

# EMR and Health

Free report on electromagnetic radiation, health and well-being

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## New international guidelines

An international organisation for standards-setting has released a new exposure guideline which is open for public comment.



In July, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) released a draft of the latest version of its Guidelines for exposure to radiofrequency (wireless radiation), aimed at facilitating 5G networks and open for public comment till 9 October.

If approved, it is likely to become the defacto standard for many countries in the world, including Australia.

The document—The ICNIRP Guidelines on Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (100 kHz to 300 GHz)—takes a similar approach to the current guidelines, allowing exposures to much higher levels of radiation than has been shown to cause unhealthy effects on the body and to affect sensitive people.

The ICNIRP document assumes that health problems will only occur if the core temperature of the body is heated by 1 degree Celsius for over six minutes. Thus, it differentiates between 'adverse health effects' and 'biological effects'.

This allows ICNIRP to make claims that there are 'no adverse effects' of exposure on just about every system of the body, despite the fact that radiofrequency

radiation has been strongly linked with brain tumours, cancer, sperm damage and oxidative stress and has been categorised as a class 2B carcinogen by the International Agency for Research on Cancer.

This approach also allows ICNIRP to ignore the mounting evidence of adverse biological effects on cells, genes, hormones, organs and systems of the body and the unpleasant symptoms that many people report after exposure.

The document specifies different exposure levels for the general public and workers on the basis that 'occupationally-exposed individuals are defined as healthy adults who are exposed under controlled conditions ... trained to be aware of potential radiofrequency EMF risks and to employ appropriate harm-mitigation measures'. We wonder how often that happens.

The draft guidelines specify limits for exposures of greater than six minutes. They differ from the current ICNIRP Guidelines in that they cover an additional frequency range of 6—300 GHz, including the higher frequencies that will be used by 5G networks.

*(Continued on page 3)*

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## Problems with ICNIRP's draft guidelines

1. The document considers 'health effects' as those caused by heating of the body by 1 degree Celsius and does not take into account biological effects.

- ⇒ This is at odds with the WHO's definition of health as a 'state of complete physical, mental, and social wellbeing, and not merely the absence of disease or infirmity'.
- ⇒ The document does not give appropriate consideration to the thousands of studies showing that RF exposure causes harmful biological effects that could lead to disease.
- ⇒ This approach has been strongly criticised by many scientists working in this field. For example, the EMF Scientists Appeal (2016), signed by 220 scientists from 41 nations.

2. The document assumes that exposure to radiofrequency radiation can be averaged over a six minute period. In other words, the body can tolerate brief, intense pulses of radiation as long as the pulses on either side of it are much less intense.

3. ICNIRP's conclusion that there is no evidence of adverse effects on the body, including cancer, is inconsistent with the IARC's classification of radiofrequency electromagnetic fields as a 2B carcinogen, in the same category as lead.

4. ICNIRP's premise that health effects are only caused by heating is inconsistent with a number of mechanisms that have been proposed to account for adverse effects on the body at nonheating levels of exposure, for example:

- ⇒ via oxidative stress, implicated in many health problems, including cancer
- ⇒ via activation of calcium ion channels
- ⇒ via activation of mast cells.

5. The document does not provide protection for particularly vulnerable populations such as:

- ⇒ the foetus
- ⇒ people with electromagnetic hypersensitivity
- ⇒ people with cancer because cancer cells absorb more radiation than normal cells.

6. The document allows higher levels of exposure than those permitted by standards in countries such as Russia, Switzerland, Austria and Italy, which draw on the same scientific evidence.

7. In light of the uncertainty about safe levels of exposure in the scientific literature, the document must recommend a precautionary approach to exposure and include suggestions for reducing exposure.

8. The results of the National Toxicology Program, showing increases in cancers at levels similar to the current standards, show that the draft guidelines do not provide the 50-fold reduction factor for general public exposure that it claims to.

(Continued from page 1)

The document says that 'it is possible that the radiofrequency health literature may not be sufficiently comprehensive to ascertain thresholds' (lines 175-6), so it is important that the limits in the document are not regarded as safe and that precautionary recommendations for reducing public exposure is added.

**You can make a submission online, using our suggestions on page 2, at <https://www.icnirp.org/en/activities/public-consultation/consultation-1.html>**

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## Phone radiation a cancer risk

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There is clear evidence that mobile phone radiation is a risk for cancer, says Professor James Lin, editor of the journal *Bioelectromagnetics* and former President of the Bioelectromagnetics Society.

Commenting on the results of the US National Toxicology Program (NTP), Lin questioned the adequacy of existing standards and suggested it may be time to update them. The NTP study found increased rates of malignant schwannomas (heart tumours) in rats, together with some evidence for cancer in the adrenal glands, pituitary gland and livers of rats. These effects occurred at levels just above the current safety limits, suggesting that the current safety margins in the standards are not as protective as has been thought.

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*'Perhaps the time has come to judiciously reassess, revise, and update these guidelines.'*

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'The finding that long-term RF exposure could lead to cancer development in rats at levels that are the same as or no greater than a factor of three above these exposure guidelines is significant,' he said.

Lin speculated whether the NTP's findings might influence the International Agency for Research on Cancer (IARC) to upgrade its classification of radiofrequency radiation to a higher level of cancer risk.

Referring to current standards for RF exposure, he said, 'Perhaps the time has come to judiciously reassess, revise, and update these guidelines.' (James Lin, 'Clear Evidence of Cell-Phone RF Radiation Cancer Risk', *IEEE Microwave Magazine*, Vol 19 (6), Sept/Oct 2018.)

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## France bans phones

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The French government will implement a ban on smart phones and tablets in schools from September in an effort to counter screen addiction.

The new law, approved on 31 July, requires students aged below 15 to keep their wireless devices at home or turned off during the school day. This extends a 2010 law which required students to keep smartphones turned off in class. (*Mailonline* 1.08.18.)

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## Good news for EHS sufferers

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It's about to get easier for people with electromagnetic hypersensitivity (EHS) to obtain a diagnosis of their condition and medical assistance.

Tasmanian GP, Dr Russel Cooper, working with Melbourne laboratory NutriPATH, has developed a panel of biological tests that will allow the diagnosis and treatment of this condition.

Dr Cooper appeared as an expert witness in McDonald and Comcare in which David McDonald, who suffered from EHS, was awarded compensation for injuries caused by the electromagnetic to which he was exposed at work.

More information will be available in future issues of *EMR and Health*.

# RESEARCH UPDATES

## ELF fields (from electrical sources)

### Oestrogen

Could magnetic fields affect the uterus? Researchers exposed tissues from pig uterus to magnetic fields of different frequencies (50 and 120 Hz). They found that exposure changed the synthesis and release of the oestrogen hormone oestradiol-17 $\beta$ . This hormone ceases production at menopause. In other words, magnetic fields could affect the production of oestrogen. (Koziorowska, A et al, *Theriogenology* 110:86-95, 2018.)

### Cognition

Power-frequency magnetic fields had a harmful effect on memory in rats, in a study from China. Researchers exposed the animals to high magnetic fields (2000 mG) for 30 days and observed oxidative stress and impaired memory in exposed rats. However, rats treated with antioxidants (catechin and epicatechin) had no such memory problems or oxidative damage. (Gao, Q et al, *J Food Biochemistry* 41(6), 2017.)

## RF/wireless radiation

### Neck cancer

A team of scientists has looked at whether mobile phone radiation could contribute to cancer of the head and neck, given the position in which phones are normally held. They found that wireless radiation stimulated several genes and affected the formation of blood vessels in ways that could contribute to neck cancer. (Alahmad, YM et al, *Head Neck* May 13, 2018.)

### Cells

To discover how mobile phone radiation affected stem cells, Iranian researchers exposed human stem cells and cancer cells to a 900 MHz signal for different periods daily. They found that exposure reduced the viability and proliferation of both types of cells and recommended that people reduce their exposure to mobile phone radiation to prevent its harmful effects. (Shahbazi-Gahrouei, D et al, *Int J Prev Med* 9:51, Jun 2018.)

### Memory

To discover how mobile phone radiation affected memory, scientists from Iran exposed young male rats to a GSM mobile phone signal for four weeks. They found that exposure impaired animals' performance of memory tasks. (Ahmadi, S et al, *Brain Res*, Jul 18, 2018.)

### 5G

Despite the advantages of 5G technologies, there are potential health risks. 5G has not been adequately studied, effects will be difficult to discern because of almost universal exposure and precaution should be taken regarding rolling out new technologies. (Russell, CL, *Environ Res* 165:484-95, Aug 2018.)

## Electromagnetic hypersensitivity

Scientists from France and Italy have detected biological damage in people with electromagnetic hypersensitivity (EHS). The researchers investigated the blood of 32 patients with self-reported EHS and found several biomarkers for oxidative stress. They conclude that these patients 'present with a true objective new pathological disorder.' (Irigaray, P et al, *Int J Mol Med* 42(4):1885-1898, Oct 2018.)



*'wireless radiation stimulated several genes and affected the formation of blood vessels in ways that could contribute to neck cancer'*

### Abbreviations

RF radiofrequency radiation (including mobile technology)

ELF extra-low frequency radiation (including electrical sources)

EMF electromagnetic fields (often used alternatively for ELF)

mG milliGauss (measurement of magnetic field)

T Tesla - alternative measurement of magnetic field; also milliTesla (mT) and microTesla ( $\mu$ T)

0.1 mT = 1000 mG

0.01 mT = 100 mG

1  $\mu$ T = 10 mG

Hz Hertz - a measure of frequency (cycles per second).

Megahertz (MHz) - million Hz

GigaHertz (GHz) thousand million hertz

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## Mobiles and memory

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Mobile phone radiation may have harmful effects on memory performance in teenagers, according to a new study from Switzerland.

Adolescent brains absorb more radiation than do those of adults and they are still developing memory functions. This raised the question of whether they could be more at risk from the effects of radiation exposure from holding a phone against their head during calls.

To answer this question, scientists from Switzerland conducted a study on nearly 700 high school students aged 12 to 17 in German-speaking Switzerland over a one-year period. In contrast with previous studies, the authors obtained information from mobile phone providers, rather than relying on personal estimates of phone use.

'We found preliminary evidence suggesting that RF-EMF may affect brain functions such as figural memory in regions that are most exposed during mobile phone use,' the authors said.

The investigators found that the more radiation exposure the teens had, the lower their performance in figural memory tasks. This function takes place in the right hemisphere of the brain and in a region most exposed during phone use. Memory problems were higher in teens who held the mobile phone against the right side of their head, suggesting that radiation absorption is responsible.

'Potential long-term risk can be minimized by avoiding high brain-exposure situations as occurs when using a mobile phone with maximum power close to the ear,' the authors wrote.

(Foerster, M et al, 'A prospective cohort study of adolescents' memory performance and individual brain dose of microwave radiation from wireless communication', *Environ Health Perspect.* 2018 Jul 23;126(7):077007).

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## Health hazard

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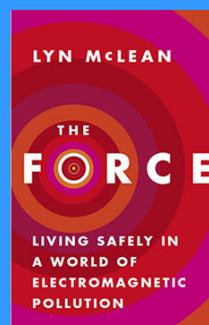
Electromagnetic radiation (EMR) is a 'significant health hazard', say scientists, writing in the July issue of the journal *Environmental Pollution*.

It's not just the thermal (heating) effects of radiation that cause health problems, they say, but the lower environmental exposures in our everyday lives. For example, long-term exposure to mobile phone radiation can increase the risk of brain cancers (in humans and animals). It can also damage male and female fertility and cause symptoms of electromagnetic sensitivity in vulnerable people.

It's likely that EMR causes these problems by oxidation (see also page 3), DNA damage and changes to gene expression.

Children are particularly vulnerable, the authors say, because their nervous systems are still developing, their brains are hyperconductive and radiation penetrates further into their brains. (Belpomme, D et al, *Environ Pollut* 242 (PtA):643-658, Jul 2018.)

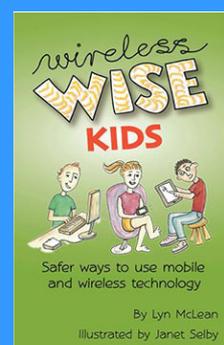
### Books by Lyn McLean



'The Force'



'Wireless-wise Families'



'Wireless-wise Kids'

for everything you need to know about keeping your family EMR-safe  
[emraustralia.com.au](http://emraustralia.com.au)

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## Gaming disorder

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It's official. Excessive gaming is a classifiable disorder.

On 18 June, the World Health Organisation released the latest edition of its International Classification of Diseases—ICD-11—which includes 'gaming disorder' among the the numerous diseases and disorders that it lists.

It states that, 'Gaming disorder, predominantly online is characterized by a pattern of persistent or recurrent gaming behaviour ('digital gaming' or 'video-gaming') that is primarily conducted over the internet and is manifested by: 1) impaired control over gaming (e.g., onset, frequency, intensity, duration, termination, context); 2) increasing priority given to gaming to the extent that gaming takes precedence over other life interests and daily activities; and 3) continuation or escalation of gaming despite the occurrence of negative consequences. The behaviour pattern is of sufficient severity to result in significant impairment in personal, family, social, educational, occupational or other important areas of functioning. The pattern of gaming behaviour may be continuous or episodic and recurrent. The gaming behaviour and other features are normally evident over a period of at least 12 months in order for a diagnosis to be assigned, although the required duration may be shortened if all diagnostic requirements are met and symptoms are severe.' (<https://icd.who.int/browse11/l-m/en#/http://id.who.int/icd/entity/338347362>) <http://www.who.int/classifications/icd/en/>

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## Digital relationships

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Now researchers have shown what many people have suspected—that smart phone use can interfere with parents' relationships with their kids.

Scientists from the University of Virginia in the US conducted two studies to see how smart phones impacted on these vital relationships. In the first study, conducted in a museum, parents who used their phones most, felt more distracted and less connected with their kids. In a second study, in which parents made diary entries, they found that smart phone use prevented parents from feeling connected when spending time with their children.

According to the authors, the results suggest 'that being constantly connected to the internet may carry subtle costs for the fabric of social life.'

(Kushlev, K and Dunn, E, 'Smartphones distract parents from cultivating feelings of connection when spending time with their children', *J Social and Personal Relationships*, Apr 10, 2018.)

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## Autism spectrum disorders

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Parents' mobile phone use may be contributing to autism spectrum disorders in vulnerable children, say researchers from Israel. Parents' eye contact is important for the development of young children and their use of cell phones can limit this eye contact.

The researchers observed that a third of parents used their mobile phone for more than half the time they spent with their child in a waiting room.

Based on their observations, the authors recommended that parents minimise their use of mobile phones when engaging with their children.

(Davidovitch, M et al, *Med Hypotheses* 117:33-36, Aug 2018.)

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*'Smart phone use can interfere with parents' relationships with their kids.'*

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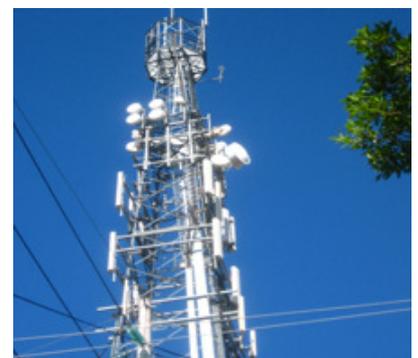
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## Dr Martin Blank

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The world has lost a great scientist and a key advocate for precautionary approach to exposure to EMR.

Dr Martin Blank, chemist, physicist and cell biologist, who was particularly interested in electromagnetic radiation, died on 13 June, aged 85.

Dr Blank published a number of scientific studies on the effects of electromagnetic fields on the body. He showed that DNA has the characteristics of a fractal antenna, making it particularly sensitive to electromagnetic fields. He showed that exposure caused breaks in DNA strands and observed that international standards do not protect against these effects.

Dr Blank was a key figure in the call for precaution. He was the architect of the 2015 scientific appeal to the WHO and United Nations, endorsed by 190 scientists from around the world, that called for changes to international exposure standards to provide a greater degree of protection to the public.

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## Wireless gadgets endanger planet

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The wireless gadgets that dominate our work, our play and our relationships may not just be endangering our health. They may be endangering the health of the planet.

The use of billions of wireless devices worldwide consumes a great deal of energy. For example, it takes the same amount of energy to watch a one-hour video on a wireless device as it does to run two fridges!

This electricity consumption is set to increase, particularly with the introduction of 5G in which wireless devices will connect with wireless devices. It's been predicted that digital technology will have a greater impact on global warming even than the aviation industry. (John Harris, *Guardian*, 17.07.2018.)

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## FCC bans protest

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The US government is determined that nothing should get in the way of its rollout of new telecommunications facilities.

On 2 August, the Federal Communications Commission (FCC) voted in favour of new legislation that makes it illegal for state or local governments to stall the rollout. The new regulations—Third Report and Order and Declaratory Ruling—prohibits moratoria and even delays in processing and issuing planning approvals for telecommunications infrastructure.

The new regulations further disempower state and local administrations from having a say about the siting of radiating infrastructure in their locality.

Local governments have till 4 September to ask the FCC to reconsider its decision and till 2 October to appeal.

(Best Best and Krieger Attorneys at Law, [https://www.bbklaw.com/news-events/insights/2018/legal-alerts/08/fcc-bans-moratoria-on-communications-facilities-de?utm\\_source=constant\\_contact&utm\\_medium=read\\_more&utm\\_campaign=LA\\_Wireless\\_Moratorium&utm\\_content=Legal\\_Alert](https://www.bbklaw.com/news-events/insights/2018/legal-alerts/08/fcc-bans-moratoria-on-communications-facilities-de?utm_source=constant_contact&utm_medium=read_more&utm_campaign=LA_Wireless_Moratorium&utm_content=Legal_Alert) )

### Mobile phone protection

Blocsock mobile phone



pouches block 96% radiation



Wavewall mobile phone cases protect the head, body and the phone



Pro Tubez airtube headsets - latest generation of airtube headsets - keep the phone away from the head

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## Dolphins know

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So mammals *can* sense electric fields!

Scientists have discovered the first true mammal known to detect electric fields—the Guiana dolphin from South and Central America.

Wolf Hanke, a researcher from Rostock University in Germany, discovered that this ability derives from the whiskerless pores in the dolphins' snouts, close to nerve endings. Using this information, they trained a dolphin to react to electric fields and determined that it responded to minute fields—less than those produced by a fish.

According to Hanke, the dolphins' sensory ability enables it to find food in the murky waters it inhabits because the marine creatures on which it feeds emit tiny electric fields.

The platypus and the echidna, other types of mammals (monotremes) are also able to detect electric fields. (<https://www.livescience.com/15240-dolphins-sense-electric-fields.html>)

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## Spiders fly with electricity

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Spiders can fly—and they do it by making use of electric fields.

This fascinating insight into the behaviour of yet another living creature who can sense and utilise minute electric fields comes from research conducted at the University of Bristol in the UK by Erica Morley and Daniel Robert.

The researchers placed spiders inside a closed plastic box and exposed them to the sort of electric field they might encounter outdoors. The spiders detected the fields through tiny hairs on their feet, pushed out their abdomens and prepared to or managed to launch themselves into the air. When the electric field was turned off, the spiders returned to the bottom of the box.

Spiders have been shown to fly hundreds of kilometres and Morley and Robert's research helps to explain how, without wings, they manage this extraordinary feat. (<https://www.theatlantic.com/science/archive/2018/07/the-electric-flight-of-spiders/564437/>)

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## Kids' cancer

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Pediatric cancer is on the rise in the United States. In a study reported at the 6th Annual Epidemic Intelligence Service, investigators studied US cancer statistics from 2001 to 2014 and found an increase, especially for leukemia, brain tumours and lymphomas. They recommended that biological and environmental exposures be investigated to help to explain the increase.

Siegel, D et al, 'Incidence Rates and Trends of Pediatric Cancer—United States, 2001—2014', <https://www.cdc.gov/eis/downloads/eis-conference-2018->

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