

Other health effects

Results from an industry backed study of 11,000 mobile phone users in Scandinavia by Dr Kjell Hansson Mild of the National Institute of Working Life in Umea, Sweden (1998), identified links with phone use and headaches, fatigue, skin irritation, dizziness and concentration lapses. The longer the phone was used, the greater the likelihood of experiencing these side effects.

Allergies

Dr. John Holt, President of the Australian Radiographers' Association, in 1996, found that mast cells were unable to turn off histamine production (an allergic reaction) in the presence of mobile phone frequencies of 800 to 900 MHz, and conventional anti-histamines and steroids did not work. This was confirmed by Johansson in 1998. The Department of Allergy in Kyoto, Japan, found that microwave radiation enhanced some allergy-induced skin wheal responses. The 11 specialist allergy clinics in the UK are not able to cope with the increased demand for their services. RF radiation is probably adding to the burden of environmental pollution that is pushing many people's biological systems over the edge towards idiopathic reactions to common allergens.

Bone growth

A study by Atay (2009) suggested that in order to obtain more favourable outcomes to iliac bone grafts, it may be important to establish mobile phone use, as this may affect bone density depending on the side of the body where it is carried.

Newborn rats exposed pre-natally to mild daily phone exposure showed ossification of cranial bones and thoracic cage ribs; older littermates showed normal bone growth, suggesting that the effect was transitory (Fragopoulou 2009).

Ear effects & hearing

A study by Sibella (2009) found that the presence of a cochlear implant inside the cochlea produced negligible variations in the averaged SAR values, both in the head and in the cochlear tissues. Panda (2010) concluded *"Long term and intensive mobile phone use may cause inner ear damage."*

Mobile phone radiation can damage the auditory hair cells present in the inner ear. Once damaged, these cells can never regenerate.

A study by Kayabasoglu (2010) found that exposure to mobile phone radiation for 6 hours a day for 30 consecutive days had no effect on the hearing of newborn or adult rats, at the outer ear, middle ear or cochlear level.

Short-term exposure to mobile phone EMFs did not affect the transmission of sensory stimuli from the cochlea up to the midbrain along the auditory nerve and brainstem auditory pathways in a study by Kwon (2010), neither did 10 minutes exposure affect evoked otoacoustic emissions (Paglialonga 2007).

30 min exposure to mobile phone RF did not show any immediate effects on vestibulocochlear function (Bamiou 2008).

Eye effects

Balik (2005) found that long term users of mobile phones had increased incidences of blurring of vision, secretion, inflammation and lacrimation of the eyes.

RF radiation can cause greater damage to eye tissue when used in conjunction with anti-glaucoma drugs. It has also been found to cause derangement of retinal differentiation in animal experiments (Zareen 2009). RF radiation is known to be associated with the development of cataracts.

Okano (2010) found no short-term effect on the inhibitory control of saccades (fast, usually conjugate, movements of the eyes) after 30 minutes mobile phone exposure.

Headaches

The following comments are from a discussion site:-

"I constantly get headaches now when I put the iPhone to my ears. I have to use the speaker or the head set. I've had my phone over a year now and the headaches just started."

"I get a headache from using my iPhone. Seems to happen most when I download or watch videos. It also seems to occur when I use my iPhone from a remote location, not in a city. I get the headache after usage and also the next day."

Chia (2000) found more than a 20% reduction in the amount of headaches mobile phone users complained about when they used a hands-free kit.

Tinnitus

Middle ear contractions can be caused by microwave RF, especially pulsed RF from digital mobile phones (personal communication from John Williams). The RF causes a partial depolarisation of neurons, resulting in contractions of the middle ear muscles, with auditory effects like 'clicks' or 'pops' such as those experienced in a plane or tunnel. Such RF can also stimulate the inner ear, causing tinnitus-type symptoms.

Hutter (2010) concludes *"Mobile phone use should be included in further investigations as a potential risk factor for developing tinnitus."* The risk was significantly increased for prolonged use, 4 years or more, of a mobile phone.

Other effects

Many, though not all (Koivisto 2001) of the epidemiological studies have shown that burning skin, warmth in the head and ear (Szyjkowska 2005), tingling/tightness, fatigue, headaches (Hillert 2008), dizziness (Cinel 2008), are regularly associated with using a mobile phone, even for a very short call. Monfrecola (2003) and Miura & Okada (1991) experiments with frogs, found that a mobile phone when it was on, increased blood flow and Monfrecola quantified the effect at the ear at over 130%, and nearly 160% when the phone was receiving a signal.

Hardell (2010) found that increasing number of years of use, and cumulative hours of use, of a mobile phone reduced the synthesis of beta-trace protein, a sleep-promoting neurohormone in the brain. He feels that this mechanism may be involved in sleep disturbances reported in people exposed to RF fields.

Drug and other interactions

RF / microwave radiation at a frequency of 2450 MHz has been found to alter the behavioural actions of benzodiazepines, such as Valium (Lai [1992](#)). Researchers concluded that since benzodiazepine receptors are found in most regions of the brain and they can undergo changes after brief perturbation, it is possible that brief exposure to RF from mobile phones can lead to changes in these receptors. They added that different durations of acute exposure could lead to different biological effects. Benzodiazepines are associated with anxiety-related disorders, and so any interference with this is likely to lead to mood swings.

John Peterson Myers, a Senior Advisor to the United Nations Foundation said in San Francisco Medicine November 2002, that *"low doses are more potent than high doses with regard to some poisons"* (National Toxicology Program 2001). Although he is speaking specifically of chemical exposure, what he says can be translated directly onto what is being said about EMF and RF exposure. Myers suggests that *"one plausible hypothesis is that at low, physiological levels, the contaminant interferes with developmental signalling but does not activate biochemical defences against impacts that would be caused by higher exposures. At somewhat higher levels, these defences are activated and the contaminant is successfully detoxified. At even higher levels, the defence mechanisms are overwhelmed by the toxicant and more traditional toxicological effects are induced"*. He continues *"Another important issue raised by emerging science is the powerful interactions that can occur within mixtures of chemicals, even though regulatory toxicology is conducted virtually exclusively on pure single compounds. The issue of mixtures is complicated further by interactions now known to occur between contaminants and infectious agents (bacteria and viruses), leading to large increases in disease risk."*

Myers states *"Epidemiology cannot be accurate in the light of modern knowledge unless it accurately addresses:-"*

- a) *Non-monotonic dose response curves (i.e. biphasic responses), (where low levels of exposure can produce greater biological effects than some higher exposures - our expansion)*
- b) *Windows of vulnerability during development*
- c) *The ubiquity of mixtures*
- d) *The likelihood that multiple exposures (chemicals or other environmental agents) can induce similar impacts via disruption of developmental processes*
- e) *The same type of exposure can cause different impacts depending on when the exposure occurred*
- f) *Long latencies between exposure and manifestation of impact in a population."*

He concludes *"The effects of low level, background exposures are likely to be far more widespread than acknowledged, and involve many more health effects than traditionally considered, yet these new mechanisms of toxicity thwart the epidemiological tools now available to establish human harm."*

Complexities of study design that may result in finding 'no effects'

A paper by Oftedal ([2007](#)) supposedly cleared mobile phones of causing headaches. However, this is one of the papers that misrepresents the situation as they did not use a mobile phone signal, but surrogate RF exposure, that omitted many of the characteristics typical of a mobile phone signal, including ELF exposure. This confuses the situation with respect to real exposure and subsequent effects when the misleading results are given such a high media profile. Other studies use 'mobile phone-like exposure' in their experiments, such as the one by Johansson looking at atopic dermatitis ([2008](#)) and find no effects. There may, indeed, be no effects, but it also may be that there were no effects because the experimental conditions used, either deliberately or accidentally, produce a type of exposure that may not simulate that from a mobile phone.

Animal, insect and plant experiments and effects

Grigor'ev (2003) and Batellier (2008) found that a significantly higher percentage of embryo mortality was observed in chicken eggs exposed to mobile phone radiation compared with an unexposed group.

Interestingly, and hardly unexpectedly, mice have been proven to act and respond differently in trials, depending on their environment and how they were treated. There have been moves to improve the living conditions of animals used in experiments that have led to variations causing problems in interpretation of test results. In an experiment (reported in New Scientist, 9th March 2002) looking at mice that carried a gene for Huntington's disease, mice in a cage with 'enriched' living conditions did much better than those in standard cages.

Apart from the obvious questions this provokes with regard to animal experimentation, reliability, and reproducibility, it also makes us wonder about our environment. Is it being 'compromised' by mobile phone masts, etc. and thus is it inevitable that our behaviour will change, even medically, in unpredictable ways?

People who have done research on primates point out that positive results of such research often has no effect or even a reverse effect when applied to humans, despite the genetic similarities.

A scheme to protect endangered wildlife has seriously backfired. The experimental programme required owners of rare species in Queensland to implant electromagnetic chips under animals' skin and to DNA test them so that they could be tracked and identified. Shortly after implementation, however, a number of valuable specimens simply dropped dead. The scheme is now under review.

Kumar (2011) found that cell phone radiation produced biochemical changes in worker honey bees. Concentrations of carbohydrate, protein and cholesterol all rose significantly (a response to stress), which then declined. The experimenters also observed an increase in agitation and general activity.

Roux (2008) found that 900 MHz RF radiation below thermal levels affected plants. When exposed, the plants initiated "self-repair" processes very similar to those expected when the plant perceives itself to be injured. Roux concluded *"Taken as a whole, the data provide new evidence supporting the hypothesis that plants perceive and respond to microwave irradiation as though it was an injurious treatment."*

Tkalec (2009) found cellular effects in germinating onions when they were exposed to 400 and 900 MHz electric fields of 41 and 120 V/m. Whilst the upper value is above ICNIRP the lower value is not, and a quite feasible electric field level to be received by the head when talking on a mobile phone.

Sharma (2009) concluded that mobile phone radiation inhibited root growth of mung bean by inducing ROS-generated oxidative stress despite increased activities of antioxidant enzymes. Another study by Singh (2011) confirmed that mobile phone radiation affected biochemical processes manifesting as oxidative stress which impaired root growth in mung beans.

Indirect effects

One report (Ramesh 2008) suggested that mobile phones could be responsible for ill-health effects in an indirect manner. Staff at a Barbados hospital rarely cleaned their mobile phones and it was believed that they therefore posed the potential for microbial contamination. This may be an

interesting area for hospital authorities to check on in view of the stricter procedures to reduce infections.

Protective effects

Gajski's study ([2009](#)) found that honeybee venom had a radioprotective effect against oxidative DNA damage from 915MHz radiation.

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