

# EMR and Health

Electromagnetic radiation,  
health and well-being

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## EMR and Health

Genetic damage, effects on hormones, cell proliferation and cellular communication, changes in the balance of calcium ions and the production of heat shock proteins ... these are some of the effects of electromagnetic radiation.

How these biological changes affect health, energy and well-being is one of the critical issues of this time.

Today every man, woman and child is affected by EMR. It is emitted by every power line, every electrical wire, appliance, computer and electronic gadget. It radiates from every microwave oven, mobile (cell) phone, phone tower and communications transmitter.

EMR is the invisible companion of technology. In an increasingly technological society, it is a ubiquitous and growing phenomenon.

At the present time, technological progress is proceeding at an unprecedented rate. There are now major international efforts to expand third generation mobile phone networks, to introduce voice over internet services, to use power lines for broadband communications. World-wide, more than 664 million mobile phones are now in use.

As mainstream use of technology grows, so does technological innovation. In this issue we report on a mobile phone that responds to hand signals, robotic cockroaches and a robot that has been taught to dance!

With every technological innova-

tion comes a new and a different exposure to EMR. That it affects our bodies is not in doubt. What are its long-term, cumulative impacts is less clear.

While there is no scientific consensus on the risks of EMR for health, there are some important trends that bear consideration. Cancer, leukemia, neurodegenerative disease, heart problems, reproductive problems and effects on the nervous system have all been associated with exposure. So have a range of uncomfortable symptoms.

In this and future issues of "EMR and Health" we look at what the latest scientific research and reviews on health are finding. In this issue we feature important new European research from the REFLEX project which has identified genetic damage from EMR. We also consider findings of a review by Britain's National Radiological Protection Board and observations by medical practitioners in Ireland.

In this issue we also provide an introduction to the concept of electromagnetic radiation that is a valuable background for those wishing to master the fundamentals for future reading.

I welcome you to the first edition of "EMR and Health" and hope you will share with us the fascinating journey to understanding the impacts of growing exposures to EMR on health and well-being.

**Editor**

# Genetic effects of EMR

## Research from the European REFLEX project has found cell damage at levels of exposure below international standards.

Damage to DNA, damage to chromosomes, effects on genes and changes to cell proliferation and division have been reported in new European research conducted as part of the REFLEX project.

The final report of the Risk Evaluation of Potential Environmental Hazards from Low Frequency Electromagnetic Field Exposure Using Sensitive *in vitro* Methods (REFLEX) was released in November last year.

The report is the result of a four-year research project involving 12 research teams throughout Europe and funded by the European Union. Its aim was to identify biological effects of ELF (extra low frequency) exposures from the power system and RF (radiofrequency) radiation from mobile communications systems - at levels below international safety limits.

The project focused on identifying critical events in the causation of disease, such as gene mutation, changes to cell proliferation and cell death (apoptosis) in living cells.

One of the significant results to emerge was the finding of genetic damage. Studies found single- and double-strand breaks in DNA from exposure to both ELF and RF radiation. Because the repair of double-strand DNA breaks is more prone to error, these breaks can lead to chromosome aberrations and are a potential risk factor for cancer.

### Genetic damage in cells exposed to ELF

The research found evidence that exposure to low frequency fields from electrical sources produced genetic damage in cells. It found:

- ◆ single- and double-strand DNA breaks in exposed cells;
- ◆ errors in DNA repair of exposed cells, resulting in chro-

mosome aberrations.

Moreover, studies showed that DNA damage was affected by a number of variables, including:

- ◆ time of exposure, with maximum breaks occurring when the signals were on for 5 minutes and off for 10 (There was no effect from exposure to a continuous signal.);
- ◆ type of wave (more effects occurred when cells were exposed to a sine wave than from a power line);
- ◆ frequency of the signal, with the highest number of breaks occurring at 50 Hz followed by 16.66 Hz (commonly used frequencies of alternating current in Europe);
- ◆ age of the donors, with more breaks occurring in cells of older people;
- ◆ strength of the signal;
- ◆ type of cell (muscle, fibroblast, lymphocyte etc);
- ◆ heat stress or UVC exposure.

### Genetic damage in cells exposed to RFR

Similarly, exposure to radiofrequency radiation resulted in genetic damage to various cell lines. Studies showed:

- ◆ Single- and double-strand DNA breaks in exposed cells;
- ◆ errors in DNA repair of exposed cells, resulting in chromosome aberrations.

As for ELF exposure, there was evidence that genetic damage was affected by different factors, such as:

- ◆ exposure time
- ◆ type of signal and
- ◆ strength of the signal.

One series of studies showed that genetic damage from RFR was inhibited by the use of ascorbic acid (Vitamin C). There was evidence to suggest that damage in one cell line

may have resulted from an increase in free oxygen radicals generated during exposure.

### Other effects

The studies also showed effects on cell proliferation, cell division (a hall-mark of cancer), and cell death. However, these effects were not always "clear-cut and unequivocal".

Some studies showed that exposure to mobile phone signals of 900 and 1800 MHz activated a stress response in cells.

### Conclusion

The REFLEX project set out to establish whether or not electromagnetic fields affected cellular functions critical for the onset of disease. "Failure to observe the occurrence of such key critical events in living cells after EMF exposure would have suggested that further research efforts in this field could be suspended and financial resources be reallocated to the investigation of more important issues. But as clearly demonstrated, the results of the REFLEX project show the way into the opposite direction."

"Taken together, the results of the REFLEX project were exclusively obtained in *in vitro* studies and are, therefore, not suitable for the conclusion that RF-EMF exposure below the presently valid safety limits causes a risk to the health of people. They move, however, such an assumption nearer into the range of the possible. Furthermore, there exists no justification anymore to claim, that we are not aware of any pathophysiological mechanisms which could be the basis for the development of functional disturbances and any kind of chronic diseases in animal and man."

<[http://www.itis.ethz.ch/downloads/REFLEX\\_Final%20Report\\_171104.pdf](http://www.itis.ethz.ch/downloads/REFLEX_Final%20Report_171104.pdf)>

# Mobile Phones and Health

## A precautionary approach to mobile phone technology has been recommended by Britain's peak radiation authority.

On 11 January Britain's National Radiological Protection Board (NRPB) released its 2004 report on "Mobile Phones and Health". The document updates its 2000 Report, widely known as the Stewart Report.

The latest document, endorses the recommendations of the Stewart Report (see box) and advises precautionary use of mobile phone technology.

"There is a lack of hard information showing that the mobile phone systems in use are damaging to health", it states. However, it continues with a number of pertinent observations.

- ◆ "First, the widespread use of mobile phone technologies is still fairly recent and technologies are continuing to develop at a pace which is outstripping analyses of any potential impact on health"
- ◆ "Second, there are data which suggest that RF fields can interfere with biological systems"
- ◆ "Third, because the use of mobile phone technologies is a fairly recent phenomenon, it has not yet been possible to carry out necessary long-term epidemiological studies and evaluate the findings."
- ◆ "Fourth, a recent paper has suggested possible effects on brain function resulting from the use of 3G phones,"
- ◆ "Fifth, populations are not homogeneous and people can vary in their susceptibility to environmental and other challenges. ... A number of people also report symptoms they ascribe to electromagnetic

**"The Board believes that the main conclusions reached in the Stewart Report in 2000 still apply today and that a precautionary approach to the use of mobile phone technologies should continue to be adopted."**

hypersensitivity arising from exposure to a range of electromagnetic fields (EMFs) encountered in everyday life."

- ◆ "Sixth, ... children might be more vulnerable to any effects arising from the use of mobile phones because of their developing nervous system, the greater absorption of energy in the tissues of the head and a longer lifetime of exposure."
- ◆ "Seventh, there are ongoing concerns in the UK about the use of Terrestrial Trunked Radio (TETRA)."
- ◆ "Eighth, there remain particular concerns in the UK about the impact of base stations on health, including well-being."

In summary, "The Board believes that the main conclusions reached in the Stewart Report in 2000 still apply today and that a precautionary approach to the use of mobile phone technologies should continue to be adopted."

Sir William Stewart, Chairman of the NRPB and chief author of the 2000 report, believes that mobile phones are not necessarily "without potential adverse health effects". He said, "The fact

is that the widespread use of mobile phones is a relatively recent phenomenon and it is possible that adverse health effects could emerge after years of prolonged use." Sir William believes that precautions should be adopted by "all involved in this area - including government, the mobile phone industry and all who choose to purchase a mobile phone for themselves, or their family, or their children."

The report is available from:

[http://www.nrpb.org/publications/documents\\_of\\_nrpb/abstracts/absd15-5.htm](http://www.nrpb.org/publications/documents_of_nrpb/abstracts/absd15-5.htm)

### Stewart Report, 2000

This report, entitled "Mobile Phones and Health", was produced by the NRPB's Independent Expert Group on Mobile Phones (IEGMP). It stated:

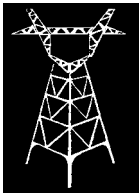
"The balance of evidence to date suggests that exposures to RF radiation below NRPB and ICNIRP (International Commission on Non-Ionizing Radiation Protection) guidelines do not cause adverse health effects to the general population.

"There is now scientific evidence, however, which suggests that there may be biological effects occurring at exposures below these guidelines.

"We conclude therefore that it is not possible at present to say that exposure to RF radiation, even at levels below national guidelines, is totally without potential adverse health effects, and that the gaps in knowledge are sufficient to justify a precautionary approach.

"We recommend that a precautionary approach to the use of mobile phone technologies be adopted until much more detailed and scientifically robust information on any health effects becomes available."

# Research Updates



## **ELF Fields (from electrical sources)**

Researchers in Italy have found evidence that biological effects of 50 Hz magnetic fields depend on the shape of the wave. B Del Re and team exposed bacteria to a pulsed-square wave and a sinusoidal magnetic field. They found that the effects were greater in cells exposed to the pulsed-square wave. (Del Re B, et al, *Radiat Environ Biophys* 43(4):265-70, 2004.)



ELF may affect heart rate. Korean researcher J Jeong exposed rats to a 60 Hz magnetic field of 20G for 1 or 5 days. The research found that exposure for one day suppressed the increase of heart rate by affecting ventricular repolarization. (Jeong, J et al, *Auton Autacoid Pharmacol* 25(1):17-23, 2005)



German research by J Rollwitz found that exposure to 50 Hz fields can elicit the formation of free radicals. "Our findings show a significant increase of free radical production after exposure to 50 Hz electromagnetic fields at a flux density of 1 mT to mouse bone marrow-derived promonocytes and macrophages, indicating the cell-activating capacity of extremely low frequency magnetic fields". (Rollwitz, J et al, *Biochim Biophys Acta* 1674(3):231-8, 2004.)



A Dattilo from Italy has shown that pollen tube growth is affected by 50 Hz magnetic fields as a result of changes in the cytoplasm of the tube.

(Dattilo, A et al, *Bioelectromagnetics* 26(2):153-6, 2005.)



## **Radiofrequency radiation (from telecommunications sources)**

Turkish research has found a correlation between mobile phone use and certain symptoms. K Balıkcı found that using a mobile phone did not correlate with dizziness, shaking in the hands, speaking falteringly and neuro-psychological discomfort.

However, there was statistical evidence that a "mobile phone may cause headache, extreme irritation, increase in the carelessness, forgetfulness, decrease of the reflex and clicking sound in the ears." (Balıkcı, K et al, *Patbol Biol (Paris)* 53(1):30-4, 2005.)



Italian researcher M Barteri examined the effects of mobile phone radiation on the enzyme acetylcholinesterase. The results showed that "radiofrequency (RF) radiations irreversibly affect the structural and biochemical characteristics of an important CNS enzyme." (Barteri, M et al, *Biophys Chem* 113(3):245-53, 2005.)



French researchers have demonstrated molecular changes from mobile phone radiation. A Mausset-Bonnefont exposed rats' heads to 900 MHz for 15 minutes at a SAR of 6 W/kg. The exposure resulted in an effect on glial cells, suggesting neuronal damage, especially in the striatum. Effects were noted on several receptors.

"Our results provide the first evidence for rapid cellular and molecular alterations in the rat brain after an

acute exposure to high power GSM ... microwaves." (Mausset-Bonnefont A et al, *Neurobiol Dis* 17(3):445-54, 2004.)



People living near mobile phone towers report a range of symptoms, according to a Polish study. A Bortkiewicz used a questionnaire to gather data on the prevalence of symptoms. The results showed symptoms "mostly of the circulatory system, but also of sleep disturbance, irritability, depression, blurred vision, concentration difficulties, nausea, lack of appetite, headache and vertigo." The symptoms were observed whether or not the subject was aware of the presence of the phone tower. (Bortkiewicz, A et al, *Med Pr*, 55(4):345-51, 2004.)



A Ahlbom and coworkers from Sweden's Karolinska Institute have published a review of the effects of RF radiation on human health.

"Results of these studies to date give no consistent or convincing evidence of a causal relation between RF exposure and any adverse health effect. On the other hand, the studies have too many deficiencies to rule out an association. A key concern across all studies is the quality of assessment of RF exposure. Despite the ubiquity of new technologies using RFs, little is known about population exposure from RF sources and even less about the relative importance of different sources. Other cautions are that mobile phone studies to date have been able to address only relatively short lag periods, that almost no data are available on the consequences of childhood exposure, and that published data largely concentrate on a small number of outcomes, especially brain

tumor and leukemia.” (Ahlbom, A, et al, *Environ Health Perspect*, 112(17):1741-54, 2004.)



A group of German doctors has found an increased incidence of cancer around mobile phone towers. In this pilot study, the doctors analysed data of close to 1000 patients.

“The result of the study shows that the proportion of newly developing cancer cases was significantly higher among those patients who had lived during the past ten years at a distance of up to 400 metres from the cellular transmitter site, which has been in operation since 1993, compared to those patients living further away, and that the patients fell ill on average 8 years earlier.”

The study also found that after five years of exposure, people had three times the risk of developing cancer of those living further from the transmitter. (Presentation by Dr Horst Eger to Workshop on “Are RF-fields able to raise the risk of cancer?”, 15-17.11.2004.)



A Swedish team has found a correlation between the output power of mobile phone handsets and health. O Hallberg and O Johansson obtained statistics from Sweden, Norway and Denmark for employee absenteeism and GSM base station coverage. In all three countries, absenteeism was greatest in sparsely populated regions with low GSM coverage, where mobile phones operated at higher output power.

Operation of mobile phones at higher output power was associated with immune-related conditions:

- ◆ an increase in absenteeism
- ◆ cancer-related diseases
- ◆ longer recovery times after illness
- ◆ nervous system problems

It was not related to death from circulation problems or Multiple Sclerosis.

The authors conclude “We strongly recommend halting any further roll-out of the next generation mobile systems

before we understand this strong correlation between GSM coverage and health degradation.” (Hallberg, O et al, *Electromagnetic Biology and Medicine* 23:229-39, 2004.)



How frequent is mobile phone use among primary school children? German researchers E Böhler and J Schütz conducted a survey of 1933 primary school children in Mainz with an average age of ten years. They found that:

- ◆ 1/3 of children owned a mobile phone
- ◆ 6.2% used it daily
- ◆ 6.4% used it several times per week
- ◆ 45.3% used it only occasionally
- ◆ 41.6% had never used a mobile phone.

“The probability of owning a cellular telephone among children was associated with older age, being male, having no siblings, giving full particulars to height and weight, more time spent watching TV and playing computer games, being picked up by their parents from school by car (instead of walking or cycling) and going to bed late.” (Bohler, E et al, *European Journal of Epidemiology* 19(11):1043-50, 2004.)



N Mahrouf and team in France examined the effects of mobile phone radiation at 900 MHz on the cellular process of endocytosis. They found that the electrical field of the exposure was responsible for an increase in the rate of endocytosis which they describe as “one of the most fundamental physiological functions of the cells.” (Mahrouf, N et al, *Biochem Biophys Acta* 1668(1):126-37, 2005.)



### Static fields

A paper, produced by members of the World Health Organisation (WHO), describes the process and methods of developing the WHO

monograph on static fields. (van Deventer et al, *Prog Biophys Mol Biol* 87(2-3):355-63, 2005.)



### Other News

W Tiller has described energetic aspects of medicine and healing. “A new theoretical model of nature is provided ... A new perspective on what constitutes the whole person is also provided”. (*J Altern Complement Med* 10(5): 867-77, 2004.)



### No Effects

- ◆ of mobile phone radiation on heat-shock proteins (Lim et al, *Radiat Res* 163(1):45-52, 2005.)
- ◆ of mobile phone radiation on the ear (Pau et al, *Otolaryngol Head Neck Surg* 132(1):43-49, 2005.)
- ◆ of mobile phone radiation on synthesis of melatonin and serotonin (Hata et al, *Bioelectromagnetics* 26(1):49-53, 2005.)
- ◆ of household domestic exposure on mammary tumours (Beniashvili et al, *Med Sci Monit* 11(1):10-13, 2004.)
- ◆ of household appliances on brain tumours (Kleinerman, *Am J Epidemiol* 161(2):136-46, 2005.)
- ◆ on breast cancer (Forsen, U et al, *Am J Epidemiol* 161(3):250-9, 2005.)



**RF - radiofrequency radiation (including mobile technology)**

**ELF—extra-low frequency radiation (including electrical sources)**

- ◆ 0.1 mT = 1000 mG
- ◆ 0.01 mT = 100 mG
- ◆ 1  $\mu$ T = 10 mG

# Dr Henry Lai - interview

Dr Henry Lai is a leading international researcher who has been investigating the effects of EMR since 1980. In collaborations with other scientists, he has produced some ground-breaking results.

Drs Lai and Singh found single- and double-strand breaks in the DNA of rats' brains when the animals were exposed to both RF and 60 Hz fields. The team found that melatonin prevent DNA damage.

Dr Lai also found evidence that microwave radiation retarded learning in rats performing a memory-related task.

More recently, Dr Lai has proposed a theoretical mechanism to explain how 50/60 Hz fields cause health problems. He suggests that magnetic fields initiate an iron-dependent process that generates free radicals and leads to cell death.

Dr Lai spoke to *EMR and Health* at last year's London conference on Childhood Leukemia.

***In the time that you have been researching the issue, have you come to any personal conclusions about the risk of EMR for human health?***

There's a cause for concern especially for ELF. Animal studies show effects. Is this a health or a biological effect? Do biological effects become health effects? Repeated exposure reduces homeostasis and leads to systems changing.

Studies on radiofrequency show that, at repeated exposures, animals become more sensitive to radiation. The body remembers effects, like remembering a bee sting. This is an immune response.

This effect has implications for our use of technology.

***You've proposed a mechanism by which EMR could cause health problems without heating. What do you see as the next step in testing your hypothesis?***

The hypothesis has already been tested. If you give iron to a cancer cell and expose it to EMR, free radicals result.

***Is there funding to carry on this work?***

There is no funding. There is no independent research now in the US, only industry-funded research. Industry wants certain results to show safety.

Independent research is stopping at the time when more and more people are using mobile phones.

I am no longer conducting research into EMR. It will be difficult to set up again because this would require personnel and equipment and would be a costly exercise.

***At this conference we've seen work presented that suggests that genetic damage caused by ionising radiation is transferred to subsequent generations. Do you think that nonionising radiation is causing transferable genetic mutations in the population?***

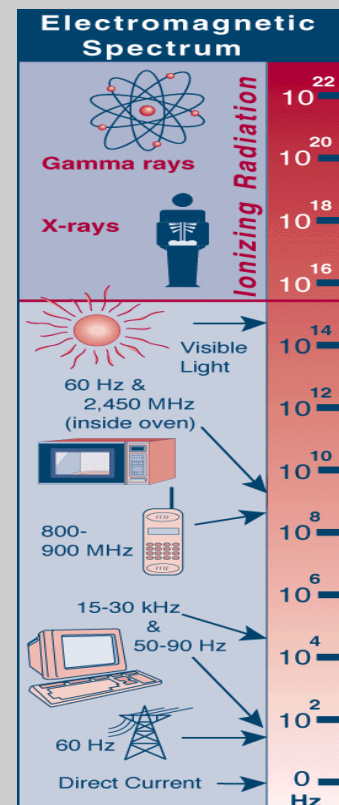
This could happen if the sperm or ovaries are damaged. There is a study that shows sperm damage to the fifth generation [of rodents].

***What do you see as the long-term cumulative impact of society's use of electric and communications technology?***

The worst case scenario is cancer. Cell phone signals, if genotoxic, may cause an epidemic of cancer within 20 years of the widespread use of this technology. The test of this will be a large population exposed for a long period of time.

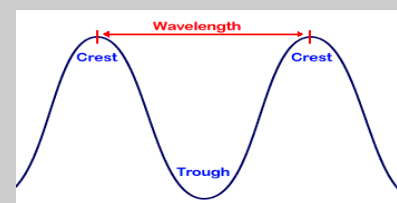
Another possible problem is neurodegenerative diseases such as Alzheimer's.

*Postscript: Dr Lai is now conducting research into cancer treatment.*



## Frequency

- ◆ the number of wave patterns (cycles) to pass a given point in a second
- ◆ measured in Hertz (Hz)
- ◆ 1 cycle per second = 1 Hz
- ◆ wavelength for 60 Hz of US power system is 5000 km; wavelength of microwave oven (2450 MHz) is 12.2 cm.



## Ionising radiation

- ◆ radiation that has the capacity to break covalent chemical bonds
- ◆ includes nuclear radiation and x-rays

## Nonionising radiation

- ◆ radiation without the capacity to directly break covalent chemical bonds
- ◆ includes ELF, microwave/RF radiation and visible light

# Background on EMR

## What is EMR?

Electromagnetic radiation is the energy that radiates from any moving electrical current. It is comprised of both a magnetic and an electric field.

## Doesn't EMR occur naturally in the environment?

EMR is a phenomenon of nature and has been part of the environment since time immemorial. Its natural forms we experience as light, as warmth from the sun, as the earth's magnetic field and during thunderstorms.

Artificial EMR entered our environment much more recently. The advent of power networks and telecommunications systems developed in the late 1800s but were not in common use till the 1900s. However, the widespread use of mobile phones is only about a decade old.

The use of EMR-emitting technologies is growing exponentially with more and different technologies entering the market each year. Artificial EMR has different characteristics to naturally occurring radiation.

## What are the characteristics of EMR?

Electromagnetic signals are characterised by their frequency and their intensity. Signals can be *pulsed* (as in the case of digital mobile communications) or *modulated* (in which either the frequency or strength of the signal is changed).

Modulated waves carry information and can be superimposed on a carrier wave.

## What's the difference between radiation from powerlines and mobile phones?

Powerlines and electrical appliances operate at a frequency of 50 Hz

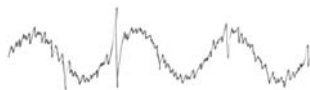
(Australia & Europe) and 60 Hz (US). They generate electromagnetic fields whose wavelengths are thousands of kilometres long.

Mobile phones, phone towers and other radiocommunications devices operate at much higher frequencies (mobile phones operate in the Megahertz region of the spectrum) where wavelengths are much shorter.

In theory, powerlines emit a signal that is a continuous, smooth sine wave (as in the picture on the right). Modern mobile telecommunications often uses a digital or pulsed signal that is a distortion of the continuous sine wave and is often considered to be more biologically active than a continuous wave.

## What about transients?

Transients are distortions in the sine wave that occur when electrical equipment is switched on or off. They have the effect of creating a high frequency signal that is superimposed on the 50/60 Hz signal produced by the power station.



## Does EMR cause health problems?

It is well-known that ionising radiation and levels of radiation greater than international standards can cause health problems.

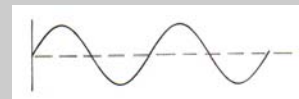
Whether everyday levels of exposure to EMR is safe is less clear and there is no scientific consensus on the issue. At this point in time there is no *conclusive proof* that everyday levels of exposure *cause* health problems. However, there is *evidence of risk*.

## Direct Current (DC)

- ♦ fields generated by batteries that do not generate an alternating wave and therefore have no frequency

## Alternating current (AC)

- ♦ the current from a power generator and the electrical system that flows backwards and forwards
- ♦ it is usually depicted as a sine wave as shown below



## ELF

- ♦ radiation in the extra low frequency part of the spectrum
- ♦ includes frequencies of international electrical networks of 50 Hz (Europe and Australia) and 60 Hz (US).
- ♦ consists of an electric and magnetic field

## Electric field

- ♦ present when an appliance is turned on even if it is not operating
- ♦ blocked by solid objects
- ♦ radiates out from the wire
- ♦ measured in volts per metre (V/m)



## Magnetic field

- ♦ present when appliance is operating
- ♦ not easily blocked by solid objects but diminishes with distance
- ♦ radiates around the wire
- ♦ measured in milligauss (mG)



## Radiofrequency radiation (RFR)

- ♦ higher frequency radiation used by communications systems.
- ♦ used in technologies such as mobile communications, radios, TVs, paging antennas, computers
- ♦ measured in microwatts per square centimetre ( $\mu\text{W}/\text{cm}^2$ )

# News from around the globe



## Swedish mobile phone report

Sweden's Independent Group on Electromagnetic Fields released its latest report on "Mobile Telephony and Health Risks" on December 20.

The Group, chaired by Professor Anders Ahlbom, was cautious in its findings which include the following:

- ◆ "For RF exposure the number of studies available today is too small to allow conclusions as to whether such fields can cause various symptoms."
- ◆ "no single clear effect on cognitive function can be identified."
- ◆ "the relevance of minor alterations on EEG and sleep on health is not significant."
- ◆ "possible [memory] effects do not seem to be detrimental."

For brain tumours, the group referred to the Swedish study that "suggests that long term use of mobile phones increases the risk of acoustic neuroma, at the side of the head where the phone is used."

On the topic of children, the Group urged precautions to reduce exposure. "Given scientific uncertainty SSI [Swedish Protection Agency] has adopted precautionary approaches for both ELF and RF which we endorse."

< [www.ssi.se/english/EMF\\_exp\\_Eng\\_2004.pdf](http://www.ssi.se/english/EMF_exp_Eng_2004.pdf)>

## Call for new standards

International scientists and medical practitioners have called for a reduction in international safety standards. In a letter to the European Parliament, known as the Helsinki Appeal, signatories call for the adoption of tighter standards for public health protection

and for further funding for scientific research.

The full text of the Appeal can be found on page 11.

## Focus on schools

A British legal judgement has paved the way for phone companies to build mobile phone towers near schools. A Court has given approval for the construction of a mobile phone tower housing antennas for three operators, within 400 metres of three schools in Harrogate. The beam of highest radiation from the towers is expected to fall on the two primary schools. The Court's decision was upheld by the Court of Appeals and was not contested by the Deputy Prime Minister in the House of Lords. (*Independent* 19.12.04.)

## Court rejects tower

A South Australian Court has rejected an application for a mobile phone tower. On 18 November the Environment, Resources and Development Court of SA refused Hutchison's appeal to construct a 3G mobile phone tower at Adelaide University. The application had previously been rejected by Mitcham City Council. The proposal consisted of a 25 m monopole, three panel antennas, a parabolic antenna, an equipment shelter and a security fence.

The Court's refusal of Hutchison's appeal stemmed from the adverse visual impact the proposal would have on surrounding properties including historic Claremont House, which did not comply with Council's Development Plan. ([http://www.courts.sa.gov.au/courts/environment/judgments/2004\\_7-12/hutchison\\_v\\_mitcham.html](http://www.courts.sa.gov.au/courts/environment/judgments/2004_7-12/hutchison_v_mitcham.html))

## Court orders transmissions off

An Australian court has ordered a carrier to cease transmission from its newly-constructed mobile phone tower.

The tower was constructed by Optus as a "low impact" facility, a classification that would exempt it from council approval. However, Canada Bay Council maintained that, because the facility was constructed in a heritage area, it could not therefore be classified as "low impact" and should have had council approval.

On 5 November 2004 the NSW Land and Environment Court found that the facility was not low impact and therefore required council approval. It ordered that transmissions cease while the carrier applied to council for planning permission. ([www.lawlink.nsw.gov.au](http://www.lawlink.nsw.gov.au))

## Kids phone rings out

Britain's first mobile phone designed for young children has been withdrawn from the market. Its manufacturer, Commun8 has suspended sales of the MyMo phone just five months after the product was launched. The company's decision follows the release of the latest Stewart Report which recommended precautions for children using mobile phones. (*London Times* 11.01.05.)

## Kid targets

South Africa's Advertising Standards Authority has ordered Nokia to withdraw a mobile phone advertisement targeting young children and not to use it in the future.

The advertisement for a Nokia 2300 appeared in a booklet from "Mindset Learn" which is a TV program geared to the teenage market.

The Authority ruled that "cell

phones are potentially dangerous to children”, that “the advertisement targets children” and that it “advertises cell phones for non-essential purposes.” (*Saturday Star* 18.12.04.)

### US legal decision

A US judge has ruled against a community organisation in a legal contest with Federal authorities over RF standards.

The EMR Network took legal action against the Federal Communications Commission (FCC), arguing that its radiofrequency standard should be revised to address non-thermal effects of exposure.

On 7 December in the Court of Appeal, Judge Stephen Williams affirmed the decision of a previous court hearing against requiring such a revision.

The EMR Policy Institute, which assisted the EMR Network, is now considering an appeal to the Supreme Court. ([http://emrpolicy.org/litigation/case\\_law/](http://emrpolicy.org/litigation/case_law/))

### Safe Schools

On 7 February the Vancouver Schools Board passed a resolution on mobile phone towers in schools. “IT IS RECOMMENDED THAT no further installations of cellular antenna be permitted on any school building or school grounds regularly used by students.” The Board also recommended that planning policies be amended to state that any installation of cellular antenna within 305m (1,000 feet) of a school be considered an incompatible use and that the Board be notified of any potential installation. <http://www.vsb.bc.ca>.

### Wider reach?

As the Australian Communications Authority (ACA) prepares to introduce broadband over power line services, it has launched a broadband information portal. It can be found at [http://internet.aca.gov.au/ACAINTER.3997752:STANDARD:990550623:pp=PC\\_2703,pc=PC\\_2845](http://internet.aca.gov.au/ACAINTER.3997752:STANDARD:990550623:pp=PC_2703,pc=PC_2845).

## Computers and Glaucoma Risk

Computer use may be a risk factor for glaucoma, according to recent research from Japan.

Dr Masayuki Tatemichi from Tokyo's Toho University studied the connection between computer use and visual problems on a group of more than 10 000 Japanese workers.

The study found that there was a relationship between computer use and refractive errors (near and far-sightedness). Further, there was a higher rate (nearly double) of glaucoma in heavy computer users with refractive errors.

Glaucoma is an eye disease that manifests symptoms of visual disruption and headaches and can lead to blindness.

(Tatemichi, M et al, *J Epidemiol Community Health*, 58(12):1021-7, 2004.)

## Doctors' statement on EMR

Irish doctors have called on their Government to take decisive action on EMR.

The Irish Doctors' Environmental Association (IDEA) has adopted a position on EMR in which it states that “a sub-group of the population are particularly sensitive to exposure to different types of electro-magnetic radiation.”

It has called on the Irish Government to review information on health effects, to initiate research and to investigate forms of treatment. It has recommended the establishment of a database of people suffering adverse symptoms and that treatment is provided by the State.

IDEA has also called for “the strictest possible safety regulations” for mobile phones and phone towers and recommended the conservative standard adopted in some parts of New Zealand.

In making these recommenda-

tions, IDEA cites the following evidence.

- ◆ “An increasing number of people in Ireland are complaining of symptoms which, while they may vary in nature, intensity and duration, can be demonstrated to be clearly related to exposure to electro-magnetic radiation (EMR).”
- ◆ “International studies on animals over the last 30 years have shown the potentially harmful effects of exposure to electro-magnetic radiation. In observational studies, animals have shown consistent distress when exposed to EMR. Experiments on tissue cultures and rats have shown an increase in malignancies when exposed to

mobile telephone radiation.”

- ◆ “Studies on mobile telephone users have shown significant levels of discomfort in certain individuals following extensive use or even, in some cases, following regular short-term use.”
- ◆ “The current safe levels for exposure to micro-wave radiation were determined based solely on the thermal effects of this radiation. There is now a large body of evidence that clearly shows that this is not appropriate, as many of the effects of this type of radiation are not related to these thermal effects.”

<<http://www.ideaireland.org/emr.htm>>

# Watt's the Buzz???



## Nano-computers

Californian scientists have developed an alternative technology to transistors, the building blocks of the modern computer. Researchers from Hewlett Packard Laboratory's Quantum Science Research Group have invented the "cross-bar latch" - a tiny device that can perform basic computing functions. Several thousand cross-bar latches could fit across the diameter of just a single human hair.

"With the cross-bar latch, we now have the final component theoretically needed for performing the multiple processing steps required for useful computing at the nanoscale," said scientist Duncan Stewart.

The research was published in the February issue of the *Journal of Applied Physics*. (HP Press Release, 01.02.05.)

## Hot topic for family men

Laptop computers may be a risk factor for infertility according to a new study from the US. Dr Yefim Sheynkin of the State University of New York has found that using a laptop computer on the thighs elevates temperature of the scrotum by up to 2.8° C. Such elevations of temperature are known to have an effect on male fertility.

Dr Sheynkin's pilot study, conducted on 29 male volunteers aged 21 to 35, was published in the journal *Human Reproduction*. Dr Sheynkin plans to follow up with further research on the topic. (*New Scientist* 09.12.04.)

## Scan to suit

Holographic scanning is the latest technology to find its way into the fashion industry.

Now customers can walk into an Intellifit scanning device which beams them with radiofrequency radiation and produces a 3D holographic image of their body. The image can be used for identifying suitable styles or providing tailor-made garments.

The technology, produced by Pacific Northwest National Laboratory, is already being used in some US clothing stores and is being considered for use in airports, prisons and security buildings. (*Australian IT* 23.11.04.)

## Mobile explosion

The number of mobile phones sold throughout the world reached 664.5 million in 2004. That represents a 29% increase in sales from 2003. (*SMH* 01.02.05.)

## Mobile takeover?

There are now more mobile phones in Czechoslovakia than there are people. The country's network operators have recorded listings for 10.7 million mobile phones, compared with only 10.2 million people! Are the phones now talking to each other? (*Australian IT* 20.01.05.)

## Launch of the e-roach

Highly intelligent, coldly calculating, clad in shining armour, this is a robot designed to lurk in the dark, manipulate his fellow creatures and lead them to their doom.

No, it's not a scene from the latest sci-fi thriller. It's the latest engineering development from a team of researchers in three European countries.

The InsBot is a robotic cockroach (yes, cockroach) developed over three

years, that looks, smells and behaves like a cockroach. Its purpose is to infiltrate the cockroach community and influence behaviour of its fellows to lure them into the light and capture or annihilation.

Researchers expect to extend the project to create robotic duplicates of other species to help control animal behaviour. ([www.news.com.au](http://www.news.com.au), 16.11.04.)

## Technology in the groove

And on the topic of robots, Japanese researchers have developed a robot that can perform a traditional Japanese dance. Prof Katsushi Ikeuchi from Tokyo University said that the project is aimed at preserving traditional dances, which are becoming a rarity, for future generations. ([uk.news.yahoo.com](http://uk.news.yahoo.com), 12.01.05.)

## Talk is cheap

Mobile phone manufacturers are encouraging people to throw away their mobile phones. Motorola has developed a plastic mobile device designed to be discarded when the battery runs out. The cheap disposable phone will be sold as part of an inexpensive pre-paid package. (*Daily Telegraph* 04.01.05.)

## Hyper-mobile

Now there's a mobile phone for people who are really on the move. Samsung Electronics has developed a phone that responds - not just to the push of a keypad - but to a range of movements.

The mobile phone's three-dimensional movement recognition allows it to interpret waves, shakes or even numbers traced while holding it in the air. (*Age* 13.01.05.)

# Case Studies

## Case study #1

This middle aged woman suffered from depression and sleep apnoea and was taking medication prescribed by her GP.

On realising that she was sleeping directly behind the meter box (located on the outside of her bedroom wall), she moved her bed to a different position.

Her depression and sleep apnoea improved shortly afterwards and she no longer required medication.

## Case study #2

This middle-aged couple slept next to their home office, with the computer (which was left turned on at night) located directly behind their bed. They woke each morning feeling tired and experiencing severe headaches.

When they moved the computer to a downstairs room, the headaches disappeared and they awoke feeling in better health.

## Case study #3

This 75-year old woman had spent most of her adult life living in a home next to a caravan park..

When a mobile phone tower was constructed next to her home she began to experience immediate symptoms: a blistered lip, sore nose, nasal congestion, tingling, nausea, mental "fuzziness", memory problems and extreme fatigue.

The symptoms were at their worst during weekends and holiday periods when the caravan park was full and the mobile phone tower was receiving and transmitting more calls. During these times she spent much of her time in bed.

In out-of-season periods when there were fewer people at the caravan park, the symptoms were much improved.

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Helsinki 01.01.2005

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## Helsinki Appeal 2005

Dear Member of the European Parliament,

We, undersigned physicians and researchers, feel great concern about the Precautionary Principle not being sufficiently applied to the electromagnetic fields, especially in the radio- and microwave frequency bands.

New applications of wireless technologies are continually being introduced, regardless of the fact that there are plenty of qualified scientific reports reporting possible health risks. According to several studies, both in the cell and animal studies, mobile phone and other RF radiation can induce various disturbances, such as increasing the permeability of the blood-brain-barrier. Also disorders of EEG (electroencephalography) and cognitive functions and in the production of the cell proteins have been reported. The latest epidemiological study by Stefan Lönn, with the wellknown Swedish professor Anders Ahlbom as a co-author, suggests that the risk of acoustic neurinoma (a nerve tumour in the ear) may increase more than three-fold after 10 years of the mobile phone use.

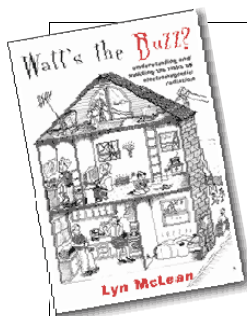
Unfortunately, the consequences of these disturbances for common health are an open question. This is a matter of great concern.

The present safety standards of ICNIRP (International Commission of Non-Ionizing Radiation Protection) do not recognize the biological effects caused by non-ionizing radiation except those induced by the thermal effect. In the light of recent scientific information, the standards recommended by ICNIRP have become obsolete and should be rejected. Especially children and other persons at risk should be taken into account when re-evaluating the limits. This was also suggested in the Freiburg Appeal of 2002, which was signed by more than 3000 European colleagues.

**We appeal to you as a member of the European Parliament to act promptly for the adoption of the new safety standard in the European Union.**

Another question of importance regards the REFLEX study (Risk evaluation of potential environmental hazards from low-energy electromagnetic field EMF) exposure using sensitive in-vitro methods), which is carried out by 12 research teams from European universities and other organizations. For example, the REFLEX study showed evidence of genotoxic effects of mobile phone radiation. EU has partly funded REFLEX. The REFLEX study has not been published in the scientific publications, nor refunded. It is absolutely necessary that the REFLEX project will be continued. However, the project should be targeted more to the non-thermal effects and be involved with those researchers, who have already been working in the field of the biological, non-thermal effects.

**The European Community should take prompt measures for solving the refunding of the NEW REFLEX project.**



### Watt's the Buzz?

by Lyn McLean

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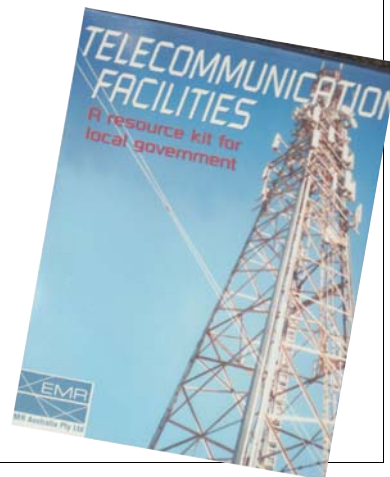
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