



Mobile phone

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Mobile phones transmit voice and data to a mobile communication base station using high-frequency electromagnetic radiation. Some of this radiation may penetrate a person's head, hand or body if they hold their mobile phone to their ear, in their hand, or carry it on their body. The level of radiation from a mobile phone and thus the amount of radiation that penetrates the body depends on various factors.



- A mobile phone that has established a good connection to a base station can reduce its radiation. The connection quality is indicated at the top of the mobile phone's display in the form of bars. The more bars you see, the better the connection quality.
- As the distance between a mobile phone and a person increases, the radiation decreases rapidly.
- A mobile phone primarily transmits during a call or when data is being exchanged. If the mobile phone is in standby mode, it only sends out a signal every few minutes in order to communicate its location.

The maximum radiation from a mobile phone that penetrates the body varies depending on the model. It is expressed through the maximum specific absorption rate (SAR). The lower the SAR value, the lower the maximum amount of radiation that can penetrate the body. The SAR is specified for two uses: head SAR applies when a person makes a call with their mobile phone held to their ear. Body SAR applies to situations in which a person carries their mobile phone directly on their body, for example on their belt or in a jacket or trouser pocket. The SAR values for mobile phones declared by the manufacturers are published by the German Federal Office for Radiation Protection ([BfS - SAR Search](#)). The French agency ANFR publishes its own measurement results of the SAR values of mobile phones [ANFR Open Data](#). The electrical currents from the mobile phone's electronics and battery generate low-frequency electromagnetic fields that also penetrate the head, hand or body.

There are uncertainties with respect to the health effects of long-term mobile phone use. No short-term negative health effects are to be expected.

The following tips will help you if you want to reduce your personal exposure to mobile phone radiation:

- Use your mobile phone in accordance with the user manual. Observe the safety instructions.
- Use a mobile phone with low head and body SAR values.
- Use your mobile phone with a wireless hands-free system with a speaker and microphone that are not close to your body.
- Use your mobile phone with a Bluetooth headset. These headsets comprise headphones, a microphone and a Bluetooth module, preferably belonging to Bluetooth class 3 (1 milliwatt) for distances of up to 10 metres or class 2 (2.5 milliwatts) for distances of up to 40 metres. Bluetooth class 1 headsets (100 milliwatts) for distances of up to 100 metres are only recommended to a limited extent due to their higher power. Bluetooth classes are usually indicated on quality



products.

- Use your mobile phone with a headset that is connected to the mobile phone by a cable.
- Where possible, use the 5G mobile network when transferring large amounts of data.
- When streaming videos on your mobile phone, do not select the highest quality setting for videos.
- Use Wi-Fi for transferring data inside buildings or on trains whenever possible.
- User manuals may contain information about accessories that allow you to carry your mobile phone on your body. Use these original accessories to minimise your radiation exposure but do not use any accessories not recommended by the user manual.
- Do not use any protective or shielding products for mobile phones that claim to reduce your radiation exposure from your mobile phone. Also do not use any products that claim to harmonise or neutralise the radiation emitted from your mobile phone. Such products may in fact amplify the level of radiation from your mobile phone by impairing the connection quality between your mobile phone and the mobile communication base station
- Discuss the use of your mobile phone with your doctor if you have an electronic medical implant.
- Further tips can be found under the following link: [How can I reduce my radiation exposure when using my mobile phone? – 5G info \(available in German, French and Italian\)](#)

Other tips:

- **NEVER use a mobile phone when driving a vehicle.** This also applies to calls via hands-free systems, which can also be a source of distraction!
- **NEVER use a mobile phone** when walking or riding a bike when crossing or using traffic routes.



1 Base stations

Detailed information on radiation from base stations can be obtained from the Federal Office for the Environment (FOEN) or from a cantonal NIR specialist centre ([Topic Electrosmog and light](#))

Further information on 5G is available on the information platform for 5G and mobile communications of the FOEN, OFCOM and FOPH ([5G info homepage \[available in German, French and Italian\]](#)).

2 Exposure measurements

2.1 SAR value due to high-frequency radiation

The specific absorption rate (SAR, stated in W/kg) is a measure of the radiation caused by a mobile phone that our body is exposed to. It indicates how much radiation power (W) that the human body (kg) absorbs. The SAR value is determined for each mobile phone model in a worst-case scenario for both the head and body. The head and body SAR limit is 2 W/kg. This limit must be complied with by all mobile phones sold in Switzerland. Information on the SAR values declared by manufacturers for individual mobile phones is published on various online portals, including that of the German Federal Office for Radiation Protection ([BfS - SAR Search](#)). The French agency ANFR publishes its own measurement results of the SAR values of mobile phones [ANFR Open Data](#).

2.2 Headsets with a cable

Various older studies on 2G mobile phones (GSM) have compared radiation exposure to the head with and without a headset. They have shown that headsets significantly reduce the level of radiation exposure when the mobile phone and cable are kept close to the user's body.

2.3 Bluetooth headset

In 2003, on behalf of the FOPH, two Bluetooth headsets were investigated that operated wirelessly between the headset and the mobile phone instead of using a cable. The two headsets examined had SAR values of 0.001 W/kg and 0.003 W/kg, respectively, which are considerably lower than the SAR values of conventional mobile phones.

3 Health effects

3.1 Cancer

Low-frequency magnetic fields

Low-frequency fields are generated in mobile phones by battery currents and electronics. There are no studies available on the health effects of magnetic fields from battery currents or electronics.



High-frequency electromagnetic fields

In 2011, the International Agency for Research on Cancer (IARC) classified high-frequency electromagnetic fields as possibly carcinogenic (group 2B) based on studies suggesting a potential link between using mobile or cordless phones and brain tumours. However, the IARC considers the data and evidence to be limited, as these studies have shortcomings with respect to their design and the estimation of exposure duration. The WHO is currently reviewing the scientific data, with results expected by the end of 2025.

3.2 Other health effects examined in connection with mobile phones

Effects on brain activity

Electroencephalograms (EEGs) are used to visualise the brain's electronic activity. Radiation from mobile phones can impact brain activity both during waking and sleeping hours. However, the health effects of this altered brain activity are unclear.

Perception and processing of stimuli

Older studies indicated shortened reaction times due to mobile phone radiation. However, this effect only occurred to a limited extent in more recent studies.

Microwave hearing

There is no evidence that mobile phone radiation leads to auditory perception of noise phenomena.

Effects on the cardiovascular system

The impact of mobile phone radiation on a person's blood pressure, pulse, heart rate variability and skin blood flow has only been examined in very few studies, which yielded inconsistent results.

Impact on well-being

Survey data reveals that some people attribute unspecific symptoms (symptoms that cannot be attributed to an illness), including tiredness, dizziness and headaches, to mobile phone radiation. However, epidemiological studies have not been able to consistently confirm this link. Possible long-term effects have not been adequately studied to date, meaning it is not possible to assess the impact of mobile phone radiation on general well-being.

Effects on sleep

Several laboratory studies have investigated the impact of mobile phone radiation on sleep patterns. Some of these studies found that people who were exposed to mobile phone radiation before falling asleep experienced shorter sleep onset times and altered electrical activity in the brain during sleep. However, most of these studies were unable to establish a link between mobile phone radiation and sleep. Epidemiological studies have found no consistent association between self-reported sleep quality and exposure to high-frequency radiation. Mobile phones are often not switched off overnight and can affect sleep quality. A study of 439 individuals showed that being woken up by a mobile phone during the night is associated with increased tiredness, headaches and rapid fatigue, while



having no effect on cognitive abilities (e.g. the ability to concentrate).

Children and attention deficit disorders

The link between attention deficit disorders in children and mobile phone use has been examined by few studies. Although some findings suggest a possible association between high-frequency radiation and behavioural problems in children and young people, these results have neither been adequately confirmed nor can it be ruled out that other factors are responsible for these behavioural abnormalities.

Sperm quality

The impact of mobile phone radiation on fertility remains inconclusive owing to the limited number of studies. Most studies have examined the effects of mobile phone radiation on sperm motility and concentration. However, the assessment of exposure to this radiation in these studies is usually inadequate, meaning that no conclusions can be drawn on this basis.

Interference with implants

Mobile phones can cause malfunctions in pacemakers (inhibition, incorrect stimulation, asynchronous mode). New pacemakers, implanted defibrillators and brain stimulators are less susceptible to such malfunctions. Nevertheless, it is recommended to keep a safety distance of 30 cm between the implant and your mobile phone. People with implants should therefore avoid carrying their mobile phone in their breast pocket and should use their ear on the opposite side to the implant when making calls.

Car accidents

The use of mobile phones while driving is proven to be dangerous. Talking on your mobile phone while driving significantly increases your risk of suffering an accident with or without fatal consequences. The impairment in driving performance due to mobile phone use can be compared to driving under the influence of alcohol (0.8%). The level of risk is not only increased during the call, but also for some time afterwards. Using a hands-free system does not reduce the risk.

Contact

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