



The Bioinitiative Report's Assessment of the Evidence and Policy Advice

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The Bioinitiative Report

- Prepared by an international team of 14 scientists with EMF expertise.
- Provides a comprehensive review of known effects on the immune and nervous systems, gene induction, stress responses, and cancer promotion, as well as bone and tissue repair.
- Provides a review of mechanistic data and current standards.



Background

- Electromagnetic fields (EMFs) permeate our environment, and everyone is exposed to both powerline frequency (ELF) and radiofrequency (RF) fields.
- There have been cell, animal and human studies for many years, many of which demonstrate physiologic effects.
- Most international and national reports have concluded that evidence of harm to humans is insufficient to conclude that EMFs are harmful.
- We find these conclusions to be unjustified and incompatible with the precautionary principle.



Key Fallacies 1

- Evidence for elevated risk of childhood leukemia from exposure to power line frequency EMF is weak and inconsistent.



Untrue!

- The 1997 NRC report states “The link between wire-code rating and childhood leukemia is statistically significant (unlikely to have arisen from chance) and is robust in the sense that eliminating any single study from the groups does not alter the conclusion that the associations exist.”
- The 2007 WHO report states “..epidemiological data...show an association between ELF magnetic field exposure and an increased risk of childhood leukemia.”
- The evidence for a relationship between ELF magnetic fields and childhood leukemia is neither weak nor inconsistent.



Key Fallacies 2

- Only a small number of children are affected.



Unjustified!

- Exposure assessment is grossly inadequate (usually only residential exposure to external powerline fields), yet elevated risks are found.
- No study adequately documents risk upon consideration of all sources of EMFs: powerlines, appliances, household wiring, RF at home, school and other venues.
- Because of these limitations in exposure assessment it is not possible to determine the number of children affected.



Key Fallacies 3

- The risk is low.



Unjustified!

- Given the inadequate exposure assessment it is not possible to determine the degree of risk.
- In circumstances where only one (often minor) component of exposure is determined the risk is undoubtedly underestimated, perhaps significantly.



Key Fallacies 4

- There is insufficient evidence that adult disease are secondary to ELF exposure.



Untrue!

- Occupational studies show elevations in leukemia, the same cancer found in children. And this with only occupational exposure, so poor exposure assessment.
- Evidence for an association between exposure and development of Alzheimer's Disease and ALS is strong and consistent.
- Evidence for other cancers (brain, breast, prostate, non-Hodgkin's, melanoma) is growing.



Key Fallacies 5

- There is little evidence that low-intensity RF fields pose human health hazards.



Untrue!

- Korean studies show elevated leukemia in children exposed to AM radio frequencies.
- Swedish studies show elevated brain cancer and acoustic neuromas in individuals using a mobile phone for 10+ years.
- Israeli studies show elevated parotid gland cancers in heavy mobile phone users.



Key Fallacies 6

- There is no animal evidence that EMFs cause cancer.



It is correct that there is no good animal model but the fallacy is in requiring that they be a good animal model.

- There are no good animal models for many human diseases, including cancer from some exposures, Alzheimer's Disease, ALS.
- Dogs in high current homes in Denver get lymphoma.
- Evidence for harm in humans is of much greater importance than having an animal model.



Key Fallacies 7

- We do not know a mechanism.



Untrue!

- We know several mechanisms that may lead to cancer, including DNA damage, gene induction, heat-shock proteins, and free radical generation.
- We do not know the mechanism for generation of most cancers or neurodegenerative diseases, even those that have been intensively studied for many years.
- As for other cancers it is naïve to expect one single mechanism of action.



What Does the Future Hold?

- Of particular concern is the possibility that we will see a RF-induced epidemic of brain cancer, acoustic neuroma and leukemia in the future, due to the long latency for these diseases following exposure.
- The risks of ELF-induced cancers and neurodegenerative diseases are documented and must be expected to increase with exposure and time.
- There is overwhelming evidence that in general children are more vulnerable than adults to environmental exposures. Unfortunately children are major users of cell phones in today's culture.



Recommended Standards

- Because of evidence for elevated risk of childhood cancer in children exposed to power line fields of 0.2 to 0.5 μT , we recommend an exposure standard of 0.1 μT .
- For RF we recommend a cautionary target level of 0.1 $\mu\text{W}/\text{cm}^2$. Even this may not be totally protective, however.



Implications of the Proposed Standards

- Our recommended standard of $0.1 \mu\text{W}/\text{cm}^2$ is to be compared with the current ANSI/IEEE limit for uncontrolled public exposure to 800-900 MHz of $530\text{-}600 \mu\text{W}/\text{cm}^2$.
- We realize that imposition of this standard will not be easy and will have serious implications in terms of both cost, technology and life-style.
- However, given the growing evidence of adverse human health effects from RF exposure, it is foolish to ignore the issue and not energetically search for solutions.