



# Mobile phones and children

In recent years mobile phones have become very popular with young people and have an obvious appeal for reasons of personal security and communication. Public concern has been expressed regarding the possibility of adverse health effects related to radiofrequency (RF) electromagnetic energy (EME) emissions from mobile phones and their associated base stations. Parents become particularly anxious if their children are exposed to a presumed hazard that is unseen but which may have possible long-term harmful effects.

Some diseases and health conditions, such as cancer, or severe and lingering pain and disability, are more feared than others. Thus, even a small possibility of cancer, especially in children, from a potential hazard such as RF EME exposure receives significant public attention.

## The science

There is very limited scientific research on the issue of mobile phone use by children. The definition of a child varies although the 3 to 14 year age range is often used.

Currently the weight of national and international scientific opinion is that there is no substantiated evidence that the RF EME emitted by mobile phones causes harmful effects in adults or children. However the research relating to children is limited and the possibility of harm cannot be completely ruled out. The important questions that research regarding children will need to answer include:

- whether the exposure received by a child's brain is higher than that received by an adult,
- whether or not children are more sensitive due to their developing nervous system, and
- whether children are more vulnerable due to a longer potential lifetime of exposure.

**Energy absorption** - It has been suggested that children may experience greater absorption of energy in the tissues of the head when using a mobile phone. Studies that have been conducted to measure the energy absorption from a mobile phone using anatomical models of both child and adult heads have shown mixed results. Research in this area has shown that the determination of age-related changes in energy absorption in the brain from mobile phone RF EME exposure depend critically on the assumptions made in specifying the analytical models of adults and children. There are age-dependent changes in the electrical properties of tissue that influence the penetration and absorption of RF EME. For mobile phone handsets, the limits of the ARPANSA Radiation Protection Standard "Maximum Exposure Levels to Radiofrequency Fields - 3 kHz to 300 GHz" are applicable to all individuals of different sizes and tissue properties, including children.

**Sensitivity** - It has also been suggested that children may be more sensitive due to their developing nervous system. It is not possible to directly assess the effect on

children however a number of experiments performed on animals have attempted to address the effects of RF EME on the developing nervous system of children. Examples of studies include those of animals exposed to RF EME in which developmental parameters, such as body and organ weight, including brain weight (which is related to the development of the nervous system), were measured. Other studies investigated morphological changes in brain cells and behaviour. No significant changes in growth rate, brain function and behavioural development in exposed offspring were found.

**Long-term exposure** - It has been suggested that children may be more vulnerable because their total time of exposure will eventually be greater than that of adults, as mobile telephones have only recently come into use. Animal research has looked at whether the age at the time of the initial exposure can affect the risk of developing a delayed pathology in the long-term, especially cancer. In particular, animal studies have investigated the effect of mobile phone emissions on tumour incidence, promotion, growth and survival rate in animals at different stages of their development. No evidence has been shown in the animal studies which are indicative of any risks due to long-term exposure in children. However there are no studies to date which have investigated the impact of long-term exposure to mobile phones directly on populations of children.

*It should be noted that none of the animal models in the research are perfect surrogates for the effects of RF EME on humans. There is still research required in this area. The difficulty for the researcher is devising novel approaches that satisfy ethics committees.*

## **What about base stations**

Public concern has also been expressed regarding the possibility of adverse health effects from mobile phone base stations that are sited on or near places where children spend large amounts of time, for example, in or outside their home, kindergartens, schools, playgrounds etc.

Public exposure levels from base station antennas are very much lower than the maximum exposures from handsets. The balance of evidence does not indicate a risk to the health of people, including children, living in the vicinity of base stations where the exposure levels are only small fractions of the ARPANSA Standard.

*For further information on mobile phone base stations see fact sheet 6 'About Mobile Phone Networks'.*

## **Recommendations**

Community concern has been expressed with regard to mobile telephone use by children. At present, there is insufficient evidence in the science to substantiate the hypothesis that children may be more vulnerable to RF EME emissions from mobile phones than adults.

It's recognised that parents provide mobile phones to their children for different reasons, including their child's personal security as well as the assurance of their child being constantly contactable.

It is recommended that, due to the lack of any data relating to children and their long term use of mobile phones, parents encourage their children to limit their exposure by reducing call time, by making calls where reception is good, by using hands-free devices or speaker options, or by texting.

**Fact sheets in the EME series are:**

- Fact sheet 1: *Electromagnetic energy and its effects*  
Fact sheet 2: *Government action on electromagnetic energy public health issues*  
Fact sheet 3: *Australian research into EME*  
Fact sheet 4: *The ARPANSA RF Exposure Standard*  
Fact sheet 5: *About mobile phones*  
Fact sheet 6: *About mobile phone networks*  
Fact sheet 7: *What about using a mobile phone while driving*  
Fact sheet 8: *Potential interference of mobile phones with pacemakers, hearing aids and other devices*  
Fact sheet 9: *What about base stations and telecommunications towers - are there any health effects?*  
Fact sheet 10: *What about broadcast towers - are there any health effects?*  
Fact sheet 11: *Mobile phones and children*

For further information you can visit the ARPANSA web site at:

**<http://www.arpansa.gov.au>**