

# Why electrohypersensitivity (EHS) is a biologically expected reaction to harmful radiation

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Is electrohypersensitivity (EHS), caused by mobile phone radiation, a fact or all in the imagination? It is comprehensible why the mobile phone industry declares this illness to be imaginary. It would be damaging to their business if their products were associated with the consequences of illness. However, the authorities responsible for health and radiation protection also claim that EHS is a psychological, anxiety-induced reaction. They deny connections with radiation exposure and claim that there is no underlying cause-and-effect mechanism. The available evidence for this correlation and the requirement for causality as a prerequisite for the recognition of a disease are the subject of this article, as are the reasons for discrimination against people with electrohypersensitivity.

## 1. Electrohypersensitivity – an accepted effect of radiation until the 1990s

Electrohypersensitivity is the term used to describe particular sensitivity to low- and high-frequency electromagnetic fields. Before the introduction of civilian use of mobile telephony until around the end of the 1990s, the existence of sensitivity to radar and wireless radiation was not questioned for more than 70 years. It had various names: Electroallergy, microwave syndrome, electrohypersensitivity and radio operator's disease. In particular operators in radar technology increasingly suffered from symptoms ranging from burnout to blood count changes and cancer.<sup>1</sup> Therefore the German government denied any connection and injured soldiers had to go through gruelling and exhausting legal proceedings. This is documented in the book "Dank des Vaterlandes" (2008, Thanks from the fatherland). The Otto Hug Radiation Institute's 2015 report "Unterschätzte Gesundheitsgefahren durch Radioaktivität am Beispiel der Radarsoldaten" (Underestimated health risks from radioactivity visible by the example of radar soldiers) dealt with the interactions between radar and mobile phone radiation:

"Exposure to radar radiation has so far only been considered harmful to health by officials and the Radar Commission if the power density of the radiation in the tissue leads to a measurable increase in temperature. However, there are now numerous studies on the effects of mobile phones, whose high frequencies are also in the microwave range. These show that long-term exposure below the so-called heat threshold can lead to irreparable and pathological disorders such as infertility. Combined effects between ionising and non-ionising radiation are also to be regarded as a possible cause of the multiple disease phenomena observed among radar soldiers and employees" (p.9).<sup>2</sup>

Protective measures were discussed in the relevant literature, but also how high-frequency radiation can be used for therapies. Its biological effectiveness was beyond doubt.<sup>3</sup> This was based on the realisation that humans are electromagnetic beings, i.e. cell processes are controlled by electrical impulses (neurons firing, cardiac action potentials, EEG, ECG, etc.). Electrobiological and electromedicine have focussed on how man-made radiation can influence these metabolic processes both positively, e.g. with

short-wave therapy or PEMFs (pulsed EMFs for bone treatment), and negatively.<sup>4</sup> Knowledge of negative effects was increasingly suppressed. For example, the study by Prof. Karl Hecht (1996) for the German Federal Office of Telecommunications on insights from Russia was not allowed to be published.<sup>5</sup> The "Guidelines on Radiation Protection" (2005) of the Federal Office for Radiation Protection, which called for legal protection regulations for the emerging civil mobile communications sector, were immediately withdrawn following protests from the Bitkom business association.<sup>6</sup>

## 2. Mechanisms of action for electrohypersensitivity have been decoded

With the rise of omnipresent mobile communications since around 1995, the entire population has been exposed to non-ionising radiation (NIR). A growing number of people are experiencing symptoms from radiation exposure that are similar to those experienced by radar soldiers. The number of studies on the effects of NIR has improved. Research results are now available on many endpoints for damage caused by NIR, documented in databases such as [www.emf-portal.de](http://www.emf-portal.de), [www.emfdata.org](http://www.emfdata.org), since 1995 in the Electrosmog Report<sup>7</sup> and in technology assessment reports of the German Bundestag and the EU.<sup>8</sup> As a rule, these are animal studies. The results of the animal experiments can be transferred to humans according to the criteria of toxicology, especially from animals that represent reference organisms, e.g. chicken embryos for pregnancy,<sup>9</sup> fruit flies (*Drosophila*) for oogenesis,<sup>10</sup> rats and mice for sperm development<sup>11</sup> and effects on DNA.<sup>12</sup> The current extensive studies on sublethal effects on insects alone illustrate that and how NIR affects cell processes.<sup>13</sup> In many of these studies, oxidative cell stress is identified as the mechanism of action; the effects are athermal, i.e. they are observed below the threshold of thermal damage (Fig. 1).<sup>14</sup> Oxidative cell stress is defined in the Federal Government's EMF-Portal database:

"Oxidative stress occurs when oxidative effects by free radicals (e.g. hydrogen peroxide) exceed the ability of antioxidant systems to neutralize them and the balance is in favor of oxidation. The damage in the cells can be oxidation of unsaturated fatty acids, proteins and DNA."<sup>15</sup>

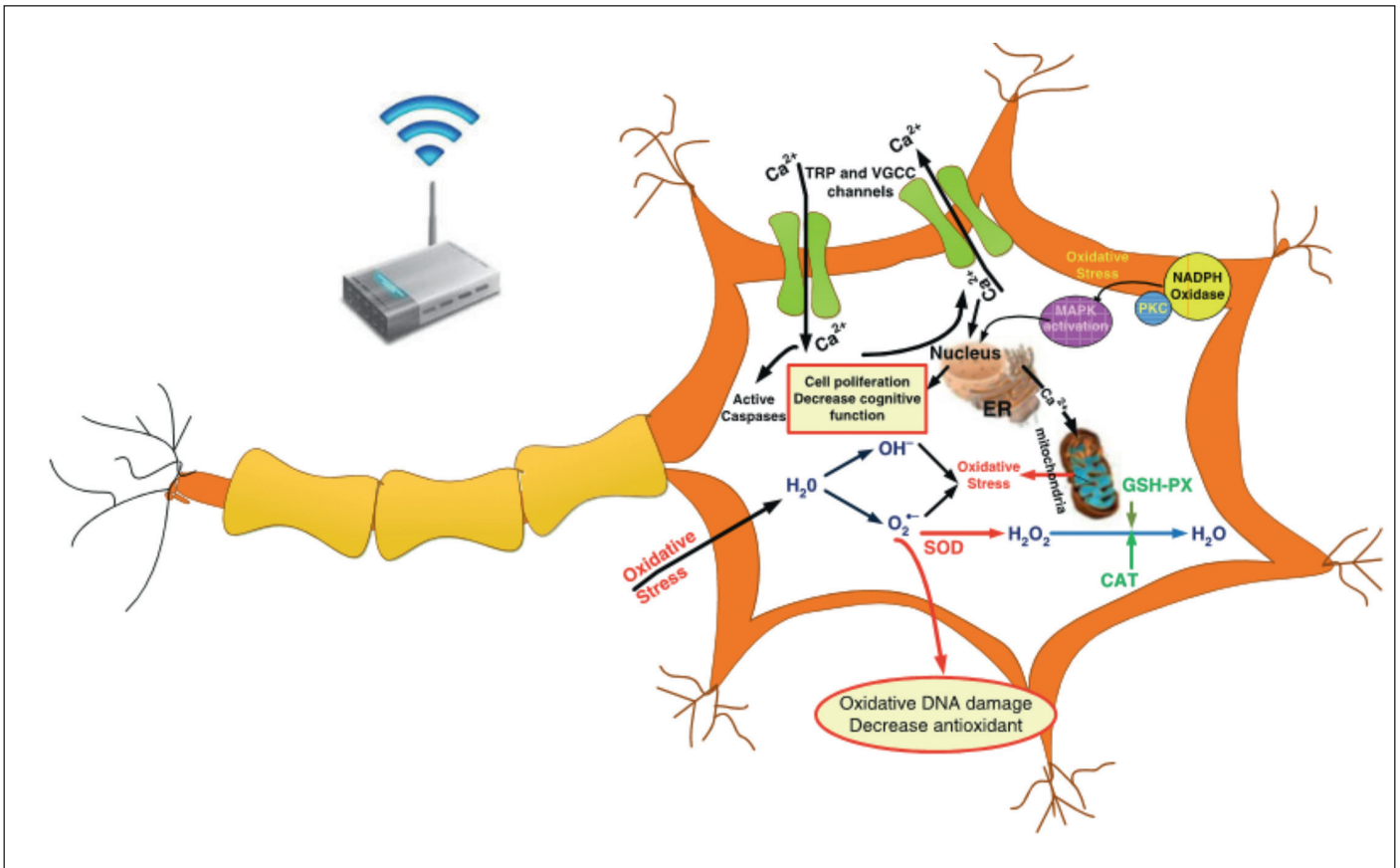


Fig. 1: Graphical representation of proven mechanisms of action after exposure to non-ionising radiation on the cell. Graphic from Naziroglu / Akman 2014, Springer Reference Book, see note 16

Extensive studies have now shown that non-ionising radiation, as well as fine particles (particulate matter), pesticides and other toxic substances, can lead to oxidative cell stress and subsequently to inflammatory processes (see Fig. 3), summarised in the reviews by Naziroglu/Akman (2014), Yakymenko et al. (2015) and in the review by Schürmann/Mevissen (2021) for the Swiss government.<sup>16</sup> Yakymenko et al. summarise: “In turn, a broad biological potential of ROS (reactive oxygen species) and other free radicals, including both their mutagenic effects and their signaling regulatory potential, makes RFR a potentially hazardous factor for human health.” An EMF exposure-related increase of oxidative damage has already occurred thousands of times below the limit values in the non-thermal range, from a power flux density of 0.1  $\mu\text{W}/\text{cm}^2$  (= 1000  $\mu\text{W}/\text{m}^2$ ) and from an absorption of SAR = 3  $\mu\text{W}/\text{kg}$ . This is far below the limit values and exposures to which users are exposed during normal operation of end user devices, routers, transmission masts (respectively cell towers) and Wi-Fi hotspots.

After analysing 223 studies, Schürmann/Mevissen write: “In summary, indications for increased oxidative stress caused by RF-EMF and ELFMEF were reported in the majority of the animal studies and in more than half of the cell studies.” Consistent evidence for oxidative cell stress was found in the brain, testes, heart, liver and kidneys: “Adverse conditions, such as diseases (diabetes, neurodegenerative diseases), compromise the body’s defense mechanisms, including antioxidant protection mechanisms, and individuals with such pre-existing conditions are more likely to experience health effects” (p.23).

The cell cascades in which these metabolic disturbances occur have been decoded (see Figs. 1 and 2).<sup>17</sup> German authorities claim, based on the so-called thermal dogma, that the limit values protect against the only proven risk, the thermal effect of NIR (non-ionising radiation). Therefore, the precautionary principle

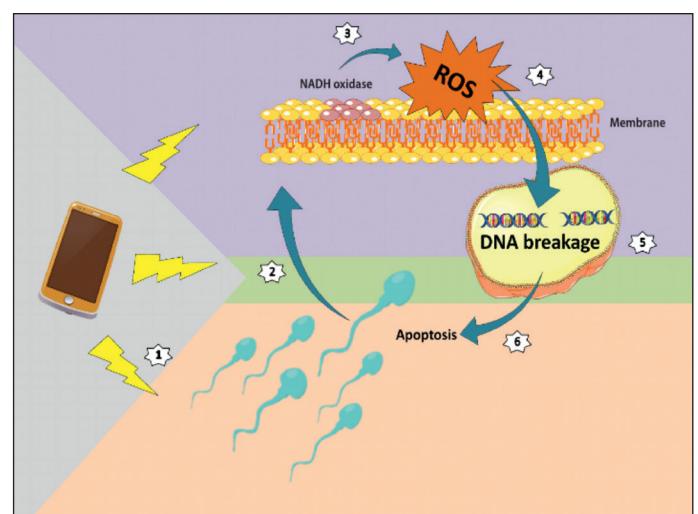


Fig. 2: “Electromagnetic waves emitted by mobile phones stimulate nicotinamide adenine dinucleotide hydrogen (NADH) oxidase in the plasma membrane, which in turn affects the integrity of the sperm nucleus. Within the nucleus, the structure of the DNA deteriorates, ultimately guiding the cellular structure towards apoptosis. ROS, reactive oxygen species.” Text & graphic from: 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

would be fulfilled because non-ionising radiation below the limit values cannot in principle damage cell processes and so there could be no electrohypersensitivity. This has been refuted not only by the evidence of the mechanism of action of oxidative cell stress, but also by hundreds of studies that demonstrate harmful athermal effects on many endpoints.<sup>18</sup>

The various complaints that people with electrohypersensitivity have, such as headaches, exhaustion, heart problems, etc., are mostly due to inflammatory processes triggered by oxidative cell stress. Research is progressing and other possible mechanisms of action are being discussed, e.g. effects on calcium ion channels, ferroptosis, etc.<sup>19</sup>

Every organism reacts to man-made radiation, but not everyone reacts and becomes hypersensitive to electromagnetic stress. The following principle applies: The external causes (e.g. radiation) act by means of the internal conditions. The state of the immune system and pre-existing conditions influence the risk of becoming ill from electromagnetic fields.<sup>20</sup> Possible pre-exposures include toxins such as mercury, lead, aluminium, microplastics, viruses or pesticides. Together with electromagnetic fields, the total exposure can become so high that the body's own balance (homeostasis) is disturbed and symptoms of illness occur. As a rule, these symptoms reduce or disappear with a reduction in exposure.

#### Conclusion 1:

There is a science-based explanation as to why people become electrohypersensitive: The non-ionising radiation from wireless communication leads to oxidative cell stress, this is undisputed in science. Oxidative cell stress leads to inflammatory processes in the organism.

It would be abnormal if people with corresponding pre-existing conditions did not feel these changes or were not affected by them. It is therefore plausible that these processes lead to symptoms of illness in some of the population.

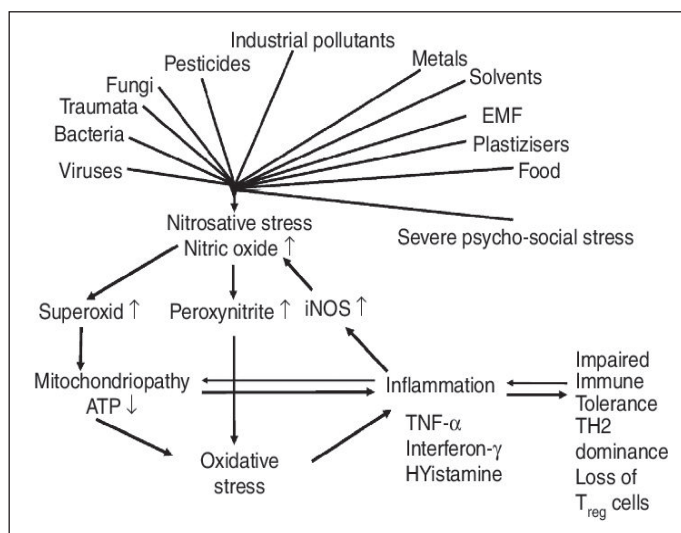


Fig. 3: Pathogenesis of inflammation, mitochondriopathy and nitrosative stress as a result of the effects of trigger factors. The interaction of many toxins leads to inflammatory processes. The interaction has not been analysed in most cases. Graphic: von Baehr, 2012, www.researchgate.net; figure uploaded by Igor Belyaev

### 3. The claim of causality as a pseudo-scientific distraction

People affected by EHS react to the athermal biological effects, which do not produce any harmful thermal effects, but alter metabolic processes and thus cause damage (see above).<sup>21</sup> Some people react quickly to electromagnetic fields, while for others the effect is delayed. As with other pollutants, not every person becomes ill as a result of exposure. However, this fact is used as an argument against the assumption of a causal relationship between radiation and illness. However, causal links are lacking in many diseases, especially in the case of non-specific symptoms. Currently, the causes of the derailment of the immune system in Long Covid sufferers are still in the dark, but a correlation can no longer be denied. Many lawsuits concerning work-related illnesses are a misery for those affected, where the cause-and-effect relationship is often clear to common sense, but insurance companies and courts refuse to recognise it due to disputed or missing causalities. A lack of, or contestable proof of, causality is used as an argument to refuse compensation or pension claims. The argument that action requires proof of causality is used to justify inaction. A causality requirement as a prerequisite for action is highly problematic in medicine; knowledge of a causal relationship is often not necessary, or not achievable, in the foreseeable future. The relevance of a risk must be assessed according to the Bradford-Hill criteria.<sup>22</sup> diagnose:funk published the Brennpunkt (magazine) "Der Kausalitätsbetrug" ("Causality fraud") (2020) on this problem.

#### 3.1. Violation of the constitution: Unprotected exposure to radiation without applying the precautionary principle

The dissertation "Kommunale Mobilfunkkonzepte im Spannungsfeld zwischen Vorsorge und Versorgung" (Municipal mobile communications concepts in the area of conflict between precaution and coverage) (2022) by Anja Brückner, published in the Erlanger Schriften zum öffentlichen Recht (Erlangen publications on public law), criticises the fact that the German government ignores research findings on athermal effects and does not commission sufficient research of its own. This leads to "unacceptable" limit values. The demand for causality is being instrumentalized to undermine the precautionary principle and thus a protection policy:

"The purpose of precaution is precisely to respond to detection difficulties and causality problems. However, in order to prevent a precautionary policy from getting out of hand, a potential for concern is necessary. Case law no longer categorises athermal effects of mobile phone radiation as emission fears, but affirms a precautionary risk level, so that there is a potential for concern regarding athermal effects despite the lack of a clear causal link" (p.65). Brückner points to the progress made in research: "Research results are now accumulating that prove the harmfulness of biological force effects caused by mobile phone radiation" (p.66). This even fulfils justiciable causality requirements. As the limit values "completely ignore athermal effects", they are "unacceptable in view of the German Federal Government's inadequate research efforts": "They do not guarantee any precautionary measures with regard to athermal effects and are therefore deficient, so that the German Federal Government is in breach of the objective content of Article 2, paragraph 2, page 1 of the German Grundgesetz (Constitution). A reassessment of the risk situation taking into account these effects is necessary" (p.66).<sup>23</sup>

Since “an incalculable number of people are exposed to electromagnetic radiation as a result of advancing digitalisation, the need for an interpretation of Section 22 of the German Federal Emission Control Act (§ 22 BImSchG) that conforms to protection requirements in the sense of a general standard requiring precautionary measures becomes even clearer ... A general duty to take precautions ... with regard to both thermal and athermal effects of mobile phone radiation – for municipalities in the context of urban land-use planning – is therefore proportionate and necessary” (p.66). The municipality therefore has “a constitutional duty to protect young people in particular due to their potentially increased electrosensitivity and need for protection” (p.132), which includes “sensitive places”, “sensitive facilities” and “residential facilities” (p.133).

### 3.2. The limit values are unacceptable

Brückner criticizes the German government for violating its “duty to monitor” (p. 49) the study situation due to “lack of inclusion of further research results regarding athermal effects” (p.53) and “no further efforts ... to conduct research” (p.52). She criticizes the fact that it does not fulfil its “obligation to improve” (ibid.) the limit values through “inaction” (p.50), so that “the limit values for the protection of health have become constitutionally unacceptable due to new findings or a changed situation and the required protection goal cannot be achieved” (p.50). Brückner deduces from this the accusation that “the legislator is not endeavouring to improve the protection of the population”: “The state is therefore only fulfilling its duty to take precautions with regard to thermal effects. Since athermal effects have not been included in the (re)calculation of the limit values of the 26<sup>th</sup> German Federal Emission Control Act (26. BImSchV) despite current research results and precautionary risk levels, these limit values – in relation to mobile phone radiation as a whole – are currently unsuitable for precautionary purposes and therefore unacceptable” (p.50). Brückner demands that research results on athermal effects should no longer be excluded from the risk assessment. Starkey (2016) has demonstrated in her analysis the extent to which this is done under the influence of the industry-related ICNIRP (International Commission on Non-Ionising Radiation Protection) and leads to a falsification of the risk potential.<sup>24</sup>

Brückner appeals to the legislator: “Both the numerous studies and research in the field of mobile radio and the current “precautionary risk level” clearly demonstrate the need for a state duty to protect. Mobile wireless communication systems do not represent a residual risk with socially acceptable side effects” (p.46). The claim of causality is an attempt to circumvent this duty to protect with an apparently logical facade, in particular at the expense of people with electrohypersensitivity, whose health and social life is massively impaired by the “side effects”. Brückner’s legal analysis is a first-class warning for the German government. This criticism is in line with the biological-medical analysis of the ICBE-EMF (International Commission on the Biological Effects of EMF) limit value, which proves that the current ICNIRP limit values are scientifically untenable and have no protective function, as they only recognize excessive thermal effects as harmful.<sup>25</sup> This “thermal dogma” has been used to legitimize military practice in wireless and radar applications since the 1950s.<sup>26</sup> In its opinion published in the Official Journal of the EU in 2022, the EU body EESC (European Economic and Social Committee) calls for new limit values to be developed on

the basis of the study situation, including studies on athermal effects, and for the industry-orientated ICNIRP to be replaced by an independent body.<sup>27</sup>

The attempt to legitimize the expansion of the mobile communications infrastructure on the basis of pseudo-scientific and unsuitable limit values is another example of the apt analysis by sociologist Ulrich Beck. In his book “World Risk Society” (2007), he defines the modern state as a “legitimising body” of industrial interests, in which the dangers to health and the environment “are normalized in the legitimising circle of administration, politics, law and management and grow into the uncontrollably global” (p. 172). He sums up this policy with the term “organised irresponsibility” (p. 345) and writes: “The forms of alliances that the neoliberal state has entered are instrumentalizing the state ... to optimize and legitimize the interests of capital worldwide” (p. 128).

### Conclusion 2:

**The claim that electrohypersensitivity cannot exist because the limit values protect against the harmful effects of electromagnetic fields is used to market digital products. The ICNIRP limits are scientifically untenable. The argument of a lack of causality is being instrumentalized to undermine the precautionary principle and thus a protection policy.**

### 4. The role of the psyche

However, despite the studies, it is still claimed that electrohypersensitivity is a figment of the imagination and can be attributed to the nocebo effect. Is electrohypersensitivity psychological? Definitely not! It is not a mental illness. The medical-biological reasons for EHS have been proven. The European Economic and Social Committee (EESC) writes in its opinion in March 2022 in the Official Journal of the EU on the subject of electrohypersensitivity as an illness:

“4.13. Electromagnetic hypersensitivity or electromagnetic intolerance is an illness which has been recognized by the European Parliament, the EESC and the Council of Europe. It affects a number of people, and with the roll-out of 5G (which needs a much denser electronic network) it is to be expected that this condition may affect more.” (see note 27).

Ignoring the studies on the effects of EMF on the organism, criticized by Brückner as “inactivity”, the German Federal Office for Radiation Protection continues to claim that electrohypersensitivity is due to the nocebo effect. This psychologizes the clinical picture. This is what the German Federal Office for Radiation Protection writes on its website:

“By contrast, knowledge about the existence of fields combined with possible health concerns may cause complaints. This action mechanism is called nocebo effect, a counterpart to the well-known placebo effect.”<sup>28</sup>

On this basis, electro-hypersensitive patients are exposed to the risk of misdiagnosis by uninformed doctors or doctors who believe the authorities, including individual attempts to hospitalize them to psychiatric care.

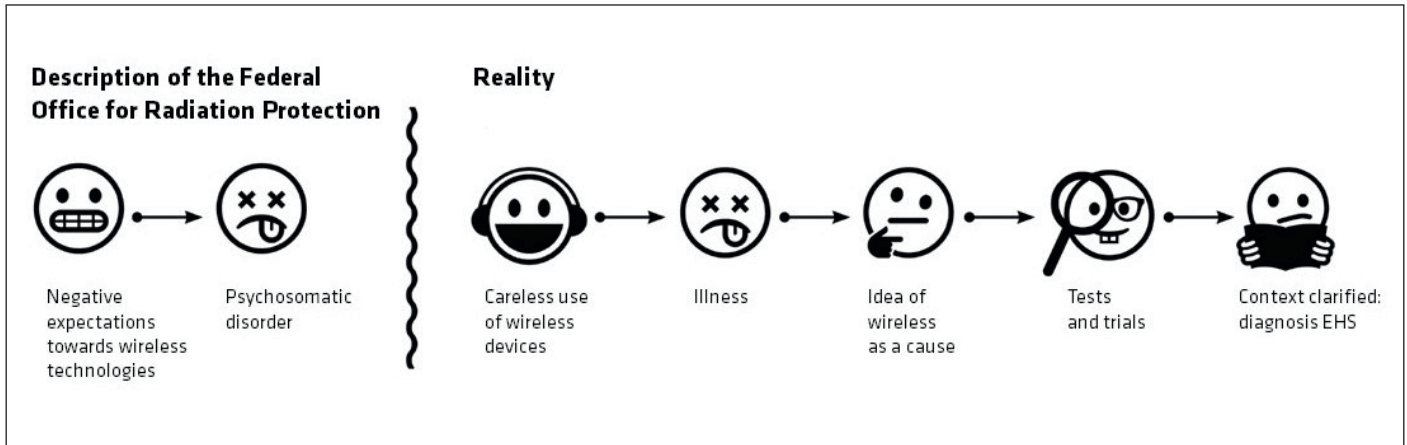


Fig. 4: The Federal Office for Radiation Protection's claim that EHS is a psychological problem triggered by the nocebo effect and can be treated by psychotherapy can be easily refuted. The majority of EHS sufferers have been ill for months/years before it occurs to them that wireless communication devices could be the trigger and they subsequently experience relief when the wireless radiation is reduced. This contradicts the theory of the nocebo effect. Fig.: diagnose:funk.

People with electrohypersensitivity (EHS) are sometimes not taken seriously by family members and friends. They often experience a lack of empathy and rejection. Those around them are hardly prepared to deal with their problem and the study situation. The misinformation provided by the Federal Office for Radiation Protection on EHS as a mental disorder, coupled with the trivialisation that EMF is harmless to health below the limit values, encourages people to continue to use wireless devices without restriction and to show no

consideration for EHS sufferers. Empathy towards EHS sufferers is not given a chance by the actions of politicians and the media. Demands that are easy to fulfil, such as a radiation-free compartment on trains in order for those affected by EHS to participate in mobility or wireless-free hospital rooms, are often rejected with indifferent text modules and standard responses. As a result, people with EHS are discriminated against, socially isolated and lonely. "The effects of loneliness on mental and physical health are high," writes the German Medical Journal: *Deutsches Ärzteblatt*.<sup>29</sup>

#### 4.1. Collective risk displacement

People with electrohypersensitivity usually have to deal with their suffering and discrimination psychologically alone. How they do this is reported by 50 sufferers in the book "Die unerlaubte Krankheit" ("The unauthorised illness"). It is not electrohypersensitivity that is psychologically caused, but – on the contrary – the vehement rejection that EHS does not exist has social-psychological reasons. People defend their own use of smartphones and other mobile devices in the same way that any criticism of the harmfulness of cars (lead in petrol, particulate matter, etc.) was dismissed as anti-progress in the 1960s.

The vast majority of the population use their smartphones to organize their lives. It now defines social status and has become a compass for life. Without smartphones, many users would be helpless and felt withdrawal symptoms, as many are now dependent or even addicted to them. As early as 2015, IT professor Alexander Markowetz warned in his book "Digital Burn-out": "The central challenge of the 21<sup>st</sup> century is to save the human psyche in dealing with digital devices" (p. 25). Markowetz

identifies "collective dysfunctions" (p.25). The US social scientist Jonathan Haidt calls his latest book "The Anxious Generation: How the Great Rewiring of Childhood is Causing an Epidemic of Mental Illness": "Their brains are being conditioned for a screen-based life. This is destroying them" (interview in the NZZ, a large private Swiss media company, from 8 April 2024).<sup>30</sup> The guideline on dysfunctional screen use for children and young people, published by 11 German professional associations, describes the pathological consequences, including the potential for addiction.<sup>31</sup> As with any drug, the addict defends himself against criticism out of fear that his substance will be taken away from him. The electro-hypersensitive person is seen as a threat to their own digital (substitute) identity, which the smartphone provides. He is the personified guilty conscience. The rejection of criticism of negative effects is therefore based on a reflexive fear that one's own media consumption, habits and comfort will be called into question by the victimized person.

This refusal to discuss the negative aspects of digitalisation does not only concern the radiation-related effects. There is even a refusal to discuss the ecological consequences such as the exploding consumption of energy and resources due to the production of devices and their data volume or the effects on nature, e.g. on insects. The hype surrounding digitalisation is leading to a collective suppression of the risks.

#### Conclusion 3:

The discussion about electrohypersensitivity must be demystified. The effects of non-ionising radiation on the metabolism in the organism have been proven by over a thousand studies. These effects, triggered by EMF, are felt by people with electrohypersensitivity. The arguments used to cast doubt on electrohypersensitivity are not based on medical-biological facts, but on business interests and expert opinions of convenience. It is damaging to the industry's business if its products are associated with the consequences of illness. It created the "mental disorder" narrative, a marketing story to protect its products. The authorities continue to spread it and ignore the medical causes. With the sale of mobile phone licence fees of 55 billion euros since 2001, the state has committed itself to promoting mobile technology and sold health.

**5. The unauthorized disease – some further arguments in the public discourse**

**5.1. Electrohypersensitive reactions meet with a lack of understanding ...**

a) because you don't notice the radiation.

**Answer:** Then radioactivity, UV and X-rays or magnetic fields from high-voltage power lines should also be harmless.

b) because the radiation is supposedly too weak for biological effects.

**Answer:** Then it would be inexplicable that EM fields can trigger cell mutations or even destroy cancer cells in genetic research. Then it would also be inexplicable why over 1000 studies show biological effects, especially in the athermal range.<sup>32</sup>

c) because you don't read or hear that "any danger has been discovered".

**Answer:** You don't read or hear anything because years of prop-aganda hold back any contrary opinion or declare it dubious, e.g. as allegedly unproven or trivialized. And this is not a "conspiracy theory", but in science it is called agnotology, the maintenance of ignorance. Ignorance, which one generates oneself by preventing information and research, is passed off as knowledge.<sup>33</sup>

**Evidence:**

It is not reported, for example, that 1. the Dutch Health Council (= the radiation protection authority there)<sup>34</sup> and 2. the European Parliament's Scientific Advisory Commission STOA have called for a moratorium on 5G<sup>35</sup> and 3. the Technology Assessment Committee of the German Parliament has recommended that "protection zones" for those affected should be "considered" (see note 8). Why not? Is this of no interest to journalists or the public?

Doctors should be informed that the Federal Office for Radiation Protection itself has repeatedly carried out large animal studies with mice with the result that the promotion of cancer by NIR (non-ionizing radiation) is considered "certain".<sup>36</sup> Why is this not being published?<sup>37</sup>

And finally: in view of the fact that three quarters of the population suffer from sleep disorders, an increase from 47.5 per cent in 2010 to 78.9 per cent in 2016 (DAK study -DAK is a German health insurance),<sup>38</sup> and the Dutch Health Council had to admit that sleep disorders caused by radio frequency radiation are "possible",<sup>39</sup> just like NIR was classified as possibly carcinogenic by the WHO (2011),<sup>40</sup> also below the limit values, the population should be informed about this! Everyone could immediately test protective measures, e.g. switching off Wi-Fi and mobile phones at night, activating the automatic switch-off function or not using DECT phones with continuous radiation.

And why has it all been like this for years? Concealing or casting doubt on product risks is part of marketing strategies, which the former deputy director of the US Occupational Safety and Health Administration David Michaels analyzes in his book "Doubt is their product" (2008), as does the MicrowaveNews portal in the article "The odious smell of truth. Corruption of the scientific literature continues" (2022) and the European Environment Agency in the documentaries "Late lessons from early warnings" (2013/2016).<sup>41</sup> diagnose:funk has published the Brennpunkt magazine "The dispute over the sovereignty of interpretation on the risks of mobile phone radiation" (2022).

**5.2. Misconceptions lead to underestimation of the risk**

The dangers of NIR are also underestimated because there are misconceptions about the spread and capabilities of normal, everyday wireless radiation. It is secretly assumed that the radiation essentially only takes place "around us". At most, a small amount hits our skin, but is absorbed into the surface. So basically, we don't really feel "hit" or affected - except perhaps by the mobile phone on our ear. In the minds of many, wireless radiation in a room feels more comparable to the mere irradiation with warming (sun) light, which we would already prevent from penetrating the body with our skin and clothing.

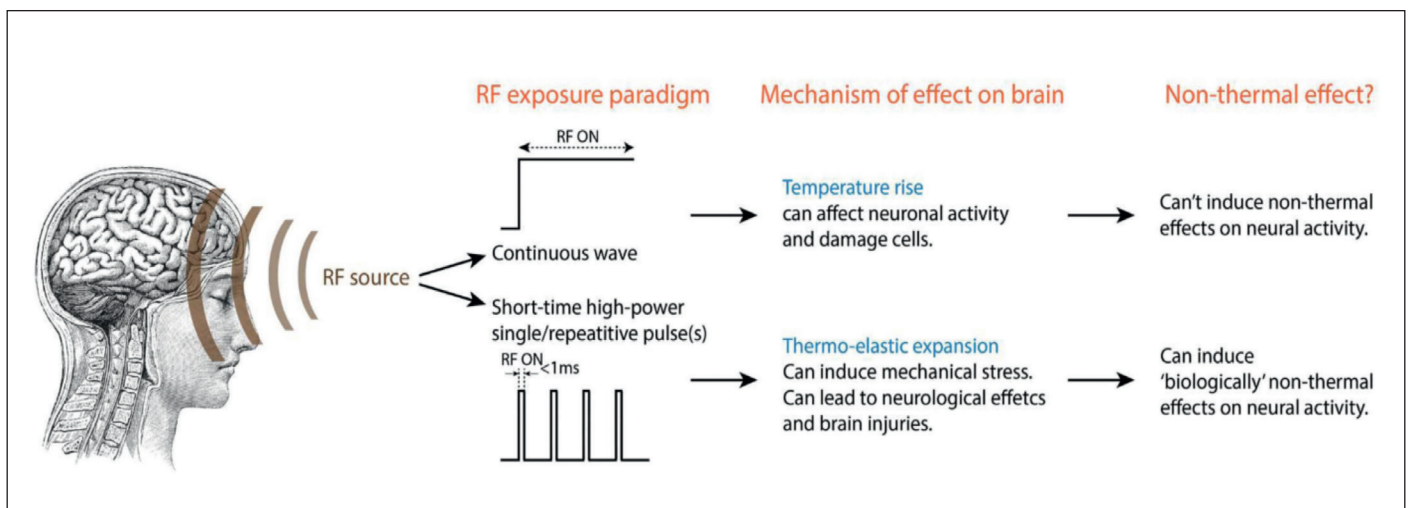


Fig. 5: Effects of non-ionising radiation, pulsed and non-pulsed on the brain. Graphic from Omid Yaghmazadeh (2024) in his article in the international journal of the Institute of Electrical and Electronics Engineers (IEEE): Pulsed High-Power Radio Frequency Energy Can Cause Non-Thermal Harmful Effects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

Technically, there is talk of a maximum “penetration depth” of “only” 10 cm (GSM network). This leads to the idea that radiation can no longer penetrate deeper. In reality, “penetration depth” means technically, however, only around 37 % of the radiation originally hitting the skin is still present at this point; 63 % has been absorbed by the body tissue up to this point. This 37 %, however, continues its path through the body with further attenuation until it has completely penetrated it. Nothing else happens when radiation passes through walls and other obstacles in the path of the transmitter.

It must also be taken into account that nowadays radiation comes at us from all sides, i.e. radiation energy is absorbed from the front and back - and also from the sides. The WHO also stated in its factsheet no. 193 that all organs, including the brain, are “slightly warmed” by mobile phones in everyday use – i.e. reached (!) by the radiation.<sup>42</sup> This artificial fever is not thought to have any detrimental effect on health as long as the warming does not exceed 0.1 – 1 °C (!).

### 5.3. The thermal dogma is no longer tenable

The denial of electrohypersensitivity is based on the false assumption that EMFs only have an effect via heat, the so-called thermal dogma. The limit values protect against this. However, wireless radiation not only leads to warming, but also to athermal effects. In her dissertation, Brückner criticizes the German government’s deliberate failure to take athermal effects into account. This undermines a protection policy. Today, for example, the nervous reactions are not really controversial. In 2015, the Swiss government stated that the change in brain waves had been “sufficiently scientifically proven”, even below the limit values (see Fig. 5).<sup>43</sup> Based on the results of the NTP study (USA) and the Ramazzini study (Italy), the Swiss government’s advisory body BERENIS estimates the cancer potential to be so high “that BERENIS supports the precautionary principle for the regulation of RF-EMF based on the results and their evaluation.”<sup>44</sup> In a review study (Schürmann/Mevissen, see above), the Swiss Environmental Protection Agency came to the conclusion that oxidative stress occurred in more than half of the studies, which makes the disorders up to and including cancer understandable.<sup>45</sup>

Increase in the number of cases	Type of Illness
+ 299 %	Acute infections of the lower respiratory tract
+ 261 %	Abnormal blood pressure without identifiable cause
+ 246 %	Folic acid deficiency anaemia
+ 147 %	Heartburn
+ 136 %	Polyneuritis
+ 134 %	Streptococcal sepsis
+ 123 %	Hyperfunction of the pituitary gland
+ 109 %	Adult respiratory distress syndrome
+ 101 %	Gout
+ 86 %	Other metabolic disorders
+ 82 %	Abnormal findings in the lungs

+ 79 %	Polyneuropathies and other Diseases of the peripheral nervous system
+ 76 %	Vitamin B1 deficiency
+ 76 %	Metabolic disorders
+ 74 %	Malaise and fatigue
+ 71 %	Dizziness and staggering
+ 67 %	Visual disturbances and blindness
+ 67 %	Irregular heartbeat
+ 64 %	Recurrent depressive disorder
+ 62 %	Other polyneuropathies
+ 58 %	Abnormal findings of the central nervous system
+ 57 %	Back pain

Table 1: Rates of increase in some subjectively selected types of illness among hospital patients in the period 2008 - 2017 (DESTATIS 2019)

And the claim that the health of the population is not showing any negative reaction is not true. On the contrary, a deterioration can be observed – parallel to the expansion of mobile communications (see Table 1), according to the DAK (German health insurance) 2017: “Highest sickness rate in 20 years”; “80 % of employees suffered from sleep disorders”, four out of five schoolchildren felt headaches (see note 38).

As early as 2015, the ZEIT weekly newspaper reported: “82 % of all Germans felt ill”! Although this is not proof of the harmful effects of wireless radiation, it does rule out the counter-evidence: “Illnesses have not increased at all in the population in parallel with the expansion of mobile phone networks; apparently nobody is getting sick from mobile phones.” It is probably not unintentional that no correlation studies are being carried out. The EU’s Economic and Social Committee (EESC) has recognized electrohypersensitivity as a disease.<sup>46</sup> In Sweden and the Netherlands, it is at least treated as a disability. With the MedNIS reporting centre, Switzerland has for the first time created a contact point for people with electrohypersensitivity.<sup>47</sup>

### Conclusion 4:

The protection of the population and the protection of minorities for people with electrohypersensitivity require a precautionary policy, i.e. the education of consumers about risks, the possibilities of avoiding them, the implementation of the various technical possibilities for minimising radiation and the development of transmission technologies that are harmless to health.<sup>48</sup> For medical and ecological reasons, the last wireless gaps must be preserved and even new “mobile communication-free protection zones” created in accordance with the recommendation of the Technology Assessment Committee (TAB) of the German Parliament - as planned in the Rhön biosphere reserve.<sup>49</sup> Electrohypersensitivity must be recognised as an illness.

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