

EMR and Health

Quarterly report on electromagnetic radiation, health and well-being

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Wireless radiation and the foetus

A pregnant woman's exposure to electromagnetic radiation may affect her unborn child, say scientists.

New studies, conducted on rats, show that a pregnant female's exposure to radiation from a mobile phone, WiFi or other wireless devices can have harmful effects on her unborn offspring that may persist into later life.

In one study, scientists exposed pregnant rats to a WiFi signal of 2.45 GHz for two hours a day throughout their pregnancy. Another unexposed group served as the controls. After birth, the pups were examined for biochemical changes. The researchers found that, unlike controls, rats exposed in utero showed evidence of impaired brain development, including oxidative stress (free radical damage).¹

In another study, scientists exposed pregnant rats to a mobile phone signal of 900 MHz for 24 hours a day for 20 days. When they examined the liver and blood of the offspring, they found that exposed pups had lower levels of the antioxidant glutathione and indications of liver damage. They also found 'intense degeneration' of some liver cells (hepatocytes) and concluded that exposure produced harmful effects on rat livers that 'persist into adulthood'.²

These findings are in line with previous animal research that has found harmful effects from maternal exposure to mobile phone radiation on offsprings'

- brains³
- skeletal development⁴



- female egg follicles⁵
- and, from maternal exposure to WiFi radiation,
- stillbirths, internal hemorrhages and reduced body mass in offspring⁶
- lower body weight of foetus⁷
- foetus malformation, particularly cleft palates⁸
- decreased body weight of foetus and skeletal immaturity.⁹

While not all studies have found that maternal exposure to wireless radiation adversely affects the foetus or offspring, the accumulating evidence for harmful effects in animal studies suggests it may be advisable



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Mobile phones exceed radiation standards

A French government agency has found that many mobile phones are exposing users to more radiation than allowed by international standards.

This alarming finding emerged from a report, published in June, by the Agence Nationale des Fréquences (ANFR) detailing the results of tests conducted on hundreds of mobile phones between January 2012 and December 2015. ANFR tested 379 mobile phones for specific absorption rate (SAR) — the amount of radiation absorbed by the head or torso of a gel-filled plastic model of the human body when the phones operate at maximum power.

When the phones were measured at the usual distance of 15mm from the body, the SAR complied with the national limit of 2 watts per kilo (W/kg). When they were measured at 5 mm from the body, most, but not all phones complied. However, when they were measured in contact with the body, it was a different picture altogether.

The results showed that 89 percent of the phones, in contact with the body, had SAR levels above the 2 W/kg limit of the standard. 25 percent of the phones had a SAR greater than 4 W/kg.¹

Phones with particularly SARs well above the 2 W/kg limit when measured in contact with the body included the:

- Polaroid PRO 881 A (7.4 W/kg)
- the HTC One SV (7.1 W/kg)
- Blackberry Z10 (6.8 W/kg)
- Nokia Lumia 530 (6.57 W/kg)
- Wiko Ridge (6.5 W/kg), Highway Pure (6.33 W/kg) and Fever (5.6 W/kg)
- Orange Neva (5.7 W/kg)
- Apple iPhone 5 (5.3 W/kg)
- Microsoft Lumia 950 (5.2 W/kg)

Among the types of phones with higher SAR levels were UMTS phones operating at 1950 MHz and LTE phones operating at 2600 MHz.

The results highlight a critical problem in radiation protection: that mobile phones are normally tested for compliance at a distance from the body and that's the way they are supposed to be used. However, manufacturers don't make this information clear to consumers, if they mention it at all. According to the French Agency for Food, Environmental and Occupational Health & Safety (ANSES), 'For 25% of the tested phones associated with a SAR in contact exceeding 2 W/kg, no separation distance was stated in the user manual.'

It's clear that many consumers hold their phones directly against their head or body during use. Commenting on the results, ANSES said, 'The separation distance between the body and the phone placed in a shirt pocket, for example, may be in fact only a few mm.'

The ANFR's results were published after a ten-month campaign by French physician Dr Marc Arazi, a former national coordinator of Priartem—an association which aims to gather, inform and act on the risks of electromagnetic radiation-emitting technologies. Following the release of the report, he called for European regulations to mandate that SAR testing be based on body contact measurements and to take into consideration the difference between children's and adults' bodies.

ANFR plans to publish new SAR measurements every six months.

1. ANFR's measurements can be found at: <https://data.anfr.fr/explore/dataset/das-telephonie-mobile/?disjunctive.marque&disjunctive.modele>
2. French Agency for Food, Environmental and Occupational Health & Safety Opinion and Report on "Exposure to Radio Frequencies and Child Health" (in French): <https://www.anses.fr/en/system/files/AP2012SA0091Ra.pdf>

'The results showed that 89 percent of the phones, in contact with the body, had SAR levels above the 2 W/kg limit of the standard. 25 percent of the phones had a SAR greater than 4 W/kg.'

Wireless-wise Families—new book by Lyn McLean



We love them, we depend on them, we fill our homes with them – but how much do you know about mobile phones and other wireless devices and the radiation they emit?

Did you know, for example, that your use of wireless devices can affect your children, your unborn children, and even your chances of conceiving? That wireless radiation has been shown to affect performance, mental health, relationships, and sleep? Or that many world authorities recommend reducing exposure to this radiation?

'Smart' families are exposed to wireless radiation from 'smart' devices. 'Wise' families make informed decisions about using wireless technologies safely.

This book, written by Director of EMR Australia Lyn McLean and published by Scribe Publications, shows you in simple, practical terms what you need to know to live wisely in our ever more connected world.

Now there's a simple and clear guide about how to use wireless devices more safely. 'Wireless-wise Families—what every parent needs to know about wireless technologies' provides easy-to-understand information for making informed decisions about wireless radiation.

'From talking to people every day about this issue, I've developed a fair understanding of what people know, what they don't know and what they want to find out,' says author, Lyn McLean. 'In *Wireless-wise Families*, I've tried to crystallise that information in a way that's easy to understand and apply.

Wireless-wise Families draws on Lyn's 22 years of experience in this field and on the important research and developments on this issue.

The book is available in stores and from EMR Australia (<http://www.emraustralia.com.au/shop/books/wireless-wise-families>) from 18 September.

(Continued from page 1)

for pregnant women to take the precaution of reducing their exposure to wireless radiation.

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RESEARCH UPDATES

ELF fields (from electrical sources)

Anxiety

Scientists from Serbia investigated the effects of power-frequency electromagnetic fields on the behaviour of rats. They exposed 10 male rats to these fields for seven days and evaluated evidence of anxiety through maze activities and an examination of the hypothalamus. They found that exposure caused anxiety-like behaviours in the rats and increased levels of free radicals superoxide anion and nitric oxide. (Djordjevic, NZ et al, *Environ Sci Pollut Res Int* Jul 29, 2017.)

Other studies showing effects from ELF fields

- Fields from incubators may contribute to the risk of autism in premature babies. (Bellieni, CV and Buonocore, G, *Acta Paediatr* 22 Jul, 2017.)
- A 50 Hz magnetic field shortened the circadian rhythm of a gene in mouse embryonic fibroblast cells. (Sun ZY et al, *Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi* 35(6):459-62, 2017.)

RF/wireless radiation

Children

How much mobile phone radiation are young people exposed to? To answer that question, researchers studied the phone habits of 534 volunteers, aged 10 to 24, from 12 countries. They found that:

- more and longer calls were made by girls (rather than boys), people of lower (rather than higher) social classes and people in their early 20s

(rather than younger age groups);

- people in aged 15-19 were highest Wi-Fi users.

Usage patterns also differed by country. (Langer, CE et al, *Environ Int* 107:65-74, June 2017.)

Salivary gland tumours

To cast light on the connection between mobile phone use and the development of tumours in the parotid (salivary) gland, Brazilian researchers conducted a review of research on this topic. From an analysis of 5087 subjects, the researchers concluded that 'cell phone use seems to be associated with greater odds to develop salivary gland tumor.' (de Siqueira, EC et al, *J Oral Pathol Med* 46 (7):480-83, 2017.)

Pancreas

To determine whether WiFi radiation has harmful effects on the young, Turkish researchers exposed six-week old male rats to a 2.45 GHz wireless signal for 30 days. They found that WiFi exposure caused 'degenerative changes' in the animals' pancreases but that treatment with Gallic acid reduced these harmful effects. (Topsakal, S et al, *J Radiat Res and Appl Sci*, 10:233-40, 2017)

Free radicals

Researchers from India and Finland exposed rats to a 2.45 GHz signal for 2 hours a day for 35 days. They found that exposure resulted in high levels of lipid peroxide in the animals' livers, brains and spleens. Lipid peroxidation causes oxidative damage to lipids in cells, leading to cell damage. (Chauhan, P et al, *Electromagn Biol Med* 36(1):20-30, 2017.)

Symptoms

Mobile phone radiation was associated with symptoms in adolescents in a study from Turkey. Researchers obtained information from over 20,000 students from 26 high schools between 2009 and 2011. They found a link between mobile phone use and symptoms of headache,



'WiFi exposure caused 'degenerative changes' in the animals' pancreases'

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

concentration difficulties, fatigue, sleep disturbances and warming of the ear. Headaches were almost twice as prevalent among mobile phone users as among nonusers. Symptoms could be reduced by 'Decreasing the number of calls and messages, decreasing the duration of calls, using earphones, keeping the phone away from the head and body,' the authors concluded. (Durusoy, R et al, *Environ Health* 16(1):51, 2017.)

Stress

Mobile phone use may be compounding stress at work, according to a study from Poland. Researchers questioned 600 volunteers about their phone habits and stress levels and found that 57% to 62% of volunteers reported problems in coping with life. Mobile phone use compounded stress of workers and increased the risk of symptoms. It also increased the risk of headaches. (Szyjkowska, A et al, *Med Pr* 68(5):617-28, 2017.)

Phone towers

Living near a mobile phone tower may not be a good idea, according to research from India. Scientists found that people living within 80 metres of a mobile phone tower were exposed to more radiation than those living 300 metres from it. Moreover, an examination of blood lymphocytes showed evidence of more DNA damage in those living closer to the tower. (Zothansiamia et al, *Electromagn Biol Med* Aug 4:1-11, 2017.)

Female reproduction

Mobile phone radiation may interfere with female reproduction, according to a study from India. The study showed that female mice exposed to a mobile phone signal of 1800 MHz had less egg-containing mature follicles and corpus lutea (a reproductive structure). Changed levels of sex hormones and oxidative stress were also observed. (Shahin, S et al, *Reprod Toxicol* Aug 2, 2017.)

Bladder and kidney

Scientists from Turkey exposed 21-day old male rats to a mobile phone signal of 900 MHz for an hour a day for 37 days. They found a range of adverse biochemical changes that were linked to free radical damage. (Türedi, S et al, *Int J Radiat Biol* Jul

27:1-10, 2017.)

Information processing

Iranian scientists exposed rats to a 2.4 GHz WiFi signal for 12 hours a day for 30 days and compared them to unexposed rats given the same tasks. The scientists observed that exposed rats had more trouble distinguishing between familiar objects in tests of vision and touch and concluded that chronic exposure to WiFi radiation could 'impair both unimodal and cross-modal encoding of information'. (Hassanshahi, A et al *Neuro Sci* 38(6):1069-76, 2017.)

Nervous system

Mobile phone radiation could have a 'devastating' effect on neural stem cells, which play an important role in the nervous system and the treatment of neurodegenerative diseases. Iranian scientists exposed these cells to a GSM mobile phone signal of 900 MHz and observed that less cells differentiated into neurons and the number and size of neurospheres (clusters of stem cells) was reduced. (Eghlidospour, M et al, *Anat Cell Biol* 50(2):115-23, 2017.)

Cognition

Exposure to wireless radiation reduced cognition in rats in a study from China. Researchers exposed 220 male rats to a 2.856 GHz wireless signal of different strengths for 6 minutes daily for up to 6 weeks. They found that the most exposed rats had poorer performance in spatial learning and memory activities and changes in brain wave patterns. They also found that animals exposed to 5 or 10 mW/cm² showed structural changes in the hippocampus that could impair cognition. (Wang, H et al, *Physiol Behav*, Aug 30, 2017.)

Exposure

To assess how much radiation Europeans are exposed to, Swiss researchers conducted a review of 21 studies that measured indoor and outdoor exposures. Different types of studies showed that people were exposed, on average, to

- 0.24 V/m, 0.29 or 0.16 in their homes;
- 0.2, 0.54 or 0.76 V/m outdoors.

(Continued on page 7)

'Mobile phone radiation may interfere with female reproduction'



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"Mobile phone use may be compounding stress at work"

Electro-perception and pollination

Birds do it. Fish do it. Amphibians and even platypi do it. So it should come as no surprise that bees do it, too.

Bees, like many other living creatures, possess the sense of electroreception—the ability to detect minute electric fields from their environment—and this sense plays a vital role in the process of pollination, on which all land-based life depends.

A recent review from the University of Bristol confirms bees' ability to detect electric fields. Honey bees detect fields with their antennae. Bumble bees do so through tiny hairs on their body that send information to their brains and hence their nervous systems. These finely-tuned receivers allow bees to detect electrical information from flowers that helps them to identify suitable candidates for pollination.

Pollen transfer, itself, is an electrical process. Bees collect a positive electrical charge as they fly through the air. The closer they fly to a flower, the stronger the electric field between bee and flower. These electrical forces cause pollen to 'jump' from bee to flower or flower to bee, even against the pull of gravity.

Scientists have been able to 'replicate' the process using a positively-charged rod instead of a bee. They showed that, when the rod approached the bee, the pollen jumped from the flower to the rod. Similarly, when a rod carrying pollen was moved towards a flower, the pollen jumped from the rod to the flower.

'Electrostatics and electroreception are likely to be a *bone fide* part of the multiple co-evolutionary adaptations between plants and their pollinators', the authors write.

Bees may not be the only insects with a capacity for electroreception. Because many other insects have antennae and hairs like bees, it's possible that electroreception plays a role in the activities of other species, the authors suggest.

(Clarke, D et al, 'The Bee, the flower, and the electric field: electric ecology and aerial electroreception', *J Comp Physiol A* June 24, 2017.)

EMF and immunity

Run down? Feeling low? Just can't seem to pick up? Perhaps exposure to electromagnetic fields has something to do with the problem.

In a new paper, published in the journal *Medical Hypotheses*, Professor Olle Johansson of Sweden's Karolinska Institute and independent researcher Paul Doyon show, not just that electromagnetic fields affect immunity, but just how these effects might occur.

It's quite well-established that electromagnetic fields affect the immune system. They affect immune organs, lymph, the spleen and a range of cells involved in immunity, including frontline troops known as T-lymphocytes. The reason this occurs could be to do with tiny gateways in cell membranes called voltage-gated calcium channels (VGCCs). In optimal conditions, these gateways regulate the flow of calcium ions in and out of the cell. However, electromagnetic fields and radiofrequency radiation can interfere with the function of these channels, allowing abnormal levels of calcium to flow into and out of the cell.

This has the potential to significantly impair the immune system.

When too much calcium flows into the cell, the end result is the production of harmful substances such as nitric oxide, peroxynitrite and reactive oxygen species (ROS). Dr Martin Pall has described this process in detail elsewhere.

What Johansson and Doyon add to the picture has to do with a tiny molecule called calcineurin. Calcineurin is an enzyme with an affinity for calcium and neurons (hence its name) that plays an important role in immunity and other body functions. When calcineurin is blocked, the immune system is suppressed, leading to increased infections (viral, fungal, bacterial and parasitic).

Johansson and Doyon suggest that the way EMFs impair immunity is as follows. The fields change the behaviour of the VGCCs, allowing calcium to flood the cell. This leads ultimately to higher levels of nitric oxide, hydrogen peroxide and ROS inside the cell. This blocks calcineurin, with the result that immunity is impaired, leaving the body vulnerable to opportunistic infections. This entire process can occur, the authors say, at everyday levels of exposure.

Doyon PR, Johansson O, "Electromagnetic fields may act via calcineurin inhibition to suppress immunity, thereby increasing risk for opportunistic infection: Conceivable mechanisms of action", *Medical Hypotheses* 2017; 106: 71-87, doi: <http://dx.doi.org/10.1016/j.mehy.2017.06.028>

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Highest measurements in transport were 1.96 V/m, recorded in Belgian trains.

[People who are sensitive may find it difficult to tolerate exposures above 0.1 V/m.]

(Sager, S et al, *J Expo Sci Environ Epidemiol*, Aug 2, 2017.)

Electromagnetic hypersensitivity

A study from the US has found evidence that people with electromagnetic hypersensitivity (EHS) have brain characteristics that vary from the norm. Dr G Heuser conducted functional MRIs and regular MRIs on 10 people with EHS. He did not observe any unusual features from regular MRIs, but functional MRIs showed changes that he described as 'hyper connectivity' in part of the medial orbitofrontal area of the brain.

He observed that many of the patients had a history of head injury or exposure to neurotoxic chemicals. 'Head injury and neurotoxic chemical exposure may make a patient more vulnerable to develop EHS', he concluded. Dr Heuser recommended that functional MRIs could be used in the future to help diagnose the condition of EHS. (Heuser G and Heuser SA, *Rev Environ Health*, July 5, 2017.)



UPDATES FROM AROUND THE WORLD

International

After a meeting with the World Health Organisation on 3 March, the European Cancer and Environment Research Institute (ECERI) made the decision to establish an alternative group to the International Commission of Non-Ionizing Radiation Protection (ICNIRP). ICNIRP has been criticised for promoting standards that protect primarily against thermal (rather than biological) effects of exposure and for the membership of its Core group (*EMR and Health* June 2017.)

The ECERI-related group, which may be called the 'International Commission of Scientific Expertise on Non-thermal Radiation Effects' (ICSENTRE), will include a number of prominent scientists with expertise in this field. They include Dominique Belpomme (France), Igor Belyaev (Slovakia), Ernesto Burgio (Italy), David Carpenter (USA), Lennart Hardell (Sweden), Magda Havas (Canada), SMJ Mortazavi (Iran), André Vander Vorst (Belgium) and Gérard Ledoigt (France). (ECERI Scientific Research Newsletter no 6, June 2017, www.eceri-institute.org)

USA

The Federal Communications Commission (FCC) has approved Apple's plan to test fifth generation wireless technology in several Californian locations. The technology, which uses millimetre waves, will operate at much higher frequencies than current communications technologies—between 30 and 300 GHz. 5G technologies are not expected to be used commercially till 2020. (DSL reports, 31.07.17)

5G

Professor Beatrice Golomb, a professor of medicine at the University of California, has published an letter raising concerns about California's plans to allow the installation of microcells to facilitate the roll-out of 5G technologies. Dr Golomb says the new technology 'will lead to serious harm in some' and refers to scientific research to validate her concerns. Her letter can be found at: <https://drive.google.com/file/d/0B14R6QNkmaXubmZUbWI1aERpX1E/view>

USA

The US National Toxicology Program (NTP) has delayed the release of its report on its vitally important mobile phone/rodent study. Preliminary results, released last year, showed that exposed rodents had more tumours of the heart and brain and more DNA breaks than unexposed mice. The report, due to be released this year, has been deferred till 2018. (<https://ntp.niehs.nih.gov/results/areas/cellphones/index.html>)



Electromagnetic hypersensitivity

The term 'Electromagnetic hypersensitivity' (EHS) is used to describe reactions to equipment that emits electromagnetic fields/radiation, including powerlines, mobile and cordless phones, wireless devices and mobile phone base stations. Symptoms include diverse effects on the central nervous system, including fatigue, stress, sleep problems, skin problems, headaches, pain, nausea, muscle weakness, heart palpitations, allergies, among others. Surveys suggest that between 1.5 and 13% of the population may be affected.

The June issue of the journal *Ecopsychology* is devoted to discussing the issues of EHS and chemical sensitivity (CS), which often go hand in hand. Here are some of the issues contributing authors discussed.

Pamela Reed Gibson ¹

Dr Gibson, a psychologist from James Madison University in Virginia USA, has studied the impacts of EHS on quality of life. She has found that sufferers are deprived of the benefits of many features of modern culture. Many have been harassed at work, lost jobs, been unable to find suitable accommodation, suffered homelessness, not been able to pursue higher education and have limited incomes. Because they are not able to tolerate fields in many buildings, these people are unable to visit shops, libraries, public buildings, universities, medical centres, hospitals or even other people. Thus deprived of social contact, they often live lonely and isolated lives. For many, the quality of life is poor and some have committed or considered suicide.

Dr Gibson refers to research showing that EHS has a biological foundation. Research has shown that exposure causes mast cells to migrate to the surface of the skin, causing inflammation. Other research has found evidence of inflammation, oxidation, permeability of the blood-brain barrier and reduced levels of the hormone melatonin in people with this condition. Dr Martin Pall has hypothesised that oxidative and nitrosative stress may be responsible for the symptoms of EHS (and other conditions).

Diana Crumpler ²

Australian writer Diana Crumpler described her experiences of life with EHS and multiple chemical sensitivity. Her descent into illness began in 1973 when she and her family purchased a rural property where they were exposed to highly toxic pesticides. Diana, her husband and all three children developed severe reactions, including dermatitis, asthma, infections, headaches, chronic fatigue and heart arrhythmias. After exposure to the organophosphate dichlorvos, Diana also became sensitive to electromagnetic fields, light and, later, to sound. In 2008, she was forcibly removed from her home and institutionalised for months on the basis that she suffered from a mental health problem: the belief she was sensitive to chemicals and EMR.

She described her experiences as follows. 'Multiple chemical sensitivity/electromagnetic hypersensitivity is a protean monster that leaves intact no facet of one's life. Your concept of self; normal relationships with lover, family, society; with the natural world beyond your isolation cell—all are irrevocably blighted. From a productive member of society, a well-qualified professional ..., an artist, a keen gardener, a breaker and trainer of horses, an avid reader, and a tireless worker for charity, I was reduced to the status of a parasite, redundant in every aspect of existence.'

Linda Sepp ³

Like Diana, Linda is isolated by severe EHS and chemical sensitivity. Confined to her home, with visitors a rarity, her main companions are the birds and squirrels she feeds daily.

'I long to be able to sit or walk outside somewhere in nature where I won't encounter human-made, petrochemical pollutants, where I can enjoy the sounds of nature, the leaves rustling, the water trickling (or rushing), the birds singing (or talking), the animals walking,' she says. Linda points out the irony that the majority of people have the right to pollute our shared environment but that she and other sufferers of environmental sensitivities have no right to a healthy environment.'

Jerry Evans ⁴

Jerry was a highly-respected computer engineer when he developed multiple chemical sensitivity and, about three years later, EHS. Among the symptoms he experienced were 'inflamed sinuses, blurry vision, the sensation that my skin was on fire, severe headaches, and "brain fog". Brain fog feels like a combination of having the flu and being severely sleep-deprived', he said. Symptoms occurred at exposures that were unnoticeable to most people.

As Jerry's health deteriorated, he left his job and his home and moved to a remote desert location in Arizona where he constructed a home of healthy, nontoxic materials. Other people with environmental sensitivities live nearby and Jerry has the benefit of social interaction with those who understand and share his condition.

Dr Scott Eberle ⁵

Medical practitioner Scott Eberle developed symptoms of EHS well before he knew what caused them. He discovered that wireless radiation was the culprit and found he developed splitting headaches when a WiFi router was, unbeknownst to him, turned on. After some experimentation, he was able to determine the way his body reacted to this radiation. He perceived that a 'buzzing headache and mental slowing starts within 2 hr of an exposure, peaks at 4-6 hr, and lingers for 24-48 hr.' His paper describes, not just his physical journey, but the emotional journey on which he was propelled by his condition.

Scott coped with his condition by rewiring his house to reduce exposure to magnetic fields and applying shielding paint, curtains and window film to block wireless radiation.

Parsaei et al ⁶

Researchers from Iran reported on the effectiveness of a model that can be used to predict subjective health symptoms among people who live near mobile phone base stations. The model predicted symptoms of EHS such as headache, fatigue, sleep disturbance, discomfort, depression, loss of memory, dizziness, reduced libido, nervousness and palpitations.

The investigators randomly selected a number of mobile phone base stations in Shiraz and then selected homes located at varying distances from towers (<100m, 100-300m, 300—600m and 600—1000m). They compared the information about symptoms from their modelling process with information they obtained in interviews with householders. There was a strong correlation.

The authors suggested that the effectiveness of the modelling process means that it might be applied by medical practitioners to improve the health of people living near base stations.

References from 'Echopsychology', June 2017, Vol 9, No 2

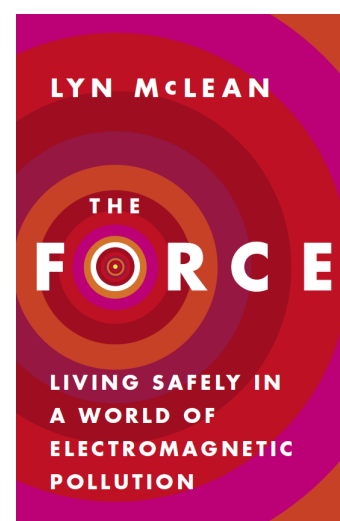
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3. Linda Sepp, 'Invisible Barriers, Invisible Disabilities, Invisible People', p. 65
4. Jerry Evans, 'Displaced by Chemical and Electrical Hypersensitivities', p. 80.
5. Scott Eberle, 'An Underworld Journey: Learning to Cope with Electromagnetic Hypersensitivity', p. 106.
6. H. Parsaei et al, 'A Multilayer Perceptron Neural Network-Based Model for Predicting Subjective Health Symptoms in People Living in the Vicinity of Mobile Phone Base Stations', p. 99.

How we help with electromagnetic hypersensitivity



EMR Australia has been helping people with electromagnetic hypersensitivity for many years. We offer the following assistance.

1. Our meters help you identify the fields present in your home or workplace and we provide phone support to help you understand and reduce your exposure.
2. Our books 'The Force' and 'Wireless-wise Families' (p 3) show you how to reduce your exposure to electromagnetic radiation.
3. Our organic Zeolite Powder helps remove the toxins that may contribute to EHS.
4. Our shielding products block wireless radiation from sources such as mobile phone towers, smart meters and neighbours' WiFi from entering your home.



Health effects of EMR

Electromagnetic fields (EMFs) act in concert with other agents and these effects have not been adequately reported in the scientific literature, according to Ronald Kostoff and Clifford Lau, writing in the recently-published book 'Microwave Effects on DNA and Proteins'.

EMFs can have either beneficial or nonbeneficial effects on the body, the authors say, depending on frequency, length of exposure, genetics and other variables. Beneficial effects are generally related to short-term exposures; harmful effects to long-term ones.

Among the harmful effects the authors identify are increased cancers, genetic mutations in cells or genes and effects on the embryo or foetus.

Kostoff and Lau point out that, whereas most research has been conducted on exposure to EMFs alone, the reality is that most of us are exposed to other agents as well. And the effects of combined exposures are often greater. For example, the effects of exposure have been increased by exposure to chemicals, (eg DMBA and TPA), static fields, anaesthetics, X-rays and ionising radiation. In

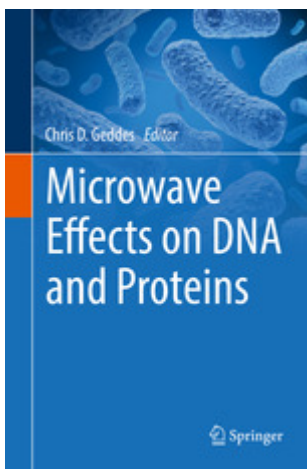
some cases, exposure to EMF alone didn't produce an effect but enhanced the effects of other agents. In other cases, neither EMF nor the second agent produced any effects individually, but when combined, they had a 'pronounced' effect.

The tendency for researchers to test EMF and other agents separately means that the combination effects aren't being noted and the result is to 'underestimate the toxic influence of combined stimuli', the authors write.

This has important implications for society. 'EMF radiation exposure safety standards are based primarily on stand-alone radiation exposures. When combined with other agents, the adverse effects of non-ionizing EMF radiation on biological systems may be more severe.'

Moreover, it's becoming increasingly clear that the harmful effects of EMFs and other possible toxins are underreported in scientific journals, Kostoff and Lau say.

Kostoff, RN and Lau, CGY, 'Modified Health Effects of Non-ionizing Electromagnetic Radiation Combined with Other Agents Reported in the Biomedical Literature' in Geddes, Chris D. (Ed.), 'Microwave Effects on DNA and Proteins', <http://www.springer.com/gp/book/9783319502885>



NBN good news

The NBN (national broadband network) is currently rolling out fibre optic and wireless connections across Australia. Some sensitive readers have reported concerns about the removal of their wired landlines and replacement with wireless equipment.

One reader reports that NBN advised her that she would need to use cordless phones in her home. However, after repeated calls to NBN, she was eventually advised by an NBN manager that her three phones could, in fact, be connected by wires. This has subsequently been done and her home remains wireless-radiation free.

Persistence pays!

iGen

Today's youngsters, those born since the mid 1990s—the iGen— are the first generation to spend their entire adolescence in the age of the smartphone. With social media and texting replacing other activities, iGen spends less time with their friends in person—perhaps why they are experiencing unprecedented levels of anxiety, depression, and loneliness.

This is the message from Professor Jean Twenge, a psychologist from San Diego State University, in her new book 'iGen—Why Today's Super-Connected Kids Are Growing Up Less Rebellious, More Tolerant, Less Happy--and Completely Unprepared for Adulthood--and What That Means for the Rest of Us'. You can read more at: <http://www.simonandschuster.com/books/iGen/Jean-M-Twenge/9781501151989>

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Smart phones reduce cognition

Researchers from the University of Texas have conducted two studies to see whether accessibility to a smart phone affected a person's mental performance—and the results are bad news for employers and educators.

In the first study, the scientists asked 800 smart phone users to perform computer tasks that required their complete concentration. During the trial, some volunteers kept their phones face down on their desks, others kept them in a pocket or bag and others left them outside the room. The volunteers who performed best in the tasks were those who kept their phones outside the room. The more accessible the phones were, the less well the volunteers performed.

'We see a linear trend that suggests that as the smartphone becomes more noticeable, participants' available cognitive capacity decreases,' said Assistant Professor Adrian Ward, one of the study's authors. 'Your conscious mind isn't thinking about your smartphone, but that process — the process of requiring yourself to not think about something — uses up some of your limited cognitive resources. It's a brain drain.'

In the second test, the researchers asked the volunteers to rate how dependent they were on their mobile phones and then to complete the computer tasks. They found that the volunteers who were most dependent on their phones performed worse than the less dependent volunteers when both groups kept their smart phones in the test room.

'It's not that participants were distracted because they were getting notifications on their phones,' said Ward. 'The mere presence of their smartphone was enough to reduce their cognitive capacity.'

Adrian F. Ward, et al, "Brain Drain: The Mere Presence of One's Own Smartphone Reduces Available Cognitive Capacity," *Journal of the Association for Consumer Research* 2, no. 2 (April 2017): 140-154, <https://doi.org/10.1086/691462>

WHO under fire

Renowned oncologist, Professor Lennart Hardell has launched a salvo at the World Health Organization for its handling of the wireless (radiofrequency) radiation/health issue. For over a decade, Professor Hardell, from Örebro University in Sweden, has published a number of studies showing that long-term mobile and cordless phone use is linked to increased rates of several types of brain tumours. In his latest paper, published June 2017, Professor Hardell suggests that world authorities have not dealt appropriately with these risks.

The International Commission on NonIonizing Radiation Protection (ICNIRP) has developed guidelines for limiting exposure to radiofrequency radiation. It is a private organisation and 'many of ICNIRP members have ties to the industry that is dependent on the ICNIRP guidelines,' he says.

Similarly, the WHO's EMF Project has close links with industry. Hardell says it has received funding from telecommunications groups and the authors of its influential Environmental health criteria monographs (the WHO's Core Group) are primarily members of ICNIRP. Project founder Dr Michael Repacholi is an advocate for the telecommunications and power industries and his successor, Dr Emilie van Deventer, is a member of the 'industry dominated' Institute of Electrical and Electronics Engineers (IEEE).

Hardell refers to requests for the WHO to take steps to change the composition of the WHO's Core Group and review its Guidelines by scientists and the wider community—but so far these have fallen on deaf ears.

Given the WHO's belief that everyday levels of wireless radiation are not a risk to people's health, how much radiation is present in the WHO building? Hardell says levels are low—more than 130 times lower than those found in Stockholm Central station!

(Hardell, Lennart, 'World Health Organization, radiofrequency radiation and health—a hard nut to crack', *Int J Oncol*. 2017 Jun 21. doi: 10.3892/ijo.2017.4046.)

What's new

Wavewall Universal mobile phone case



The WaveWall Universal anti-radiation case protects your phone against damage, while protecting your body against the radiation the phone emits.

The case blocks over 85% radiation from the phone to your head and body. It contains anti-radiation fabric on one side to block incoming signals, while still allowing your phone to connect to a phone tower.

The Wavewall Universal comes in two sizes suitable for most mobile phones. The 'small' cases fit phones with screens up to 10 cm and the 'large' fit phones with screens up to 15cm.

More information at: <http://www.emraustralia.com.au/shop/protection-shielding/wavewall-universal-mobile-phone-case>

RadAware personal radiation alarm

The Radaware is a handy, personal alarm for radiofrequency (wireless) radiation that allows you to detect the presence of radiation in your environment above the level that you set for yourself. It is thousands of times more sensitive than other alarms for radiofrequency radiation and detects a wider range of frequencies, including those planned for 5G.



It features coloured LEDs, sound function (that can be turned off) and 6 different alarm sounds for each of two sensitivity ranges.

It is battery operated for convenient use when on the move, but can be used with a mains adaptor so that it can be plugged into a power point in the home or workplace to conserve battery life.

It has two sensitivity ranges. The most sensitive setting, suitable for people very sensitive to wireless radiation, ranges from <math><0.02\text{ V/m}</math> to 0.2 V/m. The least sensitive option, suitable for people less sensitive, who nevertheless want to protect themselves from wireless radiation, ranges from 0.3 V/m to 3 V/m.

More information at: <http://www.emraustralia.com.au/shop/meters-testing/radaware-personal-radiation-exposure-alarm>



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