# **EMR and Health**

Report on electromagnetic radiation, health and well-being

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# Wireless radiation a carcinogen, say scientists

Researchers call for wireless radiation to be classified as carcinogenic, following the results of a study on military personnel

The research team (Peleg et al) investigated a group of 46 young cancer patients, both male and female, who were exposed to radiofrequency (RF/wireless) radiation during their military service. Some had operated radar and/or radio communications transmitters and others had worked close to these facilities.

They'd received high levels of exposure to the whole body – higher levels than the general public would normally receive – but still within the limits set by the International Commission on Non-Ionizing Radiation protection (ICNIRP Guidelines) on which the standards of many countries, including Australia, are based. The young patients had been exposed for one to three years and some were as young as 19 when diagnosed with cancer.

The researchers found that, of the 46 patients, 19 had hematolymphoid (HL) cancer, a rate that was approximately double that expected for people of their age and sex in the general population.



They also found higher-than-normal risks of other cancers.

The results are consistent with a study by the same authors published in 2018 and also with four other studies on people exposed to high levels of radiofrequency radiation at work or in the military.

The authors said, 'The data presented .... [from all six studies] ... show high HL cancer risk and high all cancers risk in six independent groups of people exposed to RFR in the military/occupational setting.' They added that, 'These groups were diagnosed in different locations spread over three countries, in different times spread over tens of years and operated different radiation-emitting equipment and different generations of equipment.' Animal studies, they pointed out, show the same sorts of cancer increases.

From this, the authors concluded that, 'high intensity and long-term whole-body

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## Wireless radiation harms wildlife

How do electromagnetic fields affect the natural world?

There are decades of research showing harmful effects and it's time to do something about it, say B. Blake Levitt, Henry Lai and Albert Manville in a paper published in late November.

"Many non-human species have highly specific vulnerabilities to anthropogenic EMF due to unique physiology that depend upon, and constantly use, the Earth's static geomagnetic fields for seasonal migration/orientation, nest/den building, mating, reproduction, offspring care, food finding, territorial defense, simple daily/seasonal circadian rhythms, and even longevity and survivorship", the authors say.

They provide some fascinating examples such as these.

- The heads of sharks contain conductive, jelly-filled canals for sensing external electrical signals.
- The duck-billed platypus has thousands of sensors on its bill for detecting electrical signals.
- Electric fish emit electric fields and detect electric fields of other fish.
- The abdomens of honeybees contain magnetite which reacts to external electromagnetic fields.
- The retinas of some animals (migratory songbirds, fruit flies, etc.) contain proteins called cryptochromes that respond to magnetic fields. Some plants also contain cryptochromes.
- The Monarch butterfly has magnetite in its antennae and contains cryptochromes.

Not surprisingly, many species of living creatures, as well as plants, are affected by exposure to electromagnetic fields. "Mice and rats have been the primary animal species used in research, but also rabbits, dogs, cats, chickens, pigs, non-human primates, amphibians, insects, nematodes, various microbes, yeast cells, plants, and others. Effects have been seen in all taxa, in various frequencies, intensities, and exposure parameters," the authors wrote.

Among these effects is genetic damage. "[G]enotoxic effects have been seen in land-based, aerial, aquatic, and plant species at very low intensity RFR (*radiofrequency radiation*) exposures far below ICNIRP/IEEE/FCC guidelines." These are the guidelines on which the standards of many countries, including Australia, are based.

The authors provide examples of how electromagnetic fields harmed various species. Particularly concerning are the effects on bees, which play such an important role in pollination and, therefore, the food chain.

They write, "Some RFR effects seen in bees include: significant inhibitory effects on sensory olfactory excitability and short term memory impairment after 24-h WiFi-router exposure; induced worker piping—the sound that initiates swarming behavior in colonies, or as a warning/distress signal—that demonstrated 900 -MHz GSM is a stressor to bees; reduced motor activity and changes in biomolecules in the body; reduction of worker bees and reduced egg laying by queens exposed to cell phone radiation; reduced hatching and altered pupal development after cell phone radiation exposure; decrease in comb weight and delayed return or hive abandonment after exposure to DECT phone radiation; changes in carbohydrate, lipid, and protein concentrations in the body



with cell phone radiation exposure; and increased mortality with exposure to HF (13.56 MHz) and UHF (868 MHz) RFR. RFR has also been implicated in colony collapse disorder."

The authors point out that international guidelines and standards, which are written with only humans in mind, do not provide any protection for wildlife and plants. Some species will be more at risk from exposure than others. For example, 5G could be devastating to insects because its smaller wavelengths resonate with the size of their bodies. Moreover, with the rapid evolution of technology, they do not have time to adapt.

What should be done?

The authors suggest that action is needed to prevent many species becoming extinct. They say, "Long-term chronic low-level EMF exposure guidelines, which do not now exist, should be set accordingly for wildlife; mitigation techniques where possible should be developed; full environmental reviews should be conducted prior to the licensing/buildout of major new technologies like 5G; and environmental laws/regulations should be strictly enforced."

Levitt B. Blake, Lai Henry C., Manville Albert M., Low-level EMF effects on wildlife and plants: What research tells us about an ecosystem approach, Frontiers in Public Health, VOL 10, 2022, DOI=10.3389/fpubh.2022.1000840 (open access)

This paper follows a lengthy 3-part series on the same subject by these authors published in 2021:

- Levitt BB, Lai HC, Manville AM. Effects of non-ionizing electromagnetic fields on flora and fauna, part 1. Rising ambient EMF levels in the environment. Rev Environ Health 37(1):81-122, 2021. (open access)
- Levitt BB, Lai HC, Manville AM. Effects of non-ionizing electromagnetic fields on flora and fauna, Part 2 impacts: how species interact with natural and man-made <u>Rev Environ Health</u> 37(3):327-406, 2021. (open access)
- Levitt BB, Lai HC, Manville AM. Effects of non-ionizing electromagnetic fields on flora and fauna, Part 3. Exposure standards, public policy, laws, and future directions. <u>Rev Environ Health</u>. 37(4):531-558, 2021. doi: 10.1515/reveh-2021-0083. Print 2022 Dec 16.

### **Short takes**

#### **Astronomers Worldwide Troubled by New 'Cell Phone Towers in Space'**

An international group of scientists is concerned by the brightness of a huge satellite, in terms of both visible light and radio waves. A sprawling new satellite built to connect directly with mobile phones on the surface is brighter than most of the stars in the night sky, according to astronomers who are calling it a threat to their work and humanity's view of the universe.

The satellite is almost as bright as some stars and is likely to be a model for other satellite networks that are aimed at providing 5G connections. <a href="https://www.cnet.com/science/space/astronomers-worldwide-troubled-by-new-cell-phone-tower-in-space/">https://www.cnet.com/science/space/astronomers-worldwide-troubled-by-new-cell-phone-tower-in-space/</a>

#### Blue light affects puberty

Puberty seems to be occurring earlier these day and now there's an explanation for it. Scientists have recently found that the blue light from mobile phones, tablets and other wireless devices could be contributing. <a href="https://abstracts.eurospe.org/hrp/0095/hrp0095p1-361">https://abstracts.eurospe.org/hrp/0095/hrp0095p1-361</a>

#### Girl scouts promote 5G radiation

Girl Scouts across America this year were offered a new way to earn a special uniform patch: learning about the wonders of 5G cellphone technology and, in some cases, promoting it.

Scouts of all ages were invited to "discuss with your troop or an adult how mmWave spectrum is safe and does not cause harm to our health." https://www.propublica.org/article/ericsson-girl-scouts-5g-cellphones-wireless-safety

## Stolen focus

Perhaps you're having trouble paying attention?

If so, you're not alone. It's a problem that's endemic in modern life, says bestselling author Johann Hari, and it's causing serious problems for us all.

The inability to focus has reached epidemic proportions. Typically, US college students switch tasks every 65 seconds, office workers stay on task for only three minutes at a time and most workers never get a single hour of uninterrupted work a day. Hari explores some of the reasons for this – including stress, exhaustion, poor diet, sleep deprivation, pollution, the decline in reading fiction, not making time for mind wandering and loss of free outdoor play for kids.

But one of the key culprits for declining attention spans, he says, is technology. The average American spends 3 hours 15 minutes a day on their phone and touches it 2617 times a day! People are constantly distracted by their devices and spending more time on them than ever. This is reducing their attention span, interfering with their productivity and reducing their ability to understand and recall information.

There's a good reason for this, says Hari, and that's because technology is designed to get people's attention and hold it. He writes, '...the phones we have, and the programs that run on them, were deliberately designed by the smartest people in the world to maximally grab and maximally hold our attention.'

Why?

For money. '...the longer you make people look at their phones, the more advertising they see – and therefore the more money Google gets,' Hari says.

Hari gives the sample of the 'infinite scroll', a tool developed by Aza Raskin that allows people to scroll endlessly rather than click from page to page. Raskin later found it resulted in people spending 50 percent more time on some sites and calculated that, globally, people were spending 200,000 human *lifetimes* scrolling through screens. Each day.

Big Tech encourages users to spend time on their platforms by giving them positive reinforcement. 'If you want to shape the user's behaviour, make sure he gets hearts and likes right away,' Hari says.

Another technique to hook people's attention is to position negative or shocking information in a position where users will be bound to see it. 'On average, we will stare at something negative and outrageous for a lot longer than we will stare at something positive and calm' ('negativity bias'). Hari says the best words for attracting people to watch a YouTube video are ones like *hates, obliterates, slams* or *destroys*.

And negative messages can't help but affect the viewer. 'If enough people are spending enough of their time being angered, that starts to change the culture,' he says.

There's another reason why Big Tech wants us to spend as much time on their technology as possible. And that's because it allows them to develop a profile of us that can be used to sell us more and more products. Hari says, 'Every time you send a message or status update on Facebook, or Snapchat, or Twitter, and every time you search for something on Google, everything you say is being scanned and sorted and stored. These companies are building up a profile of you, to sell to advertisers who want to target you.' It's so accurate that it can predict what people will want and market that to them as well.

Hari compares this profile to a voodoo doll. He says, 'Why is Google Maps free? So the voodoo doll can include the details of where you go every day. Why are Amazon Echo and Google Nest Hubs sold for as cheap as \$30 ..., far less than they cost to make? So they can gather more info; so the voodoo doll can consist not just of what you search for on a screen, but what you say in your home.'

Hari calls this 'surveillance capitalism'. 'This is the business model that built and sustains the sites on which we spend so much of our lives.'

It can be used for other outcomes as well. Hari reminds us that the campaign for Donald Trump's election paid Cambridge Analytica to send targeted messages to people that had been profiled in this way.

The upshot is that Big Tech is harming our attention. Hari says it's training us to crave rewards (eg likes), training us to be distracted by switching tools regularly, keeping people engaged and making them angry. He quotes former Google employee and whistle-blower Tristan Harris. 'Tristan believes that what we are seeing is "the collective downgrading of humans and the upgrading of machines." We are becoming less rational, less intelligent, less focused.' What does that mean for society?

Hari says, 'We are, I realised, in a race. To one side there is the rapidly escalating power of invasive technologies, which are figuring out how we work and fracking our attention. On the other side there needs to be a movement demanding technologies that work for us, not against us; technologies that feed our ability to focus, instead of fracturing it.'



If we can't focus on the difficult questions, then how can we address the social and environmental issues that confront us, he asks.

Johann Hari, 'Stolen Focus – Why You Can't Pay Attention', Lond, Bloomsbury, 2022

# Wireless radiation affects the heart

Wireless radiation affects the heart, according to a new review published by the Environmental Working Group (EWG) in the United States.

Dr Uloma Uche, EWG consultant, explained, 'With the widespread use of wireless devices, Wifi routers and other communication equipment that emit radiofrequency radiation (RF), as well as substantial evidence linking exposure to radiofrequency radiation to harmful impacts on human health, EWG decided to educate the public including medical professionals about these health impacts, focusing on health outcomes for one system at a time. So far we have published reviews on RF impacts on the nervous, reproductive and cardiovascular systems.

'For our piece on the impact of RF on heart health, we conducted a systematic review of literature that has examined this issue and summarised their findings. Primary studies (including animal and human studies) were examined. Studies with methodological flaws were excluded from our review.'

The EWG team found that, 'Electromagnetic radiation in the radiofrequency range emitted by cell phones, tablets and other wireless communication devices is absorbed by the human body and may affect heart health'.

The authors cited studies on animals showing that exposure to wireless radiation resulted in:

- heart tumours
- cardiomyopathy
- changes in heart rate
- structural changes in the heart
- · changes in lipids in heart tissue

- oxidative stress
- changes in blood pressure
- heart rate variability
- changes in heart function
- and changes to the weight of the heart.

Among the animal studies was a major research project by the National Toxicology Program (NTP) in the US, which found that rodents exposed to mobile phone radiation had increased rates of glioma brain tumours and schwannomas of the heart. A subsequent study by the Ramazzini Institute found the same thing. In both studies exposures complied with radiation levels allowed by international standards.

The EWG investigation also found that exposure of humans to wireless radiation caused:

- · risk factors for heart problems
- and changes in heart rate.

'Studies in people suggest that radiofrequency radiation can raise the risk for cardiovascular diseases by increasing blood pressure, total cholesterol and low-density lipoprotein cholesterol. Changes in heart rate and altered response of the sympathetic and parasympathetic nervous system have also been reported following exposure to radiofrequency radiation,' the authors said.

Given these harmful effects, what can be done?

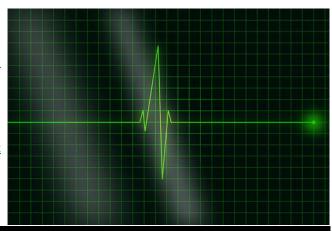
Dr Uche says, 'our recommendation includes reducing one's exposure to radiofrequency radiation via simple steps such as:

- When receiving a call from a cell phone, use a headset or put the phone in speaker mode; this helps to reduce the
  amount of radiation that is exposed to your body.
- HOLD PHONE AWAY FROM YOUR BODY when in use. If you are using a headset, don't put the phone in your pocket (shirt or pant pocket) or clip it to your belt or put it on your lap—please put it in your bag, purse, or on a nearby surface. The amount of radiation absorbed by your body decreases dramatically with even a small distance.
- TEXT MORE, TALK LESS. I know many of us would prefer to pick up the phone and place a call to send a text, However, phones emit less radiation when sending texts than during voice communications. Also, when you are texting, the phone is kept away from the body, decreasing your body's exposure to radiation.
- Finally, always check the phone signal to ensure it is strong before making a call. Fewer signal bars mean the phone must work harder to broadcast its signal to the cell tower. As much as possible, make and take calls when your phone has a strong signal. Research shows that radiation exposure increases dramatically when cellphone signals are weak.'

The EWG findings are a wake-up call for all mobile phone users.

'The harmful effects of radiofrequency radiation are real,' says Dr Uche. 'Unfortunately, our exposure to radiofrequency radiation is inevitable with all the technological changes. The public should therefore take the above-mentioned steps to reduce their exposure.'

EWG, 'Radiofrequency electromagnetic fields may affect heart health, new EWG analysis finds' by Uloma Uche, PhD, Tasha Stoiber, PhD, Olga Naidenko, PhD, Nov 22; With thanks for their assistance to Dr. Uloma Uche and Iris Myers from EWC.



# 5G safety assurances flawed

Last year, Australian scientists published a paper(by Karipidis et al <sup>1</sup>) claiming that 5G radiation was not a risk to human health that was embraced and often quoted by the telecommunications industry.

However, that paper is flawed and its conclusions biased, say scientists from Australia and Slovakia in a critique of the Karipidis paper (by Weller et al <sup>2</sup>) published in November. 'We find the Karipidis review to be both inadequate and incomplete, sending the wrong messages regarding safety assessment and public health', Weller said.

Weller and team identified a range of errors in the Karipidis paper such as:

- misreporting exposure times, frequencies and intensities
- misclassifying studies
- incorrectly reporting a study finding
- not reporting significant effects
- · not recording health risks such as cancer
- misreporting case/personnel numbers
- and incorrect statements.

It also left out over 80 relevant studies, including some that had found harmful effects, such as cancer. 'Karipidis has conducted an investigation resulting in the exclusion of important findings, while also overemphasising quality deficiencies and inconsistencies in the data, thereby suggesting confirmation bias,' they said.

Further, the Karipidis paper did not take into consideration the effects of 5G radiation on plants, insects, amphibians, birds and animals. 'This is a significant gap,' the authors

Weller points out that another problem with the Karipidis paper is its failure to deal with risks of 5G. It claimed to find 'no evidence of adverse health effects from the radiowaves used in 5G including mmWave'. Yet, no evidence of risk is not the same as no risks and that doesn't mean that we shouldn't be taking precautions.

'We consider that risks to humans and the environment identified in past epidemiological studies, as well as unknown risks yet to be identified, warrant the application of a precautionary approach,' Weller says.

1.Karipidis K, Mate R, Urban D, Tinker R, Wood A. 5G mobile networks and health-a state-of-the-science review of the research into low-level RF fields above 6 GHz. J Expo Sci Environ Epidemiol. 2021 Jul;31(4):585-605. doi: 10.1038/s41370-021-00297-6. Epub 2021 Mar 16. PMID: 33727687; PMCID: PMC8263336.

2. Weller, Steve & May, Murray & McCredden, Julie & Leach, Victor & Phung, Dung & Belyaev, Igor. (2022). Comment on "5G mobile networks and health-a state-of-the-science review of the research into low-level RF fields above 6 GHz" by Karipidis et al. Journal of Exposure Science & Environmental Epidemiology. <a href="10.1038/s41370-022-00497-8">10.1038/s41370-022-00497-8</a>;

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'We find the Karipidis review to be both inadequate and incomplete, sending the wrong messages regarding safety assessment and public health'

(Continued from page 1)

exposure to RFR causes an increase in cancer risk in groups of occupationally exposed young people.'

#### **ICNIRP Guidelines**

Given that these cancer increases occurred at levels of radiation that complied with the ICNIRP Guidelines, the authors point out that the Guidelines are not protecting people's health.

'The findings from our study add to the growing body of evidence underscoring the gross inadequacy of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) thermal standards. Based on our findings and on the previous accumulated research, we endorse the recommendations to reclassify RFR exposure as a human carcinogen, International Agency for Research on Cancer (IARC) group 1.'

It is currently classified as a Class 2B (possible) carcinogen.

#### Recommendations

'Considering the growing evidence of carcinogenicity, it is crucial to reduce human exposure to RFR while additional data accumulate,' the authors said. They suggested a number of strategies that could help, including:

- setting more appropriate standards (1 μW/cm² for average measurements and 5 μW/cm² for peak measurements)
- increasing the distance between transmitters and servicemen/women
- using antennas that reduce exposure
- shielding transmitters/soldiers
- designing equipment to reduce exposure
- requiring protective clothing (which should not replace the need for other precautions)
- · informing personnel about the cancer risks
- regular medical screening
- studies on all personnel exposed to RF radiation.

The best solution, they point out, 'is a worldwide peace'.

Peleg M, Berry EM, Deitch M, Nativ O, Richter E. On radar and radio exposure and cancer in the military setting. Environ Res. 2023 Jan 1;216(Pt 2):114610. doi: 10.1016/j.envres.2022.114610. Epub 2022 Oct 21. PMID: 36279918.

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'we endorse the recommendations to reclassify RFR exposure as a human carcinogen