

Electromagnetic radiation (EMR): The most pervasive environmental exposures

By [BioInitiative](#)

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BioInitiative Report:

A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF)

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From <http://www.bioinitiative.org/report/index.htm>

I. SUMMARY FOR THE PUBLIC

A. Introduction

You cannot see it, taste it or smell it, but it is one of the most pervasive environmental exposures in industrialized countries today. Electromagnetic radiation (EMR) or electromagnetic fields (EMFs) are the terms that broadly describe exposures created by the vast array of wired and wireless technologies that have altered the landscape of our lives in countless beneficial ways.

However, these technologies were designed to maximize energy efficiency and convenience; not with biological effects on people in mind. Based on new studies, there is growing evidence among scientists and the public about possible health risks associated with these technologies.

Human beings are bioelectrical systems. Our hearts and brains are regulated by internal bioelectrical signals. Environmental exposures to artificial EMFs can interact with fundamental biological processes in the human body. In some cases, this can cause discomfort and disease.

Since World War II, the background level of EMF from electrical sources has risen exponentially, most recently by the soaring popularity of wireless technologies such as cell phones (two billion and counting in 2006), cordless phones, WI-FI and WI-MAX networks. Several decades of international scientific research confirm that EMFs are biologically active in animals and in humans, which could have major public health consequences.

In today's world, everyone is exposed to two types of EMFs: (1) extremely low frequency electromagnetic fields (ELF) from electrical and electronic appliances and power lines and (2) radiofrequency radiation (RF) from wireless devices such as cell phones and cordless phones, cellular antennas and towers, and broadcast transmission towers. In this report we

will use the term EMFs when referring to all electromagnetic fields in general; and the terms ELF and RF when referring to the specific type of exposure. They are both types of non-ionizing radiation, which means that they do not have sufficient energy to break off electrons from their orbits around atoms and ionize (charge) the atoms, as do x-rays, CT scans, and other forms of ionizing radiation. A glossary and definitions are provided in Section 18 to assist you. Some handy definitions you will probably need when reading about ELF and RF in this summary section (the language for measuring it) are shown with the references for this section.

B. Purpose of the Report

This report has been written by 14 (fourteen) scientists, public health and public policy experts to document the scientific evidence on electromagnetic fields. Another dozen outside reviewers have looked at and refined the Report.

The purpose of this report is to assess scientific evidence on health impacts from electromagnetic radiation below current public exposure limits and evaluate what changes in these limits are warranted now to reduce possible public health risks in the future.

Not everything is known yet about this subject; but what is clear is that the existing public safety standards limiting these radiation levels in nearly every country of the world look to be thousands of times too lenient. Changes are needed.

New approaches are needed to educate decision-makers and the public about sources of exposure and to find alternatives that do not pose the same level of possible health risks, while there is still time to make changes.

A working group composed of scientists, researchers and public health policy professionals (The BioInitiative Working Group) has joined together to document the information that must be considered in the international debate about the adequacy (or inadequacy) of existing public exposure standards.

This Report is the product of an international research and public policy initiative to give an overview of what is known of biological effects that occur at low-intensity EMFs exposures (for both radiofrequency radiation RF and power-frequency ELF, and various forms of combined exposures that are now known to be bioactive). The Report examines the research and current standards and finds that these standards are far from adequate to protect public health.

Recognizing that other bodies in the United States, United Kingdom, Australia, many European Union and eastern European countries as well as the World Health Organization are actively debating this topic, the BioInitiative Working Group has conducted an independent science and public health policy review process. The report presents solid science on this issue, and makes recommendations to decision-makers and the public. Conclusions of the individual authors, and overall conclusions are given in Table 2-1 (BioInitiative Overall Summary Chart).

Eleven (11) chapters that document key scientific studies and reviews identifying low-intensity effects of electromagnetic fields have been written by members of the BioInitiative Working Group. Section 16 and 17 have been prepared by public health and policy experts. These sections discuss the standard of evidence which should be applied in public health

planning, how the scientific information should be evaluated in the context of prudent public health policy, and identifies the basis for taking precautionary and preventative actions that are proportionate to the knowledge at hand. They also evaluate the evidence for ELF that leads to a recommendation for new public safety limits (not precautionary or preventative actions, as need is demonstrated).

Other scientific review bodies and agencies have reached different conclusions than we have by adopting standards of evidence so unreasonably high as to exclude any conclusions likely to lead to new public safety limits. Some groups are actually recommending a relaxation of the existing (and inadequate) standards. Why is this happening? One reason is that exposure limits for ELF and RF are developed by bodies of scientists and engineers that belong to professional societies who have traditionally developed recommendations; and then government agencies have adopted those recommendations. The standard-setting processes have little, if any, input from other stakeholders outside professional engineering and closely-related commercial interests. Often, the industry view of allowable risk and proof of harm is most influential, rather than what public health experts would determine is acceptable.

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