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Hon'ble Mr. Justice Sharad Arvind Bobde
Supreme Court of India
Tilak Marg, Mandi House
New Delhi, Delhi 110001
India

RE: Environmental and Human Health Effects of 5G

Dear Hon'ble Mr. Justice Sharad Arvind Bobde,

As a nonprofit research and policy organization dedicated to identifying and reducing environmental health hazards, Environmental Health Trust (EHT) writes to advise you of serious scientific concerns and reservations about the proposed widespread roll-out grounds of 5G. For the new 5G system to work, it would use existing and additional 3G and 4G wireless network emitters plus add thousands of new and often large cellular network antennas sited in neighborhoods within meters of homes and bedrooms to connect the Internet of Things (IoT) with 5G technology, utilizing various wireless frequencies (low, mid, and high bands). As our experiences with tobacco and asbestos demonstrate, the consequences are grave when governments fail to act to restrict and reduce environmental pollutants associated with harmful effects in experimental research. Consistent with public health concepts of preventing harm by reducing exposure to suspected and known carcinogens, EHT opposes placing wireless antennas on city utility poles, streetlights, and in close proximity to city workers, children, and families.

Governments are halting 5G until their health authorities have reviewed the state of science and impacts to environmental and human health. More than 150 cities in Italy and a growing number of cities around the world have passed resolutions halting 5G until safety can be assured.¹

Published peer-reviewed science already indicates that the current wireless technologies of 2G, 3G, and 4G – in use today with our cell phones, computers, and wearable tech – send and receive

¹ Environmental Health Trust, [INTERNATIONAL ACTIONS TO HALT & DELAY 5G](#)

radiofrequency electromagnetic fields (RF-EMF) that clearly are wireless exposures that pose a serious health risk to humans, animals, and the environment. Human health effects associated with wireless exposures include impaired reproduction, increased incidence of brain cancer, DNA breaks, oxidative stress, immune dysfunction, altered brain development, sleep changes, headache, hyperactivity, and memory and cognitive problems.² Since the World Health Organization (WHO)/International Agency for Research on Cancer (IARC) [classified RF-EMF as a Group 2B Possible Carcinogen](#) in 2011, the peer-reviewed research connecting wireless exposure to cancer has significantly strengthened and several experts who have worked with the WHO/IARC conclude that the weight of current peer-reviewed evidence supports the conclusion that radiofrequency radiation should be regarded as a known human carcinogen.^{3,4,5} Children's skulls are thinner, their heads are smaller, and the radiation penetrates deeper into their brain. Even more importantly, children's brains are rapidly developing and thus prenatal and childhood exposures to radiofrequency radiation will have a more detrimental impact.

Scientists are cautioning that before rolling out 5G, research on human health effects urgently must be done to ensure the public and environment are protected. In September 2017, I joined more than 180 experts who sent a [declaration](#) to the European Union calling for a moratorium on 5G expansion citing potential neurological impacts, infertility, and cancer.⁶ The [Declaration](#) states, "We, the undersigned, more than 180 scientists and doctors from 35 nations, recommend a moratorium on the roll-out of the fifth generation, 5G, for telecommunication until potential hazards for human health and the environment have been fully investigated by scientists independent from industry." This Appeal has now been [signed](#) onto by more than 269 scientists and medical doctors.

Insurance Authorities Rank 5G, Wireless, and Electromagnetic Radiation as a "High Risk"

A [2019 Report by Swiss Re](#)⁷ considers the risks so great to the insurance industry that it advises against writing any policies to cover damages that might arise. "Off the leash – 5G mobile networks" are deemed a "High Impact" emerging risk.

² 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.

³ 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.

⁴ 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.

⁵ 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.

⁶ "[Appeal to the European Union: Scientists warn of potential serious health effects of 5G.](#)" 13 September 2017.

⁷ Sustainability, Emerging and Political Risk Management, Swiss Re Institute, Strategy Development & Performance Management, [Swiss Re SONAR – New emerging risk insights](#), May 2019.

- “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.”
- “Moreover, hackers can also exploit 5G speed and volume, meaning that more data can be stolen much quicker. A large-scale breakthrough of autonomous cars and other IoT applications will mean that security features need to be enhanced at the same pace. Without, interruption and subversion of the 5G platform could trigger catastrophic, cumulative damage. ...”
- “As 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.”

A Business Insurance analysis entitled, [“The Next Asbestos: Five emerging risks that could shift the liability landscape”](#) examined mass tort exposures that may have the potential to cause major difficulties for commercial policyholders and their insurers, and it includes includes workers’ overexposure to radiofrequency waves generated and emitted by rooftop wireless transmitters. The analysis also states, “research, meanwhile, also has shown biological effects from lower-level “nonthermal” exposure, and people exposed at lower levels have reported headache, dizziness, nausea, mood disorders, mental slowing and memory loss.” Several reports by the Austrian Accident Insurance Institute^{8,9} have investigated and documented nonthermal effects.

Telecommunications Companies Warn Their Shareholders

In fact, a number of corporations already advise their shareholders that they could face serious financial risks from the health damages due to RF. For instance, Crown Castle’s [2019 10-K ANNUAL REPORT](#) states that,

If radio frequency emissions from wireless handsets or equipment on our communications 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

⁸ 2011 Austrian Accident Insurance Institute (AUVA) ATHEM Report 1 [“Investigation of athermal effects of electromagnetic fields in mobile radio areas.”](#)

⁹ 2016 Austrian Accident Insurance Institute (AUVA) ATHEM Report 2 [“Investigation of athermal effects of electromagnetic fields in mobile communications.”](#)

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. Why are shareholders being warned but not the people living near the equipment? These disclosures show that even corporations cannot assure safety.

Due to these evaluations and the published scientific evidence, cell phone manufacturers cannot insure against health damages from the radiofrequency radiation emitted by their products and networks. In fact, most insurance plans do not cover electromagnetic fields (EMF) and have very clear “electromagnetic field exclusions.” In order for insurance companies to cover EMF, one often must purchase additional “[Pollution Liability](#)” or “Policy Enhancement” coverage.

According to CFC Underwriting LTD in London, the UK agent for Lloyd’s:

The Electromagnetic Fields Exclusion (Exclusion 32) is a General Insurance Exclusion and is applied across the market as standard. The purpose of the exclusion is to exclude cover for illnesses caused by continuous long-term non-ionising radiation exposure i.e. through mobile phone usage.

Even [AT&T Mobile Insurance](#) excludes loss from “pollutants” and its policy defines “Pollutants” as “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 non-ionizing radiation and waste,” ([pg. 4\) AT &T Mobile Insurance Policy, February 2014](#).

If insurance companies will not insure EMF and if even telecommunications companies consider EMF is a “pollutant,” how can governments allow such an environmental pollutant without also warning their citizens as companies do?

5G Will Increase RF Exposures to the Public and Exposures Cannot Be Accurately Measured

A 2019 European Parliament Report “[5G Deployment: State of Play in Europe, USA, and Asia](#)”¹⁰ confirms increased exposure from the 5G/4G Densification stating, “increased exposure may result not only from the use of much higher frequencies in 5G but also from the potential for the aggregation of different signals, their dynamic nature, and the complex interference effects that may result, especially in dense urban areas.” The report points out that it currently “is not possible to accurately simulate or measure 5G emissions in the real world,” stating,

[T]he 5G radio emission fields are quite different to those of previous generations because of their complex beamformed transmissions in both directions – from base station to handset and for the return. Although fields are highly focused by beams, they vary rapidly with time and movement and so are unpredictable, as the signal levels and patterns interact as a closed loop system. This has yet to be mapped reliably for real situations, outside the laboratory.

A 2020 [European Parliament Briefing on 5G](#)¹¹ references the scientific research and scientific appeals to the United Nations to halt the 5G rollout and also references research finding that “it is not currently possible to accurately simulate or measure 5G emissions in the real world.”

How can 5G technology – a known pollutant – be rolled out when we are not even able to fully measure the exposure?

“[5G wireless telecommunications expansion: Public health and environmental implications](#),” a research review published in *Environmental Research*, documents the range of adverse effects reported in the published literature – from cancer to bacteria growth changes to DNA damage – and concludes that “a moratorium on the deployment of 5G is warranted” and “the addition of this added high frequency 5G radiation to an already complex mix of lower frequencies, will contribute to a negative public health outcome both from both physical and mental health perspectives.”¹²

¹⁰ BLACKMAN, C. and FORGE, S. (2019). *5G Deployment State of Play in Europe, USA and Asia*. [PDF] European Parliament's Committee on Industry, Research and Energy. Available at: [https://www.europarl.europa.eu/RegData/etudes/IDAN/2019/631060/IPOL_IDA\(2019\)631060_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2019/631060/IPOL_IDA(2019)631060_EN.pdf) [Accessed 24 Feb. 2020].

¹¹ Karaboytcheva, M. (2020). *Effects of 5G wireless communication on human health*. [ebook] EPRS | European Parliamentary Research Service. Available at: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/646172/EPRS_BRI\(2020\)646172_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/646172/EPRS_BRI(2020)646172_EN.pdf) [Accessed 24 Feb. 2020].

¹² Russell, C. L. (2018). 5 G wireless telecommunications expansion: Public health and environmental implications. *Environmental Research*, 165, 484–495. <https://doi.org/10.1016/J.ENVRES.2018.01.016>

A study published in *Electromagnetic Biology and Medicine*, “[Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base station](#),” compared people living close and far from cellular network antennas and found that people living closer to the antennas had higher radiation levels in their homes and several significant changes in their blood predictive of cancer development.”¹³

Another published review “[Towards 5G communication systems: Are there health implications?](#)” cites research that shows higher frequencies can “alter gene expression, promote cellular proliferation and synthesis of proteins linked with oxidative stress, inflammatory and metabolic processes, could generate ocular damages, affect neuro-muscular dynamics,” concluding that “available findings seem sufficient to demonstrate the existence of biomedical effects, to invoke the precautionary principle.”¹⁴

“[A review of the ecological effects of RF-EMF](#)”¹⁵ reviewed 113 studies finding RF-EMF had a significant effect on birds, insects, other vertebrates, other organisms, and plants in 70% of the studies. Development and reproduction in birds and insects were the most strongly affected. As an example of the several studies on wildlife impacts, a [study](#)¹⁶ focusing on RF from antennas found increased sperm abnormalities in mice exposed to RF from GSM antennas.

Studies on bees have found behavioral effects^{17,18}, disrupted navigation^{19,20,21}, decreasing egg laying rate²² and reduced colony strength.^{23,24}

¹³ Zothansiam, Mary Zosangzuali, Miriam Lalramdinpuui & Ganesh Chandra Jagetia (2017) Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations, *Electromagnetic Biology and Medicine*, 36:3, 295-305, DOI: [10.1080/15368378.2017.1350584](https://doi.org/10.1080/15368378.2017.1350584)

¹⁴ Di Ciaula, A. (2018). Towards 5G communication systems: Are there health implications? *International Journal of Hygiene and Environmental Health*, 221(3), 367–375. <https://doi.org/10.1016/j.ijheh.2018.01.011>

¹⁵ Cucurachi, S., Tamis, W. L. M., Vijver, M. G., Peijnenburg, W. J. G. M., Bolte, J. F. B., & de Snoo, G. R. (2013). A review of the ecological effects of radiofrequency electromagnetic fields (RF-EMF). *Environment International*, 51, 116–140. <https://doi.org/10.1016/j.envint.2012.10.009>

¹⁶ Otitoloju, A.A., Obe, I.A., Adewale, O.A. et al. *Bull Environ Contam Toxicol* (2010) 84: 51. <https://doi.org/10.1007/s00128-009-9894-2>

¹⁷ Kumar, N. R., Sangwan, S., & Badotra, P. (2011). Exposure to cell phone radiations produces biochemical changes in worker honey bees. *Toxicology international*, 18(1), 70–72. [doi:10.4103/0971-6580.75869](https://doi.org/10.4103/0971-6580.75869).

¹⁸ Favre, D. (2011). Mobile phone-induced honeybee worker piping. *Apidologie*, 42(3), 270–279. <https://doi.org/10.1007/s13592-011-0016-x>.

¹⁹ Andrew Goldsworthy BSc PhD, Letter - [The Birds, the Bees and Electromagnetic Pollution](#), May 2009.

²⁰ Sainudeen Sahib.S, [Electromagnetic Radiation \(EMR\) Clashes with Honey Bees](#), INTERNATIONAL JOURNAL OF ENVIRONMENTAL SCIENCES, Volume 1, No 5, 2011, Research article ISSN 0976–4402.

²¹ Kimmel et al., [Electromagnetic Radiation: Influences on Honeybees \(Apis mellifera\)](#), 2007.

²² Sharma, vp, & Kumar, N. R. (2010). [Changes in honey bee behaviour and biology under the influence of cell phone radiations](#). *Current Science*, 98, 1376–1378.

²³ Sharma, vp, & Kumar, N. R. (2010). [Changes in honey bee behaviour and biology under the influence of cell phone radiations](#). *Current Science*, 98, 1376–1378.

²⁴ Harst et al., [Can Electromagnetic Exposure Cause a Change in Behaviour? Studying Possible Non-Thermal Influences on Honey Bees – An Approach within the Framework of Educational Informatics](#), 2006.

Research has also found a high level of damage to trees from antenna radiation. For example, a field monitoring study – spanning 9 years of exposures to 2G, 3G and 4G involving more than 100 trees²⁵ – found trees sustained more damage on the side of the tree facing the antenna. This is only a small sampling of the research studies that are published.

Policy which fast tracks the ability to deploy 5G technology will ensure the widespread exposure of millions to a physical agent that growing numbers of scientists and nations consider a serious health threat. The scientific evidence currently available indicates we should be drastically reducing, rather than increasing, our daily wireless exposures.

In light of the growing demonstrations of the biological impact of RF,²⁶ it is imperative that new infrastructure and 5G not be widely introduced into commerce at this time. The country needs to critically consider the impact of unprecedented increased wireless exposures to the population, insist on technological safeguards, and commit to fiberoptic cables (rather than to increased wireless radiation) as a means of improving connectivity.

Before releasing new untested 5G wireless technology into the environment, and before increasing the levels of wireless through 4G densification, it is necessary to:

- model exposures to infants, children, and pregnant women;
- conduct experimental tests on exposures' impacts on wildlife;
- evaluate impacts on human systems through *in vitro* and *in vivo* toxicology; and
- compare all of these with converting to fiberoptic cables wherever possible, i.e., institutions such as schools and hospitals that can hardwire technology networks in the building²⁷.

The assumption that all wireless technology is safe has been shown to be incorrect. We join with hundreds of scientific experts from around the world to urge that your country move forward to support fiberoptic and other safer technology instead of wireless 5th generation which has been shown in a wide range of research studies to be harmful to human health and the environment.

²⁵ Waldmann-Selsam, C., Balmori-de la Puente, A., Breunig, H., & Balmori, A. (2016). Radiofrequency radiation injures trees around mobile phone base stations. *Science of The Total Environment*, 572, 554–569. <https://doi.org/10.1016/J.SCITOTENV.2016.08.045>.

²⁶ 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.

²⁷ Frank M.Clegg, MargaretSears, Margaret Friesen, Theodora Scarato, Rob Metzinger, Cindy Lee Russell, Alex Stadtner, Anthony B.Miller, [Building Science and Radiofrequency Radiation: What makes smart and healthy buildings](#), Building and Environment, August 6, 2019

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EHT strongly opposes the widespread installation of new wireless antennas and 5G infrastructure.

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

Attachments

Ronald N. Kostoff, Paul Heroux, Michael Aschner, Aristides Tsatsakis, [Adverse health effects of 5G mobile networking technology under real-life conditions](#), Toxicology Letters, Volume 323, 2020, Pages 35-40,

Miller, Anthony B., Margaret E. Sears, L. Lloyd Morgan, Devra L. Davis, Lennart Hardell, Mark Oremus, and Colin L. Soskolne. "[Risks to Health and Well-Being From Radio-Frequency Radiation Emitted by Cell Phones and Other Wireless Devices](#)." Frontiers in Public Health 7 (2019): 223.

Thielens, A., Bell, D., Mortimore, D.B. *et al.* [Exposure of Insects to Radio-Frequency Electromagnetic Fields from 2 to 120 GHz](#). *Sci Rep*8, 3924 (2018). <https://doi.org/10.1038/s41598-018-22271-3>