



## Electricity and Health

**The scientific evidence does not establish that exposure to the electric and magnetic fields found around the home, the office or near powerlines causes health effects.**

Electricity powerlines, substations, transformers and other electrical sources such as common electrical appliances and wiring, all emit extremely low frequency (ELF) electric and magnetic fields (EMF). As we are surrounded by electrical sources in our daily lives we are all exposed to some level of ELF EMF constantly. This fact sheet has been prepared to address concerns that exposure to ELF EMF may cause health effects, particularly leukaemia in children.

### Do electrical sources cause any health effects?

Exposure to ELF EMF at high levels can affect the functioning of the nervous system. However, exposure to high levels of ELF EMF is not normally found in the everyday environment from electrical sources. While such exposures are very unusual, there are international guidelines on limits of exposure which are aimed at preventing established harmful effects.

There has been a lot of research on whether exposure to ELF EMF from electrical sources below the exposure limits causes any health effects. Most of the research indicates that ELF EMF exposure normally encountered in the environment, including in the vicinity of powerlines, does not pose a risk to human health. However, there are some epidemiological (population) studies that have reported a possible association between prolonged exposure to ELF magnetic fields at levels below the exposure limits but higher than what is typically encountered and increased rates of childhood leukaemia. Based largely on this limited evidence the International Agency for Research on Cancer has classified ELF magnetic fields as possibly carcinogenic to humans.

There are problems with the methods in epidemiological studies that weaken the conclusion from these results. It is not known how magnetic fields could cause childhood

leukaemia. Overall, other research including studies on cells and animals has not confirmed these results. On balance, the evidence related to childhood leukaemia is not strong; however people should be aware of the issue in order to make informed decisions.

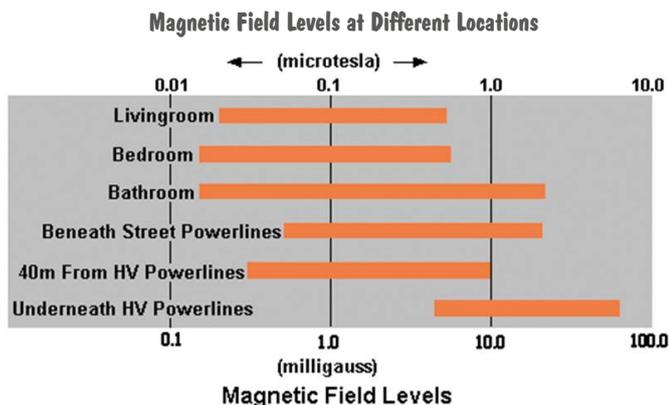
### How can I measure my exposure to ELF magnetic fields?

ARPANSA has meters available for hire to measure the levels of magnetic fields. The strength of magnetic fields is described in one of two units, microtesla ( $\mu\text{T}$ ) or milligauss (mG), where  $1 \mu\text{T} = 10 \text{ mG}$ .

### How close can I live or work near powerlines or other electrical sources?

There is no established evidence that the exposure to magnetic fields from powerlines, substations, transformers or other electrical sources, regardless of the proximity, causes any health effects. In view of the epidemiological studies, however, the possibility remains that prolonged exposure to higher than typical magnetic fields may increase the risk of leukaemia in children.

For homes near high voltage (HV) powerlines the magnetic field exposure will vary according to the amount of current carried by the powerline and the distance of the home from the powerline. Generally, homes that are more than 50 m from a high voltage powerline are not expected to have higher than typical magnetic fields. For substations and transformers the magnetic fields at distances of 5-10m away are generally indistinguishable from typical background levels in the home. The figure over shows a range of magnetic field levels measured by ARPANSA around powerlines and in Australian homes. These are well below the exposure limit in the international guidelines of  $200 \mu\text{T}$  (2000 mG).



It is important to note that living further away from high voltage powerlines will not necessarily decrease magnetic field exposures in the home or reduce any possible risks associated with magnetic fields from electricity.

### What about electrical sources within the home?

The magnetic fields from electrical sources within the home such as computers and other appliances are much lower than from powerlines and so they are not associated with health effects.

Some people are concerned about the magnetic field levels from electricity meter boxes which are often located near bedrooms. For those concerned about sleeping next to meter boxes:

- Moving the bed away from the meter box (typically more than one metre) will decrease the exposure.
- Hiring a magnetic field meter can establish what the levels actually are in the room.
- Moving the meter box is another option although this may be costly.

The above measures can also be applied to reducing exposure from solar inverters which are another domestic source of higher than typical magnetic fields during daylight hours.

### Conclusion

The scientific evidence does not establish that exposure to ELF EMF found around the home, the office or near powerlines and other electrical sources is a hazard to human health.

ARPANSA maintains continual oversight of emerging research into the potential health effects of the EMF exposure from powerlines and other electrical sources in order to provide accurate and up-to-date advice.

### Useful Links

ARPANSA fact sheet on ELF EME

[www.arpansa.gov.au/RadiationProtection/basics/elf.cfm](http://www.arpansa.gov.au/RadiationProtection/basics/elf.cfm)

ARPANSA provides advice on measuring magnetic fields

[www.arpansa.gov.au/RadiationProtection/FactSheets/is\\_magFields.cfm](http://www.arpansa.gov.au/RadiationProtection/FactSheets/is_magFields.cfm)

Exposure Guidelines on ELF EMF by the International Commission on Non-Ionizing Radiation Protection

[www.icnirp.org/cms/upload/publications/ICNIRPLFgdl.pdf](http://www.icnirp.org/cms/upload/publications/ICNIRPLFgdl.pdf)

World Health Organization fact sheet on ELF EMF

[www.who.int/peh-emf/publications/facts/fs322/en/](http://www.who.int/peh-emf/publications/facts/fs322/en/)