



# Australian research into EME

## The Australian research Program

The increased use of mobile phones in Australia has generated public concern about possible health issues associated with electromagnetic emissions from handsets and base stations.

Commencing in 1996, the Government provides \$1 million dollars per annum for the Electromagnetic Energy (EME) Program. This program supports research into, and provides information to the public about, health issues associated with mobile phones, mobile phone base stations and other communications devices and equipment. The program recognises public concern, and the need to ensure standards and public health policies continue to be based on the best available scientific information. The program is funded by a levy on radiocommunication licences collected by the Australian Communications and Media Authority (ACMA).

The EME program is coordinated by the Committee on Electromagnetic Energy Public Health Issues (CEMEPHI), which includes representatives from the Department of Broadband, Communications and the Digital Economy, the Department of Health and Ageing, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), ACMA, and the National Health and Medical Research Council (NHMRC). The program has three elements:

- an Australian research program (managed by the NHMRC) to conduct research into EME issues of relevance to Australia and to complement overseas research activities,
- continuing Australian participation in the World Health Organization's (WHO) International Electromagnetic Fields (EMF) Project which assesses the health and environmental effects of EME exposure, and,
- a public information program (managed by ARPANSA) to provide information to the public and the media.

## The NHMRC Expert Committee

In 1997 the NHMRC established an Expert Committee under its Strategic Research Development Committee, to oversee all aspects of the RF EME research funding process. Members of the Expert Committee were appointed on the basis of their recognised expertise in areas of science relevant to the responsibilities of the NHMRC in managing the EME research program.

Funding of all projects is based on scientific merit, the ability of projects to meet the objectives of the EME program and a consideration of recommended priorities for EME research identified by the WHO.

To date, there have been three completed rounds of EME research funding by the NHMRC.

## **First research funding round**

In 1998, funding (totalling \$1.38 million) was granted to four researchers to investigate certain areas of public concern around the possible effects of mobile phone usage:

1. Professor Bruce Armstrong's group, (administered by the NSW Cancer Council) received \$90,000 to conduct a 12 month case control pilot study of brain and other head and neck tumours in adults. The approved epidemiological study then formed the Australian component of an international case control study of adult brain tumours (INTERPHONE study), that includes participation from 13 countries. The hypothesis being tested was whether exposure to RF EME in the personal use of hand-held radiotelephones (mobile phones) is associated with an increased risk of cancer in vulnerable tissues close to where the phone is normally held when in use.

*The Expert Committee reviewed the report of the pilot study, conducted by Professor Armstrong. It was agreed that the project would be funded as a stand-alone, four year, Australian study that will also contribute to the INTERPHONE study. The grant totalling \$1.2 million was announced in December 2000 and the project has been completed. The first pooled results of the INTERPHONE study have been published showing no overall increased risk of brain tumours in relation to mobile phone use. There were suggestions of an increased risk of brain tumour (most pronounced for glioma) for the group representing individuals with the highest cumulative call time. Limitations of the methodology prevent conclusions of causality being drawn from these observations.*

- "The INTERPHONE Study Group. Brain tumour risk in relation to mobile telephone use: Results of the INTERPHONE international case-control study. *Int J Epidemiol.* 2010;39(3):675-94"

2. Dr Con Stough's group, (administered by the Swinburne University of Technology, Vic) received \$50,000 to conduct an 18 month study on human volunteers to determine if exposure to RF EME from mobile phones affects concentration, attention, problem solving and memory. The hypothesis being tested was whether exposure to EME emissions from mobile phones causes impairments in neuropsychological functioning.

*The project undertaken by Dr Stough's group has been completed. The study found statistical evidence of a cognitive difference after exposure to RF EME from mobile phones. The results have been published:*

- "Keetley V, Wood AW, Spong J, Stough C. Neuropsychological sequelae of digital mobile phone exposure in humans. *Neuropsychologia.* 2006; 44(10):1843-8"

3. Dr Pamela Sykes' group, (administered by Flinders University, SA) received \$75,000 for a pilot study to examine the effect of RF EME exposure in mutation and cancer. The study investigated *in vivo* - biological genetic effects, testing the hypothesis that RF induces somatic intrachromosomal recombination (SICR) in pKZ1 transgenic mice. (This would provide a direct link between RF and a biological mechanism known to be involved in carcinogenesis).

*Following evaluation, the Expert Committee decided not to recommend funding for a full proposal by Dr Sykes testing the hypothesis that exposure to EME promotes more DNA breakages than normal in transgenic mice. The results of the pilot*

*study, undertaken at high EME exposure levels, did not show more DNA breakages than could normally be expected in mice not exposed to RF EME. The results have been published:*

- “Sykes PJ, McCallum BD, Bangay MJ, Hooker AM, Morley AA. Effect of exposure to 900 MHz radiofrequency radiation on intrachromosomal recombination in pKZ1 mice. *Radiat Res.* 2001 Nov;156(5 Pt 1):495-502”

4. Professor Barrie Vernon-Roberts’ group, (administered by the Institute of Medical and Veterinary Science of the University of Adelaide in SA) received \$1.064 million to investigate the effect of RF EME exposure on cancer rates on genetically modified mice. The study examined *in vivo* - biological genetic effects, testing the hypothesis that exposure to GSM-like RF fields affects lymphoma rates in *Eμ-pim-1* transgenic mice. (This is a replication/confirmation of the Repacholi *et al* 1997 study).

*The project undertaken by Professor Vernon-Roberts’ group has been completed. The study found no change in the number or type of tumour at any dose rates of RF EME. The result of this large double blind study agrees with other animal studies and highlights the paucity of reproducible evidence of deleterious health effects in humans. The results have been published:*

- “Utteridge TD, Gebiski V, Finnie JW, Vernon-Roberts B, Kuchel TR. Long-term exposure of Eμ-pim-1 transgenic mice to 898.4 MHz microwaves does not increase lymphoma incidence. *Radiat Res.* 2002; 158(3): 357-364.”

## Second research funding round

In 2001, funding (totalling \$522,575) was granted to two researchers in the areas of neuropsychological and neurophysiological effects in relation to mobile phone use:

1. Dr Andrew Wood’s group, (administered by the Swinburne University of Technology, Vic) received \$213,570 over three years to investigate human physiological responses to mobile phone type radiation exposure (Does mobile phone radiation affect brain reactions, sleeping patterns and the biological clock?). In this project human volunteers were exposed to radiation similar to that received during a mobile phone call. Their ability to respond to visual and auditory stimuli was assessed by measuring brain electrical activity. The quality of their sleep during the subsequent night was measured. This research aimed to identify any immediate effects mobile phone use may have on human performance.

*The project undertaken by Dr Wood’s group has been completed. Six studies have been published with varying results:*

- Hamblin, D.L., Wood, A.W. (2002) Effects of mobile phone emissions on human brain activity and sleep variables. *Int J Radiat Biol* 78: 659-669
- Wood, A.W., Hamblin, D.L., Croft, R.J. (2003). The use of a ‘phantom head’ to assess the possible direct pickup of mobile phone handset emissions by EEG electrode leads. *Med Biol Engng Comput* 41: 470-472
- Hamblin, D.L., Wood, A.W., Croft, R.J., Stough, C. (2004). Examining the effects of electromagnetic fields emitted by GSM phones on human event-related potentials and performance during an auditory task. *Clin Neurophysiol* 115: 171-178
- Loughran, S.P., Wood, A.W., Barton, J.M., Croft, R.J., Thompson, B., Stough, C. (2005) The effect of electromagnetic fields emitted by mobile phones on human sleep. *Neuroreport* 16: 1973-1976
- Wood, A.W., Loughran, S.P., Stough, C. (2006). Does early evening exposure to mobile phone radiation affect subsequent melatonin production? *Int J Radiat Biol* 82: 69-76
- Hamblin, D.L., Croft, R.J., Wood, A.W., Stough, C., Spong, J. (2006) The sensitivity of human event-related potentials to mobile phone emitted electromagnetic fields. *Bioelectromagnetics*: 27:265-273

2. Associate Professor Paul Mitchell's group, (administered by Westmead Hospital, University of Sydney, NSW) received \$309,005 over two years to investigate the effects of radiofrequency electromagnetic radiation from long term mobile phone use on vision and hearing. The study aimed to build on the large scale Blue Mountains Eye Study to examine consequences of long-term mobile phone use on standard measures of vision, eye disease and hearing. The project also tested for subtle changes in sensory function using non-linear systems techniques recently developed and validated.

*More information on the Blue Mountains Eye Study can be found at <http://www.cvr.org.au/bmes.htm>*

### **Third research funding round**

Notwithstanding the results of the research in the previous two funding rounds the EME Expert Committee decided to strengthen the Australian research effort and move forward with its research agenda in Australia.

Funding of \$500,000 per annum over five years was announced in 2003 for the establishment of a Centre of Research Excellence in Radiofrequency EME. The centre called the Australian Centre for Radiofrequency Bioeffects Research (ACRBR) was originally based at the Royal Melbourne Institute of Technology and then at Swinburne University of Technology. The ACRBR offered a unique opportunity for investigators from diverse areas and organisations to work cooperatively in a challenging, new and exciting environment.

The aims of the ACRBR were:

1. Increase knowledge by conducting research on possible health effects associated with electromagnetic energy emissions from radiocommunication devices, such as mobile phones and mobile phone towers, and to facilitate translation of research findings into policy and practice.
2. Increase research capacity, including research training and career development, through conducting a comprehensive and integrated program.
3. Encourage and facilitate broad cross-disciplinary research collaboration. The range of disciplines could include dosimetry, basic biology, epidemiology, clinical sciences, physical sciences, engineering, neuropsychology.
4. Promote and enhance radiofrequency EME research and research outcomes, through broad and impartial collaboration and interaction with other researchers and other organisations.

*(Revised: July 2011)*

**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>**