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Honorable Umair A. Shah

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Washington State Department of Health P.O. Box 47890  
Olympia, Washington 98504-7890

Dear Secretary of Health, State of Washington Umair A. Shah, MD, MPH ,

Today, we are writing to advise you of the scientific grounds for taking action to mitigate student, teacher, and staff exposures to Wi-Fi and other non-ionizing electromagnetic fields in schools.

Wireless radio frequency (RF) electromagnetic (EMF) radiation and magnetic field/extremely low-frequency electromagnetic fields (ELF-EMF) are a rapidly increasing type of environmental exposure for children, teachers and staff in classrooms.

Current federal regulations for wireless radiation are 25 years old and based on outdated science. On August 13, 2021, the United States Court of Appeals for the District of Columbia Circuit [ruled](#) that the decision by the Federal Communications Commission (FCC) to retain its 1996 wireless radiation safety limits for human exposure to wireless radiation was “arbitrary and capricious.” Specifically, the Court pointed out that the FCC had ignored research showing damage to memory and reproduction, and ignored research finding children more vulnerable to wireless radiation. The Court [ordered](#) the FCC to “address the impacts of RF radiation on children, the health implications of long-term exposure to RF radiation, the ubiquity of wireless devices, and other technological developments that have occurred since the Commission last updated its guidelines.”

The bottom line from this landmark ruling is that no federal agency on record has done a review of the full body of research and U.S. FCC 1996 limits do not rest on a robust review of recent science.

A [recent analysis](#) by the Environmental Working Group concluded that FCC limits should be 200 to 400 times lower than the whole-body exposure limit set by the FCC in 1996, yet school districts nationwide are deploying high capacity Wi-Fi networks in school buildings,

testing out 5G networks with students and signing leases with companies that install cell towers on school property, relying on these outdated FCC limits to ensure safety.

A [substantial body of research](#) has found these types of non-ionizing EMFs associated with numerous adverse effects including [cancer](#), [DNA damage](#), [memory damage](#), [behavioral problems](#), [reproductive damage](#), [tumor promotion](#), [blood-brain barrier damage](#), [increased oxidative stress](#), [impacts to the endocrine system](#), and [brain damage](#). Many of these effects could be irreversible with grave consequences for our children's future.

By eliminating unnecessary sources of non-ionizing radiation on school property, schools can substantially mitigate the risk with lower exposures. A few specific examples of in-school EMF sources are Wi-Fi, wireless networks, chromebooks, laptops, electronics, electrical systems, cordless phones, and cell phones.

We are opposed to the field testing of 5G technology in [schools](#). The wireless industry has long pushed Wi-Fi in schools nationwide and is now proposing expanding 5G into [classrooms](#),<sup>2</sup> [arguing](#)<sup>3</sup> that “augmented reality” and “virtual reality” are “essential tools” in [classrooms](#).<sup>4</sup>

More protective regulations to mitigate, monitor, investigate and educate are moving forward in the U.S. and [internationally](#).<sup>5</sup> In addition, [PTAs](#) and [teacher unions](#) are now responding to the strong recommendations by medical organizations such as the American Academy of Pediatrics by educating and supporting policy and resolutions on minimizing cell tower, cell phone, and wireless radiation in classrooms.

The current body of peer-reviewed published research clearly shows that compliance with outdated 1996 Federal Communications Commission (FCC) regulations regarding human exposure to radio frequency does not ensure the safety of students and staff. Policy action to mitigate risk is needed today.

Both [magnetic field](#) (2002) and [radiofrequency radiation](#) (2011) were classified<sup>6,7</sup> as a Group 2B possible carcinogen by the World Health Organization International Agency for Research on Cancer (IARC). However, since these determinations years ago, the published peer-reviewed [scientific](#) evidence has significantly increased — clearly showing these types of non-ionizing electromagnetic radiation have adverse [effects](#) at emission

[levels governments](#) currently allow.<sup>8,9,10,11</sup> Current published [research](#) has documented that the [evidence](#) is robust to now determine that RF is a proven [human carcinogen](#).<sup>12,13,14</sup>

Numerous [published](#) scientific [reports recommend](#) that the public, especially children and pregnant women, [reduce](#) their [exposure](#) to [non-ionizing](#) electromagnetic [radiation](#) in order to protect their health, including radiation frequencies that range from extremely [low-frequency fields](#) to all wireless and the higher frequencies of 5G.<sup>15,16,17,18,19,20,21,22,23</sup>

Our children are at risk. Research shows that this type of radiation penetrates deeper and more intensely into [children](#) due to their thinner skulls and [unique physiology](#). Furthermore, wireless radiation has been shown to damage brain development and is associated with attention, memory, and behavioral problems.<sup>24</sup> [The American Academy of Pediatrics](#) has repeatedly written to the FCC on the need for an update to the FCC's 1996 wireless exposure regulations because children are more vulnerable to the exposure.<sup>25</sup>

Electromagnetic radiation exposure presents occupational health issues for teachers and staff, which are especially critical for those who are pregnant or have medical conditions. [Yale research](#)<sup>26</sup> found thyroid cancer to be associated with cell phone use in people with genetic susceptibility. Prenatal radio frequency radiation exposure led to higher hyperactivity, poorer memory, and altered brain function [in mice](#).<sup>27</sup> corroborating prior published [research](#) findings of altered brain development after exposure.

Kaiser Permanente researchers have published several studies where pregnant women's exposure to non-ionizing electromagnetic fields was associated with increased [miscarriage](#) as well as increased [ADHD](#), [obesity](#), and [asthma](#) in prenatally exposed children.

Due to the [scientific evidence](#) showing [adverse effects](#) from [wireless](#) and electromagnetic radiation at legally allowed levels,<sup>28,29,30,31,32</sup> we have joined with hundreds of [doctors and scientists](#) calling to [halt 5G](#) and to reduce children's overall wireless and non-ionizing electromagnetic radiation exposure.<sup>33,34</sup> We recommend practical and actionable measures to eliminate and reduce exposures in the school setting.

Safe alternative solutions exist to connect students to the Internet, bridge the digital divide and ensure equal access. Corded connections in classrooms rather than wireless

networks are safer, faster, more secure, and do not pose the serious [liability risks](#) posed by EMFs and RF radiation.

Importantly, 5G and cell antennas should not be installed on or near schools.

Many countries and schools are taking action. More than 20 countries clearly recommend that children reduce cell phone radiation exposure. Cyprus, Belgium, France, and Israel are among the countries banning and restricting Wi-Fi in classrooms, and many private schools [world-wide](#)<sup>35</sup> have started reducing EMF exposures.

[New Hampshire](#)<sup>37</sup> launched an investigation into the health effects of electromagnetic radiation and released its [final report](#) with 15 recommendations, including the recommendation that schools reduce radio frequency radiation and replace Wi-Fi with wired networks in classrooms. In 2020, the New Hampshire State Commission issued its [recommendations](#) which included replacing wireless networks with wired corded Internet connections.

In regards to ELF-EMFs, more than a dozen countries already have some level of protective policy in place with a magnetic field radiation limit for “sensitive areas” that ensures ELF-EMF levels do not exceed levels associated with cancer in research studies. Aside from the California Department of Education [regulation](#) that requires distances between new schools and the edge of a transmission line “right-of-way,” there exists little protection in the U.S. for schools, as there is no federal limit for human exposure to magnetic field electromagnetic fields.

## Recommendations

We recommend these best practices to reduce non-ionizing electromagnetic exposures in schools and colleges:

1. **Install a safe wired ethernet communication and information technology infrastructure in schools to meet educational needs.** Replacing wireless with wired ethernet and installing a corded, not cordless, telephone system will substantially reduce classroom exposures. Just like classrooms, dormitories should

- have wired, not Wi-Fi, connections and corded telephones for students in every room. Security systems, HVAC, and other building infrastructure should be wired.
2. **Purchase computers, laptops, tablets and other devices for classrooms that have the capability to be ethernet connected with wireless transmissions turned off.** In addition, invest in applications that can be pre-downloaded for classroom activities.
  3. **Measure radio frequency, magnetic field, and extremely low-frequency electromagnetic fields in and around school buildings and reduce levels to as low as possible.** Publicly post all results online.
  4. **Ensure school property is not located close to sources of non-ionizing radiation** such as 5G/cell towers, cell network antennas, or electricity substations of high-voltage power lines.
  5. **Promote technological literacy with new educational curriculum on how to reduce exposure to cell phone and other wireless radiation.** Students need to know laptops and tablets should be used on tables, not on laps. Students, teachers, and their families should be given clear information on why and how to reduce exposures to cell phone, wireless and magnetic field EMFs to protect their health.

We are aware that many schools and colleges are opting for virtual and/or hybrid classes. We recommend this as an opportunity to install wired technology while students are away from the buildings. In a world where our health is threatened by a pandemic, we must stop at nothing to mitigate any external health threats facing our youth. This means eliminating in-school sources of radio frequency radiation, providing the necessary equipment for students to connect to online school with wires/cords, and educating students on preventative measures they can take to reduce radiation themselves. Most importantly, however, this means taking steps toward a healthy school environment in which each student thrives.

Our recommendations to reduce radiation exposure during virtual and/or hybrid schooling include:

1. **Ensure that students have the hardware and software to hardwire Internet connections with ethernet** (instead of Wi-Fi or wireless hotspots) for virtual school at home.

2. **Educate students and staff on how to hook up their devices with an ethernet connection.**
3. **Require purchasing departments to order devices that are easily hardwired.**
4. **Educate students and staff on how to reduce EMF exposure** and on the importance of keeping devices off their laps and away from their bodies.

We have attached to this letter the following resources and tools you can use to address these environmental exposures in schools:

- The Collaborative for High Performance Schools (the United States' first green building rating program especially designed for K-12 schools) developed [Best Practices](#) for Low-EMF classrooms in 2014, addressing both wireless and ELF-EMF.<sup>43</sup>
- In 2017, the Maryland State Children's Environmental Health And Protection Advisory Council issued first ever [state recommendations](#) for reducing wireless exposure in schools by providing wired—rather than wireless—Internet connections.
- The New Jersey Education Association article, "[Minimize Health Risks from Wireless Devices](#)"<sup>44</sup> details several recommendations for reducing the health risks posed by wireless technology, such as "Keep devices away from the body" and "hard wire all devices, including printers, projectors and boards." Download [PDF](#).<sup>45</sup>
- "[Guidelines for Safer Use of Wireless Technology in Classrooms](#)" were developed for the New York State United Teachers, who also passed a Resolution "[Hazards of Wireless Radiation Emission](#)."<sup>46,47</sup>
- [The United Educators of San Francisco \(teacher union\) passed a resolution](#) recommending the [California Department of Public Health](#) issue [guidance](#) on how to reduce exposure to cell phone radiation be disseminated to all students and staff.<sup>50,51</sup>
- [Education modules](#) for students on cell phone radiation were developed in partnership with the Massachusetts Breast Cancer Coalition to teach high school and middle schoolers about why and how to reduce radiation from cell phones and wireless devices.<sup>52</sup>
- A [2017 study](#) found the environmental exposure to RF radiation in some schools with Wi-Fi is higher than reported levels for non-thermal biological effects and the researchers recommend schools prefer wired network connections and allow laptop, tablet and mobile phone usage only in flight/airplane mode.

- A [2019 publication](#) in the industry journal *Building and Environment* details best practices in buildings to reduce radio frequency as including wired technology instead of Wi-Fi and including corded (instead of cordless and other wireless mobile) phones.<sup>48</sup>
- Environmental Health Trust has developed a [checklist](#) of actions for schools to reduce EMF.<sup>49</sup>

### The Risk of Inaction is High

Wi-Fi, cell phones, cell towers, 5G in the classroom and cell towers on school property present serious liability issues.

- [Insurers](#) rank 5G and electromagnetic radiation as a “high” risk, comparing the issue to lead and [asbestos](#).<sup>38,39</sup> A 2019 Report by [Swiss Re Institute](#), a world leading provider of insurance,<sup>42</sup> classifies 5G mobile networks as a “high,” “off-the-leash” risk, stating, “Existing concerns regarding potential negative health effects from electromagnetic fields (EMF) are only likely to increase. An uptick in liability claims could be a potential long-term consequence” and “[a]s the biological effects of EMF in general and 5G in particular are still being debated, potential claims for health impairments may come with a long latency.”
- Due to their understanding of the magnitude of this future financial risk, most [insurance plans](#) have “electromagnetic field exclusions” applied as the [market standard](#).<sup>40</sup> [Portland Oregon Public School Insurance](#)<sup>41</sup> (Pg 30) states as an example, “Exclusions: This insurance does not apply to: Bodily injury, personal injury, advertising injury, or property damage arising directly or indirectly out of, resulting from, caused or contributed to by electromagnetic radiation, provided that such loss, cost, or expense results from or is contributed to by the hazardous properties of electromagnetic radiation.”
- U.S. mobile operators have been [unable to get insurance](#) to cover liabilities related to damages from long-term exposure to radio frequency emissions for over a decade.
- Wireless and non-ionizing electromagnetic radiation are defined as a type of “pollution” by wireless companies themselves. According to [pg. 10 of the Verizon Total Mobile Protection Plan](#), “pollution” is defined as “The discharge, dispersal, seepage, migration or escape of pollutants. Pollutants means any solid, liquid, gaseous, or thermal irritant or contaminant including smoke, vapor, soot, fumes,



acid, alkalis, chemicals, artificially produced electric fields, magnetic field, electromagnetic field, sound waves, microwaves, and all artificially produced ionizing or nonionizing radiation and/or waste.” We found similar definitions for pollution in the product protection plans for [AT&T](#), [Sprint](#), [Verizon](#), [T-Mobile](#) and [Asuria](#).

- Wireless companies [warn their shareholders](#) of this potential future risk related to radio frequency radiation exposure but they do not warn the users of these products, nor do they warn the people exposed to emissions from their products and infrastructure. These corporate investor [warnings](#) by companies such as [AT&T](#), [Verizon](#), [Vodafone](#) and [Crown Castle](#) are contained in their Annual Reports filed on Form 10-K (or Form 20-F or 40-F for foreign companies) with the Securities and Exchange Commission (SEC) and they clearly inform shareholders that companies may incur significant financial losses related to electromagnetic fields. Safety is not assured.

As an example, Crown Castle states in its [2020 Annual Report](#), “*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.*”

Leadership regarding wireless radiation is critical to supporting the serious challenges that education and health authorities are facing today.

We write to offer our expertise to support these needed safety measures. Please see the attached resources with additional documentation. We are available to meet with your leadership to present how to reduce and mitigate the risks of radiation exposure. Thank you for your consideration and action on this issue.



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## Scientific References

<sup>1</sup>. Priyanka Bandara, David O Carpenter, [Planetary electromagnetic pollution: it is time to assess its impact](#), The Lancet Planetary Health, Volume 2, Issue 12, 2018, Pages e512-e514, ISSN 2542-5196, [https://doi.org/10.1016/S2542-5196\(18\)30221-3](https://doi.org/10.1016/S2542-5196(18)30221-3). "A recent evaluation of 2266 studies (including in-vitro and in-vivo studies in human, animal, and plant experimental systems and population studies) found that most studies (n=1546, 68.2%) have demonstrated significant biological or health effects associated with exposure to anthropogenic electromagnetic fields." and [The REFLEX project](#) (risk evaluation of potential environmental hazard from low energy electromagnetic field exposure using sensitive *in vitro* methods) funded by the European Union, involving 12 independent research groups 2004 Final Reports found at <https://itis.swiss/assets/Downloads/Papers-Reports/Reports/REFLEXFinal-Report171104.pdf> and Belpomme et al., [Thermal and non-thermal health effects of low intensity non-ionizing radiation: An international perspective](#). Environmental Pollution, Volume 242, Part A, 2018, Pages 643-658, ISSN 0269-7491, <https://doi.org/10.1016/j.envpol.2018.07.019> and Carlberg M, Hardell L., [Evaluation of Mobile Phone and Cordless Phone Use and Glioma Risk Using the Bradford Hill Viewpoints from 1965 on Association or Causation](#). Biomed Res Int. 2017;2017:9218486. doi: 10.1155/2017/9218486. and Belyaev et al., "EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses" Reviews on Environmental Health, vol. 31, no. 3, 2016, pp. 363-397. <https://doi.org/10.1515/reveh-2016-0011> Lai H. Genetic effects of non-ionizing electromagnetic fields, Electromagn Biol Med. 2021 Feb 4:1-10. doi: 10.1080/15368378.2021.1881866. Epub ahead of print. PMID: 33539186. and Pall M., Wi-Fi is an important threat to human health, Environmental Research Volume 164, July 2018, Pages 405-416

<sup>2</sup>. Tate, Emily. "5G for Education Is Finally Here. First Stop? Cleveland." *EdSurge*, 29 Sept. 2019, [www.edsurge.com/news/2019-09-28-5g-for-education-is-finally-here-first-stop-cleveland](http://www.edsurge.com/news/2019-09-28-5g-for-education-is-finally-here-first-stop-cleveland) and Smart Young, Taiia. "A Cleveland School Is the First to Receive Verizon 5G." *3BL Media*, 3BL Media, LLC, 2 Jan. 2020, [www.3blmedia.com/News/Cleveland-School-First-Receive-Verizon-5G](http://www.3blmedia.com/News/Cleveland-School-First-Receive-Verizon-5G)

<sup>3</sup>. Gerst, Matthew B., et al. *COMMENTS OF CTIA CTIA Submits These Comments in Response to the Federal Communications Commission's (Commission's) Notice of Proposed Rulemaking (NPRM) Seeking Comment on the 5G Fund*. CTIA, 25 June 2020,

<https://ecfsapi.fcc.gov/file/106252501924218/200625%20CTIA%205G%20Fund%20Comments.pdf>

4. McNicholas, Sean. "ABC's and 123's: 5G and the Classroom." *CTIA*, 27 Aug. 2019, [www.ctia.org/news/abcs-and-123s-5g-and-the-classroom](http://www.ctia.org/news/abcs-and-123s-5g-and-the-classroom)

5. "What's Happening Internationally." *Environmental Health Trust*, 29 June 2020, [ehtrust.org/policy/international-policy-actions-on-wireless](http://ehtrust.org/policy/international-policy-actions-on-wireless)

6. International Agency for Research on Cancer, et al. *Non-Ionizing Radiation, Part 2: Radiofrequency Electromagnetic Fields* Vol. 80, Amsterdam-Netherlands, Netherlands, Amsterdam University Press, 2002.

7. Baan, Robert, et al. "[Carcinogenicity of Radiofrequency Electromagnetic Fields.](#)" *The Lancet Oncology*, vol. 12, no. 7, 2011, pp. 624–26. *Crossref*, doi:10.1016/s1470-2045(11)70147-4.

8. Yakymenko, Igor, et al. "[Oxidative Mechanisms of Biological Activity of Low-Intensity Radiofrequency Radiation.](#)" *Electromagnetic Biology and Medicine*, vol. 35, no. 2, 2015, pp. 186–202. *Crossref*, doi:10.3109/15368378.2015.1043557.

9. Bandara, Priyanka, and David O. Carpenter. "[Planetary Electromagnetic Pollution: It Is Time to Assess Its Impact.](#)" *The Lancet Planetary Health*, vol. 2, no. 12, 2018, pp. e512–14. *Crossref*, doi:10.1016/s2542-5196(18)30221-3.

10. Clegg, Frank M., et al. "[Building Science and Radiofrequency Radiation: What Makes Smart and Healthy Buildings.](#)" *Building and Environment*, vol. 176, 2020, p. 106324. *Crossref*, doi:10.1016/j.buildenv.2019.106324.

11. Carles, Camille, et al. "[Residential proximity to power lines and risk of brain tumor in the general population.](#)" *Environmental Research*, vol. 185, 2020, p. 109473. *Crossref*, doi:10.1016/j.envres.2020.109473.

12. Carlberg, Michael, and Lennart Hardell. "[Evaluation of Mobile Phone and Cordless Phone Use and Glioma Risk Using the Bradford Hill Viewpoints from 1965 on Association or Causation.](#)" *BioMed Research International*, vol. 2017, 2017, pp. 1–17. *Crossref*, doi:10.1155/2017/9218486.

13. Peleg, Michael, et al. [“Radio Frequency Radiation-Related Cancer: Assessing Causation in the Occupational/Military Setting.”](#) *Environmental Research*, vol. 163, 2018, pp. 123–33. *Crossref*, doi:10.1016/j.envres.2018.01.003.
14. Miller, Anthony B., L. Lloyd Morgan, et al. [“Cancer Epidemiology Update. Following the 2011 IARC Evaluation of Radiofrequency Electromagnetic Fields \(Monograph 102\).”](#) *Environmental Research*, vol. 167, 2018, pp. 673–83. *Crossref*, doi:10.1016/j.envres.2018.06.043.
15. Russell, Cindy L. [“5 G Wireless Telecommunications Expansion: Public Health and Environmental Implications.”](#) *Environmental Research*, vol. 165, 2018, pp. 484–95. *Crossref*, doi:10.1016/j.envres.2018.01.016.
16. Belpomme, Dominique, et al. [“Thermal and non-thermal health effects of low intensity non-ionizing radiation: An international perspective.”](#) *Environmental Pollution*, vol. 242, 2018, pp. 643–58. *Crossref*, doi:10.1016/j.envpol.2018.07.019.
17. Roda, Claudia, and Susan Perry. [“Mobile phone infrastructure regulation in Europe: Scientific challenges and human rights protection.”](#) *Environmental Science & Policy*, vol. 37, 2014, pp. 204–14. *Crossref*, doi:10.1016/j.envsci.2013.09.009.
18. Miller, Anthony B., Margaret E. Sears, et al. [“Risks to health and well-being from radio-frequency radiation emitted by cell phones and other wireless devices.”](#) *Frontiers in Public Health*, vol. 7, 2019. *Crossref*, doi:10.3389/fpubh.2019.00223.
19. Lissak, Gadi. [Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study](#) *Environmental Research*, vol. 164, 2018, pp. 149–57. *Crossref*, doi:10.1016/j.envres.2018.01.015.
20. Hedendahl, Lena K., et al. [“Measurements of Radiofrequency Radiation with a body-borne exposimeter in Swedish schools with Wi-Fi.”](#) *Frontiers in Public Health*, vol. 5, 2017. *Crossref*, doi:10.3389/fpubh.2017.00279.
21. Kostoff, Ronald N., et al. [“Adverse health effects of 5G mobile networking technology under real-life conditions.”](#) *Toxicology Letters*, vol. 323, 2020, pp. 35–40. *Crossref*, doi:10.1016/j.toxlet.2020.01.020.
22. Siervo, Beatrice, et al. [“Numerical evaluation of human exposure to WiMax patch antenna in tablet or laptop.”](#) *Bioelectromagnetics*, vol. 39, no. 5, 2018, pp. 414–22. *Crossref*, doi:10.1002/bem.22128.

- <sup>23</sup>. Park, JinKyung, et al. [“Extremely Low-Frequency Magnetic Fields Exposure Measurement during Lessons in Elementary Schools.”](#) *International Journal of Environmental Research and Public Health*, vol. 17, no. 15, 2020, p. 5284. Crossref, doi:10.3390/ijerph17155284.
- <sup>24</sup>. Adejoke Olukayode Obajuluwa, Ayodele Jacob Akinyemi, Olakunle Bamikole Afolabi, Khalid Adekoya, Joseph Olurotimi Sanya, Azeez Olakunle Ishola, [Exposure to radio-frequency electromagnetic waves alters acetylcholinesterase gene expression, exploratory and motor coordination-linked behaviour in male rats](#). *Toxicology Reports*, Volume 4, 2017, Pages 530-534, ISSN 2214-7500 and Ibitayo, A., Afolabi, O., Akinyemi, A., Ojiezeh, T., Adekoya, K. and Ojewunmi, O., 2017. [RAPD Profiling, DNA Fragmentation, and Histomorphometric Examination in Brains of Wistar Rats Exposed to Indoor 2.5 Ghz Wi-Fi Devices Radiation](#). *BioMed Research International*, 2017, pp.1-6. And Li ZQ et al., [Testing of behavioral and cognitive development in rats after prenatal exposure to 1800 and 2400 MHz radiofrequency fields](#). *J Radiat Res*. 2020 Mar 23;61(2):197-206 and 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 and Kishore, GK, Venkateshu, KV, Sridevi, NS. [Effect of 1800-2100 MHz electromagnetic radiation on learning-memory and hippocampal morphology in Swiss albino mice](#). *J Clinical and Diagnostic Research*. 13(2); Feb 2019. DOI: 10.7860/JCDR/2019/39681.12630 and Odaci E, O. Bas and S. Kaplan. [Effects of prenatal exposure to a 900 megahertz electromagnetic field on the dentate gyrus of rats: a stereological and histopathological study](#). *Brain Research*, no. 1238, 2008, 224–9 and Bas O, et al. [Chronic prenatal exposure to the 900 megahertz electromagnetic field induces pyramidal cell loss in the hippocampus of newborn rats](#). *Toxicology and Industrial Health*, vol. 25, 2009, pp. 377–84 and Aldad, Tamir 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 and Foerster M., Thielens A., Joseph W., Eeftens M., Rössli M. (2018) [A prospective cohort study of adolescents’ memory performance and individual brain dose of microwave radiation from wireless communication](#). *Environmental Health Perspectives* and Sonmez, O.F., et al. [“Purkinje cell number decreases in the adult female rat cerebellum following exposure to 900 MHz electromagnetic field.”](#) *Brain Research*, no. 1356, 2010, pp. 95-101.
- <sup>25</sup>. McInerny, Thomas K. et al. Letter to Representative David Kusinich. [American Academy of Pediatrics Letters](#), 7 April 2020 and Fernández, C., et al. [“Absorption of wireless radiation in the child versus adult brain and eye from cell phone conversation or virtual reality,”](#) *Environmental Research*, vol. 167, 2018, pp. 694–99. Crossref, doi:10.1016/j.envres.2018.05.013.

- <sup>26</sup>. Luo, Jiajun, et al. [“Genetic susceptibility may modify the association between cell phone use and thyroid cancer: A population-based case-control study in Connecticut.”](#) *Environmental Research*, vol. 182, 2020, p. 109013. *Crossref*, doi:10.1016/j.envres.2019.109013.
- <sup>27</sup>. Peart, Karen N. [“Cell phone use in pregnancy may cause behavioral disorders in offspring.”](#) *YaleNews*, 15 Mar. 2012,
- <sup>28</sup>. Avendaño, Conrado, et al. [“Use of laptop computers connected to internet through Wi-Fi decreases human sperm motility and increases sperm DNA fragmentation.”](#) *Fertility and Sterility*, vol. 97, no. 1, 2012, pp. 39-45.e2. *Crossref*, doi:10.1016/j.fertnstert.2011.10.012.
- <sup>29</sup>. Adams, Jessica A., et al. [“Effect of mobile telephones on sperm quality: A systematic review and meta-analysis.”](#) *Environment International*, vol. 70, 2014, pp. 106–12. *Crossref*, doi:10.1016/j.envint.2014.04.015.
- <sup>30</sup>. Kostoff Ronald N., and Clifford G.Y. Lau. [“Modified health effects of non-ionizing electromagnetic radiation combined with other agents reported in the biomedical literature.”](#) *Microwave Effects On DNA And Proteins*, edited by Chris D. Geddes, 2017, pp. 97-157,
- <sup>31</sup>. Belpomme, Dominique, et al. [“Thermal and non-thermal health effects of low intensity non-ionizing radiation: An international perspective.”](#) *Environmental Pollution*, vol. 242, 2018, pp. 643–58. *Crossref*, doi:10.1016/j.envpol.2018.07.019.
- <sup>32</sup>. Pall, Martin L. [“Wi-Fi is an important threat to human health.”](#) *Environmental Research*, vol. 164, 2018, pp. 405–16. *Crossref*, doi:10.1016/j.envres.2018.01.035.
- <sup>33</sup>. Kelley, Elizabeth, et al. [“International Appeal: Scientists call for protection from non-ionizing electromagnetic field exposure.”](#) *European Journal Of Oncology* vol. 20, 2015, pp. 180-182.
- <sup>34</sup>. [5G Appeal to the European Union](#) (414 Scientists as of January 2020) and Kostoff, Ronald N., et al. [“Adverse health effects of 5G mobile networking technology under real-life conditions.”](#) *Toxicology Letters*, vol. 323, 2020, pp. 35–40. *Crossref*, doi:10.1016/j.toxlet.2020.01.020 and Frank JW, [Electromagnetic fields, 5G and health: what about the precautionary principle?](#) *J Epidemiol Community Health* Published Online First: 19 January 2021. doi: 10.1136/jech-2019-213595 and [2020 Consensus Statement of UK and International Medical and Scientific Experts](#) and [5G Appeal to the European Union](#) and The Cyprus Medical Association, the Vienna Austrian Medical Chamber and the



Cyprus National Committee on Environment and Children's Health released the [2017 Nicosia Declaration](#). See a full list at <https://ehtrust.org/science/medical-doctors-consensus-statements-recommendations-cell-phones-wireless/>

<sup>35.</sup> [Schools Worldwide Removing the Wi-Fi and Reducing Exposure,](#) *Environmental Health Trust*, 17 May 2017, [ehtrust.org/schools-worldwide-removing-wifi-reducing-exposure](https://ehtrust.org/schools-worldwide-removing-wifi-reducing-exposure).

<sup>36.</sup> Oregon State Legislature, [SB283 2019 Regular Session,](#) *Oregon Legislative Information System*, accessed July 1, 2020, <https://olis.leg.state.or.us/liz/2019R1/Measures/Overview/SB283>.

<sup>37.</sup> State of New Hampshire General Court. [Final Report of the Commission to Study the Environmental & Health Effects of Evolving 5G Technology.](#) 1 November 2020, <http://www.gencourt.state.nh.us/statstudcomm/committees/1474/reports/5G%20final%20report.pdf>

<sup>38.</sup> ["White paper explores risks that could become 'the next asbestos.'"](#) *Business Insurance*, 17 May 2011

<sup>39.</sup> ["Electromagnetic Fields: More than Just an Eye Sore."](#) Willis, March 2012.

<sup>40.</sup> ["Electromagnetic Fields \(Utilities\) Liability Insurance,"](#) *CompleteMarkets*, [completemarkets.com/Electromagnetic-Fields-Utilities-Liability-Insurance/Storefronts](https://completemarkets.com/Electromagnetic-Fields-Utilities-Liability-Insurance/Storefronts). Accessed 1 July 2020.

<sup>41.</sup> [THE SCHOOL POLICY®](#) Genesis Insurance Company, 2014, <https://ehtrust.org/wp-content/uploads/Portland-Public-School-2017-18-Excess-Liability0D0A-policy-1.pdf>.

<sup>42.</sup> [New Emerging Risk Insights](#), Swiss Re Institute, May 2019, <https://ehtrust.org/wp-content/uploads/Swiss-Re-SONAR-Publication-2019-excerpt-1.pdf>.

<sup>43.</sup> [Low-EMF Best Practices](#), The Collaborative for High Performance Schools, 2014, [https://ehtrust.org/wp-content/uploads/2015/12/US-CHPS\\_Criteria\\_2014\\_Low-EMF-Criteria102314.pdf](https://ehtrust.org/wp-content/uploads/2015/12/US-CHPS_Criteria_2014_Low-EMF-Criteria102314.pdf).

<sup>44.</sup> Markowitz, Adrienne, and Eileen Senn. "Minimize Health Risks from Electronic Devices." *New Jersey Education Association*, 2 Sept. 2016, [www.njea.org/minimize-health-risks-from-electronic-devices](http://www.njea.org/minimize-health-risks-from-electronic-devices).

<sup>45</sup>. Markowitz, Adrienne, and Eileen Senn. ["Minimize Health Risks from Electronic Devices."](#) 2 Sept. 2016

<sup>46</sup>. "Health and Safety Webinars." *New York State United Teachers*, 2016, [www.nysut.org/resources/special-resources/sites/workplace-health-and-safety/webinars](http://www.nysut.org/resources/special-resources/sites/workplace-health-and-safety/webinars)

<sup>47</sup>. Ibid.

<sup>48</sup>. Hedendahl, Lena K., et al. ["Measurements of Radiofrequency Radiation with a body-borne exposimeter in Swedish schools with Wi-Fi."](#) *Frontiers in Public Health* 5 (2017): 279 and Clegg, Frank M., et al. ["Building Science and Radiofrequency Radiation: What Makes Smart and Healthy Buildings."](#) *Building and Environment*, vol. 176, 2020, p. 106324. *Crossref*, doi:10.1016/j.buildenv.2019.106324

<sup>49</sup>. [Checklist on How to Reduce EMF and Wireless Radiation for Schools,](#) Environmental Health Trust, accessed September 11, 2020,

<sup>50</sup>. ["CDPH Issues Guidelines on How to Reduce Exposure to Radio Frequency Energy from Cell Phones,"](#) California Department of Public Health, December 13, 2017, <https://www.cdph.ca.gov/Programs/OPA/Pages/NR17-086.aspx>

<sup>51</sup>. ["How to Reduce Exposure to Radio Frequency Energy from Cell Phones,"](#) California Department of Public Health, accessed July 1, 2020, <https://www.cdph.ca.gov/Programs/CCDC/DEOD/CEID/CEID%20Document%20Library/Cell-Phone-Guidance.pdf>

<sup>52</sup>. ["Let's Talk Prevention: Actions You Can Take Classroom Modules,"](#) Massachusetts Breast Cancer Coalition, accessed July 1, 2020.