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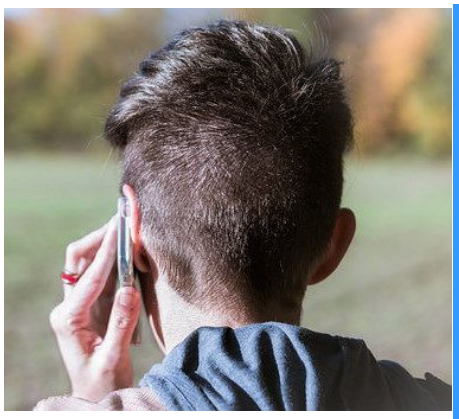
Mobiles and brain tumours

An Italian court has found that a man's brain tumour was caused by his mobile phone use.



On 2 November 2022, the Turin Court of Appeals determined that mobile phone radiation caused a man's brain tumour and reaffirmed his right to compensation.

The case was brought by an unnamed, 63 -year-old man who had worked at a metal construction company in northern Italy. In the course of his work, he used his mobile phone against his left ear for more than two and a half hours a day, or a total of 10 to more than 13 thousand hours between 1995 and 2008.

He developed a vestibular schwannoma, or tumour of the cranial nerve, also known as an acoustic neuroma. As a result, he experienced 'left deafness, right cochlear implant, facial nerve paresis, balance disorder and depressive syndrome, permanent biological damage.'

The man sought compensation from the Court of Aosta which, in 2020, determined in his favour and ordered the Italian agency responsible for insuring workplace accidents, INAIL, to pay the man a pension of approximately 350 Euros a month.

INAIL appealed the decision and the case moved to the Turin Court of Appeal.

The Turin Court consultant, Professor Roberto Albera, considered that there was a 'high probability' that the tumour was caused by the mobile phone use. 'In the absence of other possible causes, there is the presence of a single risk factor consisting of prolonged exposure to radio frequencies,' he said.

On November 2 the Turin Court of Appeal affirmed the decision by the Court of Aosta, namely that the brain tumour was caused by mobile phone use.

In the course of the hearing, the court was told that an Italian telecommunications company, Windtre, had recognised the risks of radiofrequency radiation from mobile phones and taken precautions. In a 2017 risk Assessment document, the company stated, 'every company mobile phone is supplied including a headset, which must therefore be used to keep the device not in adherence to the face. Fixed

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Scientists say radiation standards don't protect

Australian and international standards are deeply flawed, according to a recent paper from the newly-formed International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF).

The authors say that today's standards (FCC standard and ICNIRP Guidelines) are based on just two studies from the 1980s. In them, researchers exposed small groups of monkeys and rats to wireless radiation for 30 or 60 minutes and observed their behaviour. When the animals were exposed to levels resulting in specific absorption rates (SARs) of 4W/kg or more, which was associated with a temperature rise of 1 degree Celsius, changes in their behaviour were observed.

From that, they concluded, that harmful effects on humans occurred at SARs of 4 W/kg, averaged over the whole body.

Standards were then set by applying an arbitrary 10-fold 'safety' factor, to establish an exposure limit for workers (0.4 W/kg) and applying an additional 'safety' factor to produce a limit for the general public (0.8 W/kg).

The standards allowed higher levels for smaller parts of the body, including the ear, even though it's located so close to the brain.

In other words, these standards don't address the long-term effects of radiation and they don't address the non-heating effects of exposure. Further, they were introduced long before the widespread use of mobile phones and wireless devices and have not been substantially altered since then.

'Exposure limits for RF radiation are based on numerous assumptions; however, research studies published over the past 25 years show that most of those assumptions are not supported by scientific evidence,' the ICBE-EMF authors say.

In their paper, the authors identify 14 assumptions that standards made when setting these standards, all of which, they point out, are invalid.

1. Harmful effects only occur at a SAR of 4 W/kg.

However, studies show harmful effects at much lower levels of exposure, including:

- cardiomyopathy
- preneoplastic lesions in heart and brain
- prostate gland tumours
- adrenal gland tumours
- malignant neoplasms in all organs
- DNA damage
- reduced spatial learning and memory
- changes in brain electrical activity
- sleep disturbance
- breaches of blood-brain-barrier
- oxidative stress
- decreased sperm numbers, motility and viability
- impaired testicular development
- DNA fragmentation.

'Exposure limits for RF radiation are based on numerous assumptions; however, research studies published over the past 25 years show that most of those assumptions are not supported by scientific evidence'

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2. Wireless radiation can only cause damage by heating, and non-heating exposures can't damage DNA.

However, numerous studies show DNA damage – and other damage, eg above, at exposures too low to cause heating.

3. It's OK to base standards on the studies that exposed animals to radiation for 40 or 60 minutes.

However, people are exposed for longer than this in the real world. Further, studies show that animals exhibited behavioural changes at SARs much lower than 4 W/kg when exposed for longer periods of time.

4. Standards don't need to take into account exposure to other environmental stressors.

However, studies show that exposure to wireless radiation plus a chemical toxin or ultraviolet light caused greater damage than exposure to each separately. In other words, there is a synergistic effect.

5. Standards only need to be based on SAR and there's no need to consider modulation, frequency or pulsing.

However, studies show that modulation, frequency and pulsing all affect the way an organism responds to a signal.

6. Studies showing links between brain tumours and mobile phone use are flawed as there is no increase in brain tumour rates.

However, well-conducted studies show increased brain tumour risks for heavy and long-term mobile phone users and there is some evidence of thyroid microcarcinoma from long-term mobile phone use. Additionally, cancer registries in different countries show increased rates of glioma-related brain tumours and acoustic neuromas and thyroid cancer is increasing in Nordic countries.

7. One standard fits both children and adults.

However, research shows that children's brains absorb more radiation (30 times more in the hippocampus) than adults' brains. Further, the tissues of the young have higher conductivity and growing organs are more vulnerable to radiation.

8. One standard fits all members of the general public.

However, some people are more sensitive than others. Some develop Electromagnetic Hypersensitivity (EHS) which is a demonstrated and diagnosable condition that includes symptoms such as headaches, dizziness, sleep problems, heart palpitations, tinnitus, skin problems, visual problems, mood disturbance and sensory disturbance.

9. Applying a 50-fold safety factor (for whole body exposure) protects the general public.

However, basing standards on behavioural studies in rats and monkeys would require a safety factor of 900 to 10,000 to be consistent with standards set by other agencies.

10. Applying a 10-fold safety factor (for whole body exposure) protects workers.

This is based on the assumption that workers are informed of and trained in mitigating the risks of exposure. However, this doesn't happen because standards don't recognise risks below 4 W/kg.

11. It's OK to expose 10 cubic grams of tissue to 2 W/kg (general public).

However, studies show increased risks of cardiomyopathy at SARs below this level of exposure. Further, not all cells are the same. Stem cells, for example are more sensitive to wireless radiation than other cells and play a role in carcinogenesis.

12. It's OK to expose 10 cubic grams of tissue to 10 W/kg (workers).

However, studies have found harmful effects at much lower SARs.

13. Standards don't need to address effects of radiation on wildlife or household pets.

However, many species are sensitive to extremely low electromagnetic fields, as they rely on the earth's magnetic field for migration, finding food, mating and building nests/dens. Studies show wireless radiation disrupted activities of various species, including honeybees.

14. 5G standards don't need to be based on health studies because 5G only penetrates the skin.

However, radiation may penetrate further than expected if signals are modulated with an ELF (extra low frequency) component or from pulses caused by transmitting very high rates of data. Exposure of the skin could cause SARs higher than those allowed by standards, affect the nervous system and potentially cause skin cancers. Further, 5G signals are expected to be harmful to small creatures, including insects such as bees. The skin is the largest organ of the body and important for protection.

'Research on RFR conducted over the past 25 years has produced thousands of scientific papers, with many demonstrating that acute behavioral studies are inadequate for developing health protective exposure limits for humans and wildlife, and that inherent assumptions underlying the FCC's and ICNIRP's exposure limits are not valid,' the authors concluded.

As well as pointing out the inadequacies of current standards, the authors express concern about 5G technologies. They say, 'Based on lessons that should have been learned from studies on RFR at frequencies below 6GHz, we should no longer rely on the untested assumption that current or future wireless technology, including 5G, is safe without adequate testing. To do otherwise is not in the best interest of either public or environmental health.'

*Reference: International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF). Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limit determinations for radiofrequency radiation: implications for 5G. Environ Health **21**, 92 (2022). https://doi.org/10.1186/s12940...*

You can hear David Gee, an expert in environment and public health policy-making for science, talk about wireless radiation, the problems with current international standards and the new paper here.

You can hear Dr Magda Havas talk about this new paper here.

New international authority

On 18 October, the International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF), was launched.

The ICBE-EMF is a multi-disciplinary consortium of scientists, doctors and related professionals who are, or have been, involved with research on the biological and health effects of electromagnetic fields. Its Chairman, Ronald Melnick is an experienced toxicologist who designed the U.S. National Toxicology Program (NTP) long-term study on rats and mice exposed to radiofrequency radiation (RFR) and managed this study for the first 10 years. (The study ultimately found a link between mobile phone radiation and tumours.)

The ICBE-EMF is dedicated to ensuring that humans and other species are adequately protected from the harmful effects of electromagnetic fields.

The new Commission will fill an important gap in the setting of radiation protection standards. It differs from other international standards-setting authorities in a number of key respects.

- It is independent of the industries regulated.
- It is multidisciplinary with expertise in, for example, biology, physics, chemistry, engineering, and telecommunications, so it doesn't rely only on physics and engineering.
- It focuses on the physiological, biochemical and behavioural response of living organisms to electromagnetic fields – and not just the effects caused by heating.

The ICBE-EMF has further called for the public to be informed about the health risks of wireless radiation and encouraged to take precautions to minimise exposures, especially for children, pregnant women and people who are electromagnetically hypersensitive.

The ICBE-EMF was commissioned by the advisors to the International EMF Scientist Appeal, a petition signed by more than 400 scientists who have published over 2,000 papers on EMF, biology, and health. It was organised under the umbrella of the Electromagnetic Safety Alliance (ESA), a non-profit organisation in the USA.

You can see more about the new commission at ICBE-EMF.org.

Wireless radiation and sperm

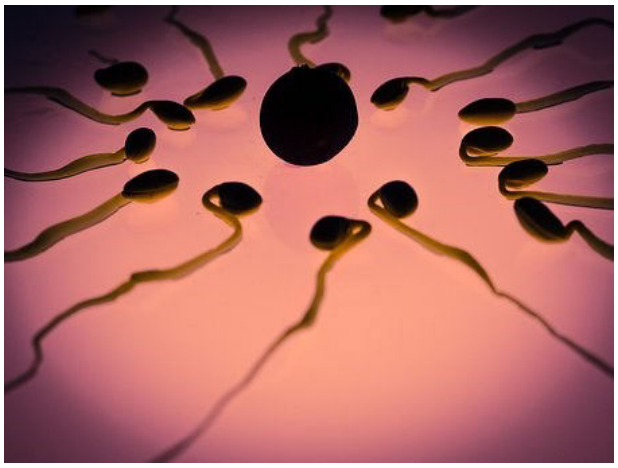
Researchers from China interviewed more than 1400 men aged 22 to 45 about their use of wireless devices and analysed samples of their semen. The results showed that the use of wireless devices was a factor in the men's sperm health. They found that:

- the more time men spent using electronic devices, the lower their sperm motility (movement)
- the more time men spent using mobile phones and computers, the lower their sperm concentration and motility
- for each hour men spent talking on their mobile phones, there was an eight percent decrease in sperm concentration and a 12.7 percent decrease in sperm count
- men who used headsets during mobile phone calls had lower sperm motility.

Reductions in sperm concentration and motility reduce the chances of a couple achieving fertilisation.

Chen HG, Wu P, Sun B, et al. Association between electronic device usage and sperm quality parameters in healthy men screened as potential sperm donors. Environmental Pollution (Barking, Essex: 1987). 2022 Nov;312:120089. DOI: 10.1016/j.envpol.2022.120089. PMID: 36058315.

More on wireless and sperm



Researchers from India showed that wireless radiation could damage the testes and cause infertility in animals. They exposed two-week old male chickens to wireless radiation (2.45 GHz) for two hours a day for 30 days and examined the effects on their reproductive systems. They found that exposure:

- reduced testicular weight and volume
- reduced diameter of the seminiferous tubules (in which sperm are produced)
- increased levels of oxidative stress (increase in free radicals)
- increased levels of inflammation.

The researchers commented that the testes are particularly vulnerable to wireless radiation and that exposure may cause male infertility.

Vaibhav Gupta, Rashmi Srivastava, 2.45 GHz microwave radiation induced oxidative stress: Role of inflammatory cytokines in regulating male fertility through estrogen receptor alpha in Gallus gallus domesticus, Biochemical and Biophysical Research Communications, Volume 629, 2022, Pages 61-70, ISSN 0006-291X,

Anxiety

Prenatal exposure to magnetic fields from electrical sources can affect stress levels in later life, according to a recent study from Iran.

The researchers divided 24 rats into four groups, each of which was subjected to a different type of stress: control (no stress); stress (chronic stress); EMF (magnetic field exposure) and EMF+stress (magnetic fields plus stress). They subsequently challenged the rats' female offspring with a battery of tests and later examined the hippocampus of the brain which plays a role in modulating behaviours such as anxiety.

'We observed that although anxiety like behavior, increased in all treatment groups, the EMF/S group showed more anxiety compared to both the ELF-EMF and Stress groups,' the authors found. 'For the first time, the present research found that prenatal stress combined with ELF-EMF brought more serious anxiety-like behaviors than prenatal stress alone or ELF-EMF alone in female rats.'

The authors say, 'One of the most prevalent types of stresses is prenatal, which can exert emotional, behavioral and cognitive changes in offspring. Anxiety is a behavioral change that introduces enormous problems in the social life of offspring in adulthood'

Women are more likely than men to develop anxiety disorders, as well as depression, and this is why the researchers chose female rats for their study. The authors believe that a it can affect the development of the neurological pathways in the child's brain that affect performance and functioning and 'may initiate anxiety-like behavior by increasing 25(S)-OHC and PNMDAr2/NMDAr2 [two receptors] in the hippocampus'.

As well as stress, magnetic fields have been strongly linked with childhood leukemia and the International Agency for Research on Cancer (IARC) has classified these fields as Class 2B (possible) carcinogens at levels that are just one five-hundredth of those allowed in Australia.

Hosseini E, Farid Habibi M, Babri S, Mohaddes G, abkhezr H, Heydari H (2022) Maternal stress induced anxiety-like behavior exacerbated by electromagnetic fields radiation in female rats offspring. PLoS ONE 17(8): e0273206.

Scientists warn EU of wireless radiation risks

What risks does radiofrequency (wireless) radiation pose to our health and environment and who's doing what about it?

This is the subject of a new paper by researchers from Australia, Sweden and Finland that should set alarm bells ringing.

The researchers refer to a document – the EU 5G Appeal – signed by over 400 medical doctors and scientists which was sent to the EU six times to advise them about the serious risks of exposing the planet to wireless radiation.

The authors say there is an abundance of evidence, dating back at least five decades, which shows that wireless radiation is harmful to humans and animals:

- a review of more than 3700 studies from the US Naval Medical Research Institute found adverse health effects as early as the 1970s
- the BioInitiative Reports, by independent researchers, found reduced fertility and harmful neurological, behavioural, genetic and immune effects
- an analysis of 2065 studies by the Oceania Radiofrequency Science Advisory Association (ORSAA) found that approximately 69% showed biological effects that have the potential to cause harm, including effects on sleep, free radicals, oxidative stress, DNA damage, as well as cardiovascular disease and cancer
- a review by the Swiss expert group on electromagnetic fields (BERENSIS) found increased oxidative stress (which is involved in cancer, diabetes and neurodegenerative diseases)

- research by Panagopoulos and team found that even weak exposure can open calcium channels in cell membranes, which can potentially cause downstream damage to the body
- a major animal study by the National Toxicology Program found that mobile phone radiation caused heart schwannomas, brain gliomas and cancerous activity in male rats
- a major animal study by the Ramazzini Institute also found that mobile phone radiation caused schwannomas in the hearts of male rats
- the REFLEX study for the EU found that mobile phone radiation caused significant biological damage
- judgements of courts (in Italy, Spain and Geneva) found that occupational exposures caused damage to plaintiffs.

As well as effects on humans and animals, the authors say that there's evidence that wireless radiation is harmful to wildlife. 'For example, honeybees maximally absorb the higher 5G frequencies because the millimetre wavelengths resonate with their body size. Adverse RFR effects also occur for other pollinating insects, plants, trees, birds, frogs, animals and humans.'

They refer to a review by Blake Levitt and colleagues that observed decades of research and concluded, 'Biological effects have been seen broadly across all taxa and frequencies at vanishingly low intensities comparable to today's ambient exposures. Broad wildlife effects have been seen on orientation and migration, food finding, reproduction, mating, nest and den building, territorial maintenance and defense, and longevity and survivorship. Cyto- and geno-toxic effects have been observed'

In addition to the problems that have already been demonstrated, the authors say there are likely to be additional risks from 5G technologies. They point out that 5G will bring increased exposure from:

- 'billions of new connections'
- 'thirty times more antennas'
- 'at least 800 base stations per square kilometre'
- 'radiation from 100,000 5G satellites'.

While it's too early to know the full impacts of exposure to 5G radiation, there is already cause for concern. The authors cite a review by Di Ciaula who concluded that 5G 'MMW [millimetre waves] increase skin temperature, alter gene expression, promote cellular proliferation and synthesis of proteins linked with oxidative stress, inflammatory and metabolic processes, could generate ocular damages, affect neuro-muscular dynamics'.

As if that were not enough to set alarm bells ringing, the authors show that wireless radiation can have harmful effects on the building blocks of nature. They say, 'the high frequency 5G millimetre waves will create quantum level changes in the rotational energy of water (at 22.3 GHz, 33 GHz, and 323 GHz) and oxygen molecules (at 60 GHz).' Further, they consider that the 'forced changes to the fundamental building blocks of life are likely to affect all lifeforms on earth in unpredictable and potentially devastating ways.'

(Continued on page 8)

'forced changes to the fundamental building blocks of life are likely to affect all lifeforms on earth in unpredictable and potentially devastating ways.'

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telephones are equipped with a connection cable between the device and the handset; cordless or similar are therefore not available in the company.'

This is the second time the Turin Court of Appeal determined that mobile phone use caused a brain tumour. In 2020, it ruled that compensation be paid to Roberto Romeo for a brain tumour related to his work at Telecom Italia.

The lawyers who represented the appellant in the November 2 judgment, from Ambrosio and Commodo Law Firm in Turin, are also following five other cases of brain tumours from mobile phone use.

Media release from lawyer Stefano Bertone from Abrosio and Commodo Lawyers. (With thanks to Dr Joel Moskowitz.)

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The EU has so far failed to respond.

The authors say, 'The Commission's latest moves to prioritise industry interests over human health leave it internally conflicted between its plans for a supposed golden future and its core values. Rather than deal with the enormity of the problem that the known health risks from RFR present, the Council of the EU has instead chosen a path of denial.

Recommendations

To rectify the situation, the authors recommend:

- accepting the evidence that wireless radiation causes adverse health effects
- replacing SCENIHR and ICNIRP with new groups of scientists who are independent of industry
- developing new and appropriate guidelines and standards
- protecting people's rights for privacy and family life according to the European Convention on Human Rights
- applying the precautionary principle to prevent causing serious or irreversible damage to health of people or the environment
- not favouring economic gain over health.

Will the EU take notice?

'If the EU continues to fail to act on these warnings, Europe may end up being faced with a non-reversible burgeoning health impact on humans, especially children and the environment,' the authors say.

Nyberg, Nils Rainer; McCredden, Julie; Weller, Steven and Hardell, Lennart (2022). The European Union prioritises economics over health in the rollout of radiofrequency technologies. Reviews on Environmental Health. 10.1515/reveh-2022-0106.

'This is the second time the Turin Court of Appeal determined that mobile phone use caused a brain tumour'