

And what do we know about 5G?

5G is the fifth generation of wireless communications technology. It is already in use or being installed in several countries (e.g. USA, China, Korea, Japan, Switzerland, Monaco, UK, Australia). For the technical aspects, see Focus on "[Basics of radio frequencies and wireless communications](#)". However, it should be remembered that it can operate at the frequencies used in 2G, 3G and 4G and will also develop in two new bands: 3.5 GHz, close to those of previous generations and of Wi-Fi, and at higher frequencies, around 26 GHz (known as millimetre waves). In France, millimeter wave frequencies will not be used in the immediate future. The use of new frequencies has raised questions and fears about possible health effects. It is legitimate to ask the question of a possible risk with the arrival of a new technology. On the other hand, the explosion of rumours linking 5G to the COVID-19 epidemic took on such proportions at the beginning of 2020 [\[1\]](#) that several health agencies, including the WHO, issued denials. We will not develop this aspect.

1. Health aspects

Worldwide, more than twenty health agencies and governments have taken a position on health issues related to 5G since the beginning of 2019. Their conclusions are reassuring. Overall, the importance of monitoring exposure levels and continuing research to add to the body of knowledge is emphasized, especially in the millimeter wave range, where data is sparse. Some examples include:

In the **United States** [\[2\]](#), the Food and Drug Administration (2020) notes that while "*many of the specifics of 5G remain ill-defined, it is known that 5G cell phones will use frequencies covered by the [exposure guidelines](#) current [FCC Telecommunications Regulatory Commission](#) (300 kHz-100 GHz) and conclusions drawn based on current scientific evidence cover these frequencies. FDA will continue to monitor scientific information as it becomes available regarding the potential impacts of 5G.*"

In **Australia** [\[3\]](#), the Department of Health (2019) wishes to "*assure the public that 5G technology is safe*" and that this position "*is supported by health authorities in Australia - such as the Australian Radiation and Nuclear Safety Agency [ARPANSA] - and globally, such as the World Health Organization.*" In March 2021 [\[4\]](#), ARPANSA reports on [two literature reviews](#) on millimeter wave frequencies (<6 GHz), conducted with Swinburne University of Technology and concludes "*The results of these reviews remain consistent with national and international radiation health and safety guidelines, which have deemed low-level 5G radio waves safe for public exposure.*"

In **Germany** [\[5\]](#) (2019), the Federal Environment Ministry explains that "*there is no fundamental difference between the electromagnetic fields of previous mobile radio networks and those of 5G transmitters. According to current scientific knowledge, regardless of the technology used, electromagnetic fields do not pose a health risk if the limit values are observed*". The Federal Office for Radiation Protection agrees with the majority of its counterparts that "*the results of studies in which the possible health effects of electromagnetic fields from mobile radio have been investigated can be largely transferred to 5G.*"

In **Denmark** [\[6\]](#), where the National Health Authority (2019) is of the opinion that "*overall [...] there is no reason to be concerned about a health risk associated with 5G. Measurements show that the total radiation from mobile phones, wifi and other equipment that emit non-ionising radiation today is low and well within the limits of what is harmful to health. Based on the available knowledge, we have no reason to believe that 5G will change this.*"

In **France**, the Anses issued a preliminary report [\[7\]](#) in January 2020 that identifies the studies available at the new 5G frequencies and considers the possibilities of using existing data at nearby frequencies, particularly for the 3.5 GHz frequency band [\[5\]](#). The actual risk assessment is expected in 2021. In the meantime, the government has commissioned a report reviewing the technical and health data available worldwide [\[8\]](#) (Sept. 2020). It notes that "*Health and regulatory authorities [also] concur that there are no specific health effects from 5G below the exposure limits*" and that "*most agencies accompany their conclusions with recommendations for research and information*".

In the **Netherlands** [\[9\]](#), at the same time, the Health Council (2020) judges that "*It is neither proven nor likely that exposure to 5G systems can be harmful, but from a scientific point of view this cannot be totally excluded either*". Specifically, it notes that "*As there is a lot of data on biological and health effects in the frequency bands already used by mobile phones and Wi-Fi up to 3.5 GHz, which do not indicate any harmful effect, the committee sees no reason to restrict or stop their use.*" On the other hand, it recommends to the Parliament "*not to deploy 5G at millimetre frequencies (26 GHz) pending a more precise assessment of the potential risks*".

2. Ambient field strength and 5G

As explained in the focus on [Radio frequencies, risk and regulation](#), the risk depends on the level of exposure, and the regulations aim to limit this level well below the threshold of danger (proven effects). Measurement campaigns on exposure levels induced by 5G have been carried out in several countries to verify the extent to which 5G may change public exposure to electromagnetic fields. After analyzing the available data, the authors of the French government report stressed that the foreseeable exposure levels will remain largely below the regulatory thresholds, even if the number of atypical points could increase (measurements exceeding a value arbitrarily set at 6 V/m - lower than the limit values that range from 36 to 61 V/m at mobile phone and WiFi frequencies - at which a solution is sought to lower the field strength without altering the quality of coverage, if possible). In France, the Agence nationale de fréquences (ANFR) has also made measurements during 5G experiments in several cities [10]. It recently produced a [simulation](#) of exposure to waves generated by mobile telephony in dense urban areas, taking into account the planned evolution to 4G and 5G [11]. At this stage, it appears that ambient exposure will not change radically with 5G and field strength levels will remain well below the regulatory reference levels.

Notes and references

Cover image. Source: © Emmanuel Drouet

[1] S. Point, [Covid-5G hypertoxicity syndrome: when science goes to the woodshed](#), SPS n°333, Jan-March 2020. Published online on 12 October 2020 on afis.org

[2] US Food and Drug Administration, " [Scientific Evidence for Cell Phone Safety / No New Implications for 5G](#)," accessed September 2, 2010. On fda.gov

[3] Australian Government Department of Health, " [Safety of 5G technology](#)," 20 January 2020. At health.gov.au

[4] [Australian Radiation Protection and Nuclear Safety Agency. World-first reviews into 5G radio waves](#), 17 March 2021. At arpansa.gov.au

[5] Federal Office for Radiation Protection (Bundesamt für Strahlenschutz), " [Radiation protection in wireless communications / 5G](#) ", accessed August 2020. At bfs.de

[6] National Health Council, " [Radiation in everyday life / 5G network](#)," accessed 10 September 2020. On sst.dk

[7] Anses, [Exposure of the population to electromagnetic fields related to the deployment of "5G" communication technology and associated health effects](#). Preliminary report, January 2019. On anses.fr

[8] CGEDD, [Déploiement de la 5G en France et dans le monde : aspects techniques et sanitaires](#). Report, September 2020. On ecologie.gouv.fr

[9] Health Council of the Netherlands, [5G and health](#), Executive summary, N° 2020/16, September 2020. On healthcouncil.nl

[10] ANFR, "ANFR publishes a measurement report on wave exposure from 5G experiments and presents a new exposure measurement indicator", 10 April 2020. On anfr.fr

[11] ANFR, ANFR publishes a [simulation of exposure to waves created by mobile telephony in dense urban areas, taking into account the planned evolution to 4G and 5G](#), 15 September 2020. On anfr.fr

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