

Media Resource Kit – answers to the most common questions about mobile communications

Are mobile communications safe?

The wireless industry relies on the advice of independent national and international health authorities – including the [World Health Organization](#) – who constantly review the latest scientific evidence.

The WHO says:

“A large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established as being caused by mobile phone use.”¹

In relation to wireless networks and health, the conclusion from the WHO is:

“Studies to date provide no indication that environmental exposure to RF² fields, such as from base stations, increases the risk of cancer or any other disease.”³

Furthermore, the WHO has stated:

“Despite extensive research, to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health.”⁴

In addition, there has been a [large number of independent expert reviews](#)⁵ that have carefully considered the nearly 10,000 studies related to electromagnetic fields (EMF) and mobile communications⁶.

In 2020, [expert committees in Spain, Ireland and the Netherlands](#) published their risk assessment for 5G and the [US Food and Drug Administration](#) published a “Review of Published Literature between 2008 and 2018 of Relevance to Radiofrequency Radiation and Cancer”. Their conclusion is:

“Based on the FDA’s ongoing evaluation, the available epidemiological and cancer incidence data continues to support the Agency’s determination that there are no quantifiable adverse health effects in humans caused by exposures at or under the current cell phone exposure limits. In the last decade, there have been approximately

<https://www.who.int/en/news-room/fact-sheets/detail/electromagnetic-fields-and-public-health-mobile-phones>
· radio-frequency
· [WHO online Q&A What are the health risks associated with mobile phones and their base stations?](#)
· WHO “What are Electromagnetic Fields” **Key Point 6:** <https://www.who.int/peh-emf/about/WhatisEMF/en/index1.html>
· <http://emfhealth.info/research-expert-opinions.cfm>
· EMF Portal: <https://www.emf-portal.org/en>

70 relevant epidemiological studies that have been published as peer-reviewed scientific evidence. ... Based on the studies that are described in detail in this report, there is insufficient evidence to support a causal association between RFR exposure and tumorigenesis. There is a lack of clear dose response relationship, a lack of consistent findings or specificity, and a lack of biological mechanistic plausibility.”⁷

Is 5G safe?

A common misunderstanding is that 5G would be a completely new and different technology. In reality, **5G is a similar technology to previous mobile communication generations** and mostly encodes data in a different form. Prof. Martin Rössli⁸ from the Swiss Tropical- and Public Health Institute in Basel compares this to speaking French instead of English⁹. Or in the words of Philippe Owezarski¹⁰, department director at the French CNRS, “the difference between 3G, 4G, and 5G generations lies in the frequency bands and media access techniques they use”¹¹.

Initially, 5G will use parts of the radiofrequency spectrum that has already been used for other applications (e.g. the 700 MHz band and the 3.4-3.8 GHz band were used earlier for terrestrial broadcasting in different countries).

Beginning in the 1950’s with studies into military radar, TV and radio we now have more than 60 years of scientific research conducted into the possible health effects of radio signals used for mobile phones, base stations and other wireless services including those frequencies being used, or planned, for 5G.

In regard to radiofrequencies and technological use of it, the World Health Organization (WHO) has stated:

“In the area of biological effects and medical applications of non-ionizing radiation approximately 25,000 articles have been published... Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals.”¹²

Also, as the **Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)** has stated recently:¹³

“(It) is important to note that higher frequencies does not mean higher or more intense exposure. Higher frequency radio waves are already used in security screening units at airports, police radar guns to check speed, remote sensors and in medicine and these uses have been thoroughly tested and found to have no negative impacts on human health”.

⁷ <https://www.fda.gov/media/135043/download>

⁸ Martin Rössli is Professor for environmental epidemiology at the Swiss Tropical- and Public Health Institute in Basel and leads the Environmental Exposures and Health Unit: <https://www.icnirp.org/en/about-icnirp/commission/details/member-roosli.html>

⁹ Interview with Prof. Rössli : <https://www.youtube.com/watch?v=fH6RQ047J9M&feature=youtu.be>

¹⁰ Philippe Owezarski, director of the Trustworthy Computing Systems and Networks (RISC) department at the CNRS Laboratory for Analysis and Architecture of Systems in France

¹¹ <https://news.cnrs.fr/articles/what-is-5g-for>

¹² WHO “What are Electromagnetic Fields” Key Point 6: <https://www.who.int/peh-emf/about/WhatisEMF/en/index1.html>

¹³ <https://www.arpansa.gov.au/news/misinformation-about-australias-5g-network>

As an international association of the wireless industry, the Mobile & Wireless Forum (MWF) has actively contributed to this research effort since its creation in 1998. A summary of these research activities can be found in the 2019 publication '20 Years of Research'¹⁴. The booklet provides an insight into the ongoing research in this area and shows that the mobile and wireless industry continues to build on the solid foundation of scientific knowledge built over decades.

Will exposure levels increase with 5G?

With the rollout of new network infrastructure, questions often arise about what this means for general levels of electromagnetic fields (EMF) in the community. This was the case with earlier generations as it is now with 5G.

Several countries have published the **results of national measurement and monitoring campaigns** that assessed the current public exposure levels from telecommunications network infrastructure. Each of the reports have found that **overall EMF levels remain far below the safety limits, with most results being around 1% of the international limits**.

Ofcom, the United Kingdom Office of Communications, for example released a set of testing carried out in 2020 that found EMF levels around Britain to be between 0.0052% and 1.4960% of the ICNIRP reference levels for general public exposure¹⁵. This is in line with the results obtained by French regulator ANFR as part of their yearly measurement program. The Australian network provider Telstra has also published the results of EMF measurements within their commercial 5G network and found that EMF levels remained at around 1000 times below the safety limits and were similar in exposure levels to those of 3G, 4G or Wi-Fi¹⁶

With the introduction of new technologies, there may be a small increase in the overall level of EMF due to the fact that new transmitters are active. In some countries, deployment of 5G may occur as part of closure of earlier mobile networks. Based on the transition from previous wireless technologies we can expect that **the overall exposure levels will remain relatively constant and a small fraction of the international exposure guidelines**¹⁷ based on the results from several studies¹⁸ that have looked at measurements of base station RF emissions over time. These studies found that irrespective of the country, the year and the mobile technology, RF fields at a ground level were only a small fraction of the international human RF exposure recommendations. Importantly, environmental levels have remained essentially constant

- MWF's "20 Years of Research" booklet:

<http://www.mwfai.org/docs/eng/2018%5F05%5FMWF%5F20YearsofResearch%2Epdf>

- Ofcom 2020 set of measurements:

<https://www.ofcom.org.uk/spectrum/information/mobile-operational-enquiries/mobile-base-station-audits/2020>

- 5 surveys of 5G show EME levels well below safety limits:

<https://exchange.telstra.com.au/5-surveys-of-5g-show-eme-levels-well-below-safety-limits/>

- See 5G and EMF Explained: [http://www.mwfai.org/docs/eng/2018_05_MWF_5G-](http://www.mwfai.org/docs/eng/2018_05_MWF_5G-EMF%20Explained%20final.pdf)

[EMF%20Explained%20final.pdf](http://www.mwfai.org/docs/eng/2018_05_MWF_5G-EMF%20Explained%20final.pdf)

- Rowley and Joyner, Comparative international analysis of radiofrequency exposure surveys of mobile communication radio base stations, Journal of Exposure Science and Environmental Epidemiology (2012) 1 – 12., Joyner, Van Wyk and Rowley National Surveys of Radiofrequency Field Strengths from Radio Base Stations in Africa, Radiation Protection Dosimetry (2013) 1–12 and Rowley JT, Joyner KH, Observations from national Italian fixed radiofrequency monitoring network, Bioelectromagnetics. 2016 Feb;37(2):136-9.

despite the increasing number of base stations and deployment of additional mobile technologies.

Are devices safe?

A substantial amount of scientific research has been undertaken into the overall safety of radio-frequencies (RF). This has resulted in the [development of international RF exposure standards and guidelines](#). Furthermore, both the standards and the underlying research are subject to ongoing review, and all products, both on the network and on the device side, are designed and tested for compliance with these standards.

Networks are inherently efficient, minimizing the output powers of both the base stations and devices to only that which is required to provide the services. This avoids interference with other nearby base stations as frequencies have to be reused and also prolongs the battery life of devices.

Smart phones also typically operate at a [fraction of international safe exposure limits](#). These independently set exposure limits and include [ample safety margins](#) to cover any unknown health impacts.

Also, the way people use their mobile phone has changed dramatically and people now rely more on texts and email which has reduced exposure even further.

What are the differences between the SAR values in the US and Europe?

Mobile phone manufacturers have provided SAR information since 2001 on company websites and in manuals. The MWF also has a SAR reporting program: www.sartick.com

Unfortunately, there is considerable confusion and misunderstanding about the meaning of the maximum reported Specific Absorption Rate (SAR) values for mobile phones. SAR is a measure of the rate of radiofrequency (RF) energy absorption by the body from a RF source such as a mobile phone. Each model of mobile phone is tested at [maximum power output](#) to ensure they are within the safety guidelines of the various countries they are sold in. However, mobile phones in normal everyday use operate at much lower power levels, always adapting to the [minimum power required](#) to make or maintain a call in order to preserve battery life, maximize call time and avoid network interference.

Because SAR compliance tests do not show real everyday exposure levels regulatory authorities such as the [FCC advise](#) consumers not to use SAR levels as a safety guide:

“Many people mistakenly assume that using a cell phone with a lower reported SAR value necessarily decreases a user’s exposure to RF emissions, or is somehow “safer” than using a cell phone with a high SAR value. While SAR values are an important tool in judging the maximum possible exposure to RF energy from a particular model of cell phone, a single SAR value does not provide sufficient information about the amount of

RF exposure under typical usage conditions to reliably compare individual cell phone models.”¹⁹

To provide protection against established effects from RF fields, exposure guidelines have been developed by both the International Commission on Non-Ionizing Radiation Protection (ICNIRP) which are used in Europe and Asia while the standards developed by the Institute of Electrical and Electronics Engineers (IEEE) have traditionally been used in North America. Both the ICNIRP and IEEE limits are now effectively harmonized around a SAR of 2W/kg (IEEE C95.1-2019²⁰ and ICNIRP RF EMF Guidelines 2020²¹). Despite the scientific agreement the FCC has retained its own limits of 1.6W/kg. As a result of this the same model of phone will have a slightly different SAR value in Europe and the USA.

IARC Classification of RF as a ‘possible carcinogen’

The IARC classification **preamble** and the **general remarks** clarify that IARC’s role is to look at the potential for radiofrequency (RF) electromagnetic fields to cause cancer in some circumstances and not the likelihood that in normal use they do cause harm.

“This Monograph is focused on the potential for an increased risk of cancer among those exposed to RF radiation, but does not provide a quantitative assessment of any cancer risk, nor does it discuss or evaluate any other potential health effects of RF radiation.”²²

The assessment of health risks is the responsibility of another part of the WHO - the **International Electromagnetic Fields (EMF)** Project, which was set up in 1996 to assess the scientific evidence of possible adverse health effects from electromagnetic fields and to provide advice to governments around the world.

Following the IARC announcement, the **WHO updated its factsheet on electromagnetic fields and public health**²³ in 2011 and while acknowledging the IARC classification, have said mobile phones were not known to cause any health problems:

“A large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established as being caused by mobile phone use.”

The WHO also published a Q&A on “Radiation: 5G mobile networks and health” where they confirm in regard to potential health risks from 5G:

“To date, and after much research performed, no adverse health effect has been causally linked with exposure to wireless technologies. Health-related conclusions are drawn from studies performed across the entire radio spectrum but, so far, only a few studies have been carried out at the frequencies to be used by 5G.”

¹⁹ <https://www.fcc.gov/consumers/guides/specific-absorption-rate-sar-cell-phones-what-it-means-you>

²⁰ IEEE C95.1-2019 - IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz: https://standards.ieee.org/standard/C95_1-2019.html

²¹ ICNIRP RF EMF GUIDELINES 2020: <https://www.icnirp.org/cms/upload/publications/ICNIRPrfgdl2020.pdf>

²² <https://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-Identification-Of-Carcinogenic-Hazards-To-Humans/Non-ionizing-Radiation-Part-2-Radiofrequency-Electromagnetic-Fields-2013>

²³ <https://www.who.int/news-room/fact-sheets/detail/electromagnetic-fields-and-public-health-mobile-phones>

Tissue heating is the main mechanism of interaction between radiofrequency fields and the human body. Radiofrequency exposure levels from current technologies result in negligible temperature rise in the human body.

As the frequency increases, there is less penetration into the body tissues and absorption of the energy becomes more confined to the surface of the body (skin and eye). Provided that the overall exposure remains below international guidelines, no consequences for public health are anticipated.”²⁴

Is a more precautionary approach required?

Despite the precautions built into existing standards and the low everyday exposures from modern smartphones we understand that some people want to take their own steps to reduce exposure even further.

Therefore, we support the advice of **independent health authorities** – such as the WHO and FCC – who advise people that are worried to use ‘hands-free’ devices which keep cell phones away from the head and body during calls and to limit the number and length of calls.

However, the FCC has **made clear** that by providing these tips it does not endorse the need for reducing RF exposure:

*“Accordingly, some parties recommend taking measures to further reduce exposure to RF energy. **The FCC does not endorse the need for these practices**, but provides information on some simple steps that you can take to reduce your exposure to RF energy from cell phones. **For example**, wireless devices only emit RF energy when you are using them and, the closer the device is to you, the more energy you will absorb.”²⁵*

We do not support the use of so called ‘shielding devices’ because they are often not properly tested and in many cases can even increase exposure. They hardly ever work as marketed as confirmed in an assessment by the French government’s Directorate for Competition Policy, Consumer Affairs and Fraud Control and French health authority ANSES²⁶.

More information

Short informative videos with explanations around 5G are posted on the MWF’s YouTube channel: <https://www.youtube.com/channel/UCvwTMEqVWD3BWx2tmxYGDUA>

Regular updates and interesting articles are posted on MWF’s Twitter account: <https://twitter.com/MWFupdates>

And shared on the MWF LinkedIn page: <https://www.linkedin.com/company/mobile-&-wireless-forum-mwf-?>

· <https://www.who.int/news-room/q-a-detail/radiation-5g-mobile-networks-and-health>

· <https://www.fcc.gov/consumers/guides/wireless-devices-and-health-concerns>

· Enquête sur les dispositifs anti-ondes pour téléphone mobile : <https://www.economie.gouv.fr/dgccrf/enquete-sur-dispositifs-anti-ondes-pour-telephone-mobile>

Common misunderstandings and topics of interest are discussed on the MWF blog: <http://mobile-wireless-forum.blogspot.com>

In-depth information can be found in the MWF publications: <https://www.mwfai.org/publications.cfm>

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For additional information contact us directly at: enquiries@mwfai.org

About the MWF

The Mobile & Wireless Forum (MWF) was founded in 1998 with a mission to facilitate joint funding of key research projects and cooperation on standards, regulatory issues and communications concerning the safety of wireless technology, product integrity and accessibility.

More information can be found at <https://www.mwfai.org>.