

Leukaemia Foundation of Australia

Position Statement: Powerlines and Childhood Leukaemia

Summary

The Leukaemia Foundation acknowledges that there is a great deal of community concern regarding the potential health effects of living close to high voltage powerlines. The possible link between proximity to these lines and exposure to the powerful electromagnetic fields (EMFs) they produce and childhood leukaemia has been the subject of a number of international studies over the past 30 years. While some have reported an *association* between exposure to high-level EMFs (greater than 0.4 μ T) and acute lymphoblastic leukaemia (ALL) in children, to date there is insufficient evidence to prove any *causal* link (i.e. that EMFs cause childhood leukaemia). There is no consistent evidence either to prove childhood exposures are associated with brain or any other types of solid tumours.

The scientific evidence surrounding the potential health effects of EMFs and in particular, magnetic fields remains uncertain. It cannot however be dismissed. As such the Leukaemia Foundation supports a *prudent avoidance*⁶ approach in relation to high-level EMF exposure (see below).

Powerlines are part of the national grid that supplies electricity across Australia. They include high voltage transmission lines, which are mounted on large steel towers and lower voltage distribution lines mounted on concrete or wooden poles on the roadside, or placed underground.

Electromagnetic fields are a combination of electric and magnetic forces that travel together in wave-like patterns, at the speed of light. These waves travel at different frequencies. The frequency is simply the measurement of the number of times the electric and magnetic waves oscillate per unit of time. This is usually expressed in measurements known as Hz.

Electric fields result from electrical charges. The strength of the electric field is proportional to the voltage, i.e. the higher the voltage, the stronger the electric field. An electric field is produced as soon as an appliance is plugged in, regardless of whether it is switched on or not. Commonly used building materials such as wood and metal can be used to successfully shield us from these fields.

Magnetic fields result from the movement of electrical charges, also known as the current. The strength of the magnetic field is proportional to the current, i.e. the greater the amount of electricity flowing through a wire the stronger the magnetic field. Magnetic fields are commonly measured in units called tesla (T) or microtesla (μ T). A magnetic field is only generated when a device is switched on, or when an electric current flows through a wire. Magnetic fields pass easily through most types of material, making attempts at shielding both difficult and expensive.

Background

Electromagnetic fields (EMFs) are produced by all electrical equipment including electrical supply equipment (high and low voltage power lines, substations, above and below ground distribution cables, electrical wiring in business and homes), domestic appliances, TV and radiotransmitters, mobile phones and their base stations. They are also produced by natural forces in the earth. As such, it would be impossible for any of us to completely avoid exposure in today's world.

Exposure levels to EMFs from electric appliances around the home are generally in the range of 0.01 - 0.25 μ T. For homes near high voltage powerlines however, these levels may be as high as 0.5 - 1 μ T. For homes immediately under the high voltage powerline, magnetic field levels of 6 - 10 μ T may be found¹. It is important to point out that very few children in Australia live in close proximity to high-voltage powerlines. (the high-voltage distinction is important, as everyone has a powerline coming into their house)

There is a general consensus among experts, including the Australian radiation health authorities, that there is no scientific evidence to prove that ongoing exposure to electric and magnetic fields at the levels commonly found in the Australian environment (including most homes and work places), constitutes a *proven* health risk¹.

Both electric and magnetic fields are generally strongest close to their origin (for example a high-voltage power line) and become progressively weaker with distance. While the potential negative health effects of electric fields are generally thought to be limited to accidental electrocution, the potential health effects of magnetic fields are generally less well understood.

A comprehensive overview of EMFs and health is available at http://www.arpana.gov.au/is_emf.htm

What does the research tell us?

The link between magnetic fields and childhood leukaemia has been investigated in a number of studies. In the most extensive and detailed to date, the UK Childhood Cancer Study (UKCCS)² found 'no evidence that either proximity to electrical installations or the magnetic field levels they produce in the UK is associated with increased risk of childhood leukaemia or any other cancer.' The researchers in this study measured children's residential exposure to electromagnetic fields (EMF) from a number of sources including domestic appliances, electrical wiring in homes, proximity to both low and high voltage power lines, underground power lines and electrical substations. They concluded that there was no evidence that exposure increased the risk of leukaemia, or any other type of childhood cancer.

In contrast, a recent UK study found that children who lived close to high voltage power lines at the time of their birth (within 200 m) had a significantly higher (1.69 times higher) chance of developing leukaemia than those who lived further away (beyond 600 m) ³. Those who lived between 200-600 m of a line also had an increased risk (1.23 times higher) than those living further away. It is important to point out that the authors admitted to having 'no satisfactory explanation' for their findings. Exposure to magnetic fields from power lines was suggested as a *possible* explanation for the increased risk, however the authors pointed out that the strength of these forces was estimated to be typically less than the average magnetic fields found in most homes generated from other sources, such as domestic electrical appliances. The authors were also careful to state that the study does not *prove* that power lines cause leukaemia in children, and that there is no 'laboratory data or acceptable biological mechanism' to support their findings, which may have resulted from some other unexplained factors.

In a major European study ⁴, researchers analysed the results from several previous studies of residential exposure to EMFs and childhood leukaemia. They found that a very small number of children (less than 1%) who were exposed to higher than average intensity magnetic fields (greater than 0.4 μ T) had around a two fold increased risk of childhood leukaemia, compared to those exposed to fields of less than 0.1 μ T. It is important to point out that very few children were found to be in this high-risk category, since very few children are ever exposed to such high intensity fields. Again the authors were unable to provide any 'explanation for the elevated risk' and suggest that at least some of it may have been due internal problems with the study. Their findings however were consistent with an American study ⁵, which identified a similarly increased risk for children exposed to fields 0.3 μ T or higher.

Prudent avoidance

Since 1991 the Energy Supply Association of Australia (ESAA), the peak organisation for electrical companies in Australia, has adopted a policy of *prudent avoidance* in regard to high-level EMF exposure. This involves taking exposure into consideration in the design and siting of new electrical facilities and avoiding where possible, and at a 'moderate cost and minimum inconvenience' homes, schools, playgrounds and 'other locations frequented by children'. It also involves sharing information with the public and involving them in decisions made regarding the siting of such facilities.

Some individuals may choose to take some simple steps to reduce their EMF exposure on a daily basis. These could include:

- Avoiding spending any time near high voltage powerlines or mobile phone base towers

- Switching off and unplug electrical equipment when not in use.
- Avoiding heated waterbeds.
- Avoiding electric blankets in beds, or at least switch them off and unplug before sleeping.
- Avoiding sleeping close to clock radios or any other electrical equipment.
- Sitting as far away as possible from your television or computer monitor.

If you are concerned about the level of EMF exposure in your home or workplace you can measure it using a special device available for hire from ARPANSA. For more information visit ARPANSA at www.arpansa.gov.au

Like many cancers, childhood ALL is thought to result from a series of changes in special proteins called genes, which normally control the growth and division of blood cells. The cause of changes remains unclear but there are likely to be a number of factors involved. For more information read the Leukaemia Foundation's *Understanding acute lymphoblastic leukaemia (ALL) in children - A guide for parents and families*.

References

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