



# **Potential interference of mobile phones with pacemakers, hearing aids and other devices**

## **Electromagnetic Compatibility**

People are often concerned about the possibility of mobile phones interfering with pacemakers, hearing aids and other devices.

The ability of electrical and electronic systems to operate in an electromagnetic environment without interference is known as electromagnetic compatibility (EMC). In fact, all electrical systems can be disturbed if exposed to sufficiently high emissions. For this reason, EMC is achieved by limiting or controlling electromagnetic emissions as well as ensuring that electrical systems are adequately immune to electromagnetic interactions.

Mobile phones emit radiofrequency (RF) electromagnetic energy (EME) and as such the issue of EMC has to be considered.

## **Cardiac pacemakers**

The Therapeutic Goods Administration (TGA), the Australian Government's organisation responsible for ensuring the quality, safety and efficacy of therapeutic goods, is continually reviewing findings of clinical and laboratory research, both within Australia and overseas. The TGA has advised that the potential may exist for temporary interaction or interference between mobile phones and the normal operation of pacemakers and implantable defibrillators.

Interference may be caused by the transmitted radio signal from the phone, when the phone is held in close proximity to the implanted device (ie within about 150 mm), or if direct contact is made between the phone antenna and the user's skin. Interference may occur when the phone is in standby mode, or in use, but not when the phone is switched off.

Some phones incorporate a magnet, either to activate the phone when opened for use or as a part of the loudspeaker in the phone. This magnet, if strong enough, and if held in close proximity to the implanted device, can activate the 'magnet' mode of the pacemaker or defibrillator.

The pacemaker does not stop working in this mode, but will pace at a fixed rate. It will revert to normal operation when the magnet is removed.

It is important to note that, based on testing to date, any effect resulting from interaction between a mobile phone and an implanted device is temporary. Simply moving the phone away from the implanted device will return it to its correct state of operation.

The potential for a mobile phone to interfere with a pacemaker or implantable defibrillator can be minimised by maintaining a separation of at least 150 mm (6 inches) between the mobile phone and implanted device. This can be achieved by:

- not keeping the phone in a pocket over the site of the implant; and
- using the ear which is furthest away from the site of the implant when operating the phone.

## Hearing aids

People with hearing aids may experience a loud interfering noise when using a mobile phone. Special consideration is therefore needed to ensure that the best mobile phone system is selected to suit their needs. This can be either the GSM (Global System for Mobiles) or UMTS (Universal Mobile Telecommunications System) also known as 3G.

*For further information on mobile phone networks see fact sheet 6 'Mobile phone networks'.*

Interference to hearing aids is likely to be experienced to a greater degree when a GSM phone is used. This may be reduced by using an accessory kit which allows for hands-free use so that the phone can be kept at a distance from the hearing aid. Other phones can be used with an inductive loop accessory that reduces interference. A "T" switch on your hearing aid is required in order to use an inductive loop.

Most hearing aid users who can successfully use a normal fixed line phone will be able to successfully use a UMTS mobile phone without the need for an accessory in most situations. A user can check UMTS phone compatibility with a hearing aid by testing the phone in a weak reception area such as the centre of a building. If interference is experienced, it may be necessary to use an accessory kit to create some distance between the hearing aid and the mobile phone.

*For further information about using a mobile phone with a hearing aid, see the fact sheet 'Hearing aids and mobile phones' in the Australian Hearing web site [http://www.hearing.com.au/digitalAssets/5325\\_1193977826416\\_Hearing%20aids%20and%20mobile%20phones\\_final.pdf](http://www.hearing.com.au/digitalAssets/5325_1193977826416_Hearing%20aids%20and%20mobile%20phones_final.pdf)*

Standards Australia has developed a hearing aid immunity standard, AS/NZS 1088.9:1995. Many hearing aids currently in use in Australia already meet the specifications of this standard. Anyone experiencing interference to their aid from mobile phones, or other radiocommunications devices, should consult their audiologist about changing to a hearing aid that complies with the standard.

## Cochlear implants

The Standard developed for hearing aids also applies to cochlear implants. Instead of using a hands free kit as described earlier, an alternative system can be used that involves connecting to the speech processor component of the cochlear implant. This system, which provides for a direct electrical connection of audio signals, is currently being evaluated. With this system, the speech processor is not implanted but worn by the individual on a belt, in a pocket or on another piece of clothing.

## Interference with other devices

RF EME emissions from mobile phone handsets can interfere with the normal operation of electronic medical equipment used for patient monitoring, diagnosis and therapy. The TGA recommends that visitors to hospitals turn off their mobile phones to avoid possible interference to electrical or electronic therapeutic equipment to ensure the safety of both patients and staff. The medical equipment itself must meet the Australian/New Zealand Standard AS/NZS3200.1.2 in addition to complying with guidelines issued by the TGA.

For similar reasons, when travelling in an aircraft, passengers are asked to turn off mobile phones and other devices to eliminate the possibility of interference to aircraft navigational equipment.

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### 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>**

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