

# EMR and Health

Report on electromagnetic radiation, health and well-being

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## Exposure and miscarriage

Could power-frequency magnetic fields and wireless radiation from mobile phones and other communications equipment be risk factors for miscarriage? The answer is yes, according to new research published in the journal *Open Medicine*.

Iranian researchers conducted a review of 17 studies involving over 57,600 women, most of whom lived in the USA. They found that 'the risk of abortion was increased by 1.27x for pregnant women exposed to ELF [power-frequency fields] and intermediate frequency EMFs in the first trimester of pregnancy.'

Miscarriages affect approximately one in four pregnant women in the US and are most-commonly caused by chromosomal abnormalities. In Australia, the incidence is approximately one in five.<sup>2</sup>

The review found that exposures from common sources could be risk factors.

One of those sources is the ubiquitous mobile phone. 'Cell phone RF [radiofrequency] waves may result in DNA damage in the fetus and microwave radiation may damage the placental barrier,' the authors wrote. 'Results of a study showed that there was an association between cell phone use by mothers and increased risk of miscarriage, congenital anomalies, and behavioral problems in children.'

The authors also found that magnetic fields from electrical equipment, such as powerlines, wiring and appliances, could



increase the risk of miscarriage. They referred to one study which showed that women exposed to magnetic fields above 16 mG had an 80% greater-than-normal risk of miscarriage. They also reported that miscarriage risk increased at exposures as low as 2 to 2.5 mG. One study showed that using an electric blanket at conception increased the risk of miscarriage.

The authors concluded that the research to date, though limited, supports a precautionary approach. They say, 'it may be prudent to advise women against this potentially important environmental hazard. Indeed, pregnant women should receive tailored counselling and stimulate more the much needed research.'

1. Ghazanfarpour M, et al '[Effect of electromagnetic field on abortion: A systematic review and meta-analysis. Open Med \(Wars\). 2021 Nov 3;16\(1\):1628-1641.](#)

2. Royal Women's Hospital, <https://www.thewomens.org.au/health-information/pregnancy-and-birth/>

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## Electromagnetic pollution and wildlife

Is electromagnetic pollution damaging wildlife?

Yes, it is, according to a major new scientific publication.

Blake Levitt, Henry Lai and Albert Manville reviewed research on the effects of electromagnetic fields on plants and animals and their findings have recently been published in a 3-part, 200plus- page report in *Reviews on Environmental Health*.

The review found that the exposure of wildlife has increased over recent decades. They referred to one study that compared exposures in 1980 and today and observed 'a 70-fold (7,000%) increase in ambient RFR [radiofrequency radiation]'.

The review found that not only are plants and animals affected by this electromagnetic pollution, but that they are affected at even lower levels than those that affect people – at 'vanishing low intensities.' Moreover, the effects occur across a range of frequencies emitted by different technologies.

How they will be affected by 5G remains to be seen but the authors noted that 'The increased infrastructure required for 5G networks will widely infuse the environment with new atypical exposures'.

The researchers found that electromagnetic pollution affected:

- orienting and migrating
- finding food
- mating and reproducing
- constructing nests and dens
- maintaining and defending territory
- lifespan and survival.

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*'The increased infrastructure required for 5G networks will widely infuse the environment with new atypical exposures'*

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Plants and animals are not being protected from this damage as there are no standards pertaining to wildlife, the authors said.

They concluded that there is an urgent need to address this problem and introduce standards that accommodate wildlife. Moreover, electromagnetic fields should be recognised as a pollutant and regulated like other pollutants.

Levitt, B. Blake, Lai, Henry C. and Manville, Albert M.. "Effects of non-ionizing electromagnetic fields on flora and fauna, part 1. Rising ambient EMF levels in the environment" *Reviews on Environmental Health*, vol. , no. , 2021, pp. 000010151520210026. <https://doi.org/10.1515/reveh-2021-0026>;

Levitt, B. Blake, Lai, Henry C. and Manville, Albert M.. "Effects of non-ionizing electromagnetic fields on flora and fauna, Part 2 impacts: how species interact with natural and man-made EMF" *Reviews on Environmental Health*, vol. , no. , 2021, pp. 000010151520210050. <https://doi.org/10.1515/reveh-2021-0050>

Levitt, B. Blake, Lai, Henry C. and Manville, Albert M.. "Effects of non-ionizing electromagnetic fields on flora and fauna, Part 3. Exposure standards, public policy, laws, and future directions" *Reviews on Environmental Health*, vol. , no. , 2021, pp. 000010151520210083. <https://doi.org/10.1515/reveh-2021-0083>



## EMR and the brain

Electromagnetic radiation affects the brain, and this can translate to effects on emotions, behaviour and disease, say the authors of a recent scientific review.

Cuicui Hu and team reviewed research on the effects of exposure on the brain and nervous system and found that it can cause structural and functional changes in the brain and, hence, the nervous system.



Specifically, EMR affects neurotransmitters—chemical messengers that convey information through the nervous system and are enormously important parts of the neural circuitry. They are involved in brain development and allow neurons to communicate with each other. Changes in neurotransmitter levels can lead to problems such as depression, schizophrenia and neurodegenerative diseases such as Alzheimer’s and Parkinson’s.

Hu’s review found that EMR affected key neurotransmitters. These include:

- Dopamine—the neurotransmitter for reward, learning, emotion, motor control and psychiatric and neurological disorders
- Norepinephrine and epinephrine—involved in stress, attention, sleep, inflammation and the autonomic nervous system responses
- Serotonin—involved in regulating mood, feeding, cognition, memory, sleep, pain and temperature
- Glutamate—involved in learning and memory
- GABA—involved in regulating emotion, sleep, memory, antihypertension, analgesia, antifatigue
- Glycine—an antioxidant, a building-block of protein and involved in countering inflammation
- Acetylcholine—involved in cognition
- Peptide neurotransmitters—involved in learning and memory
- Nitric oxide—high levels which can cause neuronal damage.

How EMR causes the effects on neurotransmitters that this review reported is not certain, however, the authors suggested a few possibilities. Effects could be due to changes in the electrical activity of the brain. They could result from cell membrane damage (such as increased permeability) or from changes in the activity of voltage-gated calcium channels and increased levels of oxidative stress.

Whatever the mechanism, the findings of this review show that exposure is causing changes to the brain that could have an adverse impact on different aspects of an organism’s functioning.

Cuicui Hu et al, ‘Effects of Radiofrequency Electromagnetic Radiation on Neurotransmitters in the Brain’, *Front. Public Health*, 17 August 2021 | <https://doi.org/10.3389/fpubh.2021.691880>, [https://www.frontiersin.org/articles/10.3389/fpubh.2021.691880/full?&utm\\_source=Email\\_to\\_rever&utm\\_medium=Email&utm\\_content=T1\\_11.5e4\\_reviewer&utm\\_campaign=Email\\_publication&journalName=Frontiers in Public Health&id=691880](https://www.frontiersin.org/articles/10.3389/fpubh.2021.691880/full?&utm_source=Email_to_rever&utm_medium=Email&utm_content=T1_11.5e4_reviewer&utm_campaign=Email_publication&journalName=Frontiers%20in%20Public%20Health&id=691880)

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## Electromagnetic hypersensitivity

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Electromagnetic hypersensitivity (EHS) is a real and verifiable condition and should be acknowledged as such, says Professor Dominique Belpomme and team, writing in the *International Journal of Molecular Sciences*.

The authors point out that there is adequate clinical evidence to establish that EHS is 'a distinct neuropathological disorder' and they want to see it classified in the WHO International Classification of Diseases.

By clinical research, they mean biological markers that can be objectively observed and measured in patients. 'These have now been shown to primarily involve low-grade inflammation, oxidative/nitrosative stress and, consequently, blood-brain barrier opening,' they say. Clinical evidence is commonly used to diagnose diseases like cancer, diabetes type 2, cardiac problems and Alzheimer's Disease, for example.

Belpomme points out that, while clinical research describes a condition, it doesn't prove what causes it. Take cancer, for example. Laboratory tests define it, whereas it's the population studies that show it's linked with smoking, asbestos and so on.

In the case of EHS, early research looked for a link between exposure and symptoms to determine whether the one caused the other. It wasn't always successful and that led some critics to conclude that EHS isn't real.

Belpomme points out the problems with that sort of logic. 'EHS first should have been objectively defined as a distinct pathological disorder thanks to the use of critical and rigorous methods of clinical research ....rather than attempting to search for EMF-related causality before EHS was objectively defined.'

Now that the markers for EHS have been clinically defined, could this condition be caused by electromagnetic exposures?

Belpomme suggests that they could. He hypothesizes that 'EHS and MCS [Multiple chemical Sensitivity] are pathological disorders of the brain, as has been suggested by imaging techniques, and that under the general term "environmental stressors", environmental EMFs and/or chemicals may be causally involved in their pathogenesis, as suggested by in vitro experimental and clinical data.'

Nevertheless, the identification of clinical markers means that EHS and MCS can be both diagnosed and treated—and that's good news for sufferers.

Belpomme D, Carlo GL, Irigaray P, et al. The Critical Importance of Molecular Biomarkers and Imaging in the Study of Electrohypersensitivity. A Scientific Consensus International Report. *Int J Mol Sci*. 2021;22(14):7321. Published 2021 Jul 7. [doi:10.3390/ijms22147321](https://doi.org/10.3390/ijms22147321)



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## Dying for an iPhone?

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So are they.

In their new book 'Dying for an iPhone', Jenny Chan, Mark Selden and Pun Ngai point out the human and environmental cost of producing Apple iPhones.

The book reports on undercover research conducted in manufacturing giant Foxconn's major factories in nine Chinese cities. They find suicides, long hours, hostility and violence. They cite examples of aluminum dust damaging workers' respiratory systems, harmful chemicals used in manufacture and untreated toxins released into the environment.

The book contains testimonials by workers from a wide range of backgrounds, including workers who took their own lives rather than continue working in these factories.

'I was so desperate that my mind went blank,' said Tian Yu who attempted suicide by jumping from a fourth-floor. She survived and, after 12 days in a coma, discovered she was paralysed from the waist down.

The book reveals the true cost of society's love affair with wireless technology and of the consequences of capitalism on an impoverished and powerless workforce.

Taiwanese journalist Hsiao-Hung Pai describes the book as 'A deep dive into exploitation and labor struggle in the world of high-tech electronics manufacturing in China during the past decade. Dying for an iPhone is an exposé of the human suffering behind the brands. Everyone should read this.'



[https://www.researchgate.net/publication/343539769\\_Dying\\_for\\_an\\_iPhone\\_Apple\\_Foxconn\\_and\\_the\\_Lives\\_of\\_China's\\_Workers](https://www.researchgate.net/publication/343539769_Dying_for_an_iPhone_Apple_Foxconn_and_the_Lives_of_China's_Workers)

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## Watch out, insects!

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Can 5G radiation affect insects?

Here's more evidence that it can.

In a paper published in October, researchers from Belgium and Switzerland speculated that the high frequency carrier waves of 5G networks could be particularly harmful to insects.

'Current telecommunication networks make use of frequencies of 0.1–6 GHz, while the carrier frequencies for 5G networks can go up to 300 GHz, entering the millimeter-wave frequency range. For these higher frequencies, the wavelength becomes comparable to the body size of insects. When wavelength and body size become of the same order of magnitude, an increase in efficiency of absorption of RF-EMFs in the body is expected,' they said.

To explore this hypothesis, they created a model of the yellow fever mosquito (*A. aegypti*) and calculated the amount of radiation that male and female insects would absorb.

They found that absorption increased with frequency, that high absorption occurred between 90 and 240 GHz, and that highest absorption occurred when the wavelength matched the size of the mosquito. This can 'cause dielectric heating and have an impact on behaviour, development and possibly spread of the insect,' the authors said.

Mosquitoes are not the only insects to be impacted by wireless radiation. According to the authors, 'The effects of RF-EMF exposure can have an important impact on insects, they have been investigated experimentally on several insects. Influences were reported on e.g. the development and mating of honeybees (reduced hatching of honey bee queens), behaviour of ants (the locomotion), and the morphology of mealworm beetles during development (abnormalities of appendages).'

De Borre E et al, Radio-frequency exposure of the yellow fever mosquito (*A. aegypti*) from 2 to 240 GHz. *PLoS Comput Biol*. 2021 Oct 28;17(10):e1009460. doi: 10.1371/journal.pcbi.1009460. Epub ahead of print. PMID: 34710086, <https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1009460>



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## Toxins and environmental sensitivities

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Toxins contribute to a wide range of diseases, among them environmental sensitivities, and many people who are sensitive to electromagnetic radiation have issues with toxicity. In this article, we take a look at a paper by Dr Harold Zeliger PhD, a professor of chemistry and environmental scientist who has made a study of the impacts of toxins on health.

Dr Zeliger says that a group of chemicals called *lipophiles*—chemicals that dissolve in oil and fat—are associated with a wide range of health problems, including:

- type 2 diabetes
- metabolic syndrome
- cardiovascular disease (myocardial infarction atherosclerosis, hypertension, coronary heart disease, peripheral heart disease, ischemic heart disease, cardiac autonomic function)
- neurodevelopmental problems (autism spectrum disorders, ADHD)
- neurodegenerative diseases (Alzheimer's, Parkinson's, Amyotrophic lateral sclerosis)
- immunological problems (allergies, chemical sensitivity, autoimmune disease)
- musculoskeletal problems (rheumatoid arthritis, osteoporosis)
- respiratory problems (asthma, chronic obstructive pulmonary disease)
- cancer (breast, prostate, kidney, childhood, leukemia).

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*'when lipophiles and hydrophiles ... are both present in the body ... combinations can affect every organ and system in the body'*

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Lipophilic chemicals, which include polychlorinated biphenyls and organochlorine pesticides, can remain in the body or decades.

According to Zeliger, effects are even worse when lipophiles and hydrophiles—chemicals that dissolve in water—are both present in the body and combinations can affect every organ and system in the body. He says that lipophiles permeate cell membranes and 'facilitate absorption of hydrophiles which serve as solvents and carriers.'

Zeliger says that, '...exposures to mixtures of lipophiles and hydrophiles produced enhanced toxicities at higher concentrations and, surprisingly, ...such mixtures targeted organs and systems not known to be affected by the individual species and ... different mixtures attacked different body organs and systems with each mixture acting as a unique toxic agent.' They can accumulate in the body over time.

'Exposures to heavy metals and metalloids .... have also been shown to increase the incidence of type 2 diabetes, cardiovascular disease, neurological disease and other ENVDs [Environmental diseases],' Zeliger says.

Zeliger believes that chemicals and metals contribute to disease by causing oxidative stress (OS) in the body, as do other agents—such as EMR, bacteria, viruses, fungi, stress, some pharmaceuticals and aging. He sug-

*(Continued on page 8)*

## The Internet of Bodies

First there was the internet of things. Now there's the internet of bodies.

The Internet of Bodies (IoB) is the use of internet-based devices—computers, tablets, mobile phones and so on—to monitor and record information about people's bodies, including their health status and treatment regime. It could include information obtained from wearable devices such as smart watches or Fitbits and implanted devices, such as pacemakers or smart pills.

What happens to this information and how secure is it?

In a their book, 'The Internet of Bodies—Opportunities, Risks, and Governance' Mary Lee and coauthors address the risks of this technology, including the legal, regulatory and ethical implications of its use.

The book can be purchased or downloaded here: [https://www.rand.org/pubs/research\\_reports/RR3226.html](https://www.rand.org/pubs/research_reports/RR3226.html)

## Digital devices and um...er...

Inattention. People's tendency to multitask while using a mobile phone is causing accidents and resulting in injuries ranging from mild, such as cuts and bruises, to more serious, such as damage to internal organs.

These findings come from researchers who recently evaluated injury statistics from around the world that were linked with the use of digital devices. They found that people aged over 35 were more likely to suffer from distraction-related injuries while using mobile phones than were millennials.

The authors recommended that more attention needs to be given to the health risks of using a mobile phone while walking and driving, in particular.

Deora H et al. Mobile phones and "inattention" injuries: the risk is real. J Neurosurg Sci. 2021 Aug;65(4):450-455. doi: [10.23736/S0390-5616.20.04986-3](https://doi.org/10.23736/S0390-5616.20.04986-3). Epub 2020 Sep 18. PMID: [32951415](https://pubmed.ncbi.nlm.nih.gov/32951415/).

## Mobiles and thyroid

Could mobile phone radiation affect the thyroid gland, situated as it is on the neck and close to the position where the phone is held?

To answer this question, researchers in the US conducted a review of relevant studies conducted after 2000.

They found that mobile phone radiation could be linked with hypothyroidism (an underactive thyroid) and changes to thyroid hormone levels. They also found changes in thyroid gland follicles in the thyroids of exposed rats. The more exposure and the longer the exposure, the greater were the effects.

Alkayyali T, et al, An Exploration of the Effects of Radiofrequency Radiation Emitted by Mobile Phones and Extremely Low Frequency Radiation on Thyroid Hormones and Thyroid Gland Histopathology. Cureus. 2021 Aug 20;13(8):e17329. doi: [10.7759/cureus.17329](https://doi.org/10.7759/cureus.17329). PMID: [34567874](https://pubmed.ncbi.nlm.nih.gov/34567874/); PMCID: [PMC8451508](https://pubmed.ncbi.nlm.nih.gov/34567874/). <https://pubmed.ncbi.nlm.nih.gov/34567874/>

### Mobile phone protection



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



Airtube headsets—no wire to conduct radiation into the head

*'mobile phone radiation could be linked with hypothyroidism (an underactive thyroid) and changes to thyroid hormone levels'*

(Continued from page 6)

gests that levels of oxidative stress in the body are a better way of predicting disease than levels of individual toxins.

‘Exposures to toxins as well as the presence of disease results in increases in these free radical species and produce the oxidative imbalances in cells that produce OS. OS is ...directly or indirectly, the cause of virtually all disease.’

Zeliger suggests a number of actions that can be taken to reduce the impact of toxins on the body.

- Avoid the use of products that contain toxic chemicals.
- Educate people about toxins and regulate toxins.
- Eat a Mediterranean diet which is rich in antioxidants.
- Detoxify the body.
- Develop non-toxic, green forms of energy.
- Reduce global warming which increases oxidative stress in a number of ways.

Zeliger concludes his paper with a warning and a glimmer of hope. He says, ‘There are steps that can be taken to lower the incidence of ENVDs, but complete prevention of ENVDs is impossible, given the wide spread distribution of the causative chemicals and genetic predispositions. Biomarkers that determine total OS in the body would provide predictive indicators of increased vulnerability to the onset of ENVD and enable individuals to act to reduce total OS and hence disease.’

Zeliger HI. ‘Causes, Mechanisms and Prevention of Environmental Diseases’ .Dual Diagn Open Acc. 2015, 1:1. [doi: 10.21767/2472-5048.100001](https://doi.org/10.21767/2472-5048.100001)

Protect the body  
from wireless  
radiation



Shielding singlets for  
kids; head protection;  
shielded scarves



Detox your body with  
our Activated Zeolite  
powder

[https://emraustralia.com.au/  
collections/detox-aids/products/  
activated-zeolite-powder](https://emraustralia.com.au/collections/detox-aids/products/activated-zeolite-powder)



‘OS [oxidative  
stress] is ...the  
cause of virtually all  
disease’