EMR and Health

Quarterly report on electromagnetic radiation, health and well-being Vol 11 No 3 Sept 2015

Mobiles and health

Mobile phone radiation causes oxidative damage that can interfere with health and wellbeing.

Mobile phone radiation damages the body in ways that could potentially cause health problems, including cancer. This is the conclusion of a review of 100 peer-reviewed studies that was published in July in *Electromagnetic Biology and Medicine* by an international team of researchers from the Ukraine, Finland and the USA.

'Our analysis revealed that RFR exposure, despite its non-ionizing nature, stimulates production of free radicals/reactive oxygen species (ROS) in living cells through the activation of key ROS generating systems, including the mitochondrial pathway and NADH oxidase,' said Dr Igor Yakymenko, one of the study's authors.

'Our meta-analysis demonstrated that 93% of experimental studies on oxidative effects of RFR were "positive". The features of oxidative stress included overproduction of ROS, depletion of antioxidant enzymes activity and oxidative damage of DNA. The effects were demonstrated in different biological models from single cells to animal and human organisms.'

Dr Yakymenko said that the findings of this study have important implications for

people's health and well-being. 'Keeping in mind the great pathogenic potential of ROS/ oxidative stress and its implication in many diseases and medical conditions, including cancer, neurodegenerative and cardiovascular ones, these findings are indeed important for RFR.'

Dr Yakymenko has previously shown increased cancer risks for long-term exposure to microwave radiation. He points out that other studies have found increased cancer risks in heavy and long-term mobile phone users and referred to the work of Professor Lennart Hardell's team from Sweden.

His current study focused on identifying a possible molecular mechanism for such effects.

Given the results of his study, we asked Dr Yakymenko what suggestions he has for readers. '

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Wireless Devices: Risk, Regulation, Compliance and Liability

Seminar Wednesday, 14 October, Faculty of Law, University of NSW

Details: http://www.cle.unsw.edu.au/courses-seminars/2015/08/wireless-devices-risk-regulation-compliance-and-liability

Canadian Recommendations

During early 2015, the Canadian Government conducted a series of meetings in which witnesses provided testimony about the country's health standard (Safety Code 6) and exposure to electromagnetic fields. These meetings were conducted by a Panel of the House of Commons' Standing Committee on Health, which published its report in June. The report concluded that 'Safety Code 6 provided adequate protection from established adverse health effects'. However, in light of the evidence brought to the Committee, the Panel made the following 12 recommendations to Health Canada.

1. That the Government ... examine existing cancer data collection methods to improve the collection of information relating to wireless device use and cancer.

2. That Statistics Canada consider including questions related to electromagnetic hypersensitivity in the Canadian Community Health Survey.

3. That the Government ... consider funding research into electromagnetic hypersensitivity testing, diagnosis and treatment, and its possible impacts on health in the workplace.

4. That the Canadian Medical Association, the Royal College of Physicians and Surgeons, the College of Family Physicians of Canada and the World Health Organization consider updating their guidelines and continuing education materials regarding the diagnosis and treatment of electromagnetic hypersensitivity to ensure they are based on the latest scientific evidence and reflect the symptoms of affected Canadians.

5. That the Government ... continue to provide reasonable accommodations for environmental sensitivities, including electromagnetic hypersensitivity, as required under the Canadian Human Rights Act.

6. That Health Canada ensure the openness and transparency of its processes for the review of Safety Code 6, so that all Canadians have an opportunity to be informed about the evidence considered or excluded in such reviews, that outside experts are provided full information when doing independent reviews, and that the scientific rationale for any change is clearly communicated.

7. That the Government ... establish a system for Canadians to report potential diverse reactions to radiofrequency fields.

8. That an independent scientific body ... examine whether measures taken and guidelines provided in other countries, such as France and Israel, to limit the exposure of vulnerable populations, including infants, and young children in the school environment, to radiofrequencies should be adopted in Canada.

9. That the Government ... develop an awareness campaign relating to the safe use of wireless technologies, such as cell phones and Wi-Fi, in key environments such as the school and home to ensure that Canadian families and children are reducing risks related to radiofrequency exposure.

10. That Health Canada conduct a comprehensive review of all existing literature relating to radiofrequency fields and carcinogenicity based on international best practices.

11. That the Government ... consider funding research into the link between radiofrequency fields and potential health effects such as cancer, genetic damage, infertility, impairment to development and behaviour, harmful effects to eyes and on the brain, cardiovascular, biological and biochemical effects.

12. That the Government ... and manufacturers consider policy measures regarding the marketing of radiation emitting devices to children under the age of 14, in order to ensure they are aware of the health risks and how they can be avoided.

'13th Report of the Standing Committee on Health, 'Radiofrequency electromagnetic radiation and the health of Canadians' June, 2015, <http://www.parl.gc.ca/Content/HOC/Committee/412/HESA/Reports/RP8041315/412_HESA_Rpt13_PDF/412_HESA_Rpt13-e.pdf>.

Electromagnetic hypersensitivity

Electromagnetic hypersensitivity (EHS) is real, can be demonstrated to be real and must be recognised by international authorities. These are some of the conclusions of the 5th Paris Appeal Congress, held on 18 May in Brussels. The Congress brought together some of the big names in Bioelectromagnetics research and looked at the latest research on the condition.

'Electromagnetic hypersensitivity exists and has to be recognised, treated and prevented,' said Dr Michael Kundi, the head of the Institute of Environmental Health at the Medical University of Vienna.

Dr Dominique Belpomme, a professor of cancer oncology and President of the Association for Research and Treatments Against Cancer (ARTAC), said that there are objective biomarkers for diagnosing EHS. He described his study of 1216 patients referred to him with the condition. When tested, he found that 90 of these patients were genuinely electrohypersensitive. His testing showed that exposures caused observable physiological changes, such as increased levels of histamine, which is triggered by exposure and can cause breaching of the blood-brain-barrier. EHS and multiple chemical sensitivity (MCS) might actually be part of the same condition, involving the thalamus or limbic system, he suggested. There are a number of scientific arguments 'strongly suggesting that self-reported EHS and/or MCS are causally-related to EMF and/or chemical exposure,' he said.

There was general consensus that children are vulnerable and must be protected from wireless exposure urgently. Dr David Carpenter said that wireless routers and wireless devices in classrooms create an 'enormous' level of radiofrequency radiation. 'Not only are children more vulnerable to environmental exposures, but if we allow our children in schools, where they're supposed to be learning, to be exposed to an agent that reduces their ability to pay attention and learn and promotes illness, this is a tragedy, it's foolish and we should act to reduce exposure.'

"We need biologically based public health standards and we need them now."

Professor Lennart Hardell said that it is necessary, 'to abandon the wireless communication in schools. I see this as the rising big problem for human health.' He referred to the IARC's decision to classify radiofrequency radiation as a Class 2B ('possible') human carcinogen and said that the evidence of carcinogenicity has increased since then. 'If there's something that is at least a possible human carcinogen, why are we exposing our children to that when we don't know the long-term effects?'

A number of speakers criticised the thermally-based international standards of the World Health Organisation. Dr Michael Kundi said that there is a growing community of scientists who oppose the thermal basis of current standards. Cindy Sage, co-editor of the BioInitiative Reports of 2007 and 2012, referred to the plethora of scientific research showing evidence that everyday levels of exposure that comply with international standards cause harm. 'We need biologically based public health standards and we need them now,' she said.

Dr Carpenter pointed out that standards are generally set by engineers and physicists rather than the biologists and health experts who are better equipped to consider health effects of exposure.

Dr William Rea, from the Environmental Health Centre in Dallas, said that chemical sensitivity has been recognised since the time of Hippocrates and perhaps even earlier. He described the setup at his Dallas clinic, discussed different methods of testing for the condition and some of the methods he uses to treated it. People with MCS have abnormal brain scans and 80 percent of people with EHS have chemical sensitivity, Rea said.

Dr Igor Belyaev, from the Russian Academy of Science, discussed studies showing that fields from both electrical and wireless sources produce clear biological effects. These effects, he said, have been shown to depend on metals, Reactive Oxygen Species (ROS) and antioxidants in the exposed subjects. 'These studies provide a mechanistic background for the treatment of electromagnetic hypersensitivity based on chelating divalent metals, reducing ROS and balancing vitamins.'

Dr S Mortazavi from Iran spoke about the risks of mercury in amalgam fillings and proposed the hypothesis that foetal exposure to mercury could contribute to autism spectrum disorders.

Ms Sage said that the next step was to lobby the World Health Organisation to recognise EHS and MCS as real diseases.

The presentations of the 5th Paris Appeal Congress can be found at: http://appel-de-paris.com/?page_id=1667&lang=en

RESEARCH UPDATES

ELF fields
(from electrical sources)

Reproduction

Exposure to magnetic fields could have harmful effects on reproduction, according to research from China. Scientists exposed pregnant mice to a field of 500 mG (half of the public exposure limit in Australia) for 12 hours a day for a week. Exposed mice had lower body weight, females had higher rates of chronic myeloid leukemia and males had reduced size of seminiferous tubules, involved in reproduction. (Qi, G et al, *Environ Health Prev Med* 20(4):287-93, 2015.)

Parkinson's Disease

The toxin MPP is known to contribute to Parkinson's Disease. Italian researchers found that exposing a cell line (SH-SY5Y cells) to a 50 Hz magnetic fields enhanced the toxicity of MMP even at low doses. (Benassi, B et al, *Mol Neurobiol* Jul 30, 2015.)

Other effects

- Long-term exposure to a pulsed field caused oxidative damage to the liver and spleen of rats. (Li, BL et al, *Wien Klin Wochenschr,* Apr 25, 2015.)
- Magnetic fields damaged DNA and cell viability in several types of human cells. (Lee, HC et al, *Bioelectromagnetics* Aug 2, 2015.)

RF/wireless radiation

Female reproduction

Wireless radiation could have a detrimental effect on the female reproductive system, according to a new study from Turkey. Researchers exposed a small group of rats to a 900 MHz field for 15 minutes a day for 15 days. Exposed rats had 'a significant decrease' in the number of their ovarian follicles. (These follicles produce eggs and hormones for menstruation. Women are born with a set number of follicles and this number reduces over their lifetime.) Bakacak, M et al, *Kaohsiung J Med Sci,* 31(6):287-92, 2015.)

Children

Children's increasing use of wireless technologies raises questions about the safety of their exposure, according to M Redmayne from Monash University in Australia. Dr Redmayne reviewed the range of international policies and advice for children's exposure. 'Minimum exposure of children to RF-EMF is recommended.' she wrote. (Redmayne, M, *Electromagn Biol Med* 1-9, 2015.)

Cognition

Wireless radiation affected memory and learning in rats in a study from India. Researchers exposed four-week old rats to a signal of 900 MHz for an hour a day for 28 days. They found that exposure reduced the rats' ability to learn spatial-related tasks. Exposed rats had structural changes in the hippocampus region of their brains which, the authors suggested, could account for the learning problems. (Narayanan, SN et al, *Metal Brain Dis,* June, 2015.)

Heavy metals

Using a mobile phone affected heavy metal levels in patients with orthodontic implants. Scientists from Iran and the US took saliva samples from 50 patients with orthodontic appliances on two occasions: one in which patients avoided using their mobile phones and one in which they used their phones and recorded the times of their calls. They found that nickel levels were higher in patients during the week of mobile phone use and there was a relationship between the release of the nickel and the times of phone calls. (Saghiri, MA et al, *Am J Orthod*

A selection of studies showing effects of exposure

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

Dentofacial Orthop 147(6):719-24, 2015.)

Thymus

Exposure to WiFi radiation caused changes in the thymus in a study from Spain. Researchers exposed 64 female rats to athermal (non-heating) levels of wireless radiation at 2.45 GHz and examined the effects on their thymus. They noticed several changes to the thymus, including changes to heat shock protein 90 which affects thymus and immune function. (Misa-Agustiño, MJ et al, *Life Sci* 127:1-11, 2015.)

Sperm

Chinese researchers obtained healthy sperm samples of from 97 volunteers. They exposed half the sperm to a mobile phone signal of 1950 MHz while the remainder was unexposed. They found that exposed sperm showed decreases in motility and viability, more sperm head defects and early death of sperm cells. (Wang, D et al, *Zhongua Nan Ke Xue,* 21(6):515-20, 2015.)

Testes

WiFi signals may adversely affect the testes, according to a study from Turkey. Researchers exposed rats to a 2.45 GHz signal for 3 hours a day for 30 days and observed reduced levels of antioxidants and testicular damage. Supplementation with the anti oxidant gallic acid reduced the damage to some extent. (Saygin, M et al, *Environ Toxicol,* Aug 13, 2015.)

Sperm

WiFi radiation had harmful effects on sperm in an experiment from Iran. Scientists exposed young rats to a 2.45 MHz signal for one hour or seven hours a day for two months. They found sperm damage that increased with exposure time and concluded that 'there should be a major concern' about the exposure of the body to WiFi radiation. (Shokri, S et al, *Cell J* 17(2):322-31, 2015.)

Exposure

What sources are responsible for people's wireless exposure inside their homes. According to a study from Hebron, the main sources are from outside the home. The researchers measured indoor exposure fromn FM radio (46%), GSM 900 base stations (26%), DECT phones (15%),WLAN (9%) and TV transmitters (1%). (Lahham, A et al, *Health Phys* 109(2):117-21, 2015.)

Brain patterns

Mobile phone radiation affected brain waves in a study from the Netherlands. Researchers asked healthy women to place a mobile phone against their ear and, on a separate occasion, to their chest when it was in dialling mode. They found that holding the phone against the ear led to significant changes to EEG. (Roggeveen, S et al, *PLoS One* 10(6), June, 2015.)

Other studies showing effects from RF radiation

- Mobile phone radiation affected the locomotion and distribution patterns of fish in a tank. (Lee, D et al, *Int J Radiat Biol* 1-20, June 2015.)
- Mobile phone radiation damaged the hippocampus of rats. (Sahin, A et al, *Brain Res* Jul 31, 2015.)
- Mobile phone radiation inhibited the growth of maize seedlings. Kumar, A et al, *Protoplasma,* Aug 16, 2015.)
- Mobile phone radiation and the drug tramadol increased lipid peroxidation in the brain, blood and kidneys of rats. (Bodera, P, *Int J Occup Med Environ Health* 28(4), 2015.)
- Mobile phone radiation affected stress levels (the hypothalamic-pituitary-adrenal axis) in children. (Geronikolou, SA et al, *Sci Total Environ,* Jul 20, 2015.)

Cardiac devices

Fields from smart phones and powerlines may interfere with some implantable cardiac devices, said presenters at the joint meeting of the European Heart Rhythm Association and the European Society of Cardiology and Cardiostim in June.

Germany's Dr C Lennerz explained that one of 308 patients wearing the devices, who were exposed to three popular smart phones, was adversely affected.

Canada's Dr Katia Dyrda, said that high fields from electrical sources—such as substations or high voltage powerlines– could also affect cardiac devices and advised wearers not to spend time in such locations. (European Society of Cardiology, Public release, 22.06.15.)

Exposure to WiFi radiation caused changes in the thymus

Mobile phone radiation caused breaches of the blood-brain-barrier.

Digital amnesia

Forgetting phone numbers? Maybe you're one of the many people with digital amnesia.

'Digital Amnesia' is a term coined by the international software security group Kaspersky Lab to refer to describe 'the experience of forgetting information that you trust a digital device to store and remember for you.' Kaspersky commissioned a survey of 6000 consumers aged 16 to 55 in a number of European countries: the UK, France, Germany, Italy, Spain, Belgium, the Netherlands, and Luxembourg.

The purpose of the study was to see how digital devices affect memory and whether people are protecting the devices that store their memories.

The study found that most people stored contact numbers, not in their memory, but in their digital devices. Most recalled the phone number of the home they lived in at age ten. But the majority did not recall the phone numbers of their children, their workplace or their children's schools.

Not only do people commit contact details to their devices, but also other important personal information such as photos, many of which are not stored elsewhere. Needless to say, losing these devices would cause 'immense distress' to many of those surveyed. Despite the importance of the information committed to their devices, consumers are not protecting them with IT security, the study found.

Finally, people are using internet to find information in preference to memories, libraries or books. A quarter or those surveyed said they would forget an online fact once they had used it rather than commit it to memory. 'The Rise and Impact of Digital Amnesia', Kaspersky Lab, June 2015, https://blog.kaspersky.com/files/2015/06/005-Kaspersky-Digital-Amnesia-19.6.15.pdf

Hidden costs of mobile phones

It might be newer, more stylish, more popular—but would you buy it if it cost the earth?

Consumers' desire to have the latest mobile phones on the market is good news for manufacturers but not such good news for the environment, according to a new study from the United Kingdom. In a paper published in June, Dr James Suckling and Dr Jacquinta Lee, from the University of Surrey, found that our compulsive use of mobile phones has many hidden costs.

Suckling and Lee say that the millions of discarded mobile phones lying, forgotten, in drawers and cupboards, contain millions of dollars of valuable metals including copper, silver, gold and platinum metals. The 85 million stockpiled mobile phones in the United Kingdom, for example, are estimated to contain about $170 million of gold alone. Instead of reusing these resources, we're mining new deposits instead.

Churning out new mobile phones to replace the old ones is also contributing to global warming. 'The averaged total GHG [Greenhouse Gas] emission of the smartphones is 47.5 kg CO_2', the authors say.

With few incentives for recycling, consumers' mobile phones often end up in landfill where the metals and toxic substances they contain leach into the environment.

The solution, the authors say, is to encourage companies to insert a 'take-back' clause in their contracts so that the phones can be responsibly recycled. They also encourage the use of cloud-based storage of information to reduce the resources used in phones' memory storage. James Suckling and Jacquetta Lee, 'Redefining scope: the true environmental impact of smartphones?', *The International Journal of Life Cycle Assessment*, DOI: 10.1007/s11367-015-0909-4, 2015.

Chronic disease

Electromagnetic radiation is compromising immunity and could be contributing to chronic diseases. This is the message of Professor Trevor Marshall at the 5th International Symposium on the Interaction of Nervous and Immune Systems in Health and Disease held in St Petersburg on 26 June.

Professor Marshall told the audience that studies had shown that proteins of the body are at a critical state and can be changed from one conformation to another by nonionising electromagnetic fields.

He exposed 74 people with chronic diseases to a generator that emitted an extremely low field—approximately one millionth of the power of a mobile phone. To his surprise, most people reported significant changes to their symptoms—either positive or negative.

Next he asked the subjects to wear a shielded hood that blocked electromagnetic fields from the environment. Ninety percent reported strong effects—mostly negative.

When the immune system is stimulated, Prof Marshall explained, symptoms often worsen before they improve.

'The brain is acting as a radio receiver, otherwise it could not sense signals in this range,' he said.

Immune dysfunction leads to chronic diseases such as autoimmune disease, chronic fatigue, idiopathic pain, Multiple Sclerosis and cancer. It can also lead to premature diseases of aging.

'If you're a physician working with patients with immune disease diagnoses, the immune symptoms these patients are reporting will be modulated by their electromagnetic environment,' Professor Marshall told the audience.

His presentation can be seen at: https://www.youtube.com/watch?v=37j2jDN8IVo&feature=youtu.be

UPDATES FROM AROUND THE WORLD

India's plans

India's ministry of Communications and IT plans to have a national EMF Portal in operation within months. The Portal will provide measurements of ground-level exposure in different locations.

Also in India, a parliamentary Committee on Science, Technology, Environment and Forests urged the government to create regulations for locating and inspecting mobile phone towers. It also advised conducting research to determine the health risk from the towers' emissions. (*Economic Times*, 02.08.15; *Financial Express*, 12.08.15.)

France

During July, the French Agency for Food, Environmental and Occupational Health & Safety (ANSES) invited public comment about the health risks of exposing children to radiofrequency (RF) radiation. Comments were to be considered in the preparation of an expert report on the subject.

In 2003 ANSES advised that children are likely to be vulnerable to RF signals. (https://www.anses.fr/en/content/exposure-children-radiofrequency-waves-anses-launches-public-consultation)

Chinese babies

A Chinese technology manufacturer has developed a wireless router aimed at dramatically reducing a foetus's exposure to radiofrequency radiation. The Qihoo 360 router has settings for penetrating walls, balance and 'pregnant women', according to the South China Morning Post. (*BBC News,* 23.06.15.)

Berkley's mobile law

This May, City of Berkley councillors voted on a 'right-to-know' ordinance that would require mobile phones to be sold with a warning that carrying a phone in a pocket or bra could expose wearers to radiation levels that exceed the US standard (*EMR and Health* 11(2) 2015).

In June, before the ordinance could become effective, the CTIA Wireless Association, filed an injunction to block it. Subsequently, the City of Berkley filed a response, submitted by a number of highly credentialed lawyers and scientists.

In August judge Edward Chen ruled that Berkley should remove reference to the radiation being potentially harmful for children, but indicated he may allow the city to proceed with its other warnings (http://www.saferemr.com/2014/11/berkeley-cell-phone-right-to-know.html; SFgate.com, 20.08.15.)

More towers for Oz

On 25 June, the Australian Department of Communications announced plans to build 499 new mobile phone base stations in regional and outer metropolitan areas. The $385 million Mobile Black Spot Program, aims to provide handheld coverage/exposure to 68,600 square kilometres and new external antenna coverage/exposure to over 150,000 square kilometres. Intended coverage locations can be found at http://nationalmap.gov.au/. (Press release, 25.06.15.)

Tablets in schools

An Israeli lawyer has cast doubt on the legality of tablet use in schools. Meyrav Israel advised that it is illegal for schools to purchase tablets under the clause of 'purchasing from free will' because this would require agreement of parents. Following her advice, Yaacov Mergi, Chairman of the Knesset Education Committee, instructed the Ministry of Education to call a halt to the tablet program in schools. (http://www.kikar.co.il/175503.html%22)

Neurological disease

Neurological deaths are on the rise world-wide and are a 'cause for concern', according to a new study from Bournemouth University. The authors found that neurological deaths have risen 2% worldwide and 82% in the US and suggest that an environmental agent could be to blame. (Pritchard, C and Rosenorn-Lanng, E, Surg *Neurology Int,* DOI:10.4103/2152-7806.161420#sthash.M23uPxlu.dpuf)

EMR symptoms:

If you believe you experience symptoms from exposure to electromagnetic radiation, you can submit feedback to the government on ARPANSA's Electromagnetic Radiation Health Complaints Register at: http://www.arpansa.gov.au/RadiationProtection/emr/index.cfm

We would also appreciate you completing EMR Australia's symptoms form at: http://emraustralia.com.au/

Interview with Elizabeth Kelly

Lyn McLean interviews Elizabeth Kelly, Director of EMF-scientist.org which co-ordinated an Appeal by international scientists sent to the WHO and UN in May.

Can you give us some information about yourself and your background?

My father was an electrical engineer and a Fellow with IEEE and the National Academy of Engineering. So I grew up with a dad who would take us to see dams and substations during vacations. My great grandfather (on my mother's side) worked for Thomas Edison and my grandfather worked for General Electric around the turn of the century. So both sides of my family were into electricity.

I have a master's degree in health administration. I worked for the U.S. Department of Health and Human Services in Washington DC as a policy analyst, conducting and analysing major societal studies on health and welfare issues.

I am not a scientist but am a policy analyst and public advocate. It is my role to represent the scientific evidence in calling upon policy decision makers to pass laws and rules that provide greater health protection from non-ionising radiation sources.

How did you become interested in this issue?

The triggering interest was my own health. In 1993 I was home a lot with my baby and selling real estate part time. We had a cordless phone and a microwave oven. Then I purchased a Motorola digital flip phone which was one of the first phones on the market in the US. When I used it in my car with the windows rolled up, I started having symptoms—fatigue, swollen face, brain fog, trouble sleeping and trouble breathing—to the extent I had to pull over and catch my breath.

I did some research and saw an interview

by David Reynard, whose wife Susan—a heavy mobile phone user–died of a brain tumour. David and Susie filed a law suit against Motorola.

I stopped using that phone and my cordless phone immediately and my symptoms disappeared.

How did you become a public advocate?

In 1996 there was a proposal to install a cell antenna array at my church, where my son was attending preschool. I did some research and learned that a new US law had just been enacted—the Federal Telecommunication Act—which included a provision that states and local government agencies were prohibited from taking citizens' health concerns into account when denying a cell antenna application. I understood how draconian this legislation was and that it needed to be repealed—and that has been my focus ever since. By the way, the church cancelled the contract for the antennas.

Can you tell us about your challenge to the FCC?

In 1997 I initiated a challenge to the Federal Communications Commission (FCC). David Fitchtenberg, 52 other citizens and I formed the Ad Hoc Association of Citizens Concerned about The FCC's RF Human Exposure Guidelines. We submitted 4000 pages of scientific abstracts as evidence.

Simultaneously, two other groups filed similar legal appeals: the Cellular Phone Task Force, run by Arthur Firstenberg, and the Communications Workers of America, the biggest union in the US, which represents telecommunications workers.

All three appeals were joined by the court into one case called "Cell Phone Task Force vs. FCC". My group hired the attorney and managed the appeal.

The court denied all of our claims. The telecom industry likes to tell me 'you lost'. My position is, 'No, we just haven't won yet!'

What work have you done since then?

In 2000, I co-produced a film called 'Public Exposure: DNA, Democracy and the Wireless Revolution' with EON International. Your readers can see it on You Tube.

I have advocated for passage of several bills introduced in the U.S. Congress to repeal the section of the Act that overrode local control over siting and managing antennas. However, these bills didn't succeed due to industry interference. A cell phone research bill that I consulted passed the California State legislature but later died in the Rules Committee, with no explanation.

I realised that the telecommunications industry wields a powerful influence over public policy in the United States on the wireless issue and that scientific studies and health concerns are being ignored. So, I started working internationally.

From 2000 to 2010, I was affiliated with the International Commission on

Electomagnetic Safety (ICEMS) and served as Managing Director from 2006 to 2010. This organisation held many international conferences and issued scientific resolutions. I made some videos on cell phone safety posted at www.icems.eu.

In 2014 I was asked to coordinate a scientific appeal to be submitted to Health Canada as it was reviewing its exposure standards (Safety Code 6). I prepared this resolution in cooperation with Drs Martin Blank, Henry Lai, Magda Havas and Joel Moskowitz and it was signed by 55 scientists from 18 nations. Recently, the Canadian Medical Association came out with a position asking Health Canada to do more research and issue precautionary advisories, particularly for pregnant women and children. Then the Canadian Parliament issued a position statement [See p 2]. We feel the scientist's appeal was one of the strong voices calling for remedies and hope these recommendations translate into public policies that offer greater EMF protection for all Canadians.

Can you tell us about the work of the EMF-scientist.org?

EMF-scientist.org is focused, like a laser beam, on an Appeal to the United Nations and the World Health Organisation

We started EMFscientist.org after we submitted the scientific appeal to Health Canada. Then, we received requests to develop appeals that would speak to WiFi in schools, power lines, cell towers etc. We agreed that we didn't need to keep reinventing the wheel. Why not just write an appeal that would go directly to the top – to the UN who has 193 member nations and is highly influential over policy making worldwide? And why not include the WHO whose mission is to protect the health of the people?

The International EMF Scientist Appeal speaks very broadly to the need for international standards-setting organisations to set guidelines based on biological effects of non-ionising radiation, in order to assure the protection all living organisms. We urge the UN and the WHO to review international exposure guidelines from this perspective and to implement precautionary measures to reduce exposure. We also urge involvement of UN Environmental Programme (UNEP), as it could evaluate the scientific evidence that demonstrates potential and actual harm to all living species and it could develop alternative solutions aimed at continuing to employ EMF emitting applications that benefit society economically, without causing harm.

The Appeal is a remarkable coming together worldwide of concerned scientists. So far, 206 EMF scientists from 40 nations have signed it. The list of signatories, which can be viewed at EMFScientist.org, includes some highly -credentialed scientists.

These scientists represent a broad span of scientific fields and their studies demonstrate how EMF interacts with biology. The non-ionising band of the electromagnetic spectrum is considered safe according to the traditional physics view that, there is no heating effect so it doesn't break the ionic bonds. However the EMF scientists have published over 2000 scientific studies that demonstrate biological changes and adverse health effects not involving heat. Since 2011, the WHO acknowledges that nonionising radiation is possibly carcinogenic yet continues to maintain that there is no credible evidence to cause concern. However, the WHO EMF program endorses international EMF exposure guidelines that only protect against heat. There are contradictions and uncertainties underlying the current international debate that must be urgently resolved.

Can non-scientists participate in the Appeal?

The International EMF Scientist Appeal is signed by scientists who qualify by having published at least one peer reviewed EMF paper. Concerned scientists who have published peer reviewed papers in related fields have applied sign the Appeal, too. So, we have created a letter of support signed by Concerned Scientists to be added to the EMF scientist Appeal.

In addition, the International EMF Alliance (IEMFA) has prepared a letter of support for the appeal which has now been signed by over 90 nongovernmental organizations (NGOs) worldwide. It will be forwarded to the UN and the WHO. This support letter can be viewed at IEMFA.org. I am a cofounder of this organisation. NGOS who wish to sign this letter of support should contact Janet Newton, President of the EMR Policy Institute in the US, who is coordinating this for the IEMFA at JNewton@emrpolicy.org.

We understand that a letter of support from doctors is being coordinated by Dr Erica Mallory-Blythe and this letter will also be published at IEMFA.org.

Are the UN & WHO listening?

We haven't heard back from these organisations yet. However, we are committed to the EMFscientist.org Appeal for the long term and we will just continue adding names of scientists to our Appeal and the letters of support will keep coming in, I'm sure.

Do you have any advice for readers?

Reduce your EMF exposure levels. Evaluate what you can do to protect yourself and your family at home and in the work place. Advocate for more EMF protection for children, pregnant women and their developing fetuses.
Remember: *'Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has. Margaret Mead*

Brussels declaration

The 2015 Brussels International Scientific Declaration on Electromagnetic Hypersensitivity and Multiple Chemical Sensitivity has called on international authorities to recognise these twin conditions.

'We stress all national and international bodies and institutions, more particularly the World Health Organization (WHO), to recognise EHS and MCS as true medical conditions which ... may create a major public health concern in years to come worldwide,' the Declaration states.

Signed by scientists and medical practitioners from many countries, the Declaration says that there is a 'high and growing number' of people with these conditions, including men women and children. It claims that 'EHS is associated with exposure to EMFs and MCS with chemical exposures' - factors which world authorities have consistently denied. EHS can be triggered by acute or chronic exposure to a range of frequencies and can be reversed with a healthy, natural environment. The Declaration also states that current epidemiological and provocation studies are unsuitable for either proving or disproving the existence of these conditions and that neither can be explained, as the WHO has tried to do, as a nocebo effect—ie caused by the sufferers' expectation of harm.

The signatories state, 'we unanimously acknowledge this serious hazard to public health' and call on relevant authorities to develop precautionary regulations, especially for vulnerable groups such as children.'

'We unanimously request that institutional committees designed for evaluating the risks of EMFs and chemicals be constituted by scientists acting in clear science-based independency and so exclude any experts with industry affiliation,' the Declarations says.

(http://www.isde.it/wp-content/uploads/2014/06/2015-Bruxelles-International-Scientific-Declaration-on-Electromagnetic-Hypersensitivity-and-Multiple-Chemical-Sensitivity.pdf)

Problems with phone studies

There's a serious flaw in the way that many scientists are conducting research into the health effects of mobile phones—and other wireless devices—according to a paper by Dimitris Panagopoulos and his colleagues.

Encouraged by agencies like the IARC (International Agency for Research on Cancer) and the HPA (Health Protection Agency), some scientists have exposed subjects to simulated mobile phone signals that have consistent, unvarying emissions. Over half the studies conducted in this way have found no evidence that mobile phone radiation could be harmful, the authors wrote.

However, mobile phone users are not exposed to signals like these, but to inconsistent, highly variable signals that change in intensity, frequency and so on. Signals of this type are more biologically active, the authors say, because the body is less able to adapt to them. Panagopoulos and team found that 98% of studies conducted with real mobile phone signals found evidence that mobile phone radiation had adverse effects.

The practice of using simulated, rather than real, mobile phone signals in experiments biases the results of the study and has the potential to obscure true health effects, the authors said. 'This is a serious scientific flaw that may lead to totally devious results with enormous adverse consequences for public health,' they wrote in their paper, published in July.

(Panagopoulos, DJ et al, *BioMed Research Int* Article ID 607053, 2015.)

Legal action

A legal case is underway in the US that could have far-reaching implications for schools with WiFi.

On 12 August, a 12-year-old boy, unnamed for privacy reasons, and his parents filed an injunction against the Fay School and its Principal, Robert Gustavson in the Massacusetts District Court.

The complaints states that the Fay School, a private residential and day school, installed an industrial-capacity WiFi network that exposed students to high levels of radiation. The boy developed symptoms of headaches, itchy skin and rashes soon after the system was installed and symptoms improved when he was away from school. His condition was diagnosed by a medical practitioner as electromagnetic hypersensitivity (EHS). Other children at the school reportedly developed similar symptoms.

The plaintiffs say that the school failed to accommodate the boy's electromagnetic EHS and that it took a 'hostile attitude', refusing to take action to reduce the boy's exposure and threatening parents with the boy's expulsion if they raised their worries about the WiFi exposure with the school community.

The plaintiffs also claim that the school and principal have disregarded the boy's rights under the American with Disabilities Act, breached the obligations of its own Student Handbook and failed to ensure the boy's safety at school.

The injunctions seeks to force the school to accommodate the boy's EHS as well as seeking damages and legal costs.

(https://drive.google.com/file/d/0B8Oub2Nx5eSLT0FWT29HRkRSZm8/view?pli=1)

WATT'S THE BUZZ?

Driving them mad

Another source of wireless radiation may be coming to a road near you.

Australia's first tests of driverless cars are about to be conducted in South Australia. The tests will be conducted at two locations in Adelaide to see how well the Volvo XC90 performs on Australian roads. South Australian Premier Jay Wetherill has said he wants to change legislation to allow driverless vehicles, which may be commercially available by 2017. (*Australian* 21.07.15.)

Woops!

But there is one small problem with computerised cars. In July, hackers working for Wired magazine in the US took remote control of a Jeep Cherokee, disabling the engine and controlling airconditioning, radio, wipers and locks. Following the demonstration, Fiat Chrysler, strongly encouraged by the National Highway Traffic Safety Administration, agreed to recall 4 million vehicles from the market. (*The Detroit News,* 24.07.15.)

Food for thought

What if we could produce light without either coal-fired electricity or the toxic materials and heavy metals used in LED and CFL globes?

The solution is at hand, according to two scientists from India. Vikram Singh and Ashok Mishra found that the juice of red pomegranate seeds and turmeric contain natural pigments that can be mixed to produce pure white light emissions.

'White light emission from such cheap and nature friendly resources could be important in the context of lighting and sensing application,' the authors said. (Singh, V and Mishra, A K, *Scientific Reports*, 5, Article 11118, June, 2015.)

Ups & downs of mobiles

Want to change your mood? Turn on your mobile phone.

US company Thync has developed a headset that changes people's mood by electrically stimulating nerve cells on their foreheads. The headset is controlled by an iPhone app that uses bluetooth radiation. (*Newsweek* 04.06.15.)

Birth control

No chips off the old block for these families.

In just a few years, women will be able to be implanted with a wireless-controlled microchip that will send birth control hormones—or other drugs for that matter—into their bloodstream for up to 16 years. This new method of contraception, developed by US company Microchips and supported by the Bill Gates Foundation, is expected to be tested in 2016 and could be on sale by 2018. (*Washington Post,* 17.07.15.)

Smart phones & learning

Smart phones may be counterproductive for learning, according to a recent study from the US. Researchers from Rice University and the US Air Force monitored 24 first-time users of smart phones. On average, students predicted that the phone would help with university work and tests, but found the reverse to be the case. They also reported it distracted them from work-related activities. 'Our research clearly demonstrates that simply providing access to a smart phone, without specific directed learning activities, may actually be detrimental to the overall learning process,' said Philip Kortum, a co-author of the study. (Tossel, CC et al, Brit J Educational Technology, 46(4):713-24, Jul 2015.)

A new e-Book investigates industry influence on the actions and regulations of the US agency that regulates telecommunications—the Federal Communications Commission (FCC). Called 'Captured Agency: How the Federal Communications Commission Is Dominated by the Industries It Presumably Regulates', the book is by investigative journalist Norm Alster. It's available from:

http://ethics.harvard.edu/files/center-for-ethics/files/capturedagency_alster.pdf

EHS documentary

Have you seen this? 'Desperately Seeking White Zone' is a French DVD about electromagnetic hypersensitivity. Featuring sufferers and doctors, the documentary explores the impacts of electrical and wireless technologies in French, with English subtitles. For more information, see: www.electrosensitive-white-zone-ehs-film,com.

(Continued from page 1)

The precautionary approach is highly recommended – the less exposure the better. Try to reduce time of cell phone talks, use landline if possible, keep radiation out of brain using handsfree/ earpieces (but not bluetooth), use cell phones with minimal SAR, use wired internet instead of Wi-Fi. All these are especially relevant for children whose biology is much more vulnerable to the effects of hazardous factors. Use healthy food, rich in antioxidants, fruits, vegetables, nuts, and practice a healthy lifestyle,' he said.

Yakymenko, I et al, 'Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation' *Electromagn Biol Med* 1-16, Jul 2015.

Australian EHS study

Scientists from the Australian Centre for Electromagnetic Bioeffects Research plan to conduct a study on electromagnetic hypersensitivity (EHS) and have advertised for volunteers to participate. The study is being conducted by Adam Verrender, a PhD candidate, with the cooperation of Professor Rodney Croft, whose view that EHS is not caused by electromagnetic fields has been widely publicised in the media.

'There are a number of concerns about the study,' said Lyn McLean, Director of EMR Australia. 'The subjects will be exposed to simulated rather than actual signals and these will be stronger than some people with EHS can easily tolerate. There is also the possibility that the study design does not allow sufficient recovery time between exposures to accurately identify volunteers' symptoms.'

More information about the study is at http://acebr.uow.edu.au/index.html.

Biased or not?

How independent are the experts entrusted with establishing guidelines for international radiation safety standards?

To answer that question, the Spanish organisation AVAATE (Vallisoletana Association of People Affected by Mobile Phone Antennas) conducted an investigation to see just what conflicts of interests members of the International Commission of Nonionizing Radiation Protection (ICNIRP)—the body which sets these guidelines—might have.

'In a majority of cases it is seen that there are direct or indirect connections between these experts and representatives of telecommunications, electric or insurance companies', their report found.

The full text of the report can be found at: http://www.avaate.org/spip.php?article2624.

Register of Environmental Sensitivities

The Australian Register of Environmental Sensitivities (ANRES) has been established to provide data on the incidence of this growing problem and highlight the need for recognition of and assistance for sufferers.

The register is an independent initiative by Dr Ian Buttfield, a retired Specialist Physician and member of the South Australian MCS taskforce Committee, Dr Sharyn Martin and Lucinda Curran, organiser of the Environmental Sensitivities Symposium. Information collected on the register will be kept private and secure.

'The prevalence of Environmental Sensitivities is largely unknown in Australia,' Dr Martyn told EMR Australia. 'Collecting numbers will not bring about immediate changes but it is the first step in gaining recognition of environmental sensitivities such as Multiple Chemical Sensitivity, Electromagnetic Hypersensitivity and Chronic Fatigue Syndrome. Those suffering these conditions have for the most part invisible functional impairments or disabilities that have a negative impact on the quality of their life. We need to reach people of all ages, social groups, location and educational status. Statistics are needed for reform, particularly at a political level.'

If you have environmental sensitivities or are a carer of someone with environmental sensitivities, you can see more about the register at www.anres.org

Breaking news

A French court has awarded a 39-year-old woman with electromagnetic hypersensitivity a disability payment. The Toulouse court ruled that Marine Richard, who lives in a remote area without electricity, could receive a monthly payment of 800 Euros (approx $1250 AUD). (BBC News, 28.08.15.)