

## The BioInitiative Working Group Report

A report assessing research on the potential health effects of exposure to electric and magnetic fields (EMF) was recently issued by the BioInitiative Working Group. This group, consisting mainly of EMF scientists, was convened on an ad hoc basis to conduct an independent examination of EMF health risk. The group was not convened under the imprimatur of a governmental body, professional society, or recognized risk assessment organization, such as the International Agency for Research on Cancer (IARC). The group's report, *BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF)*, was coedited by Dr. David Carpenter, Director of the Institute for Health and the Environment at the University at Albany in New York, and Ms. Cindy Sage, who has been involved with EMF and power line siting issues. Dr. Carpenter and Ms. Sage are responsible for a section of the report that summarizes the scientific evidence and for making recommendations based on this summary. The full report can be found at <http://www.bioinitiative.org/>.

The BioInitiative Report covers both the extremely low frequency (ELF) EMF associated with electric power and radio-frequency (RF) EMF from sources such as cellular telephones and RF transmitters. Its main conclusion is that limits for public EMF exposure set by organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and the Institute of Electrical and Electronics Engineers (IEEE) are inadequate to protect health and require substantial reduction. For ELF magnetic fields, the report recommends a more than 800-fold reduction of the ICNIRP limit and a 9,000-fold reduction of the IEEE limit. For RF fields, a 2,000-fold reduction is recommended.

The current ICNIRP limit for public ELF EMF exposure at power frequency in the United States is 0.83 Gauss (0.083 millitesla), and the IEEE limit is 9.1 Gauss (0.91 millitesla). The limits for ELF magnetic fields recommended in the BioInitiative Report "while new ELF limits are being developed and implemented" are 1 milligauss (0.1 microtesla) for "habitable space adjacent to all new or upgraded power lines" and 2 milligauss (0.2 microtesla) for all other new construction. The report also recommends a 1-milligauss limit for "existing habitable space for children and/or women who are pregnant." The recommended limit for outdoor RF exposure is 0.1  $\mu\text{W}/\text{cm}^2$ .

### EPRI Perspective

Unlike the expert panels that conducted previous EMF health risk evaluations for IARC, the U.S. National Institute of Environmental Health Sciences (NIEHS), and the World Health Organization (WHO), the BioInitiative Working Group was not convened by any governmental bodies or recognized health risk assessment organizations. Moreover, its conclusions, opinions, and recommendations are not consistent with those reached by previous panels.

All previous assessments recognize the association found in epidemiologic studies between residential ELF magnetic fields and childhood leukemia and the unexplained nature of this association. When all EMF health studies are considered together, the risk of leukemia for children with average residential magnetic fields above 3 to 4 milligauss (0.3 to 0.4 microtesla) is about 1.7 to 2.0 times the risk of children in residences with lower fields. For such weak epidemiologic associations, supporting data from laboratory studies are usually critical for establishing a causal link. Long-term studies of ELF magnetic field exposure in rodents are consistently negative, and there is no biophysically plausible basis for a causal relationship. Nevertheless, the BioInitiative Working Group concluded that "up to 80% of childhood leukemia may be caused by exposure to ELF," an estimate that is unsubstantiated. Moreover, the 1-milligauss limit the working group calls for would produce a dose in the body between 200 and

2,000 times less than the lowest dose levels expert panels believe could cause biological effects. Studies of RF exposure and cancer in rodents have also been negative, and the BioInitiative Report's recommended limits for RF exposure would produce a very small deposition of energy in the body.

Unlike the BioInitiative Report, previous EMF health risk assessments that have made recommendations regarding precautionary measures (for example, a 1999 NIEHS report and a 2007 WHO assessment) have supported measures that are safe and cost-effective. For example, WHO recommends implementation of low-cost measures in the design and engineering of new facilities, devices, and equipment, including appliances.


The BioInitiative Report will likely be subject to further scrutiny and review by the scientific community. Despite the report's position, the scientific community has determined that the ICNIRP and IEEE guidelines are protective against the known effects of ELF and RF exposures. The ICNIRP and IEEE exposure limits for ELF magnetic fields are designed to prevent nerve stimulation caused by electric fields induced in the body. As WHO stated in its June 2007 *Environmental Health Criteria* document with respect to acute neural stimulation effects of EMF exposure, "International guidelines exist that have addressed this issue. Compliance with these guidelines provides adequate protection." RF exposure limits, such as those published by the Federal Communications Commission (FCC), ICNIRP, and IEEE are designed to protect against tissue heating from deposition of thermal energy in the body. WHO plans to review the RF literature in coming years.

EPRI's EMF Health Assessment and RF Safety program continues to conduct research to investigate the uncertainties surrounding the association of magnetic fields with childhood leukemia and to address priority issues related to RF exposure, dosimetry, and safety practices.

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