



**FCC 13-39**

**Before the Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of

Reassessment of Federal Communications	)	ET Docket No. 13-84
Commission Radiofrequency Exposure Limits and	)	
Policies	)	
	)	
Proposed Changes in the Commission's Rules	)	ET Docket No. 03-137
Regarding Human Exposure to Radiofrequency	)	
Electromagnetic Fields	)	

To: Office of the Secretary  
Federal Communications Commission , Washington, DC 20554

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## **BioInitiative 2007 Report Conclusions**

- 1) The 2007 BioInitiative Report conclusively established that low-intensity (non-thermal) bioeffects and adverse health effects of non-ionizing electromagnetic radiation (NIEER) at levels significantly below existing public exposure standards.
- 2) The International Committee on Non-Ionizing Radiation Protection (ICNIRP) and the Institute for Electrical and Electronic Engineers/Federal Communications Commission (IEEE/FCC) public safety limits are inadequate and obsolete with respect to prolonged, low-intensity NIEER exposures, based on an expert group's review of more than 2000 peer-reviewed and published scientific studies and reviews.
- 3) New, biologically-based public exposure standards are urgently needed to protect public health world-wide.
- 4) It is not in the public interest to wait.
- 5) The BioInitiative 2007 Report recommends a 0.1 microwatt per square centimeter limit for outdoor exposure for combined AM, FM, TV and wireless frequencies.

**Background:** The BioInitiative Report is an internationally acclaimed scientific and public health report on potential health risks of electromagnetic fields and radiofrequency/microwave radiation. In 2007, the BioInitiative Working Group, an international collaboration of prestigious scientists and public health experts from Columbia University and the University at Albany (New York), University of Washington (Seattle), the Karolinska Institute, Umea University and Orebro University Hospital (Sweden), the European Environmental Agency (Denmark) Medical University of Vienna (Austria) and Zhejiang University School of Medicine, (China) released a 650-page report citing more than 2000 studies that document health effects of EMFs from all sources. It is incorporated by reference in this filing.

The BioInitiative Report was produced for publication to the broadest possible audience, hence placed on the Web. Much of the BioInitiative Report content, including updated chapters and new chapters was published in a special two-volume issue of the journal *Pathophysiology* (August 2009, *Pathophysiology* 16: 2,3).

It documented that chronic exposure to electromagnetic fields (EMF) is associated in some scientific studies with increased health risks that vary from impaired learning, headaches, mental confusion, skin rashes, tinnitus and disorientation to a variety of cancers, and neurological diseases like amyotrophic lateral sclerosis (ALS) and Alzheimer's. Sources of concern may include but are not limited to power lines, cell and cordless phones, cell towers, WI-FI, WiMax and wireless internet.

Strong concern was voiced by scientists and public health and environmental policy experts, that the deployment of technologies that expose billions of people worldwide to new sources of EMF may pose a pervasive risk to public health. Such exposures did not exist before the age of industry and information. Prolonged exposure appears to disrupt biological processes that are fundamental



to plant, animal and human growth and health. Life on earth did not evolve may pose a pervasive risk to public health. Such exposures did not exist before the age of industry and information. Prolonged exposure appears to disrupt biological processes that are fundamental to plant, animal and human growth and health. Life on earth did not evolve with biological protections or adaptive biological responses to these EMF exposures. A rapidly accumulating body of scientific evidence of harm to health and well-being constitute warnings that adverse health effects can occur with prolonged exposures to very low-intensity EMF at biologically active frequencies or frequency combinations.

### **BioInitiative 2012 Report Conclusions**

- 1) The 2012 BioInitiative Report was prepared by 29 international experts studying more than 1800 new peer-reviewed scientific studies published since 2007 and concluded again that exposure to EMF and radiofrequency radiation (RFR) produces biological effects and adverse health effects at levels significantly below existing public exposure standards; and substantially below levels identified in 2007.
- 2) The scientific evidence for health harm in 2012 is stronger and more consistent than in 2007; and the levels of exposure at which biological effects and adverse health impacts are reported to occur are far lower than in 2007.
- 3) ICNIRP and IEEE/FCC public safety limits remain unchanged and are still inadequate and obsolete with respect to prolonged, low-intensity NIER exposures. Worse, FCC Dockets 13-84, 03-137 and 13-39 propose to significantly relax rather than tighten exposure standards, in stark contrast to what the scientific evidence suggests is needed to protect public health from RFR.
- 4) Specific absorption rate (SAR) as a measure of compliance with new biologically-based exposure limits should be abandoned. Setting public safety limits based on heating is an unsuitable starting point for developing new standards that properly address chronic exposures to very low-intensity RFR. SAR should not be applied to new biologically-based public exposure standards since by definition SAR is a measure of tissue heating, and the biological effects of NIER are by definition, not due to a heating mechanism. It makes no sense to continue misapplying existing thermal concepts of biological harm, time-averaging and metrics for thermal heating as a basis for detecting and preventing harm from new wireless technologies in the face of strong evidence of harm without measureable heating.
- 5) New, biologically-based public exposure standards should be developed under the direction of experts in the biological effects and adverse health effects of chronic exposures to electromagnetic fields, drawing upon the substantial international body of scientific and public health literature, and not be limited to individuals in electrical and electronic engineering.
- 6) The agency to develop new biologically-based public exposure standards should be chosen to avoid the conflicts present now where the FCC acts both as the auctioneer to promote sale and use of radiofrequency radiation spectrum and works to actively enable the telecommunications



and electronics industries to develop and market new technologies through FCC compliance testing (Grants of Authorization). At the same time the FCC is charged with adopting effective

public health limits (for which it admits it has no health expertise) and for enforcing compliance with FCC public safety limits (for which it has a dismal and ineffective track record).

7) Immediate precautionary actions are urgently needed. New safety standards will take time to be developed and implemented. Societies in the interim need to begin making changes to reduce exposures now from wireless technologies (communications, data transmission, transportation, surveillance, environmental and medical monitoring, medical implants, etc.) in the interim.

8) It is not in the public interest to wait. The continued rollout of wireless technologies and devices puts global public health at risk from unrestricted wireless commerce unless new and far lower exposure limits and strong precautionary warnings for their use are implemented. Many millions of people, including the most vulnerable populations (the fetus, young children, the ill, the elderly and those with extreme sensitivity to exposures) who are affected by second-hand wireless radiation exposures must have better protection.

9) The cost of doing nothing is unacceptable. Substantial evidence for health risks from chronic exposure to wireless technologies cannot be dismissed in 2012, and if we do nothing, it will simply worsen rates of chronic diseases, disability and premature mortality.

10) The BioInitiative 2012 Report reports biological effects at exposure levels significantly below the 2007 recommended goal of 0.1 uW/cm<sup>2</sup>. Since 2007, five new studies of base-station level RFR at intensities ranging from less than 0.001 uW/cm<sup>2</sup> to 0.05 uW/cm<sup>2</sup> report headaches, concentration difficulties and behavioral problems in children and adolescents; and sleep disturbances, headaches and concentration problems in adults. If these results are confirmed to be due to RFR exposure exposure standards may need to be set at even lower levels in the future, as new and better studies are completed.

**Background:** The BioInitiative 2012 Report concludes that the evidence for health risks from electromagnetic fields (EMFs) generated by wireless technologies have substantially increased since 2007. A review of over 1800 new scientific studies indicates current guidelines are inadequate to protect the public from chronic exposure to very low-intensity (non-thermal) electromagnetic fields and radiofrequency radiation (EMF and RFR). It is incorporated by reference in this filing.

The 2012 BioInitiative Report was prepared by 29 authors from ten countries, ten holding medical degrees (MDs), 21 PhDs, and three MsC, MA or MPHs. Among the authors are three former Presidents of the Bioelectromagnetics Society and five full members of BEMS. One distinguished author is the Chair of the Russian National Committee on Non-Ionizing Radiation. Another is a Senior Advisor to the European Environmental Agency. Full titles and affiliations of authors is in Section 25 of the BioInitiative Report at [www.bioinitiative.org](http://www.bioinitiative.org)



In twenty-four technical chapters, the BioInitiative Working Group authors discuss the content and implications of about 1800 new studies since 2007. Overall, these new studies report abnormal gene transcription (Section 5); genotoxicity and single-and double-strand DNA damage (Section 6); stress proteins because of the fractal RF-antenna like nature of DNA (Section 7); chromatin condensation and loss of DNA repair capacity in human stem cells (Sections 6 and 15); reduction in free-radical scavengers - particularly melatonin (Sections 5, 9, 13, 14, 15, 16 and 17); neurotoxicity in humans and animals (Section 9); carcinogenicity in humans (Sections 11, 12, 13, 14, 15, 16 and 17); serious impacts on human and animal sperm morphology and function (Section 18); effects on the fetus, neonate and offspring (Section 18 and 19); effects on brain and cranial bone development in the offspring of animals that are exposed to cell phone radiation during pregnancy (Sections 5 and 18); and findings in autism spectrum disorders consistent with EMF/RFR exposure effects. Global precautionary actions that have been taken in countries around the world, and recommended by medical and research experts are documented in Section 22. Use of the Precautionary Principal and it's relevance are presented in Section 23. Key scientific evidence and public health policy recommendations are in Section 24.

See Appendix A for specific conclusions and findings of the BioInitiative 2012 Report, and see the Report at [www.bioinitiative.org](http://www.bioinitiative.org)

### **Recommendations to the FCC**

The FCC review of health and safety standards for radiofrequency radiation as presented (Federal Register/ Vol. 78, No. 107 / Tuesday, June 4, 2013 / Proposed Rules. Federal Communications Commission, 47 CFR Parts 1, 2, 15, 24, 25, 27, 73, 90, 95, 97, and 101 [ET Docket Nos. 03–137 and 13–84; FCC 13–39], Reassessment of Exposure to Radiofrequency Electromagnetic Fields Limits and Policies, Federal Communications Commission) does not begin to properly address the current scientific evidence that conclusively demonstrates biological effects and some adverse health effect of EMF and RFR exposures at low-intensity (non-thermal) exposure levels. The BioInitiative Reports (2007 and 2012) should define the discussion range for new chronic exposure limits; and not be drawn from re-examination of existing thermal standards.

In fact, these proposed rules and regulations relax rather than tighten exposure levels in the face of overwhelming scientific evidence that an entirely new paradigm for developing safety standards is warranted, and in fact, overdue. For example, declaring the pinna of the ear (the earlobe) to be an extremity, so as to allow a huge increase in allowable SAR exposure <sup>(5)</sup> at the head (affecting the brain including the auditory and other cranial nerves, the eye and salivary glands in the cheek) is reckless and unsupported by any legitimate expert review of the available evidence. <sup>(1,2,3)</sup> The FCC has not considered the special biology of the developing fetus, the young child, people of small stature, people with medical implants for serious chronic diseases and chronic pain in these proposed rule changes. These changes avoid making exposure-relevant reductions keyed to scientific benchmarks established in hundreds of in peer-reviewed, published studies reporting low-intensity (non-thermal) effects of chronic (prolonged) exposures now common in public life.



The new FCC public exposure limits must take into account the variable conductivity and permittivity of tissues of various ages and developmental stages and aging of humans, and the exquisite sensitivity of the human reproductive cells.

1) SUPPORT DEVELOPMENT OF NEW, BIOLOGICALLY-BASED PUBLIC SAFETY LIMITS BY A QUALIFIED AGENCY OR PROFESSIONAL ORGANIZATION:

The FCC'S thermal-based public safety MPEs and the SAR approach are useful to prevent tissue heating and damage; but not useful to protect the public against chronic exposures (as opposed to acute exposures) biologically active non-thermal, low-intensity NIER.

2) RECOGNIZE THE WHO IARC CLASSIFICATION OF RFR:

The WHO IARC classified RF radiation as a Group 2B Possible Human Carcinogen; it joins the IARC classification of ELF-EMF (Extremely Low Frequency Electromagnetic Fields) as a Group 2B Possible Human Carcinogen, which the FCC has also ignored. The evidence for carcinogenicity for RFR was primarily from cell phone/brain tumor studies but IARC applies this classification to all RFR exposures.

3) ADOPT SPECIFIC LANGUAGE ENDORSING THE PRECAUTIONARY PRINCIPLE:

The Commission should address and incorporate appropriate precautionary, public-health based measures to take into account the recent World Health Organization International Agency for Research on Cancer (IARC) classification of RFR as a Possible Human Carcinogen before subjecting widespread national populations to a preventable toxic exposure.

4) DEFINE BIOLOGICAL EFFECT AS HARMFUL INTERFERENCE WITH BIOLOGICAL ORGANISMS

A definition of biological effects should key to such effects that can reasonably be presumed to result in adverse health effects from exposure to RFR including but not limited to DNA damage; immune, blood-brain barrier, and calcium channel disruption; disturbed circadian rhythms; hormone dysregulation; degraded cognition and sleep; disrupted autonomic regulation; desynchronization of neural activity and other biological consequences of acute or chronic exposure to low-intensity NIER as documented in the BioInitiative 2007 and 2012 Reports.

5) RECLASSIFICATION OF THE PINNA SHOULD BE DEFERRED:

A reclassification of the pinna should be delayed by the FCC in all open dockets pertaining to completion of the FCC'S review of RFR health effects and proposed FCC compliance testing rule changes. New studies show adverse effects without relaxing this limit. <sup>(1,2,3,4)</sup> Lin <sup>(5)</sup> gives an answer to the FCC'S question asking on page 79 "*We request comment on the significance, if any, of the differences between these standards. For example, we request comment on whether using an averaging mass of 10 grams over a contiguous layer of tissue would yield a significantly different SAR value than that averaged over a 1-gram cube and whether that difference would be consistently higher or lower, particularly with enough consistency to be able to establish a definable relationship between the measurement methods*". See footnote to reference (5)



## 6) NEPA ASSESSMENT FOR FINAL RULES – APPENDIX A AND B

The Commission should require a NEPA assessment for Final Rules (App. A) and Proposed Rules (App. B). Proposed Rules in Appendix B, in particular, have the potential to adversely affect human health and environmental resources.

## 7) COMPLIANCE TESTING REQUIREMENTS

a) **Medical and Metal Implants:** Metal detectors in the 9 kHz range are not covered by current FCC rules and should be addressed with respect to the public with disabilities (medical and metal implants). People with deep brain stimulators for Parkinson’s disease are unable to pass through metal detectors because evidence exists that such exposures can shut down the electrodes in these devices, and such exposures are now preventing people with deep brain stimulators from normal activities (shopping, air travel, hospitals and health care facilities, attendance at public meetings and events, etc).

b) **Distance Exemptions:** More realistic provisions must be developed regarding distancing from RFR transmitters (wireless devices, wireless access points and routers, baby monitors, wireless utility meters, etc) for infants and children who cannot reasonably be expected to observe FCC rules for 20 cm or 40 cm separation. The basis for exemptions from routine evaluations (Appendix C – fixed, mobile or portable RF sources) assumes conservative derivations or worst-case predictions leading to “*minimal likelihood for the exposure limits for the general public to be exceeded*” based on faulty logic about what can be expected with regard to the general public knowing or being able to avoid breaching an arbitrary 20 cm or 40 cm distances.

c) **Compliance Testing:** Realistic assumptions about operation of wireless utility meter devices (‘smart meters’) should be mandatory in FCC testing and issuance of Grants of Authorization. FCC testing labs ignore the obvious two-antenna or three-antenna design of wireless utility meters, yet issue ‘Conditions’ for compliance that specify “*this compliance test is issued with the condition that the antenna may not operate in conjunction with other antennas*”. The FCC cannot reasonably issue Grants of Authorization based on lab testing that ignores typical construction of the device, and how in common practice it is installed and operated.

d) **Cumulative Effects:** Cumulative effects of RFR exposures from multiple wireless devices and environmental exposures are not sufficiently addressed, measured or tested under current or proposed FCC rules. The 2008 NAS Report on Research Needs for Wireless Device summarizes deficiencies for wireless effects on children, adolescents and pregnant women; wireless personal computers and base station antennas; multiple element base station antennas under highest radiated power conditions; hand-held cell phone compliance testing; and better dosimetric absorbed power calculations using realistic anatomic models for both men, women and children of different height and ages. Realistic assessments of cumulative RFR exposures need to be addressed, taking into account the high variability in environmental situations; and safety buffers below ‘effects levels’ need to be built into new FCC public safety limits.

e) **100% Duty Cycle:** FCC OET 65 should make clear that a 100% duty cycle will continue to be required in calculations of power density ‘where the public cannot be excluded’.



f) **Time-Averaging vs Pulsed RFR:** New public exposure limits for pulsed RFR are needed, rather than specifying compliance limits based on time-averaged fields. Many new wireless devices and exposures create pulsed RFR for users; such exposures are linked to biological disruption effects and adverse health impacts. Time-averaging is biologically inappropriate where such measurements effectively camouflage exposures by mathematical dilution. Positive assertions of safety of pulsed RFR exposures that are characterized only by time-averaging have been shown to be unsupportable.

8. **Basis for Biologically-based Public Exposure Limits:** Recommendations for new, biologically-based public exposure standards should not be derived from existing FCC/IEEE C95.1 thermal standards, which have other useful purposes but which are obsolete with respect to low-intensity, chronic exposure to new wireless technologies.

**Respectfully submitted:**

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The 2007 and 2012 BioInitiative Reports at [www.bioinitiative.org](http://www.bioinitiative.org) are incorporated by reference.

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*“First and foremost, for the first time in its history, the new IEEE standard instituted an exclusion for the pinnae or the external ears by relaxation of the above-mentioned basic SAR restriction from 2 W/kg to 4 W/kg. This choice segregates tissues in the pinnae apart from all other tissues of the human head. Of equal significance is the basic restriction for localized exposure at 2 W/kg in terms of SAR averaged over any 10 g of tissue. The SAR value has been increased from 1.6 W/kg averaged over any 1 g of tissue to 2 W/kg over any 10 g of tissue. Aside from the numerical difference between the SARs, the volume of tissue mass used to define the SARs in the new standard was increased from 1 g to 10 g. **The increase in tissue mass can have a profound influence on the actual quantity of RF energy allowed to be deposited in tissue by the new exposure standard.** It has been well established that the distribution of absorbed microwave energy is nonuniform, and it varies greatly from point to point inside a body. **An averaging volume that is as large as 10 g would tend to artificially flatten out the SAR distribution, whether it is computed or measured.** And the smoothing tends to substantially reduce the resulting SAR value. **Thus, a 10-g SAR at 2 W/kg could be equivalent to 1-g SARs of 5 W/kg or higher. Simply put, the absorbed energy averaged over a defined tissue mass of 10 g is inherently low compared to a 1-g SAR.**” (emphasis added)*