

Statements to the FDA by Alfonso Balmori, BSc, Lennart Hardell MD, Paul Heroux PhD, Devra Davis PhD, Elihu D. Richter MD, MPH, Alvaro de Salles, PhD, Dr. Marc Arazi, Marko S. Markov PhD, Martin L. Pall, PhD, Hiie Hinrikus, PhD, DSc, David O. Carpenter MD, Suleyman Dasdag PhD.

Statement by Wildlife Biologist Alfonso Balmori, BSc on the FDA Review of Cell Phone Radiation and Cancer

The FDA review omits an evaluation of the science on wireless radiation impacts to trees and wildlife. Electromagnetic radiation is a form of environmental pollution which may hurt wildlife. I am providing examples of my published research below as examples of this scientific evidence.

I have co-published research entitled [“Radiofrequency radiation injures trees around mobile phone base stations”](https://www.ncbi.nlm.nih.gov/pubmed/27552133) finding harm to trees near base stations (cell antennas) in a long term field monitoring study in two cities. We measured the radiofrequency radiation levels and found significant differences between the damaged side facing the cell phone mast and the opposite side. Our statistical analysis demonstrated that electromagnetic radiation from mobile phone masts was harmful to the trees. The damage usually starts on one side of the tree, then extends to the whole tree over time. <https://www.ncbi.nlm.nih.gov/pubmed/27552133>

I have also published an [experimental study](https://www.ncbi.nlm.nih.gov/pubmed/20560769) where we exposed eggs and tadpoles of the common frog (*Rana temporaria*) to the electromagnetic radiation from mobile (cell) phone antennas located at a distance of 140 meters. The experiment lasted two months, from the egg phase until an advanced phase of tadpole prior to metamorphosis. In this study, we found the exposed group had altered development and a higher mortality rate in comparison to the unexposed frogs. <https://www.ncbi.nlm.nih.gov/pubmed/20560769>

In addition, my [research](https://www.ncbi.nlm.nih.gov/pubmed/25747364) has documented anthropogenic radiofrequency electromagnetic fields as an emerging threat to wildlife orientation. For example, exposure at levels that are found in the environment (in urban areas and near base stations) may particularly alter the receptor organs to orient in the magnetic field of the earth. These results could have important implications for migratory birds and insects, especially in urban areas, but could also apply to birds and insects in natural and protected areas where there are powerful base station emitters of radio frequencies. Therefore, more research on the effects of electromagnetic radiation in nature is urgently needed to investigate this emerging threat. At the present time, there are reasonable grounds based on scientific evidence for believing that microwave radiation constitutes an environmental and health hazard. Existing guidelines are not protective. The paper “Anthropogenic radiofrequency electromagnetic fields as an emerging threat to wildlife orientation” is online at <https://www.ncbi.nlm.nih.gov/pubmed/25747364>

Another research study I co-published in the journal *Electromagnetic Biology and Medicine* is entitled [“The urban decline of the house sparrow \(*Passer domesticus*\): a possible link with](#)

[electromagnetic radiation.](#)” Between October 2002 and May 2006, point transect sampling was performed at 30 points during 40 visits in Valladolid, Spain. At each point, we carried out counts of sparrows and measured the mean electric field strength (radio frequencies and microwaves: 1 MHz–3 GHz range). Significant declines ($P = 0.0037$) were observed in the mean bird density over time, and significantly low bird density was observed in areas with high electric field strength. The logarithmic regression of the mean bird density vs. field strength groups (considering field strength in 0.1 V/m increments) was $R = -0.87$ ($P = 0.0001$). The results of this article support the hypothesis that electromagnetic signals are associated with the observed decline in the sparrow population. We conclude that electromagnetic pollution may be responsible, either by itself or in combination with other factors, for the observed decline of the species in European cities during recent years. The apparently strong dependence between bird density and field strength according to this work could be used for a more controlled study to test the hypothesis. <https://www.ncbi.nlm.nih.gov/pubmed/17613041>

In another study, monitoring of a white stork population in the vicinity of Cellular Phone Base Stations was carried out, with the objective of detecting possible effects. The total productivity, in the nests located within 200 meters of antennae, was 0.86 ± 0.16 . For those located further than 300m, the result was practically doubled, with an average of 1.6 ± 0.14 . Very significant differences among the total productivity were found ($U = 240$, $p = 0.001$, Mann-Whitney test). Twelve nests (40%) located within than 200m of antennae never had chicks, while only one (3.3%) located further than 300m had no chicks. The electric field intensity was higher on nests within 200m (2.36 ± 0.82 V/m) than on nests further than 300m (0.53 ± 0.82 V/m). The study concludes that, “these results are compatible with the possibility that microwaves are interfering with the reproduction of white storks and would corroborate the results of laboratory research by other authors”. <https://www.tandfonline.com/doi/abs/10.1080/15368370500205472>

A review on the impact of radiofrequency radiation from wireless telecommunications on wildlife is presented in “[Electromagnetic pollution from phone masts. Effects on wildlife](#)” published in the journal Pathophysiology. Electromagnetic radiation is a form of environmental pollution which may hurt wildlife. Phone masts located in their living areas are irradiating continuously some species that could suffer long-term effects, like reduction of their natural defenses, deterioration of their health, problems in reproduction and reduction of their useful territory through habitat deterioration. Electromagnetic radiation can exert an aversive behavioral response in rats, bats and birds such as sparrows. Therefore microwave and radiofrequency pollution constitutes a potential cause for the decline of animal populations and deterioration of health of plants living near phone masts. To measure these effects urgent specific studies are necessary.

<https://www.ncbi.nlm.nih.gov/pubmed/?term=Electromagnetic+pollution+from+phone+masts.+Effects+on+wildlife>

Despite the widespread use of wireless telephone networks around the world, authorities and researchers have paid little attention to the potential harmful effects of mobile phone radiation on wildlife. This paper briefly reviews the available scientific information on this topic and recommends further studies and specific lines of research to confirm or refute the experimental

results to date. Controls must be introduced and technology rendered safe for the environment, particularly, threatened species. <https://www.ncbi.nlm.nih.gov/pubmed/25089692>

Atmospheric electrical discharges during thunderstorms, and the related electromagnetic fields (EMFs)/waves called sferics, can be sensed by humans at long distances through a variety of symptoms, mainly headache, fatigue, etc. Up to today there is no explanation for this association. Sferics consist of partially polarized electromagnetic pulses with an oscillating carrier signal in the very low frequency (VLF) band and a pulse repetition frequency in the extremely low frequency (ELF) band. Their ELF intensity may reach ~5 mV/m at global ranges, and ~0.5 V/m at ~1000 km from the lightning. The health symptoms associated with sferics are also associated with antennas of mobile telephony base stations and handsets, which emit radio frequency (RF) radiation pulsed on ELF, and expose humans at similar or stronger electric field intensities with sferics. According to the Ion Forced-Oscillation mechanism, polarized ELF EMFs of intensities down to 0.1–1 mV/m are able to disrupt any living cell's electrochemical balance and function by irregular gating of electro-sensitive ion channels on the cell membranes, and thus initiate a variety of health symptoms, while VLF EMFs need to be thousands of times stronger in order to be able to initiate health effects. We examine EMFs from sferics in terms of their bioactivity on the basis of this mechanism. We introduce the hypothesis that stronger atmospheric discharges may reasonably be considered to be ~70% along a straight line, and thus the associated EMFs (sferics) ~70% polarized. We find that sferics mainly in the ELF band have adequate intensity and polarization to cause biological/health effects.

We provide explanation for the effects of sferics on human/animal health on the basis of this mechanism. <https://www.ncbi.nlm.nih.gov/pubmed/28558424>

It is documented that a few days or weeks before major Earthquakes (EQs) there are changes in animal behavior within distances up to 500 km from the seismic epicenter. At the same time Seismic Electric Signals (SES), geomagnetic and ionospheric perturbations, are detected within similar distances. SES consist of single unipolar pulses, and/or groups of such pulses called "SES activities" with an average frequency between successive pulses on the order of ~0.01 Hz and electric field intensity on the order of ~10⁻⁵-10⁻⁴ V/m (Frazer-Smith et al., 1990; Rikitake, 1998; Varotsos et al., 1993, 2011, 2019; Hayakawa et al., 2013; Grant et al., 2015). We show that the SES activities can be sensed by living organisms through the "Ion Forced-Oscillation Mechanism" for the action of Electromagnetic Fields (EMFs) on cells, according to which polarized EMFs can cause irregular gating of electro-sensitive ion channels on the cell membranes with consequent disruption of the cell electrochemical balance (Panagopoulos et al., 2000, 2002, 2015). This can be sensed by sensitive animals as discomfort in cases of weak and transient exposures, and may even lead to DNA damage and serious health implications in cases of intense exposure conditions (as in certain cases of man-made EMF exposures). Moreover, we show that the geomagnetic and ionospheric perturbations cannot be sensed through this mechanism. The same mechanism has explained meteoropathy, the sensing of upcoming thunderstorms by sensitive individuals, through the action of the EMFs of lightning discharges (Panagopoulos and Balmori, 2017). The present study shows that centuries-long anecdotal rumors of animals sensing intense upcoming EQs and displaying unusual behavior, lately documented by systematic studies, are now explained for the first time on the basis of the

electromagnetic nature of all living organisms, and the electromagnetic signals emitted prior to EQs. <https://www.ncbi.nlm.nih.gov/pubmed/28558424>

Signed, Alfonso Balmori, BSc Biologist. Spain
[Alfonso Balmori on researchgate.](#)

Paul Heroux PhD Statement in Response to the FDA Report on Cell Phone Radiation

The FDA Report stated, "We do not know if there is a causal effect or if these results are due to weakening of the immune response due to animal stress from cyclic heating and thermoregulation decline in aging animals leading to whole-body temperature increase, possible sleep disruption due to the cyclic heating, or due to an RF-specific effect that has not been identified and has an adverse effect before heating becomes the dominant safety issue."

Response by Paul Heroux PhD

"FDA is pushing red herrings to avoid the inevitable conclusion that electromagnetic fields have important carcinogenic effects on animals below thermal levels.

This is an apparent attempt to confuse the discussion by invoking an "immune" mechanism driven by heat and sleep disturbances, and other ghost mechanisms that would inevitably turn out to be dead ends.

These surprising comments should not distract us from (1) at least four previous spectacular animal experiments linking fields to cancer, from (2) the drastic action of fields on human cancer cells at field intensities nowhere near the thermal limit, as well as (3) the literature linking fields to reactive oxygen species and mutations.

An institution (FDA) displaying such a fundamental reluctance to acknowledge evidence should abstain from commenting on the NTP study.

The FDA Report stated, "It is possible that any form (ambient, IR, ultrasound) of cyclic whole-body heating of this magnitude may cause similar findings, but no such studies have been conducted to date."

Response by Paul Heroux PhD

"This is a way to extend the lie about health impacts of electromagnetic fields by directing attention to some form of further investigation that would allow industry to proceed with increases in human exposures, while we await the results of yet another waste of time."

Paul Héroux, PhD
Professor of Toxicology and Health Effects of Electromagnetism
McGill University Medicine

Department of Surgery, McGill University Health Center

Statement by Christos D. Georgiou, Ph.D.

The issued by FDA "literature review" conclusion that there are no connections between cell phones and cancer is not valid, as it is contradicted, at least, by the classification, by IARC-WHO, of cell phone-emitted EMF as possibly carcinogenic to humans (Group 2B). The numerous research studies IARC reviewed to base the Group 2B classification also included a study of mine (cited in the IARC-WHO 2013 report; https://www.ncbi.nlm.nih.gov/books/NBK304630/pdf/Bookshelf_NBK304630.pdf, pages 101,103,121), which advances the free radical pair mechanism of non thermal induction of carcinogenic oxidative stress by exposure to low-intensity RF radiation.

Christos D. Georgiou, Ph.D.
Professor Emeritus of Biochemistry
Biology Department
University of Patras, Greece

Statement by Anthony B. Miller MD

"Radiofrequency is an established carcinogen. Cell phones held close to the head will substantially increase the risk of a type of brain cancer—glioblastoma," stated Dr. Anthony B. Miller, Professor Emeritus at the Dalla Lana School of Public Health, University of Toronto and former Director of the Epidemiology Unit of the National Cancer Institute of Canada. Miller also served as a Senior Epidemiologist, International Agency for Research on Cancer and published a major [research review](#) in 2018, concluding that "based on the evidence reviewed it is our opinion that IARC's current categorization of RFR as a Possible Human Carcinogen (Group 2B) should be upgraded to Carcinogenic to Humans (Group 1). Miller recommends people use safer wired technology rather than wireless technology, "We should do all we can to reduce exposure."

Statement by Devra Davis PhD

"This astonishing report from an agency charged with protecting public health should be retracted. It does not meet minimum standards of scientific reporting or review, as it takes a skewed look at science, lists neither authors nor reviewers. It ignores the recent [Yale study](#) supported by the American Cancer Society linking cell phone use to thyroid cancer. It does not consider that antiquated phone test methods [do not protect](#) anyone from microwave radiation emitted by phones or other devices. It ignores [repeated calls](#) from the American Academy of Pediatrics and numerous experts in the field of child health to take into account the [unique vulnerability](#) of children, pregnant women and young adults. No reference is made to a growing [body](#) of [research](#) showing [brain damage](#) and [headache](#) and [replicated research](#) showing

memory damage in teens after just one year of cell phone use,” stated [Devra Davis PhD, MPH](#), President of the Environmental Health Trust.

Prof. Suleyman Dasdag, Department of Biophysics, Medical School of Istanbul Medeniyet University, Istanbul, Turkey, also noted: “Mobile phones are not as innocent as they seem. In [my studies to date](#), I have found that wireless radiofrequency (RF) does not affect every organ in the same way and very different parameters are important in the emergence of effects. In our two studies on RF and the brain in 2015 and our study published this year, we found that RFs may affect key molecules. In addition, we observed in our brain study that RF radiation can affect the death of brain cells. I also want cell phones not to cause brain tumors, but our studies and the published studies we have reviewed are in the direction that the risk will increase even more after 5G.”

Martin L. Pall, PhD, Professor Emeritus of Biochemistry and Basic Medical Sciences, Washington State University who has published [extensively](#) on how EMFs activate Voltage-Gated Calcium Channels which can lead to tumor promotion, disputed the report’s conclusions that cellphones are safe, noting that, “EMFs produce double strand DNA breaks which cause cancer via chromosomal rearrangements, copy number mutations and gene-amplification. EMFs also cause oxidized bases including 8-OHdG, which produce transition and transversion mutations such that when these occur in oncogenes or tumor suppressor genes, these mutations have important roles in causing cancer.”

“This report is pure nonsense! It is as though the author didn’t read any of the literature they cite,” stated David O. Carpenter MD, Director, Institute for Health and the Environment, University at Albany who has repeatedly documented adverse effects over 4 decades of [published research](#).

“Radiofrequency radiation should be regarded as a human carcinogen causing glioma,” stated Lennart Hardell MD, an advisor to the World Health Organization’s International Agency for Research on Cancer, who has published several studies finding associations between cancer and people who use cell phones regularly. He referred to one of his [published research](#) reviews concluding that radiofrequency is a carcinogen.

“The latest report by the National Toxicology Program is a game changer. We also should not ignore [case series reports](#) on cancer in military workers with whole body exposure to RF/MW, stated Professor Elihu D. Richter MD, MPH at the Occupational and Environmental Medicine Department at the Hebrew University-Hadassah School of Public Health and Community Medicine.

“Due to the recent results described in many peer reviewed scientific papers published in the international literature showing significant human health risks (including cancer) at levels of EMF exposures well below the available recommended limits (e.g., ICNIRP, FCC/IEEE/ANSI). We believe that the Precautionary Principle should be urgently adopted and the population

should be fully informed on the best ways to reduce their exposure and health impacts, “ stated Alvaro de Salles, Ph. D. Professor at Federal University of Rio Grande do Sul, Porto Alegre, Brazil whose [research studies](#) have found children are more exposed to RF from cell phones.

"The FDA's position is totally incomprehensible especially since the findings of the Phonegate scandal have revealed the deception by cell phone manufacturers who have knowingly overexposed all cell phone users to excessive radiation for decades," stated Dr. Marc Arazi of [Phonegate Association](#).

"Mankind is being forced to participate in a giant "experiment" without protocol, without collection of data and without adequate evaluation of the cocktail of EMF humankind is exposed to every day. The engineering community needs to recognize the fact that there is a difference between experimental exposure and continuous exposure to multiple frequencies and modulations. The FDA as well as ICNIRP have failed to investigate this to assure public safety, " stated Marko S. Markov PhD, [author](#) of major medical textbooks in bioelectromagnetics.

“Tissue heating is certainly not the only effect caused by radiofrequency radiation.,” stated Hiie Hinrikus, PhD, DSc, Professor Emeritus Centre for Biomedical Engineering at the Tallinn University of Technology who has published several [research studies](#) on microwave radiation. “Hundreds of studies performed by independent researchers have convincingly approved biological effects caused by low-level radiofrequency radiation in animals and humans at constant temperature. The reason is coherent nature of radiofrequency radiation. During billions years, living nature has been adapted to natural solar radiation, radiofrequency radiation is in principle different from solar radiation. Sun emits irregular incoherent radiation in wide frequency spectrum whereas technical radiofrequency sources emit regular coherent single-frequency radiation. The impact of irregular random and regular coherent electromagnetic radiation on living systems is different. Irregular radiation causes random forces and movement in tissues and can create only tissue heating. Coherent radiation causes regular forces and synchronous movement affecting simultaneously large amounts of molecules and cells in tissues. Therefore, the impact of radiofrequency radiation is much stronger than the heating effect only. This is convincingly approved also in microwave chemistry.”