

POWER LINES AND ELECTRIC AND MAGNETIC FIELDS

WHAT YOU NEED TO KNOW



Electric and magnetic fields, commonly known as EMF, exist wherever electricity is produced or used, including around any electric appliance or wire that conducts electricity. Whenever you turn on a lamp, use a microwave or use your computer, these frequencies are around.

The electric power we use in America is a 60 Hertz (Hz) alternating current, meaning the electric charges move back and forth 60 times per second, creating an 'extremely low frequency' field. These are different from the much higher frequency fields associated with radio and TV waves and cell phone signals.

What are electric and magnetic fields?

Electric fields are created by voltage — the higher the voltage, the stronger the field. Anytime an electric appliance is plugged in, even if it isn't on, an electric field is created in its vicinity. But these fields are easily blocked by walls, trees and even clothes and skin—and the farther away you move from the source of the electric field, the weaker it becomes. Moving even a few feet away from an appliance makes a big difference in the strength of the field that you're exposed to.

Magnetic fields, measured in milliGauss (mG), are produced by electric current and only exist when electricity is flowing through a wire or an appliance is turned on — the higher the current, the greater the magnetic field. As with electric fields, the strength of a magnetic field dissipates rapidly as you move away from its source.

Why are you calling them electric and magnetic fields instead of electromagnetic fields? Is there a difference?

These terms are often used interchangeably, and both electric and magnetic fields from power lines and electromagnetic fields may be abbreviated as EMF. However, there are differences between low frequency power line EMF and higher frequency radio waves.

The frequency (i.e., the rate of time variation) of fields produced by the generation, transmission and use of electricity — typical of most household and office appliances and power lines — are low, and electric and magnetic fields exist separately. At higher frequencies, such as with radio or TV signals, the fields are interrelated and are more accurately described by the term "electromagnetic." Radio and TV electromagnetic waves are meant to transmit away from the antenna and carry radio frequency energy to the receiver. The EMF from power lines is too low in frequency to carry any significant energy away, and the electric power stays on the utility lines.

It is important to recognize that power line EMF and radio frequency electromagnetic waves should not be confused with ionizing radiation such as X-rays. Because of its dramatically higher frequency, ionizing radiation (like X-rays) has enough energy to alter chemical bonds and damage biological molecules, something that lower frequencies in the electromagnetic spectrum (power lines, radio, TV and infrared) cannot do.

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What about EMF and power lines?

The World Health Organization (WHO), and research organizations have studied the potential for EMF to affect human health and have never found correlation between exposure to EMF and negative health issues.

Despite many studies, the evidence for whether electromagnetic fields have any effect on cancer risk remains highly controversial. However, it is clear that if electromagnetic fields do have an effect on cancer, then any increase in risk will be extremely small. The results to date contain many inconsistencies, but no large increases in risk have been found for any cancer in children or adults.

A number of epidemiological studies suggest small increases in risk of childhood leukemia with exposure to low frequency magnetic fields in the home. However, scientists have not generally concluded that these results indicate a cause-effect relation between exposure to the fields and disease (as opposed to artifacts in the study or effects unrelated to field exposure). In part, this conclusion has been reached because animal and laboratory studies fail to demonstrate any reproducible effects that are consistent with the hypothesis that fields cause or promote cancer. Large-scale studies are currently underway in several countries and may help resolve these issues.

Sources and useful links

The following are links to more information and studies on EMF:

- Extremely low frequency fields. World Health Organization. <https://www.who.int/publications/i/item/9789241572385>. Published March 13, 2007.
- Power lines, electrical devices and extremely low frequency radiation. American Cancer Society. <https://www.cancer.org/cancer/risk-prevention/radiation-exposure/extremely-low-frequency-radiation.html>. Revised October 28, 2022.
- Electromagnetic fields and cancer. National Cancer Institute. <https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet>. Reviewed May 30, 2022.
- Electric and magnetic fields from power lines and electrical appliances. Government of Canada. <https://www.canada.ca/en/health-canada/services/health-risks-safety/radiation/everyday-things-emit-radiation/power-lines-electrical-appliances.html>. Revised November 1, 2022.

