



OVERVIEW

for a clearer picture

No. 5

Does electromagnetic hypersensitivity (EHS) exist?

Overview No. 5

Does electromagnetic hypersensitivity exist?

Updated: 14 September 2026

Summary

The diagnose:funk publication series "Overview for a clearer picture" reports on the state of research into the health effects of non-ionising radiation from mobile communications. The scientific literature searches draw on the databases www.EMFdata.org and www.EMF-Portal.de.

Overview No. 5 addresses the debate over whether radiation can cause electromagnetic hypersensitivity (EHS) and documents the medical findings. It is understandable why the mobile communications industry declares this illness imaginary: linking its products to illness harms its business. Yet the authorities responsible for health and radiation protection also claim that EHS is a psychological reaction associated with fear. They deny links with radiation exposure and claim there is no causal mechanism connecting cause and effect. This article examines the evidence for this connection, the demand for proof of causality as a prerequisite for recognising an illness, and why people with electromagnetic hypersensitivity face discrimination.

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IBAN: DE39 4306 0967 7027 7638 00
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1 Electromagnetic hypersensitivity (EHS): a biologically expected reaction

1.1 An accepted effect of radiation until the 1990s

Electromagnetic hypersensitivity means particular sensitivity to low- and high-frequency electromagnetic fields. Before mobile communications were introduced for civilian use, up to around the late 1990s, sensitivity to radar and radio-frequency radiation had not been questioned for more than 70 years. It had various names: electro-allergy, microwave syndrome, electromagnetic hypersensitivity and radio operator's illness. Increasing complaints, ranging from burnout to changes in blood counts and cancer, were observed particularly among radar operators.¹ The German federal government subsequently denied a connection, and injured soldiers had to endure gruelling litigation. This is documented in "The Fatherland's Gratitude" (2008). The Otto Hug Radiation Institute's 2015 report "Underestimated health hazards from radioactivity: the example of radar soldiers" examined interactions between radar and mobile phone radiation:

"Until now, official bodies and the Radar Commission have considered radar radiation exposure harmful to health only if the radiation's power density causes a measurable increase in tissue temperature. However, numerous studies now exist on mobile communications, whose high frequencies also lie in the microwave range. They show that prolonged exposure can cause irreversible pathological disorders, such as infertility, even below the so-called thermal threshold. Combined effects of ionising and non-ionising radiation must also be considered a possible cause of the multiple illnesses observed among radar soldiers and workers" (p. 9).²

The relevant literature discussed protective measures, but also the therapeutic use of high-frequency radiation. Its biological effectiveness was beyond doubt.³ This rested on the recognition that humans are electromagnetic beings: cell processes are controlled by electrical impulses (neuronal firing, cardiac action potentials, EEG, ECG, etc.). Electrobiological and electromedical examined how artificially generated radiation can influence these metabolic processes both positively, for example through short-wave therapy or PEMF (pulsed EMF for bone treatment), and

1 Uli Borsch (2008): The Fatherland's Gratitude, Verlagsgenossenschaft Liebig.

Wenzel KP (1967): The problem of the influence of microwaves on the health of radar personnel of the National People's Army, Greifswald 1967; classified document No. C 13937, Institute of Aviation Medicine, Military Hygiene and Field Epidemiology, Ernst Moritz Arndt University.

Schliephake E: Research results in the short-wave field; Deutsche medizinische Wochenschrift, No. 32, 1932.

2 Mämpel W et al. (2015): Underestimated health hazards from radioactivity: the example of radar soldiers. Published by the Otto Hug Radiation Institute, 2015.

3 Cook HJ et al. (1980): Early research on the biological effects of microwave radiation: 1940-1960, Annals of Science, Vol. 37, No. 3, May 1980.

Steneck NH (1984): The Microwave Debate. MIT, 1984.

Varga A (1995): "Electrosmog". Molecular biological evidence of the biological effects of electromagnetic fields and radiation, Heidelberg, 1995.

negatively.⁴ Knowledge of harmful effects was increasingly suppressed. For example, Prof. Karl Hecht's study (1996) for the Federal Office for Telecommunications on research findings from Russia was not allowed to be published.⁵ The Federal Office for Radiation Protection's "Radiation Protection Guidelines" (2005), which called for statutory protection for the emerging civilian use of mobile communications, were immediately withdrawn following protests by the industry association Bitkom.⁶

1.2 Mechanisms of electromagnetic hypersensitivity have been decoded

With the advent of ubiquitous mobile communications from about 1995, the entire population has been exposed to non-ionising radiation (NIR). Growing numbers of people report complaints from radiation exposure that resemble, in milder form, those experienced by radar soldiers.

The evidence on the effects of NIR has improved. Research findings now exist for many medical endpoints involving harm from NIR, documented in www.EMF-portal.de and www.EMFdata.org, in ElektrosmogReport since 1995,⁷ and in technology assessment reports by the German Bundestag and the EU.⁸ These are generally animal studies. According to toxicological criteria, their results can be extrapolated to humans, particularly from reference organisms, such as chick embryos for pregnancy,⁹ fruit flies (*Drosophila*) for oogenesis,¹⁰ and rats and mice for sperm development¹¹

4 Schliephake E (1960): Short-wave therapy: the medical use of electrical ultra-high frequencies, Fischer, Stuttgart. The same author (1938): Treatment of rheumatic diseases with ultra-short waves, Steinkopff. The same author (2000): Cancer and inflammation: treatment with ultra-high frequencies, Kelkheim. Liebesny P (1935): Short and ultra-short waves: biology and therapy, Urban & Schwarzenberg. Gicklhorn J (1948): Electricity in living organisms, Vienna University Press. Becker RO (1994): The healing power and dangers of electricity, Scherz.

5 Hecht K (1996): Biological effects of electromagnetic fields in the 0-3 GHz frequency range on humans. Review of Russian literature from 1960-1996, commissioned by the Federal Ministry for Telecommunications; order No. 4131/630 402, 14 November 1996.

6 Federal Office for Radiation Protection: BfS position on fundamental questions of radiation protection, "Radiation Protection Guidelines", 1 June 2005. Download: <https://diagnose-funk.org/1507>

7 ElektrosmogReport archive: <https://www.emfdata.org/de/elektrosmogreport?&page=1>

8 Bundestag document 20/5646 (2023): Report of the Committee on Education, Research and Technology Assessment: Possible health effects of different frequency ranges of electromagnetic fields (RF-EMF). EU STOA and EESC documents: <https://diagnose-funk.org/1899>

9 Islam MS, Islam MM, Rahman MM & Islam K (2023): 4G mobile phone radiation alters some immunogenic and vascular gene expressions, and gross and microscopic and biochemical parameters in the chick embryo model. Veterinary Medicine and Science, 1-12. <https://doi.org/10.1002/vms3.1273>

10 Panagopoulos DJ (2012): Effect of microwave exposure on the ovarian development of *Drosophila melanogaster*. Cell Biochem Biophys 2012; 63(2): 121-132. <https://www.emf-portal.org/de/article/20327>

Panagopoulos DJ, Chavdoula ED, Nezis IP, Margaritis LH (2007): Cell death induced by GSM 900-MHz and DCS 1800-MHz mobile telephony radiation, Mutat Res Genet Toxicol Environ Mutagen 2007; 626 (1-2): 69-78 11 Kim S, Han D, Ryu J, Kim K, Kim YH (2021): Effects of mobile phone usage on sperm quality - No time-dependent relationship on usage: A systematic review and updated meta-analysis. Environ Res 2021; 202: 111784 Kesari KK et al. (2011): Effects of Radiofrequency Electromagnetic Wave Exposure from Cellular Phones on the Reproductive Pattern in Male Wistar Rats. Appl Biochem Biotechnol 2011; 164 (4): 546-559 Kesari KK, Behari J (2012): Evidence for mobile phone radiation exposure effects on reproductive pattern of male rats: Role of ROS. Electromagn Biol Med 2012; 31 (3): 213-222

and effects on DNA.¹² The extensive recent studies on sublethal effects in insects alone demonstrate that NIR affects cellular processes and how it does so.¹³ Many identify oxidative cellular stress as the mechanism; these effects are athermal, meaning they are observed below the threshold for thermal damage (Fig. 1).¹⁴

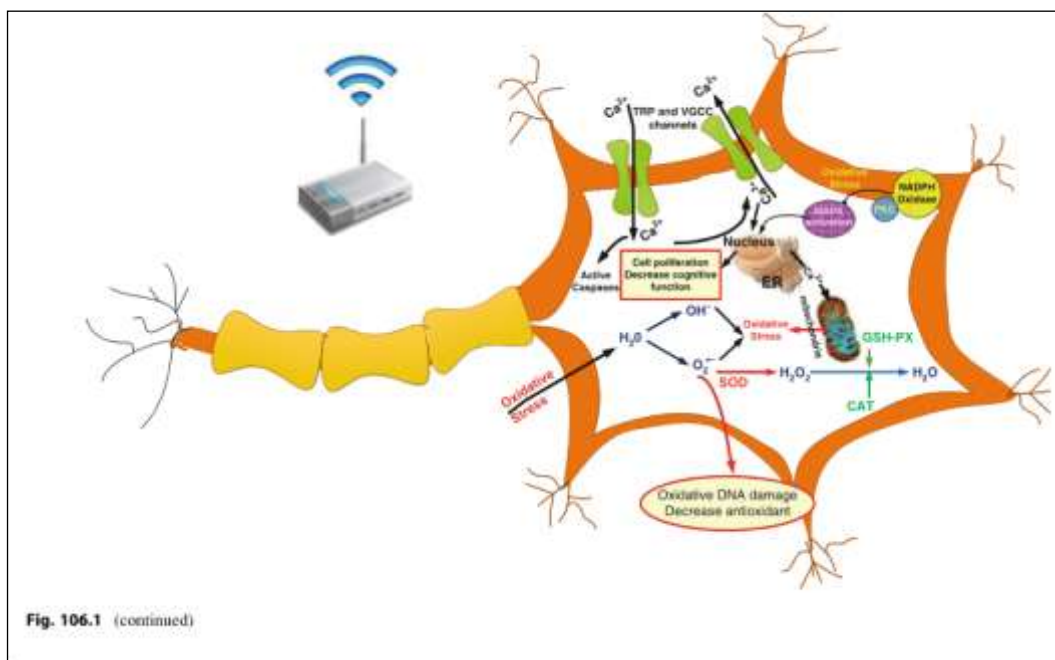


Fig. 1. Diagram of demonstrated mechanisms following exposure of a cell to non-ionising radiation. From Naziroglu / Akman 2014, Springer Reference Book; see note 16.

- 12 Choi Y J, Moskowitz J M, Myung S-K, Lee Y-R, Hong, YC (2020): Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis; International Journal of Environmental Research and Public Health, 2020, 17, 8079 National Toxicology Program (2018): Toxicology and Carcinogenesis Studies in Hsd:Sprague Dawley SD Rats Exposed to Whole-Body Radio Frequency Radiation at a Frequency (900 MHz) and Modulations (GSM and CDMA) Used by Cell Phones. US. https://ntp.niehs.nih.gov/ntp/htdocs/lt_rpts/tr595_508.pdf Falcioni et al. (2018): Report of final results regarding brain and heart tumors in Sprague-Dawley rats exposed from prenatal life until natural death to mobile phone radiofrequency field representative of a 1.8GHz GSM base station environmental emission, Environ Res 2018; 165: 496-503 13 Mulot M, Kroeber T, Gossner M, Fröhlich J (2022): Effects of non-ionising radiation (NIR) on arthropods. Report commissioned by the Swiss Federal Office for the Environment (FOEN), Neuchâtel, July 2022.
- Thill A, Cammaerts M-C, Balmori A (2023): Biological Effects of Electromagnetic Fields on Insects: a Systematic Review and Metaanalysis, Reviews on Environmental Health, <https://www.doi.org/10.1515/reveh-2023-0072>
- Treder M, Müller M, Fellner L, Traynor K, Rosenkranz P (2023): Defined exposure of honey bee colonies to simulated radiofrequency electromagnetic fields (RF-EMF): Negative effects on the homing ability, but not on brood development or longevity. Sci Total Environ 2023; 896: 165211.
- 14 See Overview No. 3 on non-thermal effects: <https://diagnose-funk.org/2090>

The German federal government's database, EMF-Portal, defines oxidative cellular stress as follows:

*"Oxidative stress arises when oxidative processes involving free radicals (e.g. hydrogen peroxide) exceed the capacity of antioxidant processes to neutralise them, shifting the balance towards oxidation. This can cause various forms of cell damage, such as oxidation of unsaturated fatty acids, proteins and DNA."*¹⁵

Extensive studies now demonstrate that non-ionising radiation, like particulate matter, pesticides and other toxic substances, can cause oxidative cellular stress and subsequent inflammatory processes (see Fig. 2). Reviews by Naziroglu/Akman (2014), Yakymenko et al. (2015) and Schürmann/Mevissen (2020), commissioned by the Swiss government, summarise these findings.¹⁶ Yakymenko et al. conclude: "Radiofrequency radiation therefore becomes a potentially dangerous factor for human health because of the extensive biological potential of ROS (reactive oxygen species) and other free radicals, including their mutagenic effects and regulatory signalling potential." The increase in oxidative damage caused by EMF exposure occurs at levels a thousand times

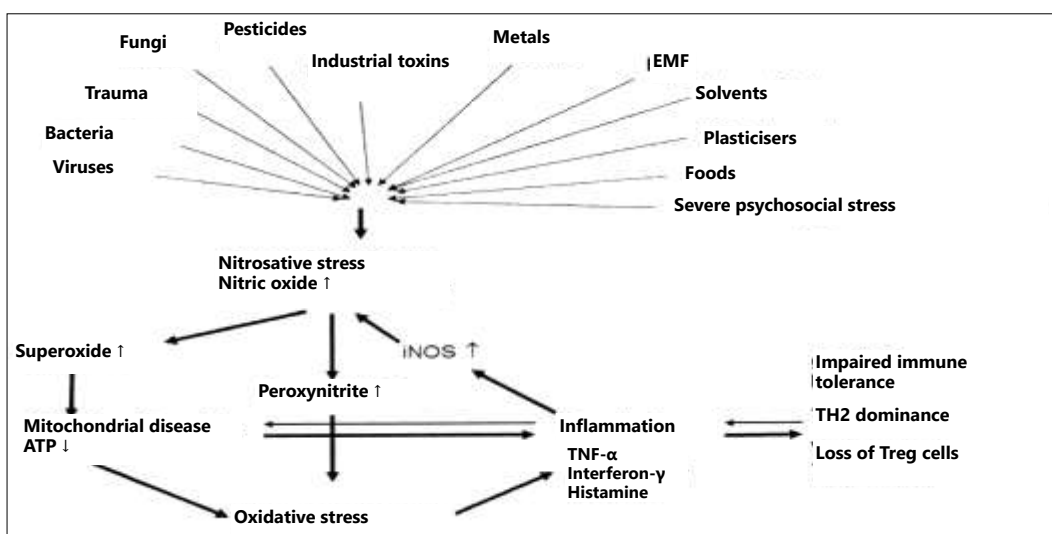


Fig. 2. Pathogenesis of inflammation, mitochondrial disease and nitrosative stress following exposure to trigger factors. Interactions between many toxic substances lead to inflammation; their combined effects are largely unstudied. Diagram: von Baehr, umg, 2012.

15 Definition from EMF-Portal: <https://www.emf-portal.org/de/glossary/1803>

16 Naziroglu M, Akman H (2014): Effects of Cellular Phone- and Wi-Fi-Induced Electromagnetic Radiation on Oxidative Stress and Molecular Pathways in Brain. In: I. Laher (ed.), Systems Biology of Free Radicals and Antioxidants, Springer Berlin Heidelberg, 106, pp. 2431-2449.

Yakymenko I et al. (2016): Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation. Electromagn Biol Med 2016; 35(2): 186-202. Published as a diagnose:funk Focus report: "Mobile phone radiation far below exposure limits causes oxidative stress in cells". PDF: <https://diagnose-funk.org/download.php?field=filename&id=311&class=DownloadItem>

Schürmann D, Mevissen M (2021): Manmade Electromagnetic Fields and Oxidative Stress - Biological Effects and Consequences for Health. Int. J. Mol. Sci. 2021, 22, 3772. <https://doi.org/10.3390/ijms22073772>

below the limits in the non-thermal range, from a power density of $0.1 \mu\text{W}/\text{cm}^2$ ($= 1,000 \mu\text{W}/\text{m}^2$) and absorption of $\text{SAR} = 3 \mu\text{W}/\text{kg}$. This is far below both the exposure limits and the levels users encounter during normal operation of devices, routers, transmitters and Wi-Fi hotspots.

After evaluating 223 studies, Schürmann/Mevissen write: "In summary, evidence of increased oxidative stress from RF-EMF and ELF-MF was reported in the majority of animal studies and in more than half of the cell studies." Consistent evidence of oxidative cellular stress was found in the brain, testes, heart, liver and kidneys: "Unfavourable conditions, such as diseases (diabetes, neurodegenerative diseases), impair the body's defence mechanisms, including antioxidant protection, and people with such pre-existing conditions are more susceptible to health effects" (p. 23).

The cellular cascades through which these metabolic disturbances occur have been decoded (see Figs. 1 and 3).¹⁷ Based on the so-called thermal dogma, German authorities claim that the exposure limits protect against the only proven risk:

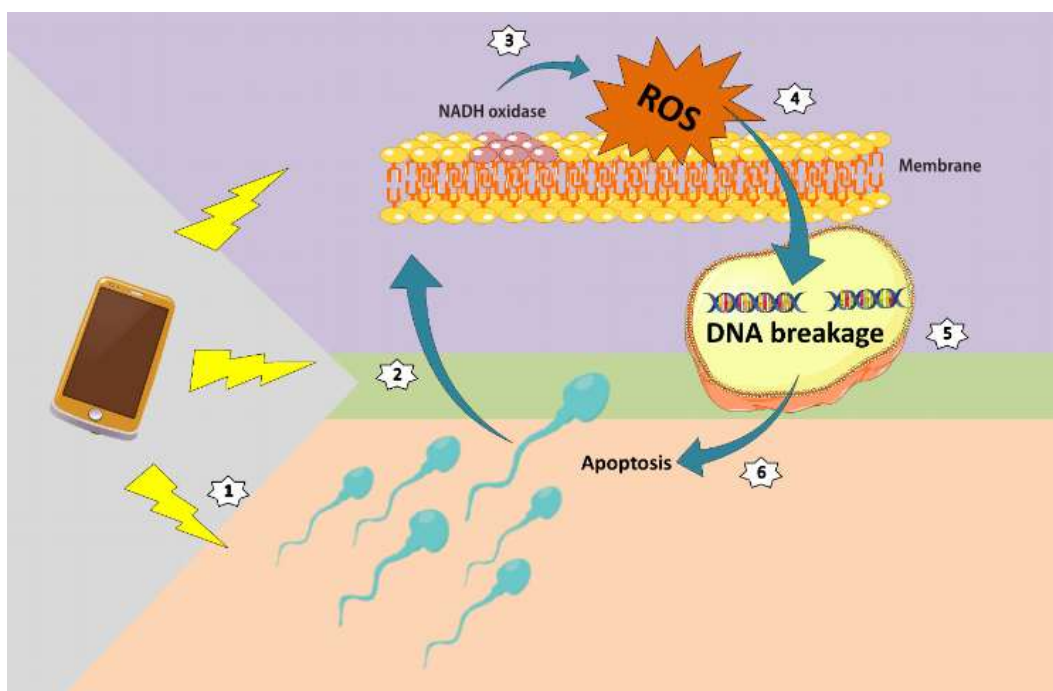


Fig. 3. "Electromagnetic waves emitted by mobile phones stimulate nicotinamide adenine dinucleotide hydrogen (NADH) oxidase in the plasma membrane, which in turn impairs the integrity of the sperm nucleus. Within the nucleus, the DNA structure deteriorates, driving the cell towards apoptosis. ROS: reactive oxygen species."

Text and diagram: Seify M, Khalili MA, Anbari F, Koohestanidehaghi Y (2023): Detrimental effects of electromagnetic radiation emitted from cell phone on embryo morphokinetics and blastocyst viability in mice. *Zygote* 2024: 1-5.

17 Desai et al. (2009): Pathophysiology of cell phone radiation: oxidative stress and carcinogenesis with focus on male reproductive system *Reproductive Biology and Endocrinology* 2009, 7:114 doi:10.1186/1477-7827-7-114

the heating effect of NIR. They claim that this fulfils the precautionary requirement, because non-ionising radiation below the limits cannot, in principle, damage cellular processes, and therefore electromagnetic hypersensitivity cannot exist. This has been refuted both by evidence of the oxidative cellular stress mechanism and by hundreds of studies demonstrating harmful athermal effects on numerous health endpoints.¹⁸

The diverse complaints experienced by people with electromagnetic hypersensitivity, including headaches, exhaustion and heart problems, are mostly attributable to inflammatory processes triggered by oxidative cellular stress. Research continues, and other possible mechanisms are being discussed, such as effects on calcium ion channels and ferroptosis.¹⁹

Every organism responds to artificially generated radiation, but not everyone responds hypersensitively or becomes ill from electromagnetic exposure. The principle is that external causes (e.g. radiation) act through internal conditions. The state of the immune system and pre-existing burdens affect the risk of becoming ill from electromagnetic fields.²⁰ These burdens may include mercury, lead, aluminium, microplastics, viruses or pesticides. Together with electromagnetic fields, the total burden may become so great that the body's equilibrium (homeostasis) is disrupted and symptoms develop. These symptoms generally lessen or disappear when exposure is removed.

Conclusion 1: There is a scientific explanation for why people become electromagnetically hypersensitive: non-ionising radiation from mobile communications causes oxidative cellular stress, which is undisputed in science. Oxidative cellular stress leads to inflammatory processes in the body.

It would be abnormal if people with relevant pre-existing burdens did not feel these changes or suffer impairment from them. It is therefore plausible that these processes cause symptoms in part of the population.

18 Documentation of 682 studies showing adverse effects: <https://www.emfdata.org> (as of 12 June 2024); collection of reviews: <https://diagnose-funk.org/1693>

19 Ullrich V, Apell HJ (2021): Electromagnetic Fields and Calcium Signaling by the Voltage Dependent Anion Channel, Open Journal of Veterinary Medicine, 2021, 11, 57-86 <https://www.scirp.org/journal/ojvm> Lai Y, Wang H, Xu X, Dong J, Song Y, Zhao H, Wu Y, Zhao L, Wang H, Zhang J Yao B, Zou Y, Zhou H, Peng R (2023): Hippocampal ferroptosis is involved in learning and memory impairment in rats induced by microwave and electromagnetic pulse combined exposure. Environmental Science and Pollution Research. <https://doi.org/10.1007/s11356-023-28280-8>

Scheler K (2016): Polarisation: a key factor in understanding biological effects of pulsed low-intensity electromagnetic waves. umwelt · medizin · gesellschaft, 3/2016, supplement. PDF: <https://diagnose-funk.org/1170> 20 diagnose:funk (2020): Mobile communications technology, radiation exposure and the immune system: what research since the 1980s tells us. <https://diagnose-funk.org/1550> Belyaev et al. (2016): EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses; Rev Environ Health 2016; DOI 10.1515/reveh-2016-0011, <https://diagnose-funk.org/1107>

2 Demanding causality as a pseudoscientific distraction

People affected by EHS respond to athermal biological effects, which do not cause harmful heating but alter and thereby damage metabolic processes (see above).²¹ Some respond quickly to electromagnetic fields; in others the effects are delayed. As with other pollutants, not everyone becomes ill from exposure. Yet this fact is used to argue against a causal connection between radiation and illness. Causal links are lacking for many diseases, particularly those with non-specific symptoms. The causes of immune system dysfunction in people with Long Covid remain unclear, although a correlation can no longer be denied. Many occupational disease cases cause hardship: common sense may make the cause-and-effect relationship clear, yet insurers and courts refuse recognition because causality is disputed or unproven. Missing or contestable proof of causality is used as a pretext to deny compensation or pension claims. The argument that action requires proof of causality justifies inaction. Requiring causality before acting is highly problematic in medicine; knowledge of a causal connection is often unnecessary or unattainable in the foreseeable future. The relevance of a risk must be assessed using the Bradford Hill criteria.²² diagnose:funk published the Focus report "The Causality Fraud" (2020) on this issue.²³

2.1 Unconstitutional: exposed without protection or a precautionary principle

Anja Brückner's dissertation "Municipal mobile communications strategies between precaution and service provision" (2022), published in the Erlangen Studies in Public Law series, criticises the German federal government for ignoring research on athermal effects and commissioning insufficient research of its own. This results in "untenable" exposure limits. The demand for causality is instrumentalised to undermine the precautionary principle and thus protective policy:

"The very purpose of precaution is to respond to difficulties of proof and problems of causality. However, grounds for concern are necessary to prevent precautionary policy from becoming excessive. Case law no longer classifies athermal effects of mobile phone radiation as mere fears of emissions, but recognises a risk level relevant to precaution. Grounds for concern about athermal effects therefore exist despite the lack of a clear

21 Documentation and definition of athermal effects in diagnose:funk Overview No. 3, "Non-thermal effects of mobile phone radiation" (2024): <https://diagnose-funk.org/2090>

22 https://de.wikipedia.org/wiki/Austin_Bradford_Hill. The issue is discussed in Klaus Scheler (2019): "How dangerous is electrosmog really?" Vince Ebert's position on mobile phone hazards examined, umwelt · medizin · gesellschaft, 2/2019.

23 PDF: <https://diagnose-funk.org/1539>

causal relationship" (p. 65). Brückner points to progress in research: "Research findings proving the harmfulness of biological force effects caused by mobile phone radiation are now accumulating" (p. 66). Even legally actionable causality requirements are therefore met. Since the limits "completely disregard athermal effects", they are "untenable in view of the federal government's inadequate research efforts": "They provide no precaution whatsoever regarding athermal effects and are therefore deficient, meaning the federal government violates the objective content of Article 2(2), sentence 1 of the Basic Law. A reassessment of the risk situation taking these effects into account is required" (p. 66).²⁴

As advancing digitalisation exposes "an incalculable number of people to electromagnetic radiation, the need to interpret § 22 of the Federal Immission Control Act (BImSchG) in a manner consistent with protection, as a norm imposing a general precautionary duty, becomes even clearer ... A general precautionary duty ... for both thermal and athermal effects of mobile phone radiation, applying to municipalities in land-use planning, is therefore proportionate and necessary" (p. 66). Municipalities thus have "a constitutional duty of protection, particularly regarding young people because of their potentially increased electrosensitivity and need for protection" (p. 132), covering, among other things, "sensitive locations", "sensitive facilities" and "residential facilities" (p. 133).

2.2 The exposure limits are untenable

Brückner criticises the German federal government for breaching its "duty to monitor" research (p. 49) through "failure to include further findings on athermal effects" (p. 53) and "no further efforts ... to conduct research" (p. 52). She censures its failure, through "inaction" (p. 50), to fulfil its "duty to remedy deficiencies" in the limits: "The limits intended to protect health have become constitutionally untenable because of new findings or changed circumstances, and the required protective objective cannot be achieved" (p. 50). She concludes that "the regulator is not striving to improve protection of the population": "The state therefore fulfils its precautionary duty only regarding thermal effects. Since athermal effects have not been included in the (re)calculation of the limits in the 26th Federal Immission Control Ordinance, despite current findings and risk levels relevant to precaution, these limits, considering mobile phone radiation as a whole, are currently unsuitable for providing precaution and therefore untenable" (p. 50). Brückner calls for an end to excluding research on athermal effects from risk assessments. Starkey (2016) demonstrated the extent to which this occurs under the influence of the industry-linked ICNIRP (International Commission on Non-Ionizing Radiation Protection), distorting the assessment of risk.²⁵ Brückner appeals to legislators: "Both the numerous studies and research on mobile communications and the current existence of a risk level relevant to

24 Brückner A (2022): Municipal mobile communications strategies between precaution and service provision. Erlangen Studies in Public Law, Berlin.

25 Starkey SJ (2016): Inaccurate official assessment of radiofrequency safety by the Advisory Group on Non-ionising Radiation. *Rev Environ Health* 2016; 31(4): 493-503. Translated as a diagnose:funk Focus report: "Study shows how exposure limits are given pseudoscientific legitimacy". <https://diagnose-funk.org/1163>

precaution clearly demonstrate the need for a state duty of protection. Mobile phone radiation is not a residual risk with socially acceptable side effects" (p. 46).

With a veneer of apparent logic, the demand for causality is used to evade this duty of protection, particularly at the expense of people with electromagnetic hypersensitivity, whose health and social lives are severely impaired by these "side effects". Brückner's legal analysis is a first-class reprimand to the federal government. It agrees with the biological and medical analysis by ICBE-EMF (International Commission on the Biological Effects of EMF), which demonstrates that the current ICNIRP limits are scientifically indefensible and provide no protection, because they recognise only excessive heating as harmful.²⁶ This "thermal dogma" has legitimised military radio and radar practices since the 1950s.²⁷ In its 2022 opinion in the Official Journal of the EU, the European Economic and Social Committee (EESC) calls for new limits based on the evidence, incorporating studies on athermal effects, and for replacing the industry-linked ICNIRP with an independent body.²⁸

The attempt to legitimise the expansion of mobile infrastructure through pseudoscience and unsuitable limits is another example of sociologist Ulrich Beck's incisive analysis. In "World at Risk" (2007), he defines the modern state as a "legitimizing body" for industrial interests, in which dangers to health and the environment "are normalised within the legitimating circle of administration, politics, law and management, and grow into an uncontrollable global dimension" (p. 172). He captures this policy with the term "organised irresponsibility" (p. 345), writing: "The forms of alliance entered into by the neoliberal state instrumentalise the state ... to optimise and legitimise the interests of capital worldwide" (p. 128).

Conclusion 2: The claim that electromagnetic hypersensitivity cannot exist because exposure limits protect against harmful effects of electromagnetic fields serves the marketing of digital products. The ICNIRP limits are scientifically indefensible. The argument of missing causality is instrumentalised to undermine the precautionary principle and thus protective policy.

26 ICBE-EMF (2022): Scientific evidence invalidates health assumptions underlying the FCC (Federal Communications Commission, USA) and ICNIRP exposure limit determinations for radiofrequency radiation: implications for 5G. <https://icbe-emf.org/>; German translation: <https://diagnose-funk.org/1937>

27 On the history of the thermal dogma: Butler T (2020): Wireless Technologies and the Risk of Adverse Health Effects in Society: A Retrospective Ethical Risk Analysis of Health and Safety Guidelines. Online Working Paper. Published as a diagnose:funk Focus report: "Butler's investigations reveal the mobile communications industry's influence on worldwide radiation protection policy". PDF: <http://www.diagnose-funk.org/1683>

28 EESC (2022): Opinion of the European Economic and Social Committee on "The societal and ecological impact of the 5G ecosystem". <https://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=CELEX:52021IE2341>
<https://www.diagnose-funk.org/1828>

3 The role of the psyche

Despite the evidence, it is still claimed that electromagnetic hypersensitivity is imaginary and attributable to the nocebo effect. Is it psychologically caused? Clearly not! It is not a mental illness. The medical and biological reasons for EHS have been demonstrated. In its March 2022 opinion in the Official Journal of the EU, the European Economic and Social Committee (EESC) writes about electromagnetic hypersensitivity as an illness:

"4.13. The European Parliament, the EESC and the Council of Europe have recognised that electrosensitivity or electromagnetic hypersensitivity is an illness. It affects a number of people, and with the introduction of 5G, which requires a much greater density of electronic installations, this condition could become more frequent" (see note 27).

Ignoring the evidence on the effects of EMF on the body - censured by Brückner as "inaction" - the German Federal Office for Radiation Protection continues to claim that electromagnetic hypersensitivity is due to the nocebo effect. This gives the illness a psychological explanation. Its website states:

"Knowing that [electromagnetic] fields are present, combined with concern about their possible health effects, can cause symptoms. This mechanism is called the nocebo effect - the counterpart of the placebo effect."²⁹

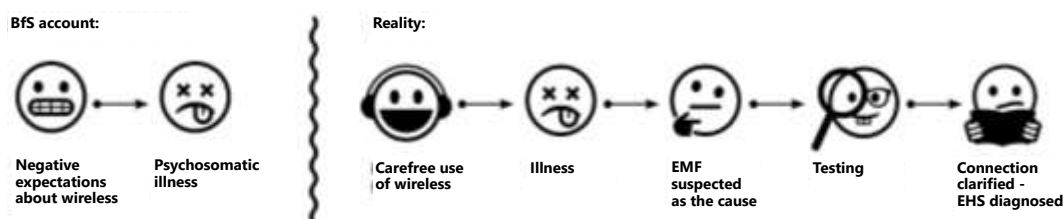


Fig. 4. The Federal Office for Radiation Protection's account of EHS as a psychological problem caused by the nocebo effect and treatable with psychotherapy can readily be refuted: most people affected have already been ill for months or years before considering that wireless radiation might be the trigger, and subsequently experience relief when exposure is reduced. This contradicts the nocebo theory. Diagram: diagnose:funk.

On this basis, patients with electromagnetic hypersensitivity risk misdiagnosis by uninformed doctors or those who trust official authorities, including occasional attempts to refer them for psychiatric admission.

²⁹ Federal Office for Radiation Protection: Scientifically discussed biological and health effects of high-frequency fields. <https://www.bfs.de/DE/themen/emf/hff/wirkung/hff-diskutiert/hff-diskutiert.html> (accessed 19 April 2024).

People with electromagnetic hypersensitivity (EHS) are sometimes not taken seriously by family and friends. They often encounter rejection without empathy. Those around them are barely willing to engage with the problem or the scientific evidence. The Federal Office for Radiation Protection's misinformation describing EHS as a psychological disorder, combined with assurances that EMF below the limits is harmless, encourages others to continue unrestricted wireless use and disregard affected people. Political and media behaviour leaves little room for empathy. Easily met requests, such as a radiation-free train compartment to allow participation in travel or wireless-free hospital rooms, are often rejected with indifferent stock responses. People with EHS thus face discrimination, social isolation and loneliness. "The effects of loneliness on mental and physical health are substantial," writes Deutsches Ärzteblatt.³⁰

3.1 Collective repression of risks

People with electromagnetic hypersensitivity usually have to cope psychologically with their suffering and discrimination alone. Fifty affected people describe how they do so in "The Forbidden Illness". EHS is not psychologically caused; on the contrary, the vehement denial of its existence has psychological reasons. People defend their own use of smartphones and other mobile devices, just as criticism of the harmfulness of cars (lead in petrol, particulate matter, etc.) was dismissed as opposition to progress in the 1960s.

The vast majority organise their lives through smartphones. These now define social status and have become a compass for life. Without them, many users would feel helpless and experience withdrawal, because many have become dependent or addicted. As early as 2015, IT professor Alexander Markowetz warned in "Digital Burnout": "The central challenge of the 21st century is to save the human psyche in its dealings with digital devices" (p. 25). He identifies "collective dysfunctions" (p. 25). US social scientist Jonathan Haidt's latest book is "The Anxious Generation", subtitled in German "How we lose our children to the virtual world and put their mental health at risk": "Their brains are configured for life on a screen. This destroys them" (NZZ interview, 8 April 2024).³¹ The guideline on dysfunctional screen use in children and adolescents, issued by 11 German professional associations, describes pathological consequences, including addiction potential.³² As with any drug, dependent users resist criticism out of fear of losing access. A person with EHS is seen as a threat to the digital (substitute) identity conferred by the smartphone. That person is

30 Bühring P (2022): Loneliness and social isolation: seeking evidence. Deutsches Ärzteblatt, Vol. 119, No. 26, 1 July 2022.

31 Haidt J (2024): Around 2012, young people's mental health fell off a cliff. NZZ interview. <https://diagnose-funk.org/2075>

32 "Guideline for preventing dysregulated screen media use in childhood and adolescence" (2023). Published by the German Society for Paediatrics and Adolescent Medicine (DGKJ), among others. <https://www.awmf.org/service/awmf-aktuell/praevention-dysregulierten-bildschirmmediengebrauchs-in-kindheit-und-jugend> and <https://diagnose-funk.org/2005>

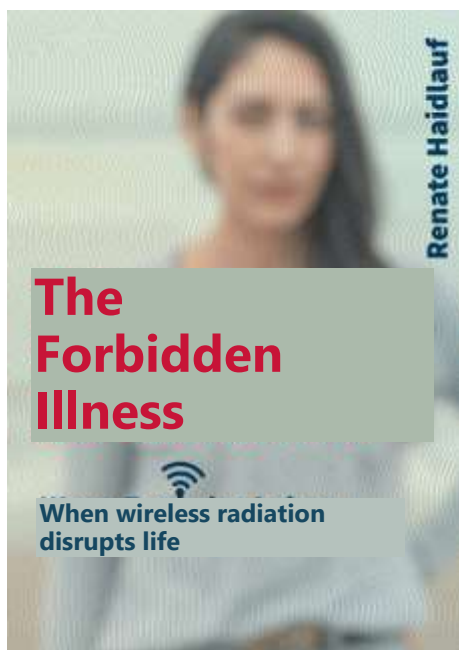
the guilty conscience made flesh. Rejection of criticism of adverse effects therefore rests on a reflexive fear that the affected person challenges one's media consumption, habits and convenience.

Resistance to discussing the negative sides of digitalisation extends beyond radiation effects. Discussion is refused even on ecological consequences, such as exploding energy and resource consumption from device production and data traffic, or impacts on nature, including insects. The hype surrounding digitalisation leads to collective repression of risks.

Conclusion 3: The debate about electromagnetic hypersensitivity must be demystified. More than a thousand studies demonstrate the effects of non-ionising radiation on metabolism in the body. People with EHS feel these EMF-induced effects. Arguments casting doubt on EHS rest on business interests and accommodating expert opinions rather than medical and biological facts. Linking products to illness harms the industry's business. It introduced the "psychological disorder" narrative as a marketing story to protect its products. Authorities continue to spread it and ignore the medical causes. By selling mobile spectrum licences worth €55 billion since 2001, the state has committed itself to promoting mobile technology and sold out health.

4 The forbidden illness - arguments in public debate

4.1 Hypersensitive reactions meet with a lack of understanding ...



This book, published by diagnose:funk, contains 50 accounts by people with electromagnetic hypersensitivity. <https://diagnose-funk.org/1889>

a) because radiation cannot be felt. Answer: In that case, radioactivity, UV and X-rays, and magnetic fields from high-voltage power lines would also have to be harmless.

b) because radiation is supposedly too weak to have biological effects. Answer: It would then be inexplicable that EM fields can trigger cell mutations in genetic research or even destroy cancer cells. It would also be inexplicable that over 1,000 studies show biological effects, particularly in the athermal range.³³

c) because nothing is heard or read about "any danger being discovered". Answer: Nothing is heard or read because years of propaganda suppress contrary views, dismiss them as unserious or allegedly unproven, or play them down. This is not a "conspiracy theory", but what science calls agnotology: the maintenance of ignorance.

Ignorance created by obstructing information and research is presented as knowledge.³⁴

Fact: There is no reporting that

- the Health Council of the Netherlands (the country's counterpart to a radiation protection office)³⁵ and
- the European Parliament's scientific advisory body STOA have called for a 5G moratorium,³⁶ and
- the German Bundestag's technology assessment committee recommended "considering protective zones" for affected people (see note 8).

³³ Effects are documented in <https://www.emf-portal.de> and <https://www.emfdata.org/>

Klaus Scheler (2019): Claims and spurious arguments, Part I: "Mobile phone radiation has too little energy to damage cells. Oxidative stress is implausible." <https://diagnose-funk.org/1441>

³⁴ <https://de.wikipedia.org/wiki/Agnotologie>

³⁵ Health Council of the Netherlands (2020): 5G and health. <https://www.healthcouncil.nl/documents/advisory-reports/2020/09/02/5g-and-health> (accessed 19 April 2024).

³⁶ EPRS | European Parliamentary Research Service (2021): Health Impact of 5G. [https://www.europarl.europa.eu/RegData/etudes/STUD/2021/690012/EPRS_STU\(2021\)690012_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2021/690012/EPRS_STU(2021)690012_EN.pdf) (accessed 19 April 2024).

Why is this not reported? Is it uninteresting to editors or the public?

Doctors ought to know that the Federal Office for Radiation Protection has itself repeatedly conducted large animal studies in mice, finding that tumour promotion by NIR is considered "established".³⁷ Why is this information not communicated?³⁸

Finally, given that three quarters of the population suffer sleep disorders - an increase from 47.5% in 2010 to 78.9% in 2016 (DAK study)³⁹ - and that the Health Council of the Netherlands had to acknowledge that sleep disorders from wireless radiation are "possible",⁴⁰ just as the WHO (2011) classified NIR as possibly carcinogenic,⁴¹ even below the limits, the public ought to be informed! Anyone could immediately try protective measures, such as switching off Wi-Fi and mobile phones at night, activating automatic shut-off, or avoiding continuously transmitting DECT phones.

Why has this continued for years? Concealing or casting doubt on product risks is part of marketing strategies analysed by former US occupational safety agency deputy director David Michaels in "Doubt Is Their Product" (2002), by MicrowaveNews in "The Foul Smell of Truth: The Corruption of the Scientific Literature Continues" (2022), and by the European Environment Agency in "Late Lessons from Early Warnings" (2013/2016).⁴² diagnose:funk published the Focus report "The struggle over interpretive authority on the risks of mobile phone radiation" (2022)⁴³ in German and English.

In their meta-analysis of the reviews commissioned by the WHO in 2019, Melnick et al. (2025) criticise serious shortcomings in the official evaluation of electromagnetic hypersensitivity (EHS). They cite the assessment of sleep disorders, which included no study involving people with EHS. They also criticise the use of power density and frequency as the only relevant criteria, while potential EHS

37 Lerchl A et al.(2015): Tumor promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans. *Biochem Biophys Res Commun* 2015; 459 (4): 585-590

38 Documentation of the overall evidence: Mobile phone radiation - a risk? Understanding the current state of research. A compass through an apparently confusing debate. <https://diagnose-funk.org/1895>

39 Ärzteblatt (2017): More and more Germans are sleeping poorly. <https://www.aerzteblatt.de/nachrichten/73627/Immer-mehr-Bundesbuerger-schlafen-schlecht>

<https://www.dak.de/dak/bundesthemen/fast-jeder-dritte-schueler-hat-schlafstoerungen-2090982.html>
40 Health Council of the Netherlands (2020): 5G and health, pp. 22, 25, 26. <https://www.healthcouncil.nl/documents/advisoryreports/2020/09/02/5g-and-health> (accessed 19 April 2024).

41 WHO (2011): Press release No. 208: IARC classifies radiofrequency electromagnetic fields as possibly carcinogenic to humans. <https://diagnose-funk.org/929>

42 Article by David Michaels: <https://diagnose-funk.org/1882>

MicrowaveNews: <https://diagnose-funk.org/1860>

EU documentation: <https://diagnose-funk.org/1039>

43 PDF and further information: <https://diagnose-funk.org/1934>

factors such as magnetic fields, low-frequency pulse modulation or the specific data transmission were ignored.⁴⁴

4.2 Misconceptions lead to an underestimation of risk

The dangers of non-ionising radiation (NIR) are also underestimated because of misconceptions about the propagation and capabilities of normal, everyday wireless radiation. People implicitly assume that radiation is essentially only “around us”. At most, a small part strikes our skin and is absorbed at its surface. We therefore do not really feel “hit” or affected, except perhaps by a phone held to the ear. Many imagine wireless radiation in a room as comparable to warming sunlight, which the skin and clothing supposedly prevent from entering the body.

Technical descriptions refer to a maximum “penetration depth” of “only” 10 cm (GSM network). This suggests that radiation cannot penetrate any deeper. In fact, the technical term merely means that about 37% of the radiation originally incident on the skin remains at that point; the body’s tissues have absorbed 63%. The remaining 37% continues through the body, becoming further attenuated until it has passed through completely. The same happens when radiation passes through walls and other obstacles between a transmitter and receiver.

We must also consider that radiation now reaches us from all directions, so energy is absorbed from the front, back and sides. The WHO already stated in Fact Sheet No. 193 that all organs, including the brain, are “slightly heated” - and thus reached by radiation (!) - during everyday mobile phone use.⁴⁵ No health disadvantage is assumed from this artificial fever provided warming does not exceed 0.1 to 1°C (!).

44 Melnick RL et al. (2025): The WHO-commissioned systematic reviews on health effects of radiofrequency radiation provide no assurance of safety. *Environmental Health*. 2025 Oct 2;24(1):70. <https://doi.org/10.1186/s12940-025-01220-4>. <https://www.emfdata.org/de/studien/detail?id=911>

45 WHO (2014): Electromagnetic fields and public health: mobile phones <https://www.who.int/mediacentre/factsheets/fs193/en/>

4.3 The thermal dogma is no longer defensible

Denial of EHS rests on the false assumption that EMF act only through heat, the so-called thermal dogma, against which the limits supposedly protect. Wireless radiation produces athermal effects as well as heating. In her dissertation, Brückner criticises the German federal government's deliberate exclusion of athermal effects, which undermines protective policy. Neural reactions, for example, are no longer seriously disputed. In 2015, the Swiss government found changes in brain waves to be "sufficiently demonstrated scientifically", even below the limits (see Fig. 5).⁴⁶ Based on the NTP study (USA) and Ramazzini study (Italy), its advisory expert group BERENIS considers the cancer potential so high "that BERENIS supports the precautionary principle for regulating RF-EMF on the basis of these results and their evaluation".⁴⁷ Regarding the underlying mechanism, the Swiss environmental office's review (Schürmann/Mevissen, above) found oxidative stress in more than half of the studies, making the disturbances, including cancer, understandable.⁴⁸

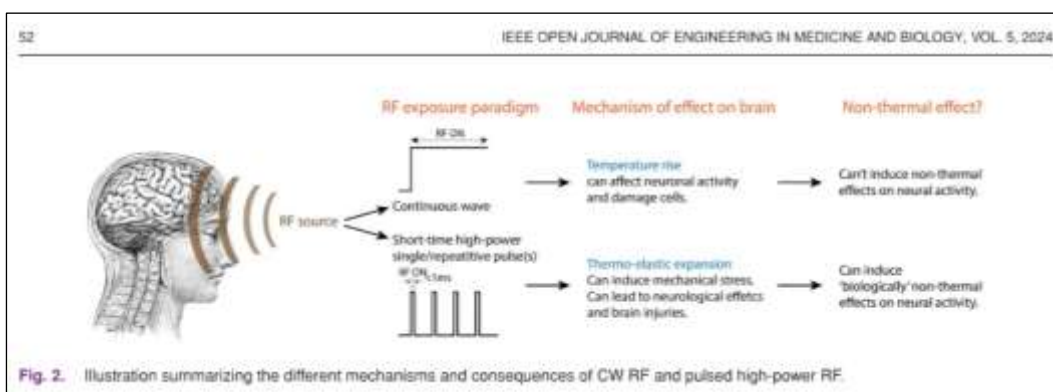


Fig. 5. Effects of pulsed and unpulsed non-ionising radiation on the brain. Diagram from Omid Yaghmazadeh's (2024) article in the international journal of the Institute of Electrical and Electronics Engineers (IEEE): Pulsed High-Power Radio Frequency Energy Can Cause Non-Thermal Harmful Effects on the BRAIN. Volume 5, 2024.

46 Swiss Confederation (2015): Future-ready mobile communications networks. <https://www.bakom.admin.ch/dam/bakom/de/dokumente/zukunftstauglichemobilfunknetze.pdf>

See also: www.snf.ch/SiteCollectionDocuments/nfp/nfp57/nfp57_synthese_d.pdf, p. 10. See diagnose:funk Overview 04: Effects of non-ionising radiation on people with epilepsy. <https://diagnose-funk.org/2090>

47 BERENIS Newsletter, September 2018 and special issue November 2018. <https://www.bafu.admin.ch/bafu/de/home/themen/elektrosmog/newsletter.html>

48 BERENIS Newsletter, January 2021, special issue - Oxidative stress. <https://www.bafu.admin.ch/bafu/de/home/themen/elektrosmog/newsletter.html>

Reuter et al. (2010): Oxidative stress, inflammation, and cancer: How are they linked? Free Radic Biol Med. 2010 December 1; 49(11): 1603-1616. <https://doi.org/10.1016/j.freeradbiomed.2010.09.006>

The claim that the population's health nevertheless shows no adverse response is untrue. Instead, health has deteriorated in parallel with the expansion of mobile communications (Table 1). DAK reported in 2017: "Highest sickness absence in 20 years"; "80% of employees suffered sleep disorders"; four in five schoolchildren experienced headaches (see note 38).

As early as 2015, DIE ZEIT reported: "82% of Germans felt ill"! This does not prove that mobile phone radiation is harmful, but it rules out the counterargument: "Illness has not increased alongside mobile network expansion; apparently wireless radiation makes nobody ill."

Increase in cases	Disease category
+ 299 %	Acute lower respiratory tract infection
+ 261 %	Abnormal blood pressure without diagnosis
+ 246 %	Folate-deficiency anaemia
+ 147 %	Heartburn
+ 136 %	Polyneuritis
+ 134 %	Streptococcal sepsis
+ 123 %	Pituitary hyperfunction
+ 109 %	Adult respiratory distress syndrome
+ 101 %	Gout
+ 86 %	Other metabolic disorders
+ 82 %	Abnormal lung findings
+ 79 %	Polyneuropathies and other peripheral nervous system diseases
+ 76 %	Vitamin B1 deficiency
+ 76 %	Metabolic disorders
+ 74 %	Malaise and fatigue
+ 71 %	Dizziness and giddiness
+ 67 %	Visual disturbances and blindness
+ 67 %	Heartbeat disorders
+ 64 %	Recurrent depressive disorder
+ 62 %	Other polyneuropathies
+ 58 %	Abnormal central nervous system findings
+ 57 %	Back pain

Table 1: Increases in selected categories of illness among hospital patients, 2008-2017 (DESTATIS 2019).

Table 1. Source: Wilfried Kühling, umwelt-medizin-gesellschaft, 33, 1-2020.

The absence of studies on correlations is probably not unintentional. The EU's Economic and Social Committee (EESC) recognised electromagnetic hypersensitivity as an illness.⁴⁹ In Sweden and the Netherlands it is at least treated as a disability. With MedNIS, Switzerland has created its first support service for people with electromagnetic hypersensitivity.⁵⁰

Conclusion 4: Protecting the population and protecting minorities with EHS require precautionary policy: informing consumers about risks and how to avoid them, implementing the many technical options for minimising radiation, and developing transmission technologies that are harmless to health.⁵¹ For medical and

49 EESC opinion documented at: <https://diagnose-funk.org/1828>

50 Report on MedNIS's work (2024): <https://www.bafu.admin.ch/bafu/de/home/themen/elektro-smog/dossiers/neu-gibt-es-ein-medizinisches-beratungsnetz.html>
<https://diagnose-funk.org/2076>

51 diagnose:funk (2024): Roaming - one network for all. <https://diagnose-funk.org/2071>

ecological reasons, the last remaining gaps in wireless coverage must be retained and new “mobile-free protective zones” created, as recommended by the technology assessment committee in the German Bundestag’s TA report - as planned in the Rhön Biosphere Reserve.⁵² Electromagnetic hypersensitivity must be recognised as an illness.

5 Studies on electromagnetic hypersensitivity

Author(s)	Study title	Publication + link
Belpomme D, Irigaray P, 2020	Electrohypersensitivity as a Newly Identified and Characterized Neurologic Pathological Disorder: How to Diagnose, Treat, and Prevent It	International Journal of Molecular Sciences, Multidisciplinary Digital Publishing Institute, 2020, 21, 1915 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7139347/ Review in ElektromogReport 2021-1 https://www.emfdata.org/de/elektromogreport/detail?id=14
Belpomme D, Irigaray P, 2022	Why electrohypersensitivity and related symptoms are caused by non-ionizing man-made electromagnetic fields: An overview and medical assessment	Environmental Research. 2022 May 7;113374 https://doi.org/10.1016/j.envres.2022.113374 https://www.emfdata.org/de/studien/detail?id=767
Belpomme D and 31 other authors, 2021	The Critical Importance of Molecular Biomarkers and Imaging in the Study of Electrohypersensitivity. A Scientific Consensus International Report.	Int. J. Mol. Sci. 2021, 22, 7321. https://doi.org/10.3390/ijms22147321 https://www.emf-portal.org/de/article/45287
Genuis SJ, Lipp CT, 2012	Electromagnetic hypersensitivity: Fact or fiction? Electrosensitivity: Fact or fiction?	Sci Total Environ 2012; 414: 103-112 https://doi.org/10.1016/j.scitotenv.2011.11.008 https://www.emfdata.org/de/studien/detail?id=460 https://www.emf-portal.org/de/article/19994
Havas M, 2019	Electrohypersensitivity (EHS) is an Environmentally-Induced Disability that Requires Immediate Attention.	J Sci Discov (2019); 3(1):jsd18020 http://www.e-discoverypublication.com/wp-content/uploads/2019/03/JSD18020-final.pdf https://www.emfdata.org/de/studien/detail?id=524 https://www.emf-portal.org/de/article/38655
Hinrikus H, Lass J & Bachmann M, 2021	Threshold of radiofrequency electromagnetic field effect on human brain	International Journal of Radiation Biology, 97(11), 1505-1515 https://doi.org/10.1080/09553002.2021.1969055 https://www.emfdata.org/de/studien/detail?id=633 https://www.emf-portal.org/de/article/45486

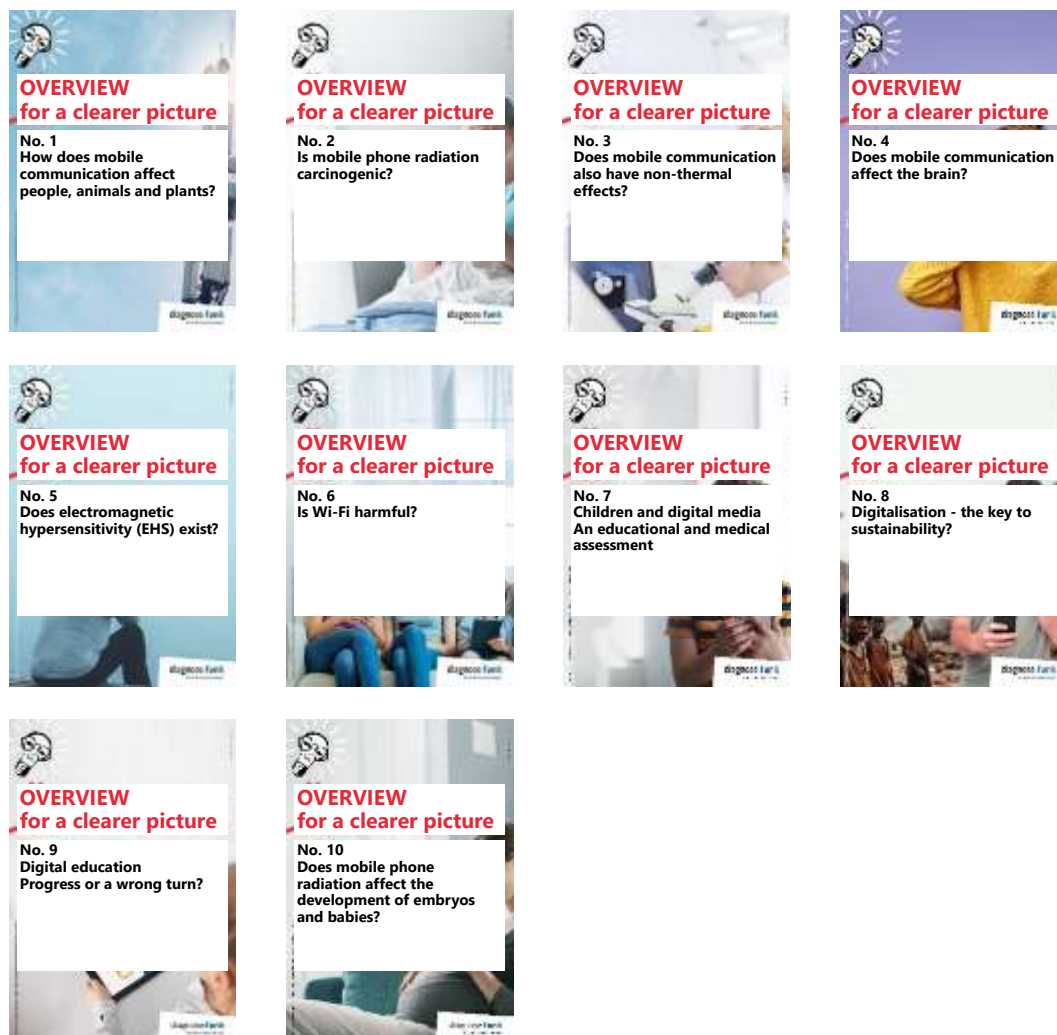
52 New framework concept 2018. UNESCO Rhön Biosphere Reserve, Vol. III, section 4.7. <https://s804a9a755f605ce0.jimcontent.com/download/version/1533640760/module/11134958494/name/BAND%20III%20mit%20Cover.pdf>

Author(s)	Study title	Publication + link
Johansson O, 2006	Electrohypersensitivity: state-of-the-art of a functional impairment.	Electromagn Biol Med. 2006;25(4):245-58 https://doi.org/10.1080/15368370601044150 https://www.emfdata.org/de/studien/detail?id=449 https://www.emf-portal.org/de/article/14563
Leszczynski D, 2022	Review of the scientific evidence on the individual sensitivity to electromagnetic fields (EHS).	Reviews on Environmental Health. 2022;37(3):423-450. https://doi.org/10.1515/reveh-2021-0038 https://www.emfdata.org/de/studien/detail?id=832 https://www.emf-portal.org/de/article/45209
Rea WJ, 2016	History of chemical sensitivity and diagnosis.	Rev Environ Health 2016;31(3):353-361 https://doi.org/10.1515/reveh-2015-0021 https://www.emfdata.org/de/studien/detail?id=217 https://www.emf-portal.org/de/article/29858
Redmayne M, Reddel S, 2021	Redefining electrosensitivity: A new literature-supported model.	Electromagnetic Biology and Medicine, 40(2), 227-235. https://doi.org/10.1080/15368378.2021.1874971 https://www.emfdata.org/de/studien/detail?id=622 https://www.emf-portal.org/de/article/44070
Stein Y, Udasin IG, 2020	Electromagnetic hypersensitivity (EHS, microwave syndrome) - Review of Mechanisms.	Environ Res 2020;186:109445 https://doi.org/10.1016/j.envres.2020.109445 https://www.emfdata.org/de/studien/detail?id=563 https://www.emf-portal.org/de/article/42260
Hardell L, Nilsson M, 2024	Summary of seven Swedish case reports on the microwave syndrome associated with 5G radiofrequency radiation.	Rev Environ Health 2025;40(1):147-157 https://doi.org/10.1515/reveh-2024-0017 https://www.emfdata.org/de/studien/detail&id=848 https://www.emf-portal.org/de/article/54952
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