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## Electric and Magnetic Fields from Power Lines

### Radiation Facts

- Scientific studies have not clearly shown whether exposure to EMF increases cancer risk.

Electric and magnetic fields, also known as electromagnetic fields (EMF), consist of waves of electric and magnetic energy moving together. These energy fields surround us all the time. Scientific studies have not clearly shown whether exposure to EMF increases cancer risk. A few studies have connected EMF and health effects, but they have not been able to be repeated. This means that they are inconclusive. Scientists continue to conduct research on the issue.

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- [About Electric and Magnetic Fields from Power Lines](#)
- [What you can do](#)
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## About Electric and Magnetic Fields from Power Lines



This is a picture of a field of grass with some surrounding trees; in the middle of the image there are power lines and their utility poles.

## Electromagnetic Radiation (EMR)

Electromagnetic radiation (EMR) consists of waves of electric and magnetic energy moving together through space. An example of electromagnetic radiation is visible light. Electromagnetic radiation can range from low to high frequency, which is measured in hertz, and can range from low to high energy, which is measured in electron volts. Wavelength, another term associated with electromagnetic radiation, is the distance from the peak of one wave to the next.

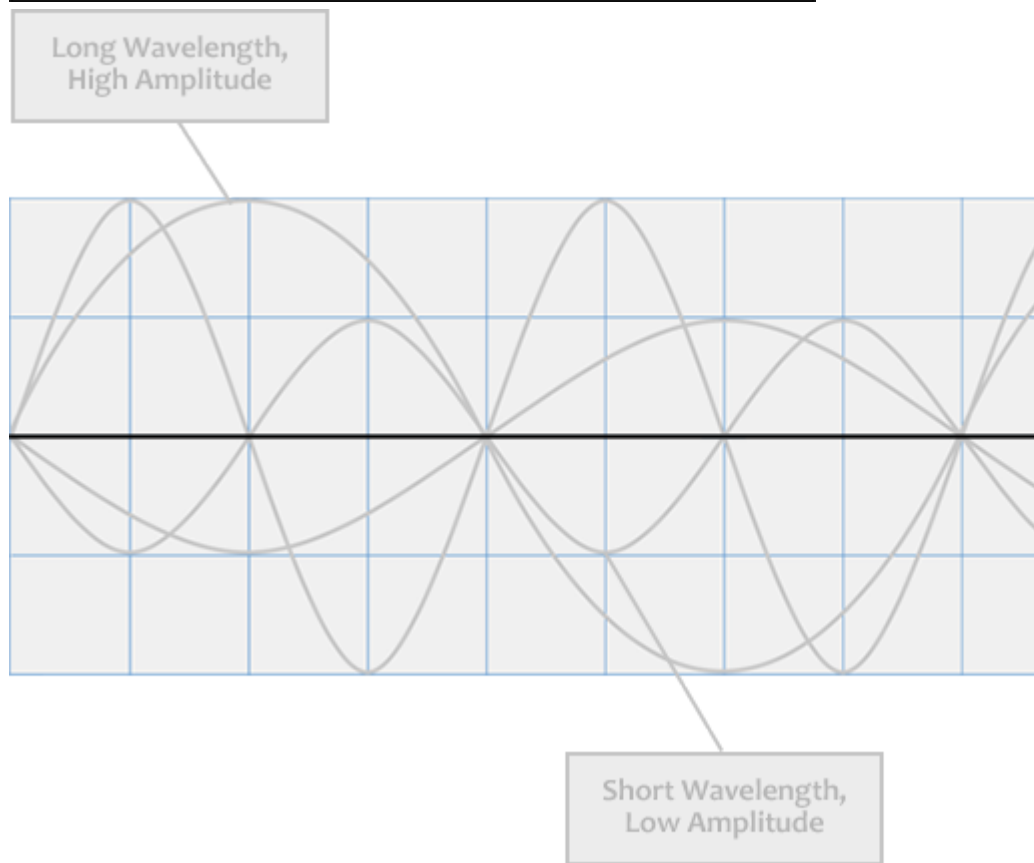
There are two general kinds of electromagnetic radiation: ionizing radiation and non-ionizing radiation. Ionizing radiation is powerful enough to knock electrons out of their orbit around an atom. This process is called ionization and can be damaging to a body's cells. Non-ionizing radiation has enough energy to move atoms in a molecule around and cause them to vibrate, which makes the atom heat up, but not enough to remove the electrons from the atoms.

## Electromagnetic Fields (EMF)

Electromagnetic fields associated with electricity are a type of low frequency, non-ionizing radiation, and they can come from both natural and man-made sources. For example, lightning during a thunderstorm creates electromagnetic radiation because it creates a current between the sky and the ground. Surrounding that current is an electromagnetic field. One example is the Earth's magnetic field. We are always in the Earth's magnetic field, which is generated at the Earth's core. This magnetic field makes compasses work and is also used by pigeons and fish to navigate. The image below shows the range of frequencies for different forms of electromagnetic radiation found in the electromagnetic spectrum.

## Wavelength and Amplitude

Click on a wave in the graph below to explore wavelength and amplitude



**Amplitude:**  
the distance  
between the  
peak or trough  
of a wave,  
and  
the “still point”

The waves from power lines and electrical devices have a much lower frequency than other types of EMR, such as microwaves, radio waves or gamma rays. However, a low frequency wave does not necessarily mean that it is low energy; a charging cable for a phone produces a low frequency, low energy electromagnetic field, while a high-tension power line can create a much higher energy electromagnetic field that is still low in frequency.

EMR associated with power lines is a type of low frequency non-ionizing radiation. Electric fields are produced by electric charges, and magnetic fields are produced by the flow of electrical current through wires or electrical devices. Because of this, low frequency EMR is found in close proximity to electrical sources such as power lines. As current moves through a power line, it creates a magnetic field called an electromagnetic field. The strength of the EMF is proportional to the amount of electrical current passing through the power line and decreases as you move farther away. Because of this property, the exposure to an electromagnetic field you would receive from a power line decreases with distance.

## What You Can Do

If you are concerned about possible health risks from electric and magnetic fields, you can:

- **Increase the distance between yourself and the source.** The greater the distance between you and the source of EMF, the lower your exposure.
- **Limit the time spent around the source.** The less time you spend near EMF, the lower your exposure.

## Where to Learn More

Multiple agencies within the federal government regulate EMF. The agency that sets standards for EMF depends on the frequency of the EMF. However, in the United States, there are no federal standards limiting electromagnetic fields from power lines and other similar sources. Some states set standards for the width of right-of-ways under high-voltage transmission lines because of the potential for electric shock.

### **The World Health Organization (WHO)**

The WHO studies EMF and RF and invites scientists from all over the world to collaborate on their research.

[Electromagnetic Fields \(EMF\)](#) **EXIT**

This page discusses the World Health Organization's (WHO's) EMF Project.

### **Department of Health and Human Services (HHS), National Institutes of Health (NIH), National Institute of Environmental Health (NIEHS)**

The National Institute of Environmental Health Sciences (NIEHS)'s mission is to discover how the environment affects people in order to promote healthier lives.

[Electric & Magnetic Fields](#)

This page includes a link to a report created by NIEHS that addresses EMF from power lines.

### **The States**

Some state radiation protection programs have guidance and information on their state's non-ionizing radiation regulations.

[Radiation Control Programs](#) **EXIT**

The Conference of Radiation Control Program Directors (CRCPD)  
This webpage provides links and contact information for each state's Radiation Control Program office.

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