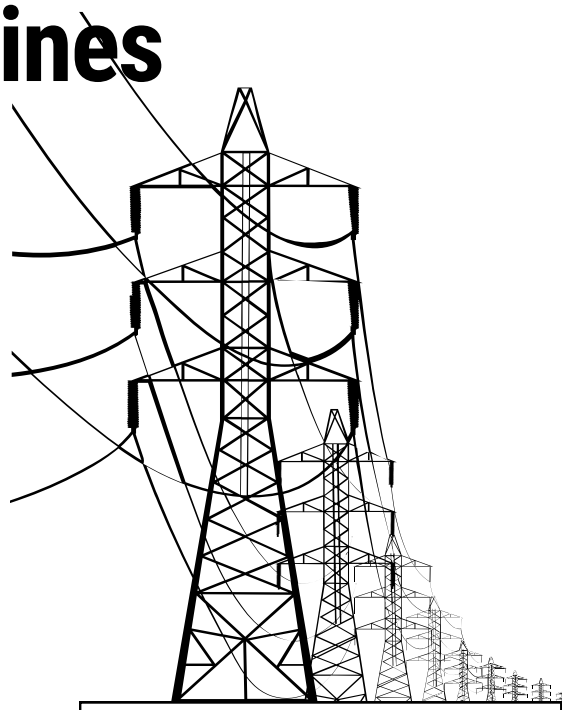
High-Voltage Power Lines EMF & Health



What Are EMFs?

High-voltage power lines and substations emit electric and magnetic fields (EMF), forms of non-ionizing radiation known as extremely low-frequency (ELF) EMF. People and animals are exposed to this EMF when near a power line, substation, or electrical grid infrastructure.

Scientific research has reported numerous adverse effects from EMF exposure.

Childhood Leukemia

Multiple epidemiological studies have reported an association between long-term residential exposure to ELF-EMF from power lines and childhood leukemia.

The World Health Organization's International Agency for Research on Cancer classified ELF magnetic fields as possibly carcinogenic to humans in 2002, based largely on findings of childhood leukemia.

Alzheimers and Miscarriage

A 2026 study of over 3.5 million people linked exposure to EMF from power lines to increased deaths from Alzheimer's.

A large body of peer-reviewed research has also reported adult cancers, miscarriage, sleep changes, genetic damage, and other biological effects.

A Regulatory Gap: No U.S. Safety Standards

EPA efforts to develop safety limits for EMF exposure ended after federal funding was cut decades ago.

The industry uses limits that primarily protect against short-term effects such as nerve and muscle stimulation. These limits do not address health effects from long-term exposure, like cancer.

Childhood leukemia is reported at levels of 3-4 mG.
Yet industry limits allow 2,000 (ICNIRP) - 9,040 mG (IEEE).

***No Safety Consensus**:* Hundreds of scientists are calling for protections to reduce EMF exposure due to research reporting adverse effects.

Wildlife Needs Protection

Research on honeybees has reported changes in stress responses, learning, behavior, and pollination activity.

Studies of birds and other wildlife have reported effects on behavior, reproduction, growth, DNA, and endocrine function.

"The scientific evidence, especially leukemia, brain and breast cancer, and Alzheimer's disease, associated with EMF exposure is sufficiently strong to warrant policy action."

-David O. Carpenter, MD
Director, Institute for Health and the Environment
University at Albany, New York

International Actions to Reduce EMF

Unlike the USA, over 20 countries and regions have policies and official recommendations to limit EMF exposure to levels thousands of times more restrictive than industry limits.

- **Netherlands:** Prohibits exposure levels above 4 mG for new homes, schools, and daycares. Government has bought out homes beneath high-voltage power lines to reduce exposure.
- **Finland:** Radiation authory advises avoiding homes with levels over 4 mG and recommends low EMF exposure.

Scientific References
EHSciences.org

Environmental Health Sciences

Key Peer-Reviewed Research Reviews and Studies

This document is hyperlinked to the study online.

CHILDHOOD LEUKEMIA & CANCER

Exposure to magnetic fields and childhood leukemia: a systematic review and meta-analysis of case-control and cohort studies
Brabant, C. et al. (2022) · *Reviews on Environmental Health*
"Our results suggest that ELF-MF higher than **0.4 µT** [4 mG] can increase the risk of developing leukemia in children, probably acute lymphoblastic leukemia."

Exposure to extremely low-frequency magnetic fields and childhood cancer: a systematic review and meta-analysis
Seomun, G. et al. (2021) · *PLOS ONE*
"In this large pooled analysis of **more than 36,000 children** diagnosed with childhood leukemia, statistically significant associations were observed between exposure to ELF-MF and childhood leukemia. Furthermore, the intensity of the association between exposure to ELF-MFs and childhood leukemia was high."

Residential proximity to power lines and risk of brain tumor in the general population
Carles, C. et al. (2020) · *Environmental Research*
"Our results strongly suggest that the risk of brain tumor, and particularly gliomas could be associated with residential ELF-MF exposure estimated by proximity of power lines, as several previous studies have already pointed out."

Extremely low frequency electromagnetic fields and cancer: how source of funding affects results
Carpenter, D. (2019) · *Environmental Research*
"Magnetic field exposure causes childhood leukemia in government-funded studies… Magnetic field exposure increases risk of adult leukemia, brain and breast cancer. Steps should be taken to reduce human exposure to elevated magnetic fields."

ALZHEIMER'S

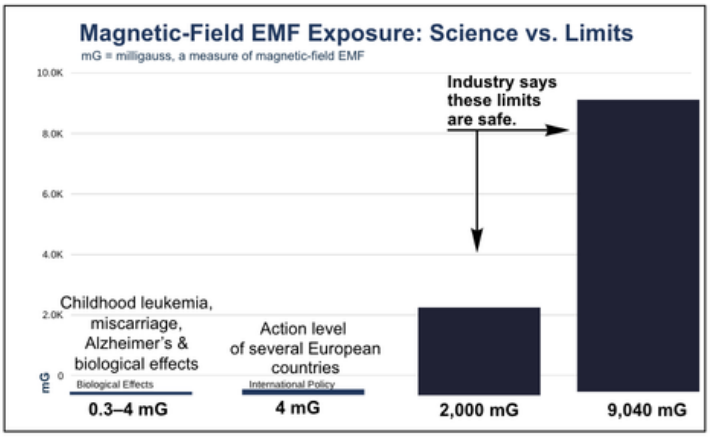
Long-term residential magnetic field exposure and neurodegenerative disease mortality: an 18-year nationwide cohort study in Switzerland
Sandoval-Diez N., et al. (2026) · *Environment International*
"We followed **3,555,064 adults** from the Swiss National Cohort (2001–2018)." "Long-term ELF-MF exposure was associated with higher dementia mortality risk in the general population."

Residence near power lines and mortality from neurodegenerative diseases: longitudinal study of the Swiss population
Huss et al. (2008) · *American Journal of Epidemiology*
"The relation between residential magnetic field exposure from power lines and mortality from neurodegenerative conditions was analyzed among **4.7 million persons**… There was a **dose-response relation** with respect to years of residence in the immediate vicinity of power lines and Alzheimer's disease."

BIOLOGICAL EFFECTS

Insights in the biology of extremely low-frequency magnetic fields exposure on human health
Karimi, A., et al. (2020) · *Molecular Biology Reports*
"According to our literature review, exposure to ELF-EMF has an adverse biological effect depending on the current intensity, strength of the magnetic field, and duration of exposure. Accumulated epidemiologic evidence indicates a **correlation between exposure to ELF-EMF and childhood cancer incidence, Alzheimer's disease (AD), and miscarriage**."

Cellular and molecular effects of non-ionizing electromagnetic fields
Lai, H., & Levitt, B. (2023) · *Reviews on Environmental Health*
"The way that living cells respond to non-ionizing EMF, including static/extremely-low frequency and radiofrequency electromagnetic fields, fits the pattern of **'cellular stress response'** – a mechanism manifest at the cellular level intended to preserve the entire organism."



ENDOCRINE SYSTEM

A narrative review on the influence of electromagnetic fields below 100 kHz on the endocrine system
Tojza, P. et al. (2026) · *Applied Sciences*
"Preclinical studies… have reported a range of biological responses potentially associated with ELF-EMF exposure." "The widespread exposure to low-frequency electromagnetic fields **justifies precautionary considerations**."

FLORA & FAUNA

Effects of non-ionizing electromagnetic fields on flora and fauna, Part 2: how species interact with natural and man-made EMF
Levitt, B., et al. (2021) · *Reviews on Environmental Health*
"Effects from both natural and man-made EMF over a wide range of frequencies, intensities, wave forms, and signaling characteristics have been observed in **all species of animals and plants investigated**."

Biological effects of electromagnetic fields on insects: a systematic review and meta-analysis
Thill, A., et al. (2023) · *Reviews on Environmental Health*
"This systematic review summarizes the results of studies investigating the toxicity of EMF in insects." "**The vast majority of studies found effects, generally harmful ones.**"

Electromagnetic fields disrupt the pollination service by honeybees
Molina-Montenegro et al. (2023) · *Science Advances*
"Our study provides conclusive evidence of detrimental impacts of EMF on honeybee's pollination behavior, leading to negative effects on plant community."

STUDIES BY KAISER PERMANENTE RESEARCHERS

Exposure to magnetic field non-ionizing radiation and the risk of miscarriage: a prospective cohort study
Li, D.-K., et al. (2017) · *Scientific Reports*
"After controlling for multiple other factors, women who were exposed to higher [magnetic field non-ionizing radiation (MF)] levels had **2.72 times the risk of miscarriage**… than those with lower MF exposure. The increased risk of miscarriage associated with high MF was consistently observed regardless of the sources of high MF."

A prospective study of in-utero exposure to magnetic fields and the risk of childhood obesity
Li et al. (2012) · *Scientific Reports*
"Prenatal exposure to high [magnetic fields (MF)] level was associated with **increased risk of being obese** in offspring than those with lower MF level."

Maternal exposure to magnetic fields during pregnancy in relation to the risk of asthma in offspring
Li et al. (2011) · *Archives of Pediatrics & Adolescent Medicine*
"In this prospective cohort study, we found that a high maternal MF exposure level in pregnancy is associated with a **significantly increased risk of asthma in offspring**."