

EMR and Health

Quarterly report on electromagnetic radiation, health and well-being

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WiFi in schools

A new study, published in January, reports on the levels of WiFi radiation in Australian schools.

Measurements of WiFi radiation in Australian schools were reported in a paper published in the January issue of *Radiation Protection Dosimetry*. It's the first comprehensive study to investigate this exposure in Australia.

The study, conducted by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), investigated radiofrequency fields in one classroom from each of 23 schools in NSW and Victoria. These included primary and secondary, rural and urban schools and schools of different sizes. Measurements were conducted between June and September 2016.

While the study appears to exonerate WiFi radiation from any harmful effect, questions can be asked about whether that's really the case.

The paper presents the collected information, not as actual measurements, but as percentage of the levels allowed by the International Commission of Nonionizing Radiation Protection (ICNIRP) Guidelines. We asked Dr Ken Karipidis, co-author of the paper, why the paper did not reference the limits of the Australian standard (RPS3) and he advised, 'For radiofrequencies the limits in the ARPANSA Standard are the same as the ICNIRP 1998 Guidelines. In the paper we make reference to the ICNIRP Guidelines because we published in an



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international journal "Radiation Protection Dosimetry" with a focus on wider audience rather than just Australian audience.'

In one of their tests, investigators walked slowly through the classroom, sweeping the meter probe in different directions over a ten-minute period.

In another test, investigators measured fields in different classroom locations over a one-minute period. Measurements were taken at 1.5 metres above the ground, which is above the levels of children's heads while sitting, so does not represent their actual exposure. Dr Karipidis told us, 'this is a standard measurement protocol for RF measurements'.

The ARPANSA investigators found that measurements at the desk closest to the router were slightly higher than those further away. Average and peak measurements were 0.00006 V/m and 0.006 V/m at desks furthest from the router and 0.0002 V/m and 0.02 V/m at desks closest to it.

In 20 of the 23 classrooms, these measurements were conducted without any children present and using technology in the classroom. To our question why ARPANSA

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Nonionising radiation and cancer

For decades authorities have told the community that nonionising radiation—the emissions from power lines, mobile phones, base stations and wireless devices—can't harm us. But this information is not only incorrect, there's evidence that nonionising radiation is a risk factor for cancer, infertility and other health problems, according to Dr Magda Havaas, writing in a recent issue of *Environmental Pollution*.

Powerlines, wiring, electrical equipment, mobile and cordless phones, tablets, computers, WiFi routers, base stations all emit fields in the non-ionising part of the electromagnetic spectrum. There's a widespread assumption in scientific and government circles that these fields are not harmful to human health because, unlike ionising radiation, they do not have sufficient energy to dislodge electrons and break chemical bonds, thereby causing cancer.

This assumption is false, according to Dr Magda Havaas, Associate Professor of Environmental & Resource Studies at Trent University in Canada.

'Ionizing radiation increases free radicals in the body *directly*. Non-ionizing radiation increases free radicals in the body *indirectly*,' she says.

Dr Havaas refers to a large body of scientific evidence showing that exposure to non-ionising radiation increases free radicals in the body. Studies have shown, for example, that exposure to radiofrequency radiation activates pathways that generate free radicals, activates peroxidation, causes oxidative damage of DNA and changes levels of antioxidant enzymes in the body. Others have shown that exposure to power-frequency fields increases free radicals, causes oxidative damage and alters activity of antioxidant enzymes. Moreover, supplementation with antioxidants has been found to reduce the effects of exposure.

'A preponderance of scientific evidence clearly indicates that NIR [non-ionising radiation] both ELF and RF, causes oxidative stress in living cells. This oxidative stress ...may be the key mechanism involved in carcinogenicity and may also be involved with other effects including symptoms of electrohypersensitivity (EHS) and reproductive problems due to impaired sperm,' Dr Havaas writes.

Not surprisingly, studies have found that populations exposed to non-ionising radiation have developed higher rates of cancer. Havaas refers to studies showing that people living near mobile phone base stations, broadcast antennas and radar installations have developed higher rates of cancer. So have people exposed to high levels of radiofrequency radiation at work. Long-term and heavy mobile phone use has been linked with higher rates of gliomas, parotid gland tumours and acoustic neuromas and children exposed at home to high magnetic fields—such as from power lines—have developed higher rates of leukemia. Moreover, and workers exposed to these fields have developed breast cancer, leukemia and brain tumours.

If non-ionising radiation can cause cancer, then what of international standards that permit exposure in myriad everyday situations?

'Government safety guidelines for microwave radiation emitted by mobile phones, Wi-Fi, smart meters, and other common wireless devices, are fundamentally flawed and fail to protect the public from this possible carcinogen,' Havaas says. She recommends reconsidering the widespread use of wireless technologies and implementing precautions to protect public health.

'Steps that need to be taken by individuals as well as by governing bodies and industry are provided in the EMF Scientist Appeal. We know enough to act and we need to take steps to reduce public exposure if we are to minimize an emerging health crisis,' she says. 'As usage of microwave-emitting devices increases and is marketed to younger consumers without caution, we can expect a societal increase of certain types of cancers including glioblastoma as well as infertility and other health effects associated with free-radical damage. Indeed this is already happening.'

(Havaas, M, 'When theory and observation collide: Can non-ionizing radiation cause cancer?' *Environmental Pollution*, 2016, <http://dx.doi.org/10.1016/j.envpol.2016.10.018>.)

'...oxidative stress ... may be the key mechanism involved in carcinogenicity and may also be involved with other effects including symptoms of electrohypersensitivity (EHS) and reproductive problems due to impaired sperm.'

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chose to measure exposure in classrooms without children, Dr Karipidis replied, 'the decision to include students in the classroom was up to the school and not under our control.'

Students were present in only two of the classrooms measured. Here the average walkthrough measurements were 0.0049 V/m when WiFi was idle and 0.0065 V/m when it was active. In the stationary tests, the measurements at the desk furthest from the router were 0.00045 V/m (average) and 0.0355 V/m (peak). The measurements at the desk closest to the router were 0.0007 V/m (average) and 0.098 V/m (peak).

The investigators also took measurements in the playground at least five metres away from buildings and found, not surprisingly, that signals from TV, radio and mobile phone base stations were higher than those from WiFi.

The authors suggest that WiFi radiation does not pose a health risk to exposed staff and students. 'The results of this study showed that children's exposure to RF fields from Wi-Fi in schools is several orders of magnitude below exposure reference levels recommended by international guidelines for protection against established health effects,' they concluded.

We asked Dr Ken Karipidis what was meant by the term 'established' effects. He replied, 'International health authorities such as the World Health Organization, ICNIRP and ARPANSA have reviewed the evidence on RF and health and have determined that at certain high levels, RF causes whole-body and localised excess heating.'

However, does compliance with international standards protect public health?

Not according to Dr Magda Havaas, who describes them as 'fundamentally flawed' (page 2). Not according to the BioInitiative Working Group who say there are 'thousands of high quality scientific papers indicating possible non-thermal RF risks to health' (page 6). Not according to the signatories of the Reykjavik Appeal (page 11). Not according to the International Agency for Research on Cancer (IARC) which classified radiofrequency radiation as a class 2B (possible) carcinogen in 2011. Not according to the governments of the many countries that have reduced their exposure limits below those of the ICNIRP Guidelines.

Indeed, any foray into a database of scientific studies will provide an abundance of reports showing adverse effects on the body from exposures that comply with the ICNIRP Guidelines.

We asked Dr Karipidis how ARPANSA recommends that the precautionary approach recommended by the Australian radiofrequency standards (RPS3) could be applied to the use of WiFi in schools.

He replied, 'The ARPANSA Standard recommends minimising exposure with certain provisos. To be exact Section 5.7 of the Standard mentions "Minimising, as appropriate, RF exposure which is unnecessary or incidental to achievement of service objectives or process requirements, provided this can be readily achieved at reasonable expense. Any such precautionary measures should follow good engineering practice and relevant codes of practice. The incorporation of arbitrary additional safety factors beyond the exposure limits of this Standard is not supported". How the precautionary minimisation principle is applied is a matter for the school or relevant department remembering that the survey showed that the exposure from WiFi in the classroom is thousands of times below the limits of the Standard.'

That does little to reassure some people, such as this primary school casual teacher with 30 years' teaching experience.

She told *EMR and Health* she had to resign from teaching as she could not tolerate the WiFi radiation in classrooms. 'When 17 laptops were turned on, my head felt like it was going to explode. My vision would become distorted and my face would begin to burn. I would experience a kind of "brain fog" which would last for many hours.' As WiFi was introduced in more and more of the schools at which she worked, the prevalence of her symptoms increased. 'To say the emissions comply with the standard,' she said, 'is of no comfort to me and others who are sensitive to this radiation.'

Other teachers and principals have also been forced to resign due to the symptoms they developed when WiFi was introduced into their schools. Some parents have reported that their children experience symptoms at school but not in WiFi-free home environments.

(Karipidis, Ken et al, 'Exposure to Radiofrequency Electromagnetic Fields From Wi-Fi in Australian Schools', *Radiation Protection Dosimetry*, 10 January, 2017, <https://doi.org/10.1093/rpd/ncw370>)

'When 17 laptops were turned on, my head felt like it was going to explode. My vision would become distorted and my face would begin to burn. I would experience a kind of "brain fog" which would last for many hours.'

RESEARCH UPDATES

ELF fields (from electrical sources)

Children's exposure

In a major French study, known as the EXPERS study, researchers investigated the magnetic field exposure of 977 children throughout the country. Unlike some other studies that have used wiring or proximity to power lines to estimate children's exposure, this study involved personal measurements over a 24-hour period. The study found that only 3.1% of children were exposed to more than 4mG, the level classified by the International Agency for Research on Cancer as a 2B (possible) carcinogen. In most of these cases, exposure was due to high magnetic fields from alarm clocks. Exposures were higher among children living close to a high voltage power line but, even so, did not exceed the 4mG level. (Magne, I et al, *J Expo Sci Environ Epidemiol* Nov 9, 2016.)

Cars

To discover what fields drivers are exposed to, researchers from Spain measured fields in different seats, at different heights and at different speeds in cars. They found that the emissions were mainly in the frequency range 5—100 Hz and emanated primarily from the rotation of the wheels. Fields were highest at foot level and increased with the speed of the vehicle. (Paniagua, JM et al, *Sci Total Environ*, Jan 2017.)

Other studies

- Rats exposed to a power frequency magnetic field performed worse in social recognition tests. (Bernal-Mondragón, C, *Neurol Res*, Nov 28:1-11, 2016.)

RF/wireless

radiation

Testes

Mobile phone radiation may have harmful effect on the testes, according to scientists from Turkey. The scientists found that rats exposed to a mobile phone signal had lower weight and volume of testes, higher cortisol (stress) levels and evidence of damage to the epithelial tissues. (Cetkin, M et al, *Andrologia* Jan 26, 2017.)

Brain tumours

Mobile phone radiation may be responsible for an increased risk of brain tumours in the temporal lobe, according to a study published in December. F de Vocht looked at the relationship between mobile phone use and incidence of various types of brain tumours in England from 1985 to 2014. This analysis showed that malignant neoplasms of the temporal lobe increased faster than expected and is consistent with mobile phone use. (de Vocht, F, *Environ Int*, 97:100-1007, Dec, 2016.)

Teen exposure

How much radiation are teenagers exposed to? To answer this question, Swiss researchers measured exposure of 90 teenagers aged 13 to 17 over a 3-day period between May 2013 and April 2014. They found that total exposures were 63.2 uW/m² or 0.15 V/m. The majority of this exposure (over 67%) was from teens' own mobile phones. Other contributors were base stations (19.8%) and WLAN (3.5%). (Roser, K et al, *Environ Int*, Dec 27, 2016.)

Headaches

Korean researchers conducted a follow-up study on a group of volunteers to assess the link between mobile phone calls and various health effects. They found that increased call duration was more of a risk for headaches than other symptoms and 'that this effect can be chronic'. Cho, YM et al, (*Environ Health Toxicol* Dec 29, 2016.)



'In most of these cases, exposure was due to high magnetic fields from alarm clocks.'

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 (µT)

0.1 mT = 1000 mG

0.01 mT = 100 mG

1 µT = 10 mG

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

Megahertz (MHz) - million Hz

GigaHertz (GHz) thousand million hertz

Symptoms

Swiss researchers investigated the link between adolescents' use of wireless devices and health symptoms. They found that the number of text messages sent daily was linked with tiredness. They also found more of a link between symptoms and device use than RFR exposure. (Schoeni, A et al, *Environ Res* 154:275-283, 2017.)

Shopping malls

A study from Turkey measured exposures to wireless radiation in one of the country's largest shopping malls. Researchers measured exposure for 24 hours a day for a week. They found that average exposure was 0.59 V/m, with maximum exposure being 7.88 V/m. [People who are sensitive often react to exposures over 0.1 V/m.] Over 70% of the signal was from UTMS2100 signals, over 16% from GMS900 and 3.5% from WiFi sources. (Engiz, BK et al, *Radiat Prot Dosimetry*, Nov 24, 2016.)

Auditory system

Mobile phone radiation may have a damaging effect on the auditory system, according to a study from Turkey. Researchers continuously exposed a small group of rats to a GSM mobile phone-like signal of 2100 MHz for 30 days. Exposed rats had more signs of degeneration and cell death in the cochlea than unexposed rats. (Çeliker, M et al, *Braz J Otorhinolaryngol* Nov, 2016.)

Genes

Mobile phone radiation altered the expression of genes in female fruit flies. Four-day-old flies were exposed to a mobile phone signal for 30 minutes. Two hours after exposure, researchers found changes to the expression of 168 genes important for 'critical biological processes', including metabolism, stress response and cell death. Exposure also affected the production of damaging reactive oxygen species in the ovaries. (Manta, AK et al, *Fly (Austin)* 14:1-21, Dec 2016)

Mechanism

Researchers from Estonia have proposed a mechanism to explain how low levels of microwave radiation affect the body. They suggest that radiation affects the polarisation of hydrogen bonds in water molecules and

this causes electrical oscillations in the brain. They say that the findings of their experiments, in which human brain wave patterns were affected by exposure to a 450 MHz signal, are consistent with their theory. (Hinrikus, H et al, *Electromagn Biol Med*, 36 (2):202-212, 2016.)

Tiredness

Korean researchers investigated factors contributing to excessive daytime sleepiness (EDS) in 249 high school students. They found that excessively tired students drank more chocolate/cocoa drinks and spent more time watching TV and using a mobile phone. They concluded that teenagers may need to reduce screen time and avoid caffeine consumption to reduce daytime sleepiness. (Jun, N et al, *Clin Nutr Res* 6(1):55-60, 2017.)

Newborns

To help understand the effects of mobile phone radiation on babies, scientists exposed newborn rats to a GSM-like mobile phone signal of 1800 MHz. They found that exposure caused cell death in the liver tissues of female rabbit pups. (Meral, O et al, *Bratisl Lek Listy* 117(11):672-76, 2016.)

Laptops

Laptop computers should not be used on the lap, say researchers from Iran. The heat from the device can warm men's scrotums and the fields generated by it may decrease sperm quality, they conclude. (Mortazavi, SA et al, *J Biomed Phys Eng* 6(4):279-84, 2016.)

AGNIR report

Because the 2012 report of the Advisory Group on Non-ionising Radiation (AGNIR) plays an influential role on the UK's and international safety policies, S Starkey conducted a review of the report. She concluded that the report contains incorrect and misleading statements, omissions and conflicts of interests and is unsuitable for health risk assessment. (Starkey, SJ, *Rev Environ health* 31(4):493-503, 2016.)

Other studies showing effects from RF radiation

- A 900 MHz mobile phone signal reduced the viability and proliferation of human stem cells. (Shahbazi-Gahrouei, D et al, *J Biomed Phys Eng* 6(4):243-52, 2016.)

'Laptops should not be used on the lap.'



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'Exposed rats had more signs of degeneration and cell death in the cochlea than unexposed rats.'

BioInitiative Team tackles WHO

The BioInitiative Working Group, a team of independent EMR experts, has urged the World Health Organisation to change the membership of its Environmental Health Criteria (EHC) Core Group.

On 19 December¹, representatives of the BioInitiative Working Group wrote to Dr Emilie Van Deventer, head of the WHO's Radiation Programme, stating that the EHC Core Group membership is 'unacceptable'. They requested that the membership of the EHC Core Group be changed to incorporate experts who were involved in the 2011 IARC RF Working Group, which classified radiofrequency radiation as a Class 2B (possible) carcinogen, and that the committee include scientists from Russia, China, India, Turkey and Iran, who have conducted the majority of relevant research over a considerable number of years.

'The EHC Core Group members uniformly represent attitudes and scientific positions of ICNIRP [International Commission on Nonionizing Radiation Protection], an organization whose membership has steadfastly refused to accept new scientific evidence of potential health risks from non-thermal, low-intensity radiofrequency radiation despite recent scientific advances in knowledge on the subject,' the letter says.

The WHO maintains that exposure to fields too low to cause heating does not present a health problem. 'Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields.'²

However, there is evidence to the contrary. 'There are now many thousands of high quality scientific papers indicating possible non-thermal RF risks to health and those experts most competent by virtue of their research contributions are absent from this [EHC Monograph] process,' the authors of the letter wrote. They refer to the Interphone study which showed increased risks of malignant brain tumours among long-term users and the National Toxicology Program study which showed increased risks of cancer and precancerous lesions in animals from chronic exposure.

If indeed the EHC Core group remains a select group of biased researchers ignoring the nonheating effects of electromagnetic fields, then we wonder what confidence the public can have in its pronouncement.

1. <http://www.bioinitiative.org/report/wp-content/uploads/2016/12/BIWG-final-draft-WHO-RF-EHC-Monograph-team-composition.pdf>
2. <http://www.who.int/peh-emf/about/WhatisEMF/en/index1.html>

Phones exceed standards

The US Federal Communications Commission is not addressing serious questions about mobile phone safety, including evidence that many mobile phones on the market may exceed its exposure limits.

In September 2016, lawyers Swankin and Turner wrote to the FCC with evidence that 75% of phones on the market may exceed the country's standard. It also questioned how the standard could protect children when its SAR methodology was not designed to do so. The letter was sent on behalf of the National Institute for Science, Law and Public Policy (NISLAPP) and the Environmental Health Trust (EHT).

As of January, the FCC has failed to respond.

According to Camilla Rees, NISLAPP Senior Policy Advisor, 'The FCC has failed to protect children, despite scientific evidence there is significantly greater absorption of cell phone radiation in the brain and bone marrow of the skull in children, compared to adults. So the question of how the FCC considers its safety limits to protect children calls for an immediate and urgent reply. An entire generation looks to be at risk.'

'75% of phones on the market may exceed the country's standard.'

'The issues raised in this inquiry letter highlight the FCC's failures to protect public health,' said Dr Devra Davis, President of the Environmental Health Trust.

(<http://ehtrust.org/health-policy-groups-question-fccs-allowing-manufacturer-violation-cell-phone-microwave-radiation-exposure-limit/>)

UPDATES FROM AROUND THE WORLD

France protects workers

On 1 January a law enacted on 6 August 2016 to protect workers from electromagnetic fields came into effect. The law requires employers to assess workers' risks of electromagnetic field exposures and to advise workers of these risks. Particular care is to be taken for pregnant women and employees under 18 years of age. The law, in French, can be found at <https://www.legifrance.gouv.fr/eli/decret/2016/8/3/ETST1611714D/jo>

France protects EHS sufferer

A French court has ordered the removal of a 'smart' water meter from the home of a woman with electromagnetic hypersensitivity. After the meter was installed in 2012, the woman's symptoms worsened and she was obliged to sleep in her car. In mid-November, the Grenoble District Court ordered the wireless water meter be replaced with a non-wireless alternative. (<https://informations.handicap.fr/art-electrosensible-justice-875-9369.php>)

2G/3G phone risks

The use of 3G mobile phones is more likely to cause cancer than the use of 2G phones, according to a 5-country team of investigators. From an analysis of studies to date, they concluded that using a 3G phone increased the risk of developing glioma brain tumours by nearly 5% per 100 hours of use. This is despite the fact that 3G phones operate at lower power than 2G phones. The authors hypothesise that effects may be due to the wider frequency band used by these phones. (Environmental Health Trust, <http://ehtrust.org/wp-content/uploads/Epidemiological-Evidence-on-the-Relative-Toxicity-from-Modulated-Radio-Frequency-Radiation-for-Glioma-Risk-v3-4-21-16.pdf>)

Denmark

In Denmark the incidence of tumours of the central nervous system (CNS), including brain tumours, has more than doubled in the last ten years, a period during which mobile phone use has also been on the rise. According to the Swedish Radiation Protection Foundation, data from the Danish Cancer Registry shows that the number of diagnosed cases of CNS tumours increased from 827 in 1990 to 1807 in 2015. Rates have risen particularly among people aged under 40 years. (Media release, Swedish Radiation Protection Foundation, 20.01.17, www.stralskyddsstiftelsen.se; Danish Cancer Registry database <http://esundhed.dk/sundhedsregistre/CAR/CAR01/Sider/Tabel.aspx>)

USA

In Massachusetts, two new bills have been prepared aimed at reducing the public's exposure to electromagnetic fields.

One proposes to introduce 'a special commission to examine the health impacts of electromagnetic fields'. Presented by Senator Karen Spilka, it aims to examine the biological and psychological effects of wireless radiation and excessive screen time. (<https://malegislature.gov/Bills/190/SD1462>)

Another proposes that primary and secondary schools and tertiary institutions 'shall develop best practices and guidance for the purchase and installation of wireless internet service'. It says that these authorities, 'shall consider and prioritize practices that protect the health and safety of' public school/higher education 'students and staff.' (correspondence)

ICC

A delegation of experts has approached the International Criminal Court (ICC) in the Hague with a view to having environmental pollution classified as a crime against humanity.

The delegation included former judge Marie Odile Bertella-Geffroy, Professor Olivier Cachard of the University of Nancy, Judge Antonino Abrami and two representatives of the Association for Research and Treatments Against Cancer (ARTAC) - Etienne Riondet and Professor Dominique Belpomme. It met with Judge Cuno Tarfusser requesting an amendment to the ICC statute which recognise crimes against humanity such as genocide, war crimes and crimes of aggression. The purpose of the amendment would be to prosecute people guilty of harming the health of the population, directly or indirectly, by exposing them to physical, chemical or infectious agents that can be scientifically proven to be harmful. (Bulletin d'information cancérologique, 82 December, 2016, http://www.artac.info/fic_bdd/pdf_fr_fichier/BI_82_V2_14818841950.pdf)

Australia's landlines

In a draft report entitled 'Telecommunications Universal Service Obligation', the Australian Government's Productivity Commission has recommended phasing out the existing telecommunications universal service obligation which requires every Australian to have access to a 'standard' telephone service. The report considers wireless phone connections to be an acceptable alternative. This could leave residents of rural communities without a wired landline phone connection. (<http://www.pc.gov.au/inquiries/current/telecommunications/draft>)

EMR and plants

by Melissa van Herk and Lyn McLean

In 2013, at Hjallerup High School in Denmark, five students performed an experiment to determine the effects of mobile phone radiation on the seeds of *Lepidium sativum*, a variety of garden cress. It was motivated by the students' inability to sleep well when lying next to their phones. Over twelve days, they observed twelve trays of seeds, six trays in a room exposed to two routers with equivalent emissions to a cell phone and six trays in a room not exposed to radiation. After the allotted time period, the seeds exposed to radiation were nearly all dead, while the seeds away from the radiation thrived. [Ref 1 do you have a reference for this?]

This experiment, reported widely in the media, drew attention to the fact that radiofrequency radiation can have a harmful effect on plants.

The students were not the first to draw this conclusion. For some decades, studies have demonstrated the deleterious effects of exposure, some of the more recent showing:

- exposure to 915 MHz caused genotoxic effects in broad bean seedlings ²
- exposure to 1800 MHz interfered with growth and carbohydrate metabolism of maize ³
- exposure to 900 MHz mobile phone/base station radiation reduced growth of soybean seedlings ⁴
- mobile phone radiation caused oxidative damage and damaged roots in mung bean plants ⁵
- exposure to 2.4 GHz and 900 MHz (WiFi and GSM) affected leaf anatomy and oil content of aromatic plants consistent with a stress response. ⁶

There's also evidence that radiofrequency radiation has a harmful effect on trees.

As early as 1996 a study was conducted in Latvia on pine trees (*Pinus sylvestris*) in an area that received direct radiation from the Skrunda radio location station. It was found that, in the area impacted by the electromagnetic waves, pine trees experienced a lower growth ratio than pine trees outside the area. Also, a statistically significant negative correlation was found between increased tree growth and intensity of electromagnetic fields. In other words, the higher the intensity of electromagnetic waves, the more impacted was the growth of the pine trees. It was confirmed that the decline in tree growth coincided with the initiation of radar emissions. Other environmental factors that may have affected tree growth were evaluated by the authors, but none of these factors had any noticeable effects ⁷.

In a follow-up study, researchers collected pine needles and cones from low-exposure and high-exposure locations around the Skrunda radio transmitter. They found that pine needles from high-exposure areas had markers of stress response. They also found that all seeds from the low-exposure area successfully germinated, whereas only 27% and 55% of the seeds from high-exposure areas did so. ⁸

The effect of radiofrequency radiation on trees has also been documented in urban areas following the mass deployment of phone base stations and unusual, often unilateral (one sided) damage has been found to occur in trees. In an article well worth reading, 'Radiofrequency injures trees around mobile phone base stations', Cornelia Waldmann-Selsam and colleagues, conducted a self-funded, long term study from 2006-2015. Prompted by a coinciding rise in human resident ill health and tree ill health, they looked at the German cities of Bamberg and Hallstadt. They were able to compile an electromagnetic map of the power flux density in both cities within which, 60 damaged trees, 30 random trees and 30 trees in low radiation areas were selected. The authors found that:

- high-level damage was found in trees within the vicinity of phone base stations
- unilateral damage on trees always had a direct, line of sight connection with one or more phone base stations
- the trees in low areas of exposure or in the 'radio wave shadow' of buildings did not show damage
- damage inflicted on trees by mobile phone base stations usually started on one side and extended to the whole tree over time.

The authors concluded, 'statistical analyses demonstrated that the electromagnetic radiation from cell phone towers is harmful to trees'. They considered that exposure 'constitutes a danger for trees worldwide' and that 'the further deployment of phone masts has to be stopped.' ⁹

Brain tumours increase

Despite the mobile phone industry's claims that brain tumours are not on the increase, the incidence of some types of brain tumours has risen dramatically in the UK during the last three decades, according to new data published in the journal *Environmental International*.

In order to determine whether mobile phone use is leading to an increased rate of brain tumours, Frank de Vocht, from the University of Bristol, conducted an analysis of the incidence of several types of brain tumours in the UK during the period 1985 to 2014. In a paper published in December last year, de Vocht claimed that he'd found 'no evidence of an increase in malignant glioma, glioblastoma multiforme, or malignant neoplasms of the parietal lobe', though he did report an increase in malignant neoplasms of the temporal lobe.¹

However, a correction to the paper published in January tells a different story. It shows a dramatic rise in glioblastoma multiforme, the most common and most malignant of the glial tumours. The corrected figures show increases from approximately 300 new diagnoses in 1985 to around 2250 in 2014. The data shows a decline in malignant gliomas from almost 2000 in 1985 to approximately 750 in 2014.²

Dr Louis Slesin, Editor of *Microwave News*, has this to say about the corrected data. 'While the new plots in themselves say nothing about any possible links between cell phones and brain tumors, they go a long way toward puncturing the argument offered by numerous public health officials and media outlets that such an association is highly unlikely because the overall incidence of brain tumors has remained relatively stable over the last number of years, he said.³

Mobile phone radiation has previously been associated with glioblastoma multiforme. Studies have found that long-term mobile phone use increased the risks of developing these tumours⁴ and that people with glioblastoma multiforme who were long-term mobile and cordless phone users had lower survival rates.⁵ People with glioblastoma multiforme tumours who used mobile phones for three hours a day or more were shown to be more likely to have the mutant type of p53 gene in peripheral zone of the glioblastoma and elevated rates of this gene were linked with shorter survival time. When several patients with long-term wireless cochlear implants developed these tumours, researchers postulated a link between the two.⁶

1 De Vocht, Frank, 'Inferring the 1985-2014 impact of mobile phone use on selected brain cancer subtypes using Bayesian structural time series and synthetic controls', *Environment International* 97 100-107, 2016

2. De Vocht, Frank, 'Corrigendum to "Inferring the 1985-2014 impact of mobile phone use on selected brain cancer subtypes using Bayesian structural time series and synthetic controls"', *Environment International* 2017, <http://dx.doi.org/10.1016/j.envint.2017.01.015>

3. *Microwave News*, 31.01.17, <http://microwavenews.com/short-takes-archive/changing-mix-uk-bts>

4. Mild, K Het al, *Int J Occup Saf Ergon*. 2007;13(1):63-71

5. Carlborg, M and Hardell, L, *Int J Environ Res Public Health* 11(10):L10790-805, 2014

5. Akhavan-Sigari R et al, *Rare Tumors* 6(3):5350, 2014

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Orange advises precaution

Telecommunications company Orange has published a list of precautions for reducing exposure to radiation on its website.

Suggestions include:

- using an earpiece or handsfree kit;
- texting to keep phone away from the body;
- keeping phones away from the foetus in pregnant women;
- using phones in good reception areas.

(<http://radio-waves.orange.com/en/your-mobile/best-practice>)



THE

The book that tells you everything you need to know about electromagnetic radiation.

WATT'S THE BUZZ?

Radiation-free holiday

Varuna is an historic cottage in Simpsons Bay, available for hire, with a cosy wood fire and panoramic water views. It's also low in EMR. You can see more information about the cottage at <http://brunyislandaccommodation.com.au/simpsonsbay.php>

Phones & personality

Want to know a person's personality? Check out what type of phone they have.

In a new study from the UK, researchers investigated the personalities of users of different types of smart phone.

They found users of Android phones were more likely to be honest, male, older, more agreeable and less interested in wealth and status. On the other hand, iPhone users were more likely to be female, young and extroverted. (Heather Shaw, et al, 'Predicting Smartphone Operating System from Personality and Individual Differences', *Cyberpsychology, Behavior, and Social Networking*, 2016)

French turn-off devices

On 1 January the French Government introduced a new law aimed at allowing employees to ignore work-related messages on their smart phones after hours. The new law requires companies with more than 50 workers to negotiate with employees their rights to disconnect and ways to prevent work from infiltrating their personal lives.

A French study showed that more than a third of the French workforce used their phones for work outside office hours. (*The Telegraph* 31.12.16.)

Could your fridge do on you?

Need an alibi? Ask your door bell.

Were you at the crime scene? Ask the fridge.

The smart appliances that communicate with each other in the world of the internet-of-things can also provide information about the whereabouts and activities of the people who use them. Police are currently being trained in how to use these technologies to assist in solving crimes. For example, cameras in devices or devices that connect to a person's phone have the potential to provide information about whether or not a person was present at a crime scene. (*The Telegraph* 02.01.17)

Reconnections

Mobile phones are not only changing the way we communicate, but changing the nature of social connections, according to anthropologists. A three-man research team from the Smithsonian National Museum of Natural History has completed the first year of a three-year study into the effects of mobile phone use on teenagers. They say that phones are restricting people's social environment and changing patterns of communication, removing both the personal element and vulnerability from communication. The changes may translate, they say, into substantial changes in human sociology. (Smithsonian.com, 16.12.16)

Children's devices

Children's use of smart phones is growing at a greater rate than that of any other user group and, at the same time, they're embracing many other wireless

technologies enthusiastically. While parents often raise concerns about their children's unsafe and excessive online activities, it's been shown that parents themselves often engage in unsafe and excessive internet activities. Because children often model their use technology use on that of their parents, UK researchers M Terras and J Ramsay have recommended that parents set good examples with their own internet behaviour. (Terras, MM and Ramsay, J, *Front Psychol*, 7:1957, Dec 2016)

Crash bang

Road accidents are now the leading cause of death among teenagers. And the main contributor to these accidents, a greater risk factor even than drink driving, is using a handheld mobile phone while driving.

These alarming findings emerged from a study investigating the behaviour of young drivers in Australia, New Zealand and Colombia. (Scott-Parker, B and Oviedo-Trespalacios, O, *Accid Anal Prev* 99 (PtA):30-38, 2016)

Renewables success story

Perhaps we don't need to rely on polluting coal-fired electricity generation after all.

The tiny South American country of Costa Rica is leading the world in the use of renewable energy. Last year, the country succeeded in using only renewable energy for 76 days in a row. Over the last two years, it used only renewable energy for a total of 299 days. By 2021 it hopes to be completely carbon neutral. This success is inspiring other countries to follow suit. (*Costa Rica News*, 07.10.16)

Reykjavik Appeal on wireless technology in schools

A group of international doctors and scientists has expressed concern about the impacts of wireless technology in schools on children's health. In a document, known as the Reykjavik Appeal, they called on world authorities to take responsibility for protecting children's health and wellbeing into the future.

Signatories to the Appeal called on education authorities to use wired rather than wireless technologies. 'We ask you to follow the ALARA (As Low As Reasonably Achievable) principle and Council of Europe Resolution 1815 to take all reasonable measures to reduce exposure to RFR,' they said.

Among the evidence that wireless radiation may be harmful, they refer to research showing increased cancer and brain tumours risks, opening of the blood-brain-barrier, damage to hippocampal neurons, changes to important proteins in the brain, stress responses of cells, oxidative damage, DNA damage and harmful effects on neurotransmitters and sperm.

Children are particularly vulnerable to the radiation, the signatories to the document say, because they have a lifetime of use and 'developing and immature cells can be more sensitive to exposure'.

The appeal lists a number of precautions that can be taken to reduce children's exposure to the radiation from wireless devices.

- 'No wireless networks in preschool, kindergarten and schools.
- A hard wired direct cable connection is recommended to each classroom for the teacher to use during lessons.
- Prefer wired telephones for personnel in preschool, kindergarten and schools.
- Prefer cabled connection to Internet and printers in schools and turn off Wi-Fi settings in all equipment
- Prefer laptops and tablets that can be connected by cable to Internet.
- Students should not be allowed to use cell phones in schools. They can either leave them at home or the teacher collects them in turned off mode before first lesson in the morning.' (correspondence)

Electrosensitivity is real

Electrosensitivity (ES) is real says Dr Andrew Tresidder, a general practitioner from the UK.

In a letter of 1 January to medical colleagues, he wrote, 'ES is a condition that can arise due to continued exposure to an environment polluted by man-made EM and RF (radio-frequency) wireless signals at orders of magnitude below heating effects, and is well understood in Russia. Symptoms include headaches, fatigue, disturbed sleep, tingling, pains in limbs, head or face, stabbing pains, brain-fog and impaired cognitive function, dizziness, tinnitus, nosebleeds, palpitations and others.'

His letter contains information about symptoms, mechanisms that could contribute to them, treatment and suggestions for reducing exposure.

'It is essential to minimise exposure to adverse EM fields, as well as pay attention to nutrition, sleep and other factors to ensure high levels of health,' he wrote.

(https://doc-08-bk-apps-viewer.googleusercontent.com/viewer/secure/pdf/3nb9bdfcv3e2h2k1cmq10ee9cvc5l0le/d706h0soddoobb41ut545df2hv1o8h9k/1486350900000/lantern*/ACFrOgCqmtsIvxxogAEIYFz2tl29u5PfZ4Djg7dDQHnN5rXqOByxfaz-ty_i4kMms8JEiAjNtKW4cliEd-Z0pRpWpZ6nlOJz-7ThR5dZrTqilMr6h-fr2SVWsrCE8ZJzuKfngVrY9zICDi4iOB6l?print=true)

ELECTRIC FIELDS



The image shows two items: on the left, an EMFields Pocket PF Meter, a handheld device with a screen displaying various readings for Electric and Magnetic fields; on the right, a blue plastic bottle of YSHIELD NSF34, a product designed to block electromagnetic fields.

Measure and block
www.emraustralia.com.au

Similarly, Karen Haggerty, observed the effects of radiofrequency radiation on trembling aspen trees. She concluded that, 'the RF background may be adversely affecting leaf and shoot growth and inhibiting fall production of anthocyanins associated with leaf senescence in trembling aspen seedlings. These effects suggest that exposure to the RF background may be an underlying factor in the recent rapid decline of aspen populations.'

Plants are not only the lungs of the earth but play a vital role in the food chain on which all of humanity depends. If radiofrequency radiation is having a harmful effect on plants, what might be the implications for the future? Certainly, the effects of exposure have so far ignored by policy makers and corporations in the ever-increasing installation of mobile phone base stations and NBN transmitters. As Cornelia Waldmann-Selsam and her team suggested, in order to prevent irreversible environmental damage, we need to start plugging our phones and computers back in.

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Men, protect your fertility.

Men's shielding underpants are now available from EMR Australia at: emraustralia.com.au

Defense Agency Research

The US Defense Advanced Research Projects Agency (DARPA) has announced a new program to investigate whether cells use electromagnetic waves to communicate with each other.

In a media release of 2 February, DARPA said the program aimed 'to establish if purposeful electromagnetic wave signalling between biological cells exists—and if evidence supports that it does, to determine what information is being transferred'.

Investigators will be asked to suggest and tests theoretical models of how this communication could occur.

Scientists have hypothesised since the 1960s that cells emit electromagnetic signals, a phenomenon Professor Ross Adey described as cell whispering.

<http://www.darpa.mil/news-events/2017-02-07>

Do you have a spare room?

A woman with chemical and electromagnetic sensitivity is looking for accommodation.

Do you have a suitable room to rent? Or perhaps you would like to share a house that's low in EMR and chemicals.

If you can help, please contact Catherine Cherry on (03) 9754 1252 or PO Box 208 Belgrave Vic 3160.



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