HHS-OASH-2026-0397

Comments for HHS "Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure.

Question 2. Perspectives Represented in This Response to the RFI

I'm a retired mechanical engineer with a BSME, MSME, and PE license (CA retired). I did technical work for 35 years in federal civil service, Department of the Navy, at the large Navy R&D laboratory in San Diego. Motivated by continued public service, now voluntary without compensation, I'm a public educator and wireless-radiation safety advocate for all who will listen. For the last eight years, to support a local smart-meter advocacy movement, Oregon for Safer Technology, and other interested groups, I've given original slide presentations that cover the independent science, effects, and politics of man-made electromagnetic radiation. This information is clear evidence of the need to minimize personal wireless-radiation exposure. Minimizing exposure involves choosing wireless technologies wisely and adopting precautionary measures and safe habits for their use. I am responding to this RFI to HHS as an individual, in good faith as to the RFI's purpose, with trust that it will be received in kind. None of this submission has been prepared with AI.

Question 3. Shared Experiences

After making many electromagnetic-field and radio frequency radiation measurements in homes as a free public service, and attending many city-counsel meetings (with high Wi-Fi radiation levels) in unsuccessful advocacy against new cell towers in my city, I've developed **Electromagnetic Radiation Syndrome (EMR-S)**. Home exposures usually lasted one hour and council meetings lasted two hours or more. My symptoms are a feeling of mental fatigue, discomfort on the top of my head, and a sluggish cognitive function. I've also spent as much as 1 to 2 hours making field measurements of cell-tower radiation levels, after which, I've felt sick for several days with the uncomfortable feeling of waking suddenly during the the night. I have not sought medical treatment.

Question 5. Consideration of Existing National and International Exposure Guidelines

No existing national and international exposure standards, guidelines, or regulatory frameworks should be considered credible by federal agencies. The assumptions of all exposure regulations and guidelines, to date, are based on short-term effects associated with the heating of skin and tissue, <u>not on long-term effects</u> at the cellular and biomolecular level unrelated to heating effects. It has been shown that nonionizing RFR <u>does cause adverse health effects</u> in the absence of heating effects. The understanding of long-term effects is a prerequisite for developing safety standards.

See the attached files: **Reference 1,** "The WHO-commissioned systematic reviews on health effects of radio frequency radiation provide no assurance of safety"; **Reference 2**, "Conflicting views in experimental carcinogenesis: a commentary on design and methodological deficiencies in the follow-up validation studies on radio frequency radiation"; and **Reference 3**, "Cell Phone Radiation Exposure Limits and Engineering Solutions."

In addition, see the video at https://www.healthandenvironment.org/che-webinars/97191. At 20:42 (20 minutes, 42 seconds), Dr. Melnick reviews 14 false assumptions discussed in the journal paper, "Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limit determinations for Radio Frequency Radiation: implications for 5G."

Question 5, Item n. Need for Scientific, Technical, or Regulatory Changes by Health Agencies

Meaningful scientific, technical, and regulatory changes by federal health agencies and the development of undisputed safety standards will not be possible until credible, comprehensive, biological studies have identified long-term exposure effects from **radio frequency radiation (RFR)**. Such studies must address biological exposure effects for relevant RFR frequency bands, peak RFR power densities during a specified exposure duration, and different RFR modulation technologies in use by the telecom industry. Studies must also address "safety factors" for vulnerable groups, such as children, seniors, and those affected by **Electromagnetic Radiation Syndrome (EMR-S)**. These studies must be conducted and reported by independent, third-party, scientists, such as those who participated in a commission study in the state of New Hampshire and those accomplished authors in attached references.

Until long-term exposure effects are well understood, health agencies may adopt the precautionary principle and reduce existing exposure limits by a factor of 200 or more. The U.S. and Japan have higher RFR exposure limits than any other country.

Issues and results from the New Hampshire study are attached in their their entirety in **Reference 4**, "Final Report of the Commission to Study The Environmental and Health Effects of Evolving 5G Technology" (HB 522, Chapter 260, Laws of 2019, RSA 12-K:12–14). These studies contain essential background information for addressing public RFR exposure regulations.

Research is needed to identify bio markers of cellular and biomolecular damage from RFR. The response of red blood cells to RFR exposure has been well documented as cell rouleau, cell aggregation, and cell disfiguration, as evidence of oxidative stress level, which is a preliminary marker of disease. So, red blood cells are an obvious candidate for scientific studies of critical RFR exposure markers and parameters. DNA damage is another bio marker of RFR exposure damage to be investigated.

Question 5, Item o. The Need for Additional Research to Reduce Electronic Product Radiation

Because our environment will always have some involuntary exposure to RFR, it serves everyone to become aware of ways to minimize personal exposure, but it's also possible for the telecom industry to implement design changes to minimize wireless-device RFR. Many patents have been filed for this purpose, but none have been implemented. (Consumers would favor devices with lower RFR exposure, and the first manufacturer to announce a patented product with this feature could enjoy a jump in market share.)

Comments appear under other questions regarding future research that is needed to establish revised exposure limits.

Question 5, Item p. How a Classification System Should Account for RFR Exposure Characteristics

See the response to Question 5, Item o. Electric field and magnetic field exposures can be measured with known parameters. What is most important is to quantify parameters, such as power density and frequency for RFR, magnetic field strength and frequency, and electric field strength and frequency at the surface of the organism, which might be skin on the human body. Formulas can quantify the change in parameter values with distance from the source.

Specific Absorption Rate (SAR) has no relevance or correlation to harmful effects from **electromagnetic radiation (EMR)** exposure because EMR causes harmful biological effects at the cellular level, long before it causes a measurable increase in tissue temperature. Accounting for heat absorption ignores the cellular damage caused before heating occurs. SAR ratings have no useful purpose in predicting harm from EMR exposure.

Question 6. Scientific Evidence of Potential Adverse Health Effects Caused by RFR Levels at Current Federal Exposure Limits

Please see answers to question 12. Potential adverse health effects from RFR at current exposure limits will arguably be much more severe than well-documented adverse health effects below the current exposure limits. Furthermore, it would be challenging to find cases where adverse health effects could be consistently, simultaneously, correlated with measurements at current exposure limits. RFR measurements made at current exposure limits would expose personnel to an unacceptable health risk.

Current FCC public RFR exposure limits in units of power density, as high as 10,000,000 **microwatts per square meter (μW/m^2),** are extremely high compared to exposure levels from wireless technology 50 years ago, which is the time frame when harmful effects from RFR were well documented. Current RFR exposure limits are for short-term exposures of approximately 30 to 60 minutes. **Long-term exposure limits have never been studied,** which suggests current limits are meaningless for public health.

Question 7. Scientific Methods of Characterizing RF Radiation Exposure

One important method for accurately characterizing individual and population-level RFR exposure is analysis of blood parameters. RFR exposure causes oxidative stress in the blood. One result of this is the decrease of electric charge on red blood cells, which keeps the cells separated. When the charge is lost, red blood cells form strings and clusters that cannot pass through fine blood capillaries, which results in tissue damage and disease from loss of oxygen and immune-system function. Photos of the progressive stages of red blood cell damage from increasing RFR exposure appear on pages 6 through 10 in **Reference 5,** "Does Short-term Exposure to Cell Phone Radiation Affect the Blood"?

Numerous references on changes in other blood parameters, are listed in **Reference 6**, "Hematological Effects of Non-ionizing Radio Frequency Radiation." This reference cites the research reported in Reference 5.

Question 9. Technical and Exposure-related Information for Local Governments and the Public

It is a tragic reality that children are the most vulnerable victims of RFR, largely because parents are not aware of the dangers of RFR exposure from cell phones and laptop computers. Children are harmed neurologically by RFR even before they are born when mom uses a computer in her lap. The

media refuse serious coverage of this reality to avoid loss of advertising revenue. Warning labels on products that use wireless radiation are urgently needed. Technical information about RFR exposure must be provided to consumers of this technology. We label products with lead, asbestos, harmful chemicals, etc., for consumer awareness. The public must be educated about the documented harm from RFR.

Question 11. Exposure and Risk Considerations for Sensitive Populations

Research that addresses adverse health effects from RFR and EMF must identify exposure limits for sensitive populations. Sensitivities result from such factors as a person's fitness; health status; skull thickness; age; occupational exposure levels and duration; and the presence of metal contained in dental work, artificial joints, and embedded devices (such as pacemakers). Manufacturers of wireless devices must be required to warn consumers about potential harm from their products and how to minimize risk.

All doctors and medical practitioners who are serious about sustaining the good health of their patients and achieving positive outcomes from therapies must inform patients about the need to minimize RFR and EMF exposure levels in all environments. Precautionary exposure limits must be identified for sensitive populations.

Question 12. Scientific Evidence of Potential Adverse Health Effects Caused by RFR Levels below Current Federal Exposure Limits

As indicated previously, current federal RFR exposure limits, as much as 10,000,000 $\mu W/m^2$ at some frequencies, are so extremely high, they would not likely have been present 50 or more years ago when government agencies were documenting all the diseases caused by this radiation. Public exposures at this power density would have immediately caused obvious harmful effects. Government documents 50 years ago cite literally thousands of reports that were reviewed for the diseases and adverse effects of RFR from exposures below current federal limits. The most recent studies also indicate harmful effects far below the current exposure limits.

It's essential to understand that man-made **wireless radiation (WR)** is pulsed and modulated in "coherent wave forms" to transmit voice and data, and that is the reason WR is much more harmful than natural radiation from the sun, fire, and incandescent light bulbs. "Coherent waves," are "in phase" as they travel. When these wave forms enter our bodies, they create small voltages that disrupt the regulation of our cellular and biological functions. Natural radiation has "incoherent waves," which travel randomly without order, and they don't create disruptive voltages. Whereas radiation from the sun at sea level has a power density of approximately 1000 Watts per square meter (1 billion $\mu W/m^2$), which our bodies can tolerate, the FCC maximum exposure limit for man-made WR, as previously mentioned, is 10 Watts per square meter (10,000,000 $\mu W/m^2$), which our bodies cannot tolerate.

Here are a few of the most well-know early government studies and recent studies.

Reference 7, "Bibliography of Reported Biological Phenomena ('Effects') and Clinical Manifestations Attributed to Microwave and Radio-frequency Radiation," by Zorach R. Glaser, Ph.D., LT, MSC, USNR.

This report was released by the U.S. Naval Medical Research Institute on October 4, 1971. The report lists disease categories from non-ionizing RFR exposure identified in more than 2300 references. The lengthy report bibliography is not included in this reference. Categories of adverse health effects and diseases appear on pages 7 through 11 in the report. The reader is referred to those pages for detailed

adverse effects, which are listed under each category. The categories without those detailed effects are summarized as follows:

A. Heating of Organs (Applications: Diathermy, Electrosurgery, Electro-coagulation, Electrodesiccation, Electrotomy)

B. Changes in Physiologic Function

C. Central Nervous System Effects

D. Autonomic Nervous System Effects

E. Peripheral Nervous System Effects

F. Psychological Disorders ("Human Behavioral Studies") —the so-called "Psychophysiologic (and Psychosomatic) Responses"

G. Behavioral Changes (Animal Studies)

H. Blood Disorders

I. Vascular Disorders

J. Enzyme and Other Biochemical Changes

K. Metabolic Disorders

L. Gastro-Intestinal Disorders

M. Endocrine Gland Changes

N. Histological Changes

O. Genetic and Chromosomal Changes

P. Pearl Chain Effect (Intercellular orientation of subcellular particles and other (non-biologic particles)

Q. Miscellaneous Effects

Reference 8, "BioInitiative of 2012"

The "BioInitiative of 2012" was a project of 29 scientists, worldwide, who reviewed 1800 recent reports concerning RFR symptoms and corresponding exposure power densities. The project objective was to quantify as much as possible, the RFR exposure levels that actually cause various adverse health effects, to establish "A Rationale for Biologically-based Public Exposure Standards for Electromagnetic Fields (ELF and RF)." The report of 2012 contains more than 1550 pages. **The final report and information to follow may be found at https://bioinitiative.org/.**

Conclusions from the 2012 report appear in Table 1-1 at the above link. Here is a summary of main statements from the conclusions that table.

BIOEFFECTS ARE CLEARLY ESTABLISHED (at very low exposure levels)

BIOEFFECTS WITH CHRONIC EXPOSURES CAN REASONABLY BE PRESUMED TO RESULT IN ADVERSE HEALTH EFFECTS

EVIDENCE FOR FERTILITY AND REPRODUCTION EFFECTS: HUMAN SPERM AND THEIR DNA ARE DAMAGED

EVIDENCE THAT CHILDREN ARE MORE VULNERABLE

FETAL AND NEONATAL EFFECTS OF EMF

EMF/RFR AS A PLAUSIBLE BIOLOGICAL MECHANISM FOR AUTISM (ASD)

THE BLOOD-BRAIN BARRIER IS AT RISK

EPIDEMIOLOGICAL STUDIES CONSISTENTLY SHOW ELEVATIONS IN RISK OF BRAIN CANCERS

EVIDENCE FOR GENETIC EFFECTS

EVIDENCE FOR NEUROLOGICAL EFFECTS

EVIDENCE FOR CHILDHOOD CANCERS (LEUKEMIA)

MELATONIN, BREAST CANCER AND ALZHEIMER'S DISEASE

ALZHEIMER'S DISEASE

STRESS PROTEINS AND DNA AS A FRACTAL ANTENNA FOR RFR

EVIDENCE FOR DISRUPTION OF THE MODULATING SIGNAL HUMAN STEM CELL DNA DOES NOT ADAPT OR REPAIR

N. EFFECTS OF WEAK-FIELD INTERACTIONS ON NON-LINEAR BIOLOGICAL OSCILLATORS AND SYNCHRONIZED NEURAL ACTIVITY

EMF AND RFR MAKE CHEMICAL TOXINS MORE HARMFUL

EMF IS SUCCESSFULLY USED IN HEALING AND DISEASE TREATMENTS

ELF-EMF AND RFR ARE CLASSIFIED AS POSSIBLE CANCER-CAUSING AGENTS –
WHY ARE GOVERNMENTS NOT ACTING?

NEW SAFETY LIMITS MUST BE ESTABLISHED – HEALTH AGENCIES SHOULD ACT NOW

SCIENTIFIC BENCHMARKS FOR HARM PLUS SAFETY MARGIN = NEW SAFETY LIMITS THAT ARE VALID

SENSITIVE POPULATIONS MUST BE PROTECTED

PROTECTING NEW LIFE – INFANTS AND CHILDREN

STANDARD OF EVIDENCE FOR JUDGING THE SCIENCE WIRELESS WARNINGS FOR ALL

DEFINING A NEW 'EFFECT LEVEL' FOR RFR

Reference 9, "BioInitiativeReport-RF-Color-Charts"

The "BioInitiative of 2012" produced a **remarkable 11-page table/color chart**, "Reported Biological Effects from Radio frequency Radiation at Low-Intensity Exposure (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)." The table lists quantitative RFR power densities associated with specific reports that were reviewed in the project. Units of power density in the table are microwatts per square centimeter, $\mu W/cm^2$. Since there are 10,000 square centimeters per square meter, one must multiply power densities in the table by 10,000 to convert units to $\mu W/m^2$ used elsewhere in this discussion.

Of special importance on page 1 in Reference 9 are the range of low RFR power densities that affect children. (Compare these numbers with the 10,000,000 $\mu W/m^2$ public exposure limit.)

The seventh entry in the table reads:

0.003 - 0.02 $\mu W/cm^2$ (30 – 200 $\mu W/m^2$): In children and adolescents (8-17 yrs), short-term exposure caused headache, irritation, concentration difficulties in school. Heinrich, 2010.

The eighth entry in the table reads:

0.003 to 0.05 µW/cm$^{2.}$ (30 – 500 µW/m^2): In children and adolescents (8-17 yrs) short-term exposure caused conduct problems in school (behavioral problems). Thomas, 2010

Reference 10, "Long-term Exposure to Microwave Radiation Provokes Cancer Growth: Evidences from Radars and Mobile Communication Systems"

Beyond the alarming title of this review in *Experimental Oncology*, the review abstract introduces relevant information for Question 12, Existing Evidence. Here is the entire abstract, which refers to **microwaves (MW**).

Recently, a number of reports revealed that under certain conditions the irradiation by low intensity MW can substantially induce cancer progression in humans and in animal models. *The carcinogenic effect of MW irradiation is typically manifested after long term (up to 10 years and more) exposure.* ***Nevertheless, even a year of operation of a powerful base transmitting station for mobile communication reportedly resulted in a dramatic increase of cancer incidence among population living nearby.*** *In addition, model studies in rodents unveiled a significant increase in carcinogenesis after17-24 months of MW exposure both in tumor-prone and intact animals. To that, such metabolic changes as overproduction of reactive oxygen species, 8-hydroxi-2-deoxyguanosine formation, or ornithine decarboxylase activation under exposure to low intensity MW confirm a stress impact of this factor on living cells.* ***We also address the issue of standards for assessment of biological effects of irradiation. It is now becoming increasingly evident that assessment of biological effects of non-ionizing radiation based on physical (thermal) approach used in recommendations of current regulatory bodies, including the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines, requires urgent reevaluation.*** *We conclude that recent data strongly point to the need for re-elaboration of the current safety limits for non-ionizing radiation using recently obtained knowledge.* ***We also emphasize that the everyday exposure of both occupational and general public to MW radiation should be regulated based on precautionary principles which imply maximum restriction of excessive exposure.***

Reference 11, "Commentary on the utility of the National Toxicology Program study on cell phone radio frequency radiation data for assessing human health risks despite unfounded criticisms aimed at minimizing the findings of adverse health effects." Ronald L. Melnick

The National Toxicology Program (NTP) received direction from the FDA around 1999 to conduct research to test the "null hypothesis" that cell-phone radiation does not cause cancer. The 10-year-plus study cost $30,000,000 and was carefully designed and executed to be the most complete testing to date on the health effects of 2G and 3G RFR modulations on animals. Results have been formally stated as follows (see Reference 11 for more details).

- NTP study on cell phone radiation shows the null hypothesis has been disproved.
- Proliferative effects were observed in the heart (Schwann cells) and brain (glial cells)
- Tumors of the same cell types have been reported in human studies of cell phone users.

- DNA damage was increased in brains of exposed rats and mice.
- The animal data are relevant and useful for assessment of human health risks.

Question 14. Scientific Evidence for Potential Environmental Effects from RF Radiation

At this link, one may find an overview of environmental effects caused by RFR with a list of scientific reports on the subject: https://ehtrust.org/wp-content/uploads/Radiofrequency-EMFs-and-Effects-to-Wildlife-EHT-Flyer-pdf.pdf

Question 15. Types of Scientific Evidence to Be Considered when Evaluating RF Exposure from Wireless Infrastructure

The best scientific evidence for evaluating RFR exposures from all sources must include power densities in $\mu W/m^2$ in relevant frequency bands and harmful biological and cellular markers that are found in current and future research to indicate such causative factors as exposure duration, RFR frequency, type of modulation, and power density. These markers should identify characteristic tissue damage independent of such RFR factors as antenna density, distance to antennas, and indoor or outdoor exposure.

Question 16. Highest Priority EMF and RF Radiation Research Gaps for Public Health

The highest priority research gaps in EMF and RFR science are studies of adverse effects of low-level, long-term exposures as the basis for revised exposure limits. Another priority is research in how these exposures affect children, before and after birth. **Yet another important area of research would be nutritional factors that provide improved tolerance to EMR and RFR exposures, as indicated in cellular and blood markers.**

Question 18. Additional Recommendations

A research study.

An interesting study in schools would be any association between RFR exposure level and student test scores. RFR exposure in school settings with Wi-Fi computer networks certainly affects cognitive function and learning. Test scores from schools remote from cell towers or schools using strictly wired Ethernet cables and networks could be compared to test scores from schools that use Wi-Fi and/or receive cell-tower radiation.

A practical study.

Even in the absence of revised RFR exposure limits, the public (especially children) would benefit immediately from reduced RFR exposure with the installation of RFR shield materials in their homes and buildings. The government should fund a study of existing information or fund additional testing to identify the best materials, such as metal screens, metal sheets, and metallic-coated insulation, with rankings for effectiveness and consumer cost.