



Adopting Scientifically Invalid Assumptions of No Risks for Deployment of the Fifth Generation, 5G, for Wireless Communication by the EU Commission is Harmful to Human Health and the Environment

Nyberg R¹, Nilsson M² and Hardell L^{3*}

¹Åbo Akademi University, Vasa, Finland (retired)

²Swedish Radiation Protection Foundation, Adelsö, Sweden

³The Environment and Cancer Research Foundation, Örebro, Sweden

Abstract

During recent years exposure to harmful Radiofrequency (RF) radiation has increased considerably. One reason is the implementation of the fifth generation, 5G, for wireless communication. There are no studies showing that 5G radiation exposure is not harmful to human health and the environment and that the limits by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) accepted by most countries are adequately protective for real life exposure situations. On the contrary, new case reports indicate development of the microwave syndrome in persons exposed to 5G although the radiation is far below these ICNIRP limits. ICNIRP is a self-appointed, industry-friendly and scientifically biased organization and its limits are supported by the telecommunications industry. The Scientific Committee on Health, Environmental and Emerging Risks (SCHEER) at the EU Commission has recently evaluated risks of RF radiation thereby recommending adoption of the highly controversial view by ICNIRP that protection only against biological effects caused by heating is sufficient. All non-thermal effects are dismissed although the evidence for these effects is substantial and convincing. The EU Commission has proposed a regulation called the Gigabit Infrastructure Act (GIA) that will facilitate deployment of 5G millimeter technology. This will favor the telecom industry, while the public will be exposed to increasing levels of RF radiation the combined effects of which have never been studied. GIA and SCHEER pave the way for much denser 5G infrastructure technology, mainly millimeter wave technology in the frequency range 26 GHz and higher, which can be anticipated to constitute a health hazard.

Keywords: Radiofrequency radiation; Health risks; EU; 5G; SCHEER; Gigabit Infrastructure Act; Moratorium

Introduction

Since 2017 the 5G appeal, today endorsed by 436 scientists and medical doctors, has been sent to the EU seven times requesting a moratorium on the deployment of the Fifth Generation (5G) for wireless communication until health risks have been investigated (<http://www.5gappeal.eu/>). These calls have not had any effect on EU officials who continue to support the rollout of 5G technology.

Contrary to the request of a moratorium, 5G has increasingly been implemented in spite of no comprehensive studies and evaluations of potential risks to human health and the environment. 5G is associated with high pulsed Radiofrequency (RF) radiation with considerable variation of the pulse intensity and higher total RF exposure compared to previous generations of telecommunications technology. From biological and health perspectives 5G may therefore even be worse than previous generations of wireless telecommunications.

The first seven studies so far on health effects from real exposure to 5G (case studies) indicated that 5G causes very high levels of RF radiation exposure to people living in the vicinity of 5G base stations. They also showed that 5G at 3.5 GHz, often in combination with 4G+, may rapidly cause the microwave syndrome, in some cases so severe that people had to leave their dwellings. As a result of moving to dwellings with considerably lower levels of RF radiation, the symptoms decreased and complete health was regained within a short time period. This may be regarded as provocation

OPEN ACCESS

*Correspondence:

Lennart Hardell, The Environment and Cancer Research Foundation, Örebro, Sweden

Received Date: 26 Jan 2024

Accepted Date: 07 Feb 2024

Published Date: 12 Feb 2024

Citation:

Nyberg R, Nilsson M, Hardell L. Adopting Scientifically Invalid Assumptions of No Risks for Deployment of the Fifth Generation, 5G, for Wireless Communication by the EU Commission is Harmful to Human Health and the Environment. *Ann Clin Case Rep.* 2024; 9: 2572.

ISSN: 2474-1655.

Copyright © 2024 Hardell L. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Table 1: Recommended safety limits by various organizations [16].

Year	Power Density ($\mu\text{W}/\text{m}^2$)	Name	Description
1998	10,000,000 9,000,000 4,500,000	ICNIRP [23]	10,000,000 for 2–300 GHz 9,000,000 for 1800 MHz and 4,500,000 for 900 MHz Whole body exposure averaged over 6 min.
2001	1,000 100,000	Salzburg Resolution [24]	1,000 for the sum total of all pulse modulated high-frequency exposures 100,000 for the total of all high-frequency irradiation. ¹
2001	100	EU Parliament STOA 2001 [25]	For chronic exposure from pulsed microwaves. ¹
2002	1	New Salzburg Precautionary Exposure Limit Indoor [26]	Indoor chronic exposure from GSM base stations. ¹
2012	3-6	Bioinitiative 2012 Recommendation [27]	For chronic exposure to pulsed RF. ¹
2016	0.1-100	EuropaEM EMF Guidelines [28]	For extended exposure at least 4 hours a day to frequencies between GSM 900 to WiFi 5.6 GHz depending on sensitivity, night time or daytime exposure. Peak maximum values.
2020	10,000,000 9,000,000 4,500,000	ICNIRP 2020 [12]	10,000,000 for >2–300 GHz 9,000,000 for 1800 MHz and 4,500,000 for 900 MHz Whole body exposure averaged over 30 min.
2020	10,000,000 18,200,000 36,600,000 40,000,000 40,000,000 26,600,000 20,000,000	ICNIRP 2020 [12]	10,000,000 for 400 MHz 18,200,000 for 800 MHz 36,600,000 for 1,800 MHz 40,000,000 for 2 GHz 40,000,000 for 6 GHz: 26,600,000 for 60 GHz: 20,000,000 for 300 GHz: Local exposure averaged over 6 min.

¹ Average or peak maximum values not specified

Table 2: Measured 5G RF radiation levels in an apartment where a man developed severe health problems [5] compared to ICNIRP 2020 limits [12].

Place	Measured Power Density ($\mu\text{W}/\text{m}^2$) ¹	ICNIRP 2020 limits for >2–300 GHz ($\mu\text{W}/\text{m}^2$) ²
Living room	135,983	10,000,000
Sleeping room	13,668	10,000,000

¹Averaged over 2 minutes

²Averaged over 30 minutes

studies of health effects from real life 5G exposure [1-7].

In April 2023 the Scientific Committee on Health, Environmental and Emerging Risks (SCHEER), on request of the EU Commission services, advised in a report positively on the adoption of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) 2020 limits on exposure to Radiofrequency (RF) radiation [8]. A draft SCHEER report was already previously published in August 2022, also recommending adoption of the ICNIRP 2020 limits. However, these limits are clearly insufficient for the protection of human health and the flora and fauna, as discussed below.

Further, the EU Commission in February 2023 proposed a regulation called the Gigabit Infrastructure Act (GIA) which appears to be intended to facilitate and accelerate the deployment of 5G millimeter technology [9]. Thereby the telecom industry would be favored while risks to the public health and the environmental effects are ignored. The seven case reports on health effects from 5G base station radiation exposure, on the contrary, show an urgent need for a moratorium on deployment of 5G and frequencies above, i.e. 6G that is now discussed to be implemented. GIA will pave the way for much denser 5G infrastructure technology in the frequency range 26 GHz and higher.

In the following SCHEER and the Gigabit Infrastructure Act (GIA) are discussed with some critical aspects on risks and violation of conventions and laws aimed at the protection of human health.

The Scientific Committee on Health, Environmental and Emerging Risks (SCHEER) final opinion on the need of a revision of the annexes in the council recommendation

1999/519/EC and directive 2013/35/EU

In this report SCHEER recommends that the EU Commission adopts the ICNIRP 2020 guidelines for RF radiation exposure [8]. However, there is now overwhelming evidence that exposure to RF radiation levels well below the ICNIRP limits are harmful to human health. The effects are clearly established and range from harmful effects on trees, plants, pollinating insects and mammals to detrimental effects on humans including increased risk of cancer, DNA-damage, oxidative stress, harmful effects on the brain, wellbeing, fertility and reproduction [10,11].

ICNIRP guidelines only protect against effects caused by heating for a short time period observed in laboratory studies within less than 1 h [11,12]. However, there is no scientific evidence to support the position that people and all living beings can tolerate long-term whole-body RF radiation exposure from 5G and 4G technology in combination, corresponding to real life exposure situations, at limits proposed by ICNIRP for 24 h every day. No evidence has ever shown the safety of ICNIRP limits for chronic full body human exposure.

The opinion from the SCHEER is clearly not objective in view of the available science. SCHEER appears to be very biased in favor of the ICNIRP limits and thus the interests of the telecommunications industry. SCHEER argues that they “could not identify moderate or strong level” of evidence for adverse health effects resulting from chronic or acute RF exposure. That opinion ignores current knowledge of harmful effects from RF radiation exposure and may be explained by the selection of pro-ICNIRP experts in the SCHEER working group that wrote the opinion report and who also have ties to industry in terms of research funding [13].

ICNIRP guidelines are proven inadequate for protection of human health, the flora and fauna by scientists around the world. The ICBE-EMF 2022 review by 14 scientists showed that the ICNIRP limits are based on “invalid assumptions” and that they “continue to present a public health harm” [11]. 259 Scientists in the EMF Scientists Appeal (www.emfscientist.org) agree that ICNIRP guidelines do not protect against known harmful effects and that “numerous recent scientific publications have shown that EMF affects living organisms at levels well below most international and national guidelines. Effects include increased cancer risk, cellular stress, increase in harmful free radicals, genetic damages, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on general well-being in humans. Damage goes well beyond the human race, as there is growing evidence of harmful effects to both plant and animal life.”

Also, a former member of ICNIRP has recently raised severe critique on the ICNIRP limits: “there are consistent indications from epidemiological studies and animal investigations that RF exposure is probably carcinogenic to humans. The principle of ALARA— as low as reasonably achievable ought to be adopted as a strategy for RF health and safety protection.” As low as reasonably achievable, ALARA is the opposite of the ICNIRP limits which allow extremely high exposure in comparison to levels shown to cause harmful effects. In a later paper this former ICNIRP member concluded that ICNIRP limits “are not applicable to long-term exposure at low levels. Instead of advances in science, they are predicated on assumptions using outdated exposure metrics, thus their ability to protect children, workers, and the public from exposure to the RF radiation or people with sensitivity to electromagnetic radiation from wireless devices and systems. Furthermore, the limits are based on outdated information and circumvent important animal data.” [14,15].

To understand the extremely insufficient level of “safety” that the limits recommended by ICNIRP offer, Table 1 is illustrative. It shows the recommended limit from ICNIRP compared to levels recommended by other organizations. For example, EUROPAEM EMF group in 2016 recommended maximum exposure levels between $0.1 \mu\text{W}/\text{m}^2$ to $100 \mu\text{W}/\text{m}^2$ based on available research and knowledge, while ICNIRP recommends that people without harm would be able to tolerate $10,000,000 \mu\text{W}/\text{m}^2$ averaged over 6 or 30 minutes.

In one of the case studies on health effects from 5G base station exposure, levels of radiation were measured with a meter that gave results averaged over 2 minutes. The case study presented the health effects on a man 49 years old who was exposed to a new 5G base station only 20 meters from his apartment [5]. Within a short time after the deployment of the 5G antennas, the man developed typical symptoms of the microwave syndrome. After a week of 5G exposure the symptoms were so severe that the man could not stay in his apartment any more. The levels of RF radiation averaged over 2 minutes were very much lower than the ICNIRP 2020 recommended limits (Table 2).

The SCHEER opinion appears to be a minority opinion that favors telecommunications industry interests. It is clear that ICNIRP limits are considered important to the industry. An example of that is given by an employee within Ericsson who in 2018 stated in a presentation with the title “Impact of EMF limits on 5G network roll-out” that 5G roll-out would be difficult or impossible if 100 times

lower limits than ICNIRP’s are applied [17]. Another example is a promotional brochure advocating for the ICNIRP 2020 limits from the GSM Association, which is a global organization representing the interests of telecommunication operators [18].

The majority of scientists in this field recommend that lower limits than ICNIRP’s are elaborated and then applied to protect against all kinds of harmful health and other biological effects. These limits must also take into account that people are not equally sensitive and that there are more sensitive groups within the populations such as children, fetuses, the elderly and the electrosensitive persons. The SCHEER report also failed to address the risks with millimeter waves and the combined exposure effects with 5G and 4G at lower frequencies.

The Gigabit Infrastructure Act (GIA) for deployment of 5G millimeter wave technology

The EU Commission has to the EU parliament proposed a regulation called the Gigabit Infrastructure Act (GIA) which seems to be intended to facilitate and accelerate deployment of 5G millimeter technology, also called FR2 [9]. The proposal unilaterally favors telecom industry and those corporations that provide the infrastructure technology for 5G FR2, without taking any account of potential harmful effects on the public health and the environment. It would pave the way for much denser 5G infrastructure technology than today, mainly millimeter wave technology (26 GHz and above).

The GIA proposal lacks health and environmental impact assessments on (a) the cumulative long time RF radiation exposure from the 5G until now and (b) the total radiation after planned deployment of new millimeter wave technology. No studies have investigated effects on human health or on flora and fauna, neither from 5G millimeter wave exposure only, nor from the combined real exposure from 5G at 3.5 GHz and 5G millimeter waves at 26 GHz and more. In view of the lack of available studies scientists have recommended that 5G millimeter wave technology is not deployed as long as the potential health risks have not been investigated [19].

Several expert groups, e.g. ICBE-EMF, Health Council of the Netherlands and the EU Parliament’s STOA, have concluded that there are insufficient or no studies on health impacts from 5G millimeter waves [11,19,20]. As mentioned before, to date, only seven case studies have examined the health impact of real-life exposure to radiation from 5G antennas deployed at frequencies around 3.5 GHz [1-7]. All showed rapidly developing adverse health impacts. GIA millimeter wave additions from much denser networks of antennas will most likely increase the risks – there are no data that show that there are no health hazards.

Legal aspects

The consequences of GIA will be deployment of a technology continually exposing entire populations, against their informed consent, to a new form of radiation that has never been safety tested. This is contrary to the consolidated version of the Treaty on the Functioning of the European Union (TFEU) Articles 3 and 168 [21]. These articles state that the objectives of the EU include ‘a contribution to a high level of health protection’ (article 3) and that a high level of human health protection shall be ensured in the definition and implementation of all Union policies (article 168). It seems that both the SCHEER opinion report and the GIA proposal have overlooked these legal aspects.

A democratic society like EU must ensure that the environment and humans, especially children, will not be forcibly exposed to new

forms of radiation never experienced in history that has not been adequately tested to be safe. The burden of proof to demonstrate absence of serious environmental and health impacts must be placed on those industries responsible for the exposure, the EU Commission and its health agencies. It could be argued that the 5G roll-out is in violation of the Nuremberg code [22]. Although the code is intended for medical experiments, it could apply also to involuntarily enforced exposure to 5G since it is untested as to its safety below or at ICNIRP limits, thus experimental. The most essential aspect of the code is informed consent which is clearly violated by both the telecommunications industry and the EU Commission when proposing to deploy the 5G microwave and millimeter wave technology exposing people in their own homes, in schools and in their workplaces without their informed consent.

Another important aspect is that the experiment should be conducted so that all unnecessary physical and mental suffering and injury are prevented, also clearly ignored by the industry and the responsible political decision makers at the EU Commission. There have been no efforts so far to investigate the health effects that have been reported from the involuntary exposure to 5G so far. Instead, injured people have been left without any help and support from the governments that allowed the involuntary and experimental exposure.

Concluding remarks

Until now, the EU Commission has - contrary to the EU Precautionary Principle - not acted to protect European citizens from the adverse effects of massively increasing electromagnetic radiation exposure from the 5G roll-out. One major drawback is that EU relies on its expert group SCHEER with working group members supporting industry interests. The SCHEER opinion report is clearly biased in favor of ICNIRP, which in turn is a 14-person self-selecting group of members supporting telecom industry interests of maintaining the ICNIRP limits. Thereby only heating effects from RF radiation are admitted as risk factors and all other well proven biological and health effects caused by non-thermal radiation are rejected.

However, also EU:s own STOA report [20] and most scientific results [11] up to this day convincingly show that there are harmful effects both on humans and animals well below the ICNIRP limits. This means that the ICNIRP limits are not based on an objective assessment of available science.

Public health and wellbeing must be more important than economic considerations. The push for 5G seems much to be based mainly on economic considerations that favor a few very influential telecommunications interests. The Gigabit Infrastructure Act (GIA) must be postponed since there is no research that shows the 5G technology to be safe. On the contrary the few studies available this far indicate considerable risks to human health and the environment.

To deploy this technology without consideration of health effects and safety testing would force all European people to be "guinea pigs" in a massive health experiment which infringes several EU laws and several paragraphs in the EU Treaty [21].

References

1. Hardell L, Nilsson M. Case report: The microwave syndrome after installation of 5G emphasizes the need for protection from radiofrequency radiation. *Ann Case Report*. 2023;8:1112.
2. Nilsson M, Hardell L. Development of the microwave syndrome in two men shortly after installation of 5G on the roof above their office. *Ann Clin Case Rep*. 2023;8:2378.
3. Hardell L, Nilsson M. Case report: A 52-year healthy woman developed severe microwave syndrome shortly after installation of a 5G base station close to her apartment. *Ann Clin Med Case Rep*. 2023;10(16):1-10.
4. Nilsson M, Hardell L. 5G Radiofrequency radiation caused the microwave syndrome in a family living close to the base stations. *J Cancer Sci Clin Ther*. 2023;7:127-34.
5. Nilsson M, Hardell L. A 49-year-old man developed severe microwave syndrome after activation of 5G base station 20 meters from his apartment. *J Community Med Public Health* 2023;7:382.
6. Nilsson M, Hardell L. Case Report: Both parents and their three children developed symptoms of the microwave syndrome while on holiday near a 5G tower. *Ann Clin Med Case Rep*. 2023;12(1):1-7.
7. Hardell L, Nilsson M. A woman aged 82 years with electromagnetic hypersensitivity since almost four decades developed the microwave syndrome after installation of 5G base stations in her living vicinity – ethical principles in medicine are violated. *J Environ Sci Publ Health*. 2024;8:01-08.
8. European Commission: Scientific Committee on Health, Environmental and Emerging Risks SCHEER Opinion on the need of a revision of the annexes in the Council Recommendation 1999/519/EC and Directive 2013/35/EU, in view of the latest scientific evidence available with regard to radiofrequency (100kHz–300GHz). Final Opinion April 18, 2023.
9. European Commission: Gigabit Infrastructure Act Proposal and Impact Assessment. 23 February 2023.
10. Levitt BB, Lai HC, Manville AM. Effects of non-ionizing electromagnetic fields on flora and fauna, part 1. Rising ambient EMF levels in the environment. *Rev Environ Health*. 2021;37(1):81-122.
11. 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*. 2022;21(1):92.
12. International Commission on Non-Ionizing Radiation Protection (ICNIRP). Guidelines for limiting exposure to electromagnetic fields (100 kHz to 300 GHz). *Health Phys*. 2020;118:483-524.
13. Nilsson M, Frøkjær Jensen V, Eiriksson H. Critique of SCHEER Opinion Report on Health Risks from Radiofrequency Radiation. A review of the EU expert group and opinion of April 2023 on the need of a revision of the maximum exposure limits for radiation from wireless communications, 3rd edition October 2, 2023. The Council for Safe Telecommunications (Denmark) and The Swedish Radiation Protection Foundation.
14. Lin JC. Carcinogenesis from chronic exposure to radio-frequency radiation. *Front Public Health*. 2022;10:1042478.
15. Lin JC. RF Health Safety Limits and Recommendations. *IEEE Microwave Magazine*, June 2023.
16. Hardell L, Nilsson M, Koppel T, Carlberg M. Aspects on the International Commission on Non-Ionizing Radiation Protection (ICNIRP) 2020 guidelines on radiofrequency radiation. *J Cancer Sci Clin Ther*. 2021;5:250- 83.
17. Törnevik C, Ericsson. Impact of EMF limits on 5G network roll-out. ITU Workshop on 5G, EMF and Health. Warsaw, December 5, 2017.
18. GSM Association. International EMF Exposure Guidelines. Explaining the 2020 RF-EMF exposure guidelines published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), October 2021.
19. 5G and Health. Executive summary. Health Council of the Netherlands. September 2, 2020.
20. Belpoggi F. Health impact of 5G. European Parliamentary Research Service, 2021.

21. Nyberg R, McCredde J, Hardell L. The European Union assessments of radiofrequency radiation health risks – another hard nut to crack (Review). *Rev Environ Health*. 2023. <https://doi.org/10.1515/reveh-2023-0046>
22. Shuster E. Fifty years later: the significance of the Nuremberg code. *N Engl J Med*. 1997;337:1436-40.
23. International Commission on Non-Ionizing Radiation Protection (ICNIRP). Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz). *Health Phys*. 1998;74(4):494-522.
24. Salzburg resolution on mobile telecommunication base stations. Salzburg, June 7-8, 2000.
25. European Parliament. The physiological and environmental effects of non-ionising electromagnetic radiation. Final Study. Luxembourg, 2001.
26. Oberfeld G, Navarro AE, Portoles M, Maestu C, Gomez-Perretta C. The microwave syndrome - further aspects of a Spanish study. 2002.
27. BioInitiative Working Group. Sage C, Carpenter DO, editors. BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Radiation.
28. Belyaev I, Dean A, Eger H, Hubmann G, Jandrisovits R, Kern M, et al. EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses. *Rev Environ Health*. 2016;31:363-97.