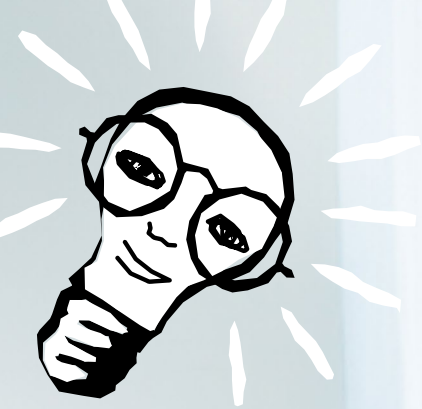




OVERVIEW

for a clearer picture

No. 6

Is Wi-Fi harmful?



diagnose:funk
Use technology wisely

Overview No. 6

Is Wi-Fi harmful?

Updated: 16 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. 6 documents the research on Wi-Fi and its alternatives. Because Wi-Fi uses a licence-free frequency and access is often free of charge, young people use it particularly frequently, making the evidence on these frequencies especially relevant. The Wi-Fi frequency has been studied particularly thoroughly. Findings exist on effects on the brain and, consequently, on sleep, memory, spatial thinking, genetic material and the blood-brain barrier, as well as on fertility, the eyes, EEG and the triggering of inflammatory diseases through oxidative cellular stress.

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1 Wi-Fi at home and in schools - risks and alternatives

There is extensive research on Wi-Fi, yet remarkably little of it is communicated. First, a preliminary observation: look at this advertisement with the slogan “New main subject: app-watching”. This has indeed become a principal activity for many children and adolescents. The smartphone, introduced in 2007, changed the conditions under which children are raised and socialised



in every area of life. The new “Guideline for preventing dysregulated screen media use in childhood and adolescence” (2023) reflects 15 years’ experience of smartphones, the internet, social media and online gaming. “Dysregulated screen media use” is now the new normal.

According to the Postbank study (2026), young people in Germany spend an average of 67.4 hours online per week, including 23.9 hours on smartphones. The 2025 JIM (Youth, Information, Media) study puts average daily smartphone screen time among 12-19-year-olds at 3 hours 51 minutes. The 2024 KIM children’s study found that 72% of 6-13-year-olds use the internet; over half of these online users (54%) now go online daily. Among 8-9-year-olds, this daily share almost doubled within a short period, reaching 40%. Almost half of all 6-13-year-olds own a smartphone; from ages 10-11, more than half do. These statistics can be experienced on the underground, train or bus: most people around you stare at their smartphones.¹

Excessive screen media use has enormous potential to harm children and adolescents medically and psychologically. The guideline evaluates the accompanying research and identifies the main risks: obesity, sleep disorders, eye disease, developmental disorders, attachment disorders, behavioural disorders, internet addiction, bullying and sexual harassment, gambling, radiation exposure, and prenatal and postnatal effects of use during pregnancy.

¹ Postbank (June 2026): Postbank Digital Study 2026: Germans spend less time online. postbank.de
Medienpädagogischer Forschungsverbund Südwest (2025): JIM Study 2025: Youth, Information, Media. Baseline study of media use among 12-19-year-olds. <https://mpfs.de/studie/jim-studie-2025/>
Medienpädagogischer Forschungsverbund Südwest (mpfs), ed. (2024): KIM Study 2024: Childhood, Internet, Media. Baseline study of media use among 6-13-year-olds. Accessed 25 August 2026 at mpfs.de.

Neuroscientist Prof. Joachim Bauer describes the sociopolitical and psychosocial consequences in "Loss of Reality: How AI and virtual worlds take possession of us - and threaten our humanity" (2023):

"If we use them as tools instead of allowing ourselves to become their tools, digital products can enrich our lives. But we are approaching the tipping point. Digital offerings have begun to take possession of our lives. Without our noticing, they gently take us by the hand and replace analogue interpersonal reality with their digital communication channels and spaces for experience. The change presents itself as assistance: they help us walk until we can no longer walk. They help us think until we can no longer think" (p. 9).²

Despite, or perhaps precisely because of, digitalisation, Germany faces an educational catastrophe. In his meta-analysis "Between fiction and truth: possibilities and limits of digital media in the education system" (2021), education professor Klaus Zierer writes:

"The longer children and adolescents spend using smartphones in their leisure time, and the more time they spend on social media, the poorer their academic learning performance" (Zierer, 2021).

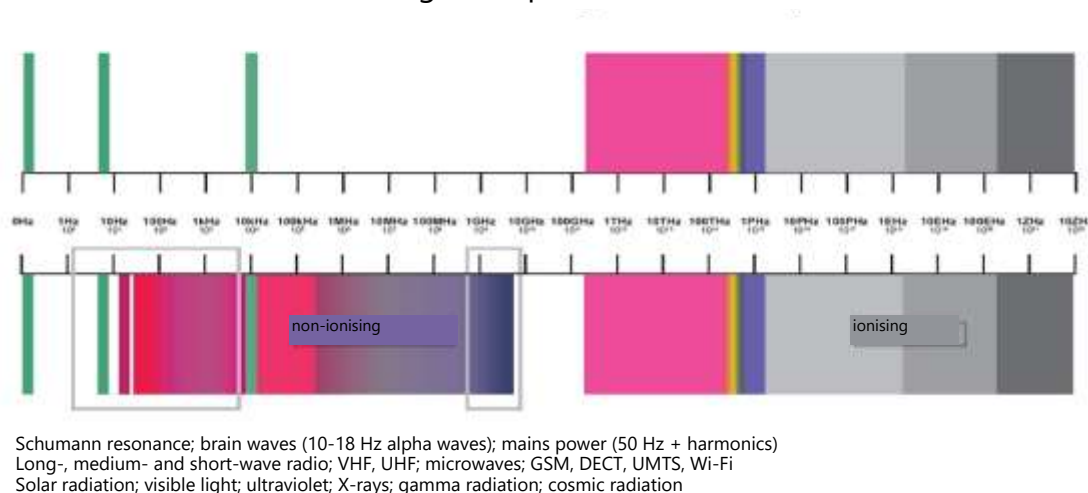
What role might continuous Wi-Fi exposure play? We document research on Wi-Fi (Wireless Local Area Network), specifically the 2,450 MHz frequency pulsed at 10 Hz. More than 150 studies demonstrate its potential for harm. Wi-Fi carries a particularly large amount of communication because it is provided free almost everywhere: on trains, in shopping and youth centres, and elsewhere. Almost every household has a Wi-Fi router through which users access the internet to avoid apparently troublesome cabling.

2 Effects of non-ionising radiation on the body

To aid understanding, first consider the electromagnetic spectrum. The first illustration shows the spectrum with gaps: its natural state around 1900, before humans filled these gaps with wireless and radio waves. Our cells communicate in these frequency gaps. The gaps no longer exist today. Marconi discovered the possibility of artificially generated radiation for wireless communication and used these frequencies. As the illustration shows, the gaps are now filled, with density increasing each year. What happens when artificially generated radiation, which has increased since about 1900 (electricity, radio, wireless communications, TV), strikes the body at the frequencies of cellular communication and brain rhythms? Research examines this question because humans are electromagnetic beings.

² Bauer J (2023): Loss of Reality: How AI and virtual worlds take possession of us and threaten our humanity. Munich.

The natural electromagnetic spectrum



Today's electromagnetic spectrum

In 2011, the WHO's cancer agency IARC classified non-ionising radiation, including Wi-Fi, as possibly carcinogenic. Henry Lai's study (1996) was among the first to demonstrate DNA strand breaks. He used the Wi-Fi frequency of 2,450 MHz. DNA strand breaks are a precursor to cancer. The cancer-causing potential of non-ionising radiation has since been confirmed repeatedly, including by the NTP study of the US government's National Institute of Environmental Health Sciences (NIEHS) (NTP 2018), the Ramazzini study (Falcioni 2018) and Hardell's studies (Hardell 2018, NTP 2018 a&b). Moreover, in March 2015, following a replication study, the German Federal Office for Radiation Protection announced that a tumour-promoting effect below the limits must be considered established (!) (Lerchl et al. 2015).

The toxicity of mobile communication radiation at the frequencies used so far - GSM, UMTS, LTE and Wi-Fi - is fundamentally confirmed. This is not news to insiders. In 2011, the WHO classified mobile phone radiation as possibly carcinogenic; today science speaks of "Clear Evidence" (Lin 2022).

Not only cancer risk but also pathological effects on sperm and embryos have been demonstrated. The European Parliament's STOA technology assessment report, the European Economic and Social Committee's (EESC) opinion and, most recently, the German Bundestag's 2023 technology assessment (TA) report confirm these risks (see Overview No. 2).

3 Official warnings against continuous exposure

Wi-Fi uses a licence-free radio frequency. Smartphones, tablets and Wi-Fi routers transmit and receive at the microwave frequency of 2.45 GHz (= 2,450 MHz), pulsed at 10 Hz. Body cells are therefore permanently exposed to non-ionising radiation. Wi-Fi transmits at a constant power of 100 mW in the 2.4 GHz ISM band. Depending on distance, users experience high exposure levels of up to 200,000 $\mu\text{W}/\text{m}^2$ (see table).

Radiation exposure from Wi-Fi (2,450 MHz)		
Source	Distance	Exposure in $\mu\text{W}/\text{m}^2$
Wi-Fi router	0.2 m	149,204 **
	1.0 m	12,838 **
	1.5 m	1,009 *
	3.5 m	566 *
Laptop	0.5 m	27,161 *
	1.0 m	2,650 *
Wi-Fi client	0.2 m	205,411 **
	1.0 m	8,216 **
Reference values: BUND (Friends of the Earth Germany) recommends 1 $\mu\text{W}/\text{m}^2$ for continuous exposure and 100 $\mu\text{W}/\text{m}^2$ as a legally enforceable protection standard. The "Transmitter Construction Guide" (issued by, among others, the Austrian Medical Association and Chamber of Commerce) specifies a maximum of 1,000 $\mu\text{W}/\text{m}^2$ for all sources and transmitters combined.		
* IMST study ** ECOLOG study (peak values)		

For comparison, BUND calls for 100 $\mu\text{W}/\text{m}^2$ as a legally enforceable protection standard. The "Transmitter Construction Guide", issued by, among others, the Austrian Medical Association and Chamber of Commerce, calls for a maximum of 1,000 $\mu\text{W}/\text{m}^2$ for all sources and transmitters combined. This shows that describing Wi-Fi as "weak" is inaccurate. Here too, duration $\times$ dose makes the poison. Official bodies also recognise this issue:

Federal Office for Radiation Protection: "The Federal Office for Radiation Protection (BfS) generally recommends minimising personal radiation exposure to keep possible, as yet unrecognised health risks low. Simple measures include:

Prefer wired connections wherever wireless technology can be avoided.

Avoid placing central Wi-Fi access points immediately beside locations where people spend long periods, for example the workplace.

If available, enable range limitation to reduce maximum radiated power" (Federal Office for Radiation Protection, 2012).

Telekom Wi-Fi router manual: "Your Speedport's integrated antennas transmit and receive radio signals, for example to provide Wi-Fi. Avoid placing your Speedport immediately beside bedrooms, children's rooms or living areas to minimise exposure to electromagnetic fields" (Telekom, 2017).

The consistent message is that Wi-Fi should not be installed close to people. Research confirms these safety instructions.

4 Wi-Fi risks documented by more than 150 studies

As early as 2014, the meta-study "Effects of Cellular Phone- and Wi-Fi-Induced Electromagnetic Radiation on Oxidative Stress and Molecular Pathways in Brain" by Naziroglu/Akman appeared in the Springer Reference Book "Systems Biology of Free Radicals and Antioxidants", a high-level scientific publication. It indicates that even weak Wi-Fi radiation is harmful to health. Oxidative cellular stress was identified as the mechanism of harm.

The largest review so far of 2.45 GHz radiation, "Biological and pathological effects of 2.45 GHz radiation on cells, cognition and behaviour" (Wilke 2018), documents more than 100 studies and concludes: "Current exposure limits and SAR values do not protect against the health risks of Wi-Fi radiation. The negative effects on learning, attention and behaviour justify avoiding Wi-Fi applications in educational institutions for all age groups ... Wi-Fi should not be used in bedrooms, workplaces, living areas, hospital rooms, lecture theatres, classrooms or public transport."

The review documents harmful effects on EEG and brain functions (12 studies), fertility (18), DNA and cancer development (29), the heart (5), thyroid (3), gene expression (5), apoptosis (9), liver (4) and cell growth (4). Forty-one studies demonstrate oxidative cellular stress as the mechanism of harm; 22 report adverse effects on cognition, learning, attention and behaviour.

5 Current research on Wi-Fi

First, a typical finding that runs counter to using Wi-Fi in nurseries and schools, published in ElektrosmogReport in April 2018. Two studies by Shahin et al. (2015, 2018) demonstrated the following for Wi-Fi:

"(1) Impaired learning and memory in adult male mice exposed to 2.45 GHz microwaves. (2) Increased hippocampal stress. (3) Impaired synaptic plasticity. (4) Reduced expression of signalling pathway

components that are highly important for learning and memory. All these effects depend on exposure duration: the longer the exposure, the more severe the effect. In the authors' view, the underlying mechanism by which 2.45 GHz microwaves impair learning and memory in mice has been identified."

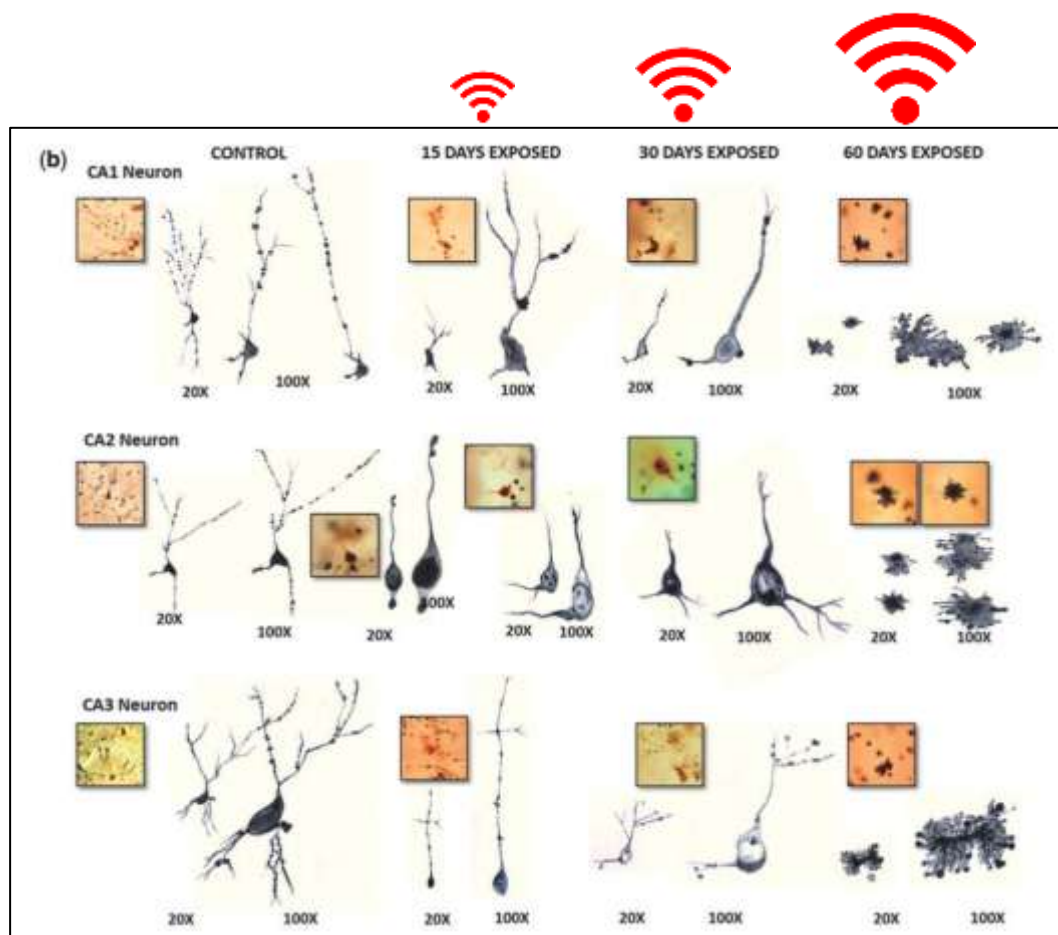


Diagram from Shahin et al. (2015): structure and shape of hippocampal neurons in exposed mice after EMF exposure. "The number of dendrites decreased significantly over time in all exposed groups." "The number of dying or degenerating neurons increased in mice exposed to 2.45 GHz for 30 and 60 days." "Note the neuronal clumping or congestion in mice exposed to 2.45 GHz for 60 days."

All this starkly contradicts the aims of learning. It is not an isolated anecdotal finding.

5.1 Effects on memory and spatial thinking; resulting behavioural disorders

Adverse effects of mobile phone radiation on memory have been demonstrated beyond animal experiments. A study entitled "A Prospective Cohort Study of Adolescents' Memory Performance and Individual Brain Dose of Microwave Radiation from Wireless Communication", involving 700 adolescents in Switzerland, found that

high-frequency electromagnetic fields from mobile phones adversely affect the development of figural and verbal memory. The study's underlying calculation model included all everyday frequencies, including Wi-Fi. It was conducted by the Swiss Tropical and Public Health Institute (Foerster et al. 2018).

Phone use among 12-17-year-olds was evaluated over a year. As expected, frequent callers had higher brain radiation exposure. The striking finding was that more calls meant poorer performance in the figural memory test. Verbal memory results were also worse.

Medical and biological studies examining radiation-induced changes in brain metabolism demonstrate causes underlying these epidemiological findings. Such studies exist for all frequencies used so far. Kim et al.'s South Korean study (2024) shows at the molecular level that radiation disrupts this learning process. Mobile phone radiation inhibits the development and density of synaptic structures and neurite growth in the prefrontal cortex, adversely affecting behaviour, spatial learning and memory, particularly regarding neurodevelopmental disorders such as autism spectrum disorder. See Overview No. 4: Does mobile communication affect the brain?

Wi-Fi studies demonstrate direct effects on the hippocampus, the brain region chiefly responsible for memory, including its pyramidal neurons. The consequences are stress responses (Yang et al. 2012), impaired spatial learning and memory (Lai and Singh 2014; Wang/Lai 2000; Chaturvedi et al. 2011), and cognitive behavioural disorders accompanied by loss of mitochondrial function (Gupta et al. 2018).

Karimi et al.'s study (2018) has the self-explanatory title "2.45 GHz microwave radiation impairs learning, memory, and hippocampal synaptic plasticity in the rat". Behavioural experiments showed that 2.45 GHz microwave radiation from a Wi-Fi device impaired rats' spatial memory and learning. Long-term neuronal plasticity was also adversely affected.

In Hasan et al.'s study (2022), exposure caused anxiety accompanied by neurobiological and cellular changes, particularly damage to pyramidal cells in hippocampal regions.

Zhu et al.'s results (2021) indicate that a single brief radiofrequency exposure could cause significant changes in learning and memory, hippocampal structure and energy metabolism. According to the authors, the observed EEG changes suggest suppression of electrical brain activity.

Bamdad et al.'s study (2019) points in the same direction. They conducted three psychological tests among schoolgirls to assess Wi-Fi's effects on short-term memory, selective attention (focusing on one thing) and divided attention

("multitasking"). The Wi-Fi group performed significantly worse on memory tests. The researchers suggest free radical formation (ROS) as one possible cause.

Besides altered behaviour and EEG in rats exposed to 2.45 GHz, Sinha (2008) found effects on thyroid hormones. Exposed animals behaved significantly differently from unexposed animals: they were hyperactive.

Popovičová et al.'s results (2024) show that Wi-Fi exposure can disrupt the formation of new neurons in the central nervous system, with exposed rats showing developmental delays and conspicuous behavioural changes.

DastAmooz et al. (2023) found that prenatal Wi-Fi exposure in rats significantly altered body and tail lengths and slightly but statistically significantly reduced concentrations of the important brain growth factor BDNF after 56 days.

In their review of 49 studies, Laván et al. (2025) show that 2.4 GHz Wi-Fi alters the expression of key genes involved in oxidative stress, DNA repair and Alzheimer's pathways, potentially impairing genomic stability and mitochondrial function.

5.2 Effects on genetic material

Doctors recognise the significance of studies demonstrating damage to genetic material, or DNA; this cancer-causing potential of mobile phone radiation is central to the debate. Since the results of the two large-scale studies mentioned earlier, NTP and Ramazzini, its carcinogenic potential is considered demonstrated.³ The following four studies also demonstrate this for Wi-Fi.

Deshmukh et al. (2015) used 900, 1,800 and 2,450 MHz to investigate the effects of chronic low-intensity microwave exposure on learning, memory, heat shock proteins (HSP) and DNA damage in rat brains. Male animals were exposed to very low field strengths for 180 days. Spatial orientation, learning and memory were impaired at all three frequencies. Brain HSP70 levels and DNA strand breaks increased significantly. Li et al. (2008) found the same.

Cappucci et al. (2022) showed that long-term Wi-Fi exposure causes a moderate but significant increase in ROS concentrations, indicating oxidative cellular stress. Exposed larvae crawled significantly more slowly than controls and travelled shorter overall distances. Wi-Fi-exposed larvae developed

³ See diagnose:funk Overview No. 2, "Is mobile phone radiation carcinogenic?" <https://diagnose-funk.org/2090>

more tumours. The metastasis rate was 68% in Wi-Fi-exposed larvae and 37% in controls.

Kumar et al. (2020) examined DNA changes caused by Wi-Fi, specifically epigenetic modulation of DNA histone methylation. They used 900, 1,800 and 2,450 MHz (Wi-Fi) signals. Wi-Fi signals had the strongest effects. Effects on brain performance, cancer development and reproduction are suspected.

Panagopoulos et al.'s review (2025) demonstrates that Wi-Fi signals, as part of wireless communication EMF, can cause oxidative stress, DNA damage, disturbed cellular function, impaired fertility and other health effects through their pulsed and low-frequency-modulated structure.

5.3 Opening the blood-brain barrier

Aggarwal et al. (2013) show that chronic exposure to low-strength 2.45 GHz fields changes the electrophysiology of nerve cells. According to the researchers, synchronisation/desynchronisation of firing neurons changes, affecting the blood-brain barrier and neurotransmitter concentrations at synapses.

On the plausibility of effects on the blood-brain barrier, neurobiologist Dr. Keren Grafen's review "Albumin as a key marker" appeared in DHZ - Deutsche Heilpraktiker Zeitschrift, published by Thieme, in 2022.

5.4 Effects on fertility

Studies show that sperm concentrations have halved over the past 50 years, from an average of 99 million to 47 million sperm per millilitre. This is thought to result from a combination of environmental factors (hormonally active substances, pesticides, radiation) and behavioural factors (diet, alcohol, stress, smoking).

In September 2023, the University of Geneva and the Swiss Tropical and Public Health Institute in Basel (Swiss TPH) published an epidemiological study of mobile phone use and sperm (Rahban et al. 2023). Researchers analysed data from 2,886 men aged 18-22 recruited into the army between 2005 and 2018. Men who used a phone more than 20 times daily had significantly lower average sperm concentrations (44.5 million/ml) than those using it no more than once weekly (56.5 million/ml): a decrease of about one fifth (21%). The chance of pregnancy decreases below 40 million/ml.

Adverse effects of non-ionising radiation on fertility, particularly sperm, are considered proven according to the review published by the European Parliament's technology assessment committee

(STOA study, 2022) and Kim et al.'s meta-analysis (2022). Here are seven studies demonstrating this for the Wi-Fi frequency:

Saygin et al.'s findings (2016) suggest that Wi-Fi can cause degeneration of testicular cells and sperm formation. Oxidative damage and inflammatory processes play a key role.

Ding et al. (2018) show that Wi-Fi radiation can cause oxidative stress affecting DNA and mitochondria in human sperm in vitro, indicating a link between radiofrequency exposure and impaired male fertility.

Prenatal exposure also has adverse effects. Almasiova et al. (2021) conclude that exposure before birth (2.45 GHz, 2.8 mW/cm², SAR = 1.82 W/kg, 2 hours/day) adversely affected rats' testicular structure and spermatogenesis later in life. They consider oxidative damage and an impaired blood-testis barrier as possible mechanisms.

Jamaludin et al. (2025) confirm that 2.45 GHz Wi-Fi exposure causes oxidative stress and significantly reduces sperm concentration, motility and viability after four hours of exposure.

Vijay et al. (2025) demonstrated that 2.45 GHz Wi-Fi causes degenerative changes in male reproductive organs, disturbed spermatogenesis and a possible risk to male fertility.

Baldini et al. (2025) show that exposing sperm samples close to a mobile phone or Wi-Fi repeater for one hour reduces progressive motility by about 20%, with corresponding increases in non-progressive and immotile sperm.

Mehta et al. (2025) demonstrated structural damage to reproductive organs in adult zebrafish exposed to 2.4 GHz Wi-Fi and transgenerational developmental and behavioural disorders, mediated by oxidative stress, mitochondrial dysfunction and epigenetic changes.

5.5 Effects of Wi-Fi on the eyes

A study by Ulm ophthalmologist Dr. Hans-Walter Roth drew attention to the effects of non-ionising radiation on the eyes.⁴ He demonstrates a link with cataracts among frequent callers. His epidemiological observations are supported by medical and biological studies showing various pathological thermal and non-thermal effects on the eyes. Akar et al.'s Wi-Fi study (2013) shows non-thermal corneal damage after exposure for two hours daily over 21 days at an SAR of

⁴ <https://diagnose-funk.org/1969>

0.25 W/kg. Yao et al. (2004) found disrupted cell proliferation at low power densities. In the thermal range, Ye et al. (2002) concluded that changes following Wi-Fi exposure cause an osmotic imbalance within the lens and induce early cataracts at power densities of 5 and 10 mW/cm² after only three hours. Kojima et al. (2004) also found various adverse thermal effects. Holding a phone close to the eyes can cause hotspots and thermal effects, including when many phones exceed the limit at 0.00 cm distance. This damage also appears related to the eye's lack of its own thermoregulation.

5.6 Other effects

Annual health insurer surveys confirm the epidemic increase in headaches and sleep disorders. Several Wi-Fi studies show a significant association with headaches and exhaustion (Chiu 2015, Cho 2016, Redmayne 2013, Wang 2017). Mortazavi et al. (2011) confirmed this in 469 schoolchildren examined for consequences of mobile phone use. Call duration was statistically significantly associated with the frequency of headaches, muscle pain, palpitations, fatigue, tinnitus, dizziness and sleep problems. Problems with attention, concentration and nervousness were also greater than expected among heavy users.

Masoumi et al. (2018) examined Wi-Fi radiation's effects on the pancreas. Insulin concentrations decreased significantly.

Holovská et al.'s recent study (2025) in chick embryos shows that continuous Wi-Fi exposure (2.4 GHz, 300 µW/m²) changes the fibrous structures of blood vessel walls: elastic fibres were significantly reduced, while collagen fibres increased or decreased depending on developmental stage. This indicates structural impairment of blood vessels under Wi-Fi exposure.

Treder et al.'s group (2025) at the University of Hohenheim's State Institute of Bee Research demonstrated that exposing plants to Wi-Fi reduced bumblebee visitation. In an earlier study (Treder et al. 2023), the group demonstrated adverse effects of Wi-Fi on honeybee orientation.

5.7 Oxidative cellular stress as a mechanism of harm

A frequent question is why non-ionising radiation can trigger a whole range of illnesses. The answer lies in its mechanism: oxidative cellular stress. Radiation causes overproduction of free radicals, disrupting cellular metabolism and contributing to weakened immunity and thus many inflammatory diseases. Our website has a dedicated

documentation section on this.⁵ The reviews by Naziroglu (2014) and Yakymenko et al. (2015) on oxidative cellular stress are now impressively confirmed by Schürmann/Mevissen's study (2021). The Swiss government's BERENIS expert group newsletter states:

*"In summary, the majority of animal studies and more than half of cell studies provide evidence of increased oxidative stress from RF-EMF and LF-MF."*⁶

Studies demonstrate oxidative stress and mitochondria-mediated apoptosis as mechanisms of Wi-Fi harm (Gupta et al. 2018). Asl et al. (2020) demonstrate oxidative stress in the brain.

Özsobacı et al.'s results (2019) indicate that 2.45 GHz exposure triggered oxidative cellular stress in kidney cells. They also observed increased apoptosis (programmed cell death). Adding zinc attenuated both effects.

Fahmy/Mohammed (2020) found that exposure reduced the antioxidants glutathione (GSH) and superoxide dismutase (SOD); overproduction of free radicals caused liver damage. The authors recommend raising public awareness to reduce the duration of Wi-Fi exposure and keeping as much distance as possible from the radiation source.

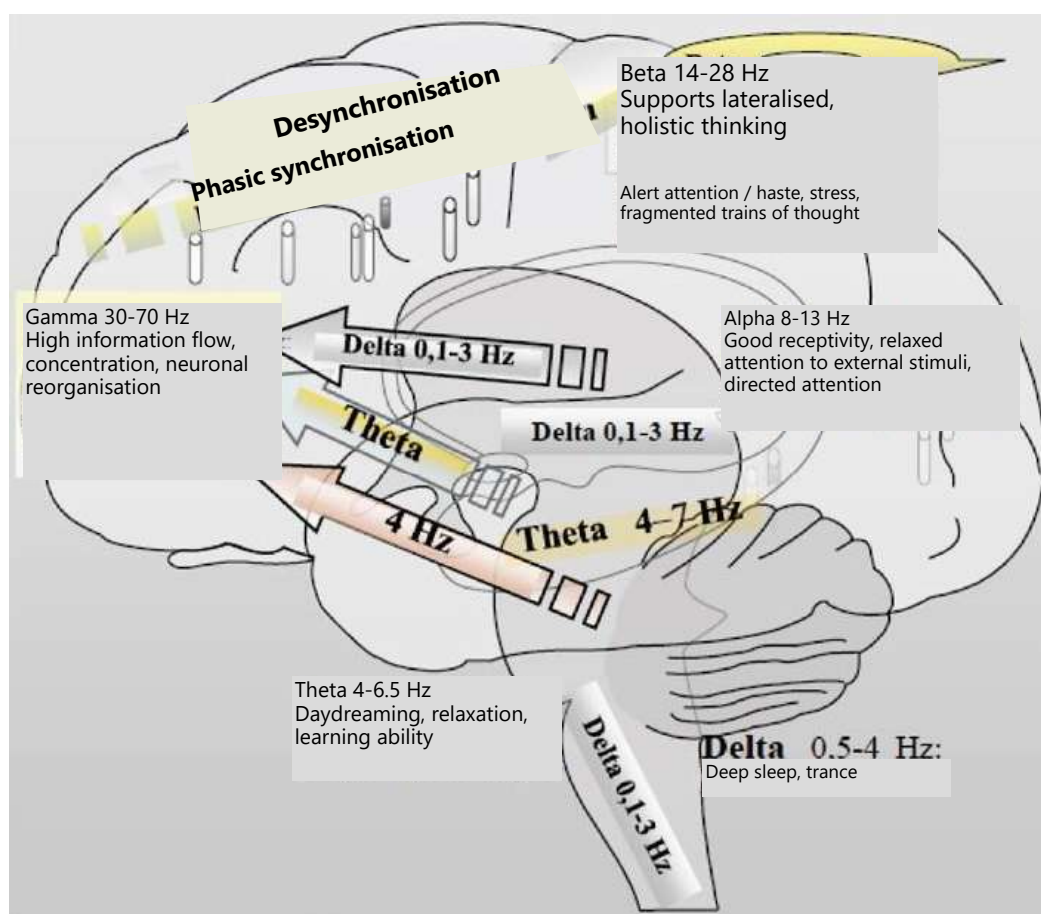
5.8 Effects of Wi-Fi's 10 Hz pulsing

Wi-Fi is pulsed at 10 Hz. The alpha-wave component of the electroencephalogram has a mean frequency of 10 Hz (Hecht 2017). Rütger Wever's research in the famous Andechs bunker demonstrated interactions between human circadian rhythms and the 10 Hz frequency of Earth's electromagnetic fields (see Hecht 2018).

Prof. Dr. Lebrecht von Klitzing's research (1995, 2022) shows possible pathological effects of Wi-Fi on the brain. A medical physicist, he directed the clinical and experimental research facility at the Medical University of Lübeck from 1975 to 2002. A pioneer in electromagnetic field research, he has 23 papers listed in EMF-Portal since 1986. He discovered that the 10 Hz pulsing of the Wi-Fi signal affects bodily functions. In a 2023 interview with Peter Hensinger, he said:

⁵ <https://diagnose-funk.org/1550> ⁶ <https://www.bafu.admin.ch/bafu/de/home/themen/elektrosmog/newsletter.html>

*"Nerve signals can be recorded in an electromyogram (EMG), not only directly from nerves but also nearby, at the overlying skin surface. An electrode matrix allows non-invasive surface EMG recording. After exposure, the 10 Hz Wi-Fi signal was predominantly detectable in recordings from groups who describe themselves as electrosensitive. This reveals a particular dynamic in changes to nerve signals ... We gained one finding in this context: the cardiac symptoms of atrial flutter/fibrillation were frequently detected. The similarity of frequencies to Wi-Fi is striking."*⁷

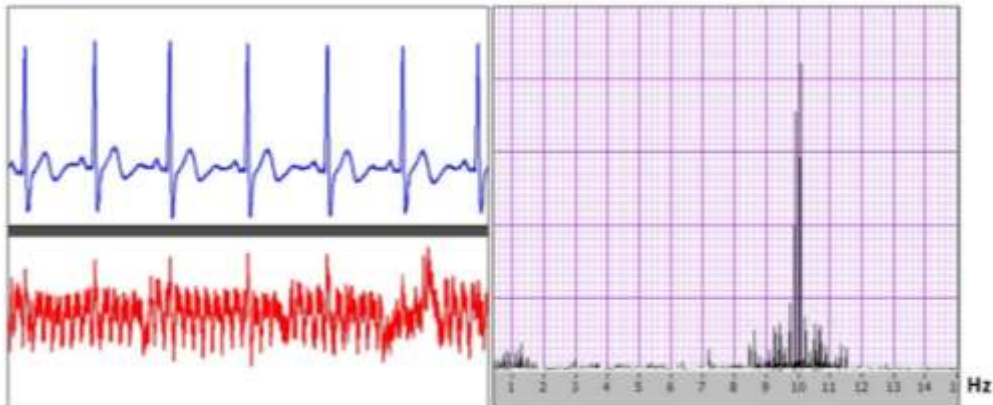


Brain rhythms are pulsed at low frequencies: "Oscillators arise partly from communication between neurochemical cellular processes. They are rhythmically coordinated, and interfering sequences synchronise: activity is central to all neuronal maturation. It arrives through sensory pathways from the environment and is also supplied by the brain's own oscillators, being transferred into synchronising brain rhythms that form the basis of thinking and learning. Both sources influence each other through brain chemistry, via specific neurotransmitters through which electrical signal currents become embedded in neural network structures. Coupling electrical and chemical signals is a core component of neuronal structure-function coupling" (text and diagram: Teuchert-Noodt 2019).

⁷ <https://diagnose-funk.org/1964>

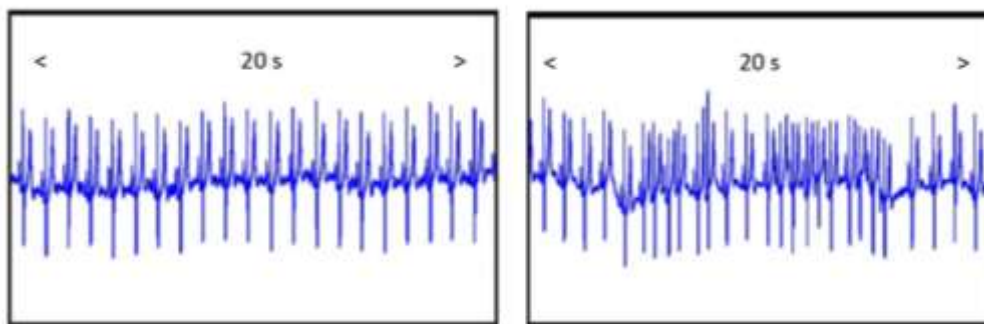
The FFT (Fast Fourier Transform) measurement diagrams show the changes:

Patient reports headaches during / after work in an open-plan office



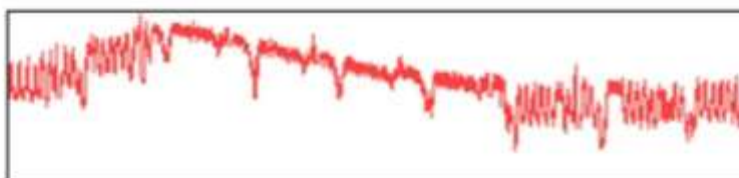
EMG (red) and FFT (black) show a clear 10 Hz signal after earlier Wi-Fi exposure. About 30 h elapsed between the last exposure and measurement. Key finding: the artificial signal is retained for a long time.

Patient reports breathlessness during and after computer work

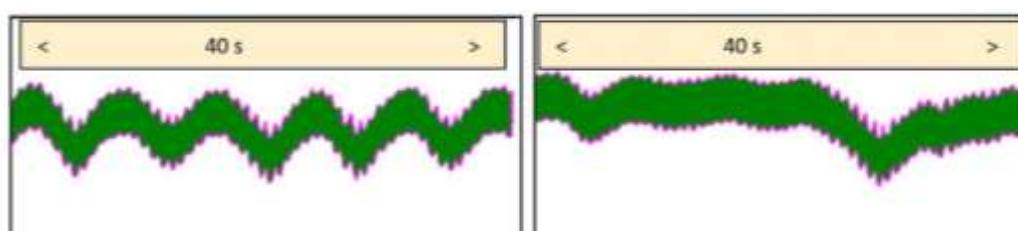


ECG before exposure

after 6 min Wi-Fi exposure



This patient also showed spontaneous EMG changes after exposure and ...



... disturbed (= inactive) microcirculation

A medicine would immediately be withdrawn from the market on the basis of this evidence. Prof. Karl Hecht (2018) concludes in "Effects of the 10 Hz pulsing of Wi-Fi electromagnetic radiation on humans": "With continuous long-term exposure, the 10 Hz pulsing of Wi-Fi EMF radiation can create a Wi-Fi EMF stress memory. This is an enormous danger to human health, particularly children's health. Equipping schools with Wi-Fi systems must be prohibited by law" (Hecht 2018).

Panagopoulos et al.'s review (2026) clearly shows that all communication signals examined have highly variable ELF pulse components. According to the authors, this low-frequency variability, together with full polarisation and coherence, contributes substantially to wireless signals' bioactivity because organisms cannot adapt to such stressors. They identify ion oscillation at voltage-gated ion channels as the mediating mechanism responsible for non-thermal biological activity, rather than the unmodulated RF carrier wave.

The German Bundestag's technology assessment report (TA report, 2023) also suggests that this evidence requires action. Regarding research on children, it states:

"Seventeen studies in total found indications of various effects. Epidemiological studies most frequently described behavioural abnormalities, particularly among children who themselves used phones or were exposed in utero during pregnancy. Children and adolescents also reported health complaints (headaches, fatigue, etc.) when using mobile phones. Effects on cognition were also found in adolescents. Experimental studies provided isolated indications of changes in brain activity and skin resistance, and impaired cognitive performance" (pp. 17, 149).

6 Solutions for an environment with minimal radiation

The overview of Wi-Fi research shows that radiation has various toxic effects on the body. Even contradictory evidence calls for the precautionary principle; given what is known about Wi-Fi's effects, measures to avert danger ought to apply.

Given this evidence, we must ask what we are doing. Wi-Fi's toxic potential makes its use in hospitals clearly absurd. We therefore call for special Wi-Fi-free hospital rooms, particularly for people with electromagnetic hypersensitivity. Imagine teachers and pupils with a history of cancer being exposed to tumour-promoting radiation at school! Continuous exposure will make children electromagnetically hypersensitive. diagnose:funk has initiated a movement for Wi-Fi-free schools and calls on doctors, parents and teachers to explain the risks in nurseries and schools, aiming for: our school and nursery will remain Wi-Fi-free!

The sharp rise in headaches and poor concentration among children, for example, is already an indication. diagnose:funk has created an informative website on electromagnetic hypersensitivity, www.diagnose-ehs.org, and published "The Forbidden Illness".

It is now claimed that exposure limits protect against these effects! Yet almost all these findings arose at power densities far below the limits during normal device operation. The limits do not protect; these studies are generally ignored in risk assessments. Extensive literature explains why the limits are unscientific and provide no protection (ICBE-EMF 2022; Overview No. 3: Does mobile communication also have non-thermal effects?).

How should Wi-Fi be handled? First recommendation: digital media can use wired connections, removing the need for Wi-Fi. Schools should retain wired computers and computer rooms. All tablets should also be required to have a cable connection. If schools and education ministries made this a condition of approval for school use, the industry would comply.

Second recommendation: anyone who, for whatever reason, does not wish to dispense with Wi-Fi should set power control to the minimum.

Third recommendation: if wireless technology cannot be prevented in schools, often because of pressure from young teachers, Wi-Fi must nevertheless be rejected in favour of a new wireless technology, Visible Light Communication (VLC, LiFi). This is now ready for mass production. Data are transmitted through LED room lighting or directly through infrared transmitters. It is very likely harmless because our bodies are adapted to light radiation. diagnose:funk has published a Focus report on the evidence. Our webinar 25 offers more on LiFi.⁸ The Waldorf school at Prenzlauer Berg in Berlin has equipped nine rooms for data transmission using light waves.⁹ Our vision is to replace Wi-Fi everywhere with LiFi.

7 Conclusion

The Wi-Fi evidence makes clear that the question of whether Wi-Fi radiation is harmful is not an apparently unresolved controversy. The health risks of mobile phone radiation are not a scientific dispute, but a conflict between the economic interests of industry and the state and the population's health interests. As with diesel or glyphosate, billions are at stake.

Wi-Fi also forms part of the "digital education" business model, promising worldwide turnover of \$9 trillion, planned by the education-industrial complex (KRAUTZ 2014,

⁸ diagnose:funk webinars at: <https://diagnose-funk.org/1680> ⁹ <https://diagnose-funk.org/1932>

MÜNCH 2018). Teachers are to be replaced by autonomous digital technology and relegated to learning facilitators. There are thus two reasons to reject Wi-Fi: it harms health and forms part of the infrastructure of “digital education”, a wrong turn. Wrong turns should be avoided!

Home learning during the coronavirus pandemic exposed all the weaknesses of digital learning. A petition for screen-free nurseries and primary schools, initiated by the Alliance for Humane Education, Alliance ELIANT and diagnose:funk, was delivered to the EU in Brussels in 2021 with 100,425 signatures. This achieved a small success: “age-appropriate” was added to the EU education plan’s provisions on digitalisation. Schools can decide their own equipment. Let us help them reject Wi-Fi installations.

The European Parliament technology assessment committee’s STOA study outlines policy options on pp. 181 ff. that also apply to Wi-Fi:

- “Novel technologies [...] that enable a reduction in RF exposure”
- “Revision of exposure limits for the public and the environment”
- “Fibre-optic cables connecting schools, libraries, workplaces, homes, public buildings, all new buildings, etc.”
- “Public gathering places could be declared RF-EMF-free zones (similar to smoke-free zones) to avoid passive exposure”
- “Information campaigns should be conducted at all levels, starting with schools. They should explain potential health risks, [...] alternatives, [...] and proper use [...].”

Doctors can contribute to the fifth point. Radiation must be included in medical history-taking, and patients informed about possible consequences of using radiation-emitting devices.

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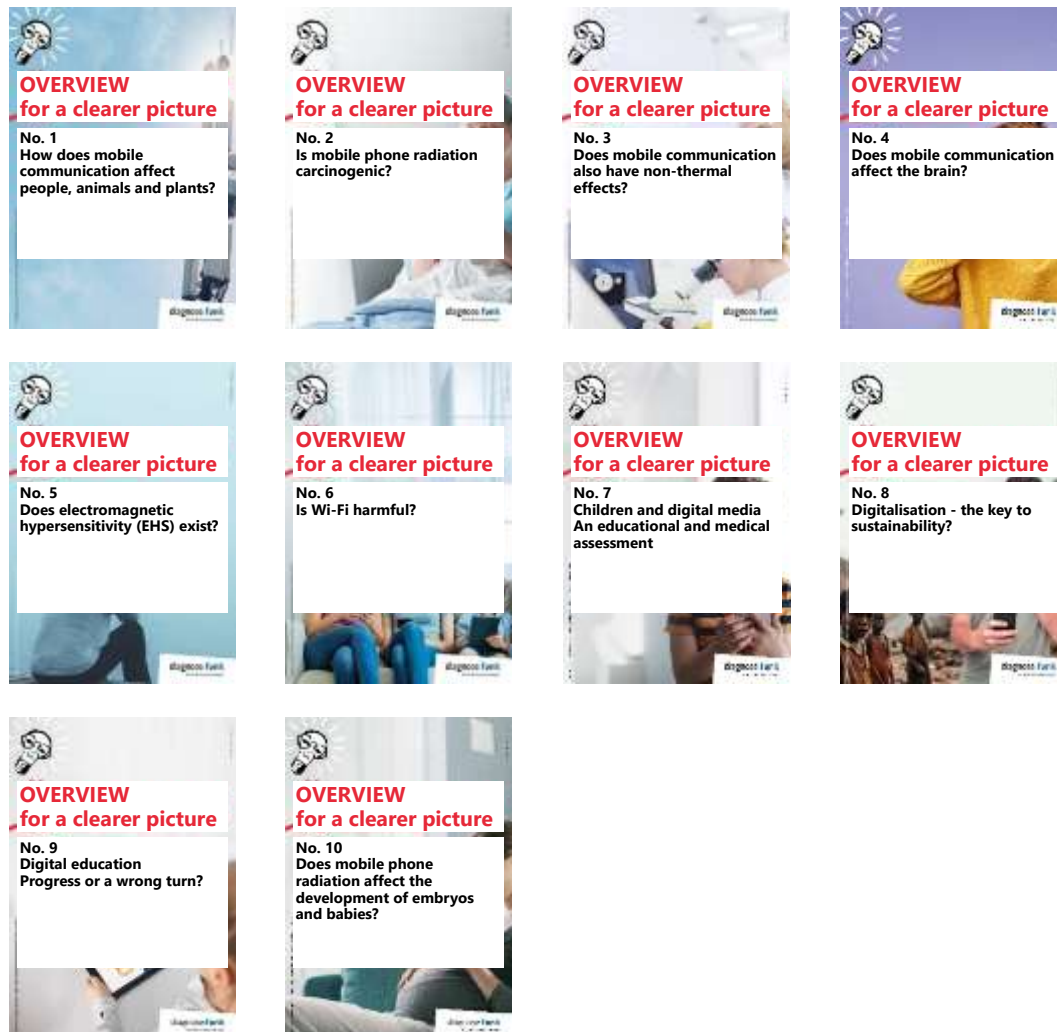
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