

To: Dr. Tedros Adhanom Ghebreyesus,
Director-General of the World Health Organization (WHO)

International Public call for Protection from Non-ionizing Electromagnetic Field (EMF) Exposure

We write as experts in bioelectromagnetics with grave concerns about the public health and environmental impacts of exponentially increasing use of wireless radiating devices relying on radiofrequency (RF) and extremely low frequency (ELF) electromagnetic field (EMF) throughout the world today. As the authors of more than a thousand relevant peer-reviewed publications on this topic and concerned citizens, we urge the WHO to convene an independent global Commission on wireless radiation and health, and recommend biologically-based EMF exposure limits.

The safety standards used for personal wireless devices such as smart telephones were originally formulated back in 1970's before the advent of personal wireless devices when less than 0.1% of the civilian population lived close to RF transmitters of that period such as broadcast and TV antennas. Use of RF-radiating antennas on or close to an individual's body came decades later with the development of the mobile telephones in 1990's.

Today in the U.S., Australia, and much of the world, there are more phone numbers than people and over 90% of the world population is regularly exposed to unmeasured levels of RF radiation close to the body. For the first time in human history the rapidly developing brains of young children are irradiated on a regular basis for many hours a day. This exposure to RF radiation is likely to increase even further when the space-based internet from low orbit satellites is completely rolled out in the next 2-3 years.

Even though important consideration was originally given to all likely users of EMF including children, women and smaller adults in 1970s [1], safety compliance testing of new wireless devices has now been focused on models of large male adults using a head size of army recruits of weight 100 kg to determine the coupled electromagnetic energy. Several reports in the peer-reviewed scientific literature have shown a considerably higher incidence of coupled electromagnetic energy (EME) being deposited in the brains of children, smaller adults and women because of a closer placement of the cell phone radiating antenna to the brain [2,3] for these users.

Lastly, several long-term exposure studies conducted with laboratory animals have shown higher rates of cancer, DNA and other organ damage for EMF-exposed animals as compared to those that were not exposed [4-6].

Many expert scientists around the world have done research documenting significant biological and environmental effects of these man-made electromagnetic signals that can lead to pathological consequences and other diseases. These diseases include cancer and other risks that have been described in many reports [see publications a - g below] ; also additional reports such

as the Bioinitiative Report, the REFLEX Project Report, the Interphone Project Report, the National Toxicology Program (NTP) Report [5,6], the Ramazzini Report, as well as results in high quality studies by scientists without conflicts of interest [7] . These effects can occur at levels well below the existing recommended RF-EMF exposure limits recommended by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and endorsed by the WHO EMF project to avoid acute short-term heating. Several expert organizations have recently documented the fact that the ICNIRP constitutes a self-appointed, self-monitored group that only represents a minority scientific viewpoint.

Most recently, an expert panel advising the Swiss government concluded that low levels of EMF cause serious health problems, especially for children, the elderly, and those with existing diseases (<https://ehtrust.org/wp-content/uploads/Newsletter-BERENIS-Special-Issue-January-2021-1.pdf>). Following the outdated guidelines of ICNIRP could have grave consequences for humanity and the environment. [5-7].

In June 2001, the WHO/International Agency for Research on Cancer (IARC) classified extremely-low frequency magnetic fields as a Group 2B, possible human carcinogen that increases risk of childhood leukemia. Static/ELF magnetic fields are emitted by ubiquitous electrical appliances and powerlines. Low intensity static/ELF –EMF has been reported to cause biological effects that could be detrimental to health, e.g., oxidative stress, genetic, and neurological changes [8-10]. In addition, man made static/ELF-EMF could affect wildlife and possibly survival of many species.

In May 2011, the WHO/IARC classified all radiofrequency electromagnetic fields as “possibly carcinogenic to humans” (Group 2B).

Several important appeals, resolutions and other documents were issued in the last few years by the scientific community warning public health authorities about the necessary reduction on EMF exposure limits and its associated risks. These include the Freiburg Appeal, the Salzburg Resolution, the Catania Resolution, the Benevento Resolution, the Venice Resolution, the Porto Alegre Resolution, the Copenhagen Resolution, American Academy of Pediatrics recommendations, Seletun Scientific Statement, International EMF Scientist Appeal , 5G Appeal, 2020 Consensus Statement of UK and International Medical and Scientific Experts and Practitioners on Health Effects of Non-Ionising Radiation (NIR), as well as many other important documents.

We concur that the present guidelines are obsolete and must be revised based on new research data. We advocate the prompt adoption of the Precautionary Principle in all applications of these technologies and services.

Therefore, the undersigned ask for the following actions from the WHO :

- 1.) Recommendations to the health authorities of all countries to adopt reduced EMF exposure limits considering the biological effects due to low-level and long-term exposures;
- 2.) Promote awareness, considering sustainability and leading a program to reduce EMF exposures, including broad disclosure of the health risks associated with EMF;
- 3.) For wireless devices operated close to the head or body, the certification process must consider a distance compatible with realistic practices of the user population;

- a.) National testing of 677 cell phones by ANFR France has revealed that the cell phones presently on the market exceed the safety limits of ICNIRP used in Europe by factors as large as 1.6-3.7 ; and by factors as large as eleven used by the FCC in U.S.A. [11,12].
- b.) Such high rates of microwave absorption measured by ANFR in France have previously been reported to cause elevation of temperature in excess of 1 degree centigrade for parts of the brain close to radiating antennas of cell phones [13].
- 4.) Broad recommendation to the population of all countries to use the Precautionary Principle to reduce EMF exposure, and encourage the use of wired devices (e.g., connected via cables, such as ethernet or optical fiber) ;
- 5.) Broad recommendation to the population of all countries :
 - a.) when talking on the mobile phone, make only short or essential calls; try to hold it at least one inch away from the head; and use of hands-free kits, headphones and text messages;
 - b.) children and other sensitive and vulnerable people should avoid the use of mobile phones and other wireless devices.
- 6.) The WHO EMF project needs to be reconstituted with a balanced panel of experts who have ***no conflicts of interest***. The current panel constitutes members from ICNIRP who ignore evidence of bio-effects other than acute heating.

Peer-reviewed publications

- [1] O.P. Gandhi, L.L. Morgan et al. "Exposure Limits: The underestimation of absorbed cell phone radiation, especially in children", *Electrom Biol Med*, 31(1):34-51, 2012. doi: 10.3109/15368378.2011.622827.
- [2] O.P.Gandhi, G.Lazzi and C.M.Furse, "Electromagnetic Absorption in the Human Head and Neck for Mobile Telephones at 835 and 1900 MHz", *IEEE Trans.MTT*, vol.44 (10), pp.1884-1897, 1996.
- [3] A.A.de Salles, G.Bulla and C.E.F.Rodriguez, "Electromagnetic Absorption in the Head of Adults and Children due to Mobile phone operation close to the Head", *Electromagn.Biol.Med.*, vol. 25(4), pp.349-360, 2006.
- [4] C.K. Chou, A.W. Guy et al. "Long-term low-level microwave irradiation of rats", *Bioelectromagnetics*, 13(6):469-496, 1992. doi :10.1002/bem.2250130605.
- [5] S.L. Smith-Roe et al. "Evaluation of the genotoxicity of cell phone radiofrequency radiation in male and female rats and mice following subchronic exposure", *Environ Mol Mutagen*, 61(2):276-290, 2020. doi: 10.1002/em.22343.
- [6] National Toxicology Program. NTP Technical Report on the Toxicology and Carcinogenesis Studies of GSM- and CDMA-Modulated Cell Phone Radiofrequency Radiation at 900 MHz in Hsd :Sprague Dawley SD Rats (Whole-Body Exposure), NTP TR 595. 2018. Downloaded on 02/01/2021: https://ntp.niehs.nih.gov/ntp/htdocs/lt_rpts/tr595_508.pdf

[7] L. Hardell. "World Health Organization, radiofrequency radiation and health – a hard nut to crack (Review) ". *Int J Oncol*, 51(2):405-13, 2017. doi: 10.3892/ijo.2017.4046.

[8] H. Lai, "Exposure to static and extremely-low frequency electromagnetic fields and cellular free radicals. *Electromagnetic Biology and Medicine* 38:231-248, 2019.

[9] H. Lai , "Genetic effects of nonionizing electromagnetic fields". *Electromagnetic Biology and Medicine* DOI: [10.1080/15368378.2021.1881866](https://doi.org/10.1080/15368378.2021.1881866), 2021.

[10] H. Lai, Research summary- ELF-EMF/Static field neurological effects abstracts. In Sage, C and Carpenter, D. (eds) *BioInitiative Report: "A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF) "*, <https://bioinitiative.org>, Updated 2020.

[11] Report provided by Dr. Marc Arazi of Phonegate Alerte, Paris, France:
<https://data.anfr.fr/anfr/visualisation?id=ad8014ec-f631-450e-a259-799188714ef9>

[12] O.P.Gandhi, " Microwave Emissions from Cell Phones Exceed Safety Limits in Europe and the U.S. When Touching the Body", *IEEE ACCESS*, vol.7 pp.47050-47052, 2019.

[13] Q-X.Li and O.P.Gandhi, " Thermal Implications of the New Relaxed IEEE RF Safety Standard for Head Exposures to Cellular Telephones at 835 and 1900 MHz", *IEEE Trans. MTT* vol. 54 (7), pp.3146-3154, 2006.

Additional information can also be obtained from the following references [a-i]

[a] P. Bandara, D. Carpenter. "Planetary electromagnetic pollution: it is time to assess its impact". *Lancet Planet Health*, 2(12):e512-e514, 2018. doi: 10.1016/S2542-5196(18)30221-3.

[b] D. Belpomme, L. Hardell, et al. "Thermal and non-thermal health effects of low intensity non-ionizing radiation: An international perspective". *Environ Pollut*, 242(Pt A):643-658, 2018. doi: 10.1016/j.envpol.2018.07.019.

[c] L. Hardell and M. Carlberg, "Lost opportunities for cancer prevention: historical evidence on early warnings with emphasis on radiofrequency radiation", *Rev Environ Health*, 2021, <https://doi.org/10.1515/reveh-2020-0168>.

[d] C. Fernández, A.A. de Salles, M.E. Sears, R.D. Morris, D.L. Davis, "Absorption of wireless radiation in the child versus adult brain and eye from cell phone conversation or virtual reality", *Environmental Research*, Volume 167, Pages 694-699, 2018, ISSN 0013-9351, doi:0.1016/j.envres.2018.05.013.

[e] R. Kostoff, P. Heroux, et al. "Adverse health effects of 5G mobile networking technology under real-life conditions", *Toxicol Lett*, 323:35-40, 2020. doi: 10.1016/j.toxlet.2020.01.020

[f] A.B. Miller, L.L. Morgan, et al. "Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102) ", Environ Res, 167:673-683, 2018. doi: 10.1016/j.envres.2018.06.043.

[g] "International Appeal: Scientists call for protection from non-ionizing electromagnetic field exposure". Eur J Oncol, 20(3-4):180-182, 2015. Downloaded 02/01/2021: <https://www.mattioli1885journals.com/index.php/EJOEH/article/view/4971>

Signatures –

Experts

- Adlkofer, Franz, Pandora- Foundation for Independent Research, Germany
- Arazi, Marc, Phonegate, France
- Bandara, Priyanka, ORSAA - Oceania RF Scientific Advisory Association, Australia
- Belyaev, Igor, Biomedical Research Center, SAS, Slovak Republic
- Blackman, Carl, EPA - Environmental Protection Agency (retired), USA
- Ben Ishai, Paul, Ariel University, Israel.
- Carpenter, David, University of Albany, USA
- Dasdag, Suleyman, Biophysics Dept., Med. School of Istanbul Medeniyet Univ., Turkey

- Davis, Devra L., President Environmental Health Trust - EHT, USA

- De Salles, Alvaro A., UFRGS – Federal University of Rio Grande do Sul, Brazil
- Dode, Adilza C., MRE Engineering- BH, Brazil
- Fernández, Claudio R., IFRS – Fed. Inst. of Education, Science and Technology of RS, Brazil
- Figueroa, Hugo E., UNICAMP – University of Campinas, Brazil
- Gallozzi, Stefano, President Environm. Protection and Safeguard Comm.- ONLUS, Italy
- Gandhi, Om P., University of Utah, USA
- Giuliani, Livio, ICEMS, Italy and ECERI, Belgium
- Hardell, Lennart, The Environment and Cancer Research Foundation, Sweden
- Havas, Magda, Trent University, Canada
- Héroux, Paul, McGill University Medicine, Canada
- Johansson, Olle, Karolinska Institute and the Royal Institute of Technology, Sweden
- Lai, Henry C., University of Washington, USA
- Leach, Victor, FRMIT Applied Physics, ARPS, ORSAA, Australia
- Maisch, Don, ORSAA, ACNEM - the Australasian Coll. of Nut. and Env. Medicine, Australia
- Margaritis, Lukas H., Athens University, Greece
- Marinelli, Fiorenzo, ICEMS, Italy
- May, Murray, ORSAA – Oceania RF Scientific Advisory Association, Australia
- Morgan, L. Lloyd, EHT, USA
- Moskowitz, Joel, School of Public Health, University of California, USA
- Pall, Martin, Washington State University, USA
- Poggi, Claudio, ICEMS, Italy
- Sage, Cindy, Co-Editor, BioInitiative Reports, USA
- Salford, Leif G., Lund University, Sweden
- Sears, Meg, Research Associate at the Ottawa Hospital Research Institute, Canada

- Seyhan, Nesrin, Founder, Gazi Univ. Biophysics Dept & NIR Protection Centre, Turkey
- Silva, Hugo G., Universidade de Evora, Portugal
- Skouroliaou, Katerina, University of West Attica, Greece
- Soffritti, Morando, Honorary President Ramazzini Institute, ICEMS, Italy
- Stein, Yael, Hebrew University - Hadassah Medical Center, Israel
- Sun, Wenjun, Bioelectromagnetics Key Lab., Zhejiang Univ. School of Medicine, China
- Tejo, Francisco de A., UFCG - Federal University of Campina Grande, Brazil
- Touzet, Rodolfo, CNEA - Argentinian Atomic Energy Commission, Argentina
- Vieira, Geila R., environmental and public health medical doctor, Brazil