissions and certain negative health effects, including some forms of cancer, has been the subject of substantial study by the scientific community in recent years. We cannot guarantee that claims relating to radio frequency emissions will not arise in the future or that the results of such studies will not be adverse to us...If a connection between radio frequency emissions and possible negative health effects were established, our operations, costs, or revenues may be materially and adversely affected. We currently do not maintain any significant insurance with respect to these matters.”*

Most wireless companies—from [AT&T](#) to [Nokia](#) to [T Mobile](#) to [Verizon Wireless](#)—have issued [similar warnings](#) to their shareholders.³⁹ Will the Wisconsin public also be warned of the risk?

Scientists Worldwide: Stop 5G

An increasing number of [experts](#) around the world are calling for a moratorium on 5G—due to the unprecedented threat to public health and the environment—to stop the installation of radiation-emitting equipment placed within meters of homes, playgrounds and schools.

- In 2015, the [International EMF Scientist Appeal](#), now signed by over 225 scientists from 41 nations, urging the development of more protective guidelines for EMF (including RF-EMF), encouraging precautionary measures, and calling for education of the public about health risks, particularly risks to children and fetal development, was submitted to the Secretary-General of the United Nations, the Director-General of the World Health Organization and U.N. Member Nations.⁴⁰
- In June 2017, EMF Scientists submitted [Comments to the U.S. FCC](#), asking the FCC to critically consider the potential impact of the 5th generation wireless infrastructure on the health and safety of the U.S. population before proceeding to deploy this infrastructure.
- In September 2017, I joined over 180 experts from 35 countries who sent a [declaration](#) to the European Union calling for a moratorium on 5G until hazards have been fully investigated by independent scientists, citing potential neurological impacts, infertility and cancer.⁴¹

Wireline networks can satisfy consumer demand for faster speeds and are more cost-effective, energy efficient, safe and reliable in comparison to wireless networks.⁴²

The tobacco and asbestos crises demonstrate that failing to act on public health hazards when they arise can lead to irreversible damage later. EHT thus strongly opposes building out 5G infrastructure—which would place thousands of new sources of microwave radiation emissions in close proximity to workers and families—at least until more testing has been conducted. We join with hundreds of scientific experts from around the world⁴³ to urge that Wisconsin instead support the installation of underground fiber optic cables all the way to premises. We also hope

³⁹ [Corporate Company Investor Warnings In Annual Reports 10k Filings Cell Phone Radiation Risks](#)

⁴⁰ Blank, M., et al. ["International Appeal: Scientists call for protection from non-ionizing electromagnetic field exposure."](#) *European Journal of Oncology*, vol. 20, no. 3/4, 2015, pp. 180-2.

⁴¹ [“Appeal to the European Union: Scientists warn of potential serious health effects of 5G.”](#) 13 September 2017.

⁴² For an in-depth discussion of the benefits of wired infrastructure, see Timothy Schoechele, [Re-Inventing Wires: The Future of Landlines and Networks](#), National Institute for Science, Law and Public Policy (2018).

⁴³ Russell, Cindy. [“A 5G Wireless Future: Will it give us a Smart Nation or Contribute to an Unhealthy One?”](#) Santa Clara Bulletin, Jan./Feb. 2017.

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that you will expand support for research and training in this field so that future decisions can be based on solid information.

Environmental Health Trust scientists are prepared offer you our expertise in next steps to protect the health of the people of Wisconsin. We thank you for your consideration of this issue.

Sincerely,

A handwritten signature in black ink that reads "Devra Davis".

Devra Davis, PhD, MPH
Fellow, American College of Epidemiology
Visiting Prof. Hebrew Univ. Hadassah Medical Center & Ondokuz Mayıs Univ. Medical School
Associate Editor, *Frontiers in Radiation and Health*
President, Environmental Health Trust