

## How harmful is 5G really?

***5G should transfer huge amounts of data quickly. But it could also harm your health. Europe's governments ignore the danger.***

Harald Schumann and Elisa Simantke, Der Tagesspiegel, Jan 15, 2019 (Google translation from German to English)

An electric minibus turns over a deserted test area in the nowhere of the Rhenish province. Two passengers are sitting in the backseat. Then suddenly another person appears from nowhere. Hannes Ametsreiter, the boss of Vodafone Germany, joins the conversation - as a hologram. Actually, he works at the desk in Dusseldorf, 70 kilometers away, but at the same time he sits apparently bodily in the car. Facial expressions, gestures and body language make the electronic mind look almost alive. This requires several gigabytes per second to be transmitted, a transmitter of new type makes it possible. "The driver's seat in the car of the future becomes a TV couch or office chair," rejoices the manager.

The expansion of 5G is expected to cost 500 billion euros. PHOTO: TOBIAS HASE / DPA Such and similar gags have been staging the telecommunications industry for months across Europe. Telecom Italia is flying drones across Turin's Piazza Vittorio to deliver medicines and rid the streets of transporters. Or the Swedish high-tech group Ericsson demonstrates the automatic remote monitoring of critically ill and surgical operations by robot. Competitor Nokia shows how robots working together in cycles of milliseconds work together to solve a complex task.

### **500 billion euros investment for competitiveness**

The effort serves to get the citizens into the mood for an information technology mega-project: 5G, the fifth generation of mobile technology, is supposed to transmit up to 1000 times more data volume than before. The number of connected devices is supposed to increase hundreds of times and the reaction speed should not even be more than one millisecond. From autonomous driving through thought-out refrigerators and radiators to fully robotic factories, the new technology is set to revolutionize the entire lifecycle.

According to estimates by Deutsche Telekom, the investments required for this, about 500 billion euros, are "of strategic importance for Europe," announces Jyrki Katainen, EU Commissioner for Jobs and Growth. The expansion of 5G "is critical to our global competitiveness," he says, agreeing with all EU governments.

### **A small circle of insiders assesses the dangers**

But are the promises true at all? And what risks are involved? The journalist team Investigate Europe investigated these questions and came up with astonishing contradictions. Not only is it completely unclear whether the planned billions of investments will ever pay off. Moreover, the project harbors a tremendous risk that hides those responsible as it becomes more urgent: An increasing number of studies suggest that high-frequency electromagnetic radiation used in mobile communications can harm human health, such as causing cancer or males Seeds damage.

However, the competent institutions, from the World Health Organization to the EU Commission and the German Federal Office for Radiation Protection, leave it up to a small group of insiders to set limit values for the protection of the population. But its members hide many inconvenient new insights.

### **For the nationwide expansion, it requires tens of thousands of transmitters**

5G would greatly enhance the "electrosmog", as critics call it. Because the new technology operates at very high frequencies, their range is significantly lower than in previous antennas. She is not fit for the filling of the [often-complained radio](#) holes. But it multiplies the number of necessary radio cells. That is why Telekom alone is currently building 71 new transmission [towers in](#) the five-kilometer [test strip in Berlin-Schöneberg](#) . If it comes to area-wide expansion, that will require tens of thousands of additional transmitters.

With "the implementation of 5G threaten serious, irreversible consequences for humans," warn more than 400 physicians and scientists [in a recent appeal](#) for a stop to expand the 5G technology, including the longtime German environmentalist and biologist Ernst -Ulrich von Weizsacker. "We do not know for sure whether mobile data transmission technology brings with it health risks, but we still can not rule it out," he explains.

Therefore, policies must "insist that the health risks associated with the ubiquitous high-frequency radiation for mobile devices be investigated before exposing the entire population to ever-higher levels of electromagnetic fields from that technology."

### **A topic for spinners? So far it seemed so**

Cell phone radiation? That seemed only an issue for spinners and people with paranoia. The authors of this report initially saw it that way. After all, there are already around 24,000 transmission towers in Germany alone. Many millions use their smartphones for hours every day. From health damage they do not notice anything.

---

*In mobile radio, high-frequency electromagnetic fields are used for the wireless transmission of data. Hertz (Hz) is the unit of measure for the frequency and indicates the number of oscillations of the electromagnetic waves per second. The following applies: The wider the frequency band used, the more data can be transmitted. For LTE (4G) bands from 20 to 60 MHz are in use. In contrast, the 5G technology requires 100 MHz, which are only available for higher frequencies. For this purpose, the Federal Network Agency will initially auction the three bands between 3.4 and 3.7 GHz. A fourth band up to 3.8 GHz is reserved for local use in factories and research centers. Later, bands from 22 to 25 GHz will be used.*

*However, the high frequencies have a shorter range. For the closure of the often-depleted dead spots, therefore, the LTE network must be removed, the 5G technology is not needed for this. The strength of the fields is measured in volts / meter. In order to protect the population, the previously used mobile radio frequencies between 400 MHz and 3 GHz are subject to limit values of 38 to 61 V / m in most EU countries. Because health damage can not be ruled out with lower strengths, in France, Italy, Belgium and Switzerland, public places and homes are 10 times more stringent. The telecom industry is calling for the expansion of the 5G network now easing these limits.*

---

But as simple as the everyday experience suggests, it is not. This clarifies a look at the "legal information", which are available in many of the smartphones under "telephone information". "Hold this smartphone at least 1.5 cm from the body," it says, and "use only accessories with a belt clip to wear on the body." Failure to do so may cause your smartphone to exceed the specified limits." Apparently there is a problem.

This is even clearer in the documents with which the corporations concerned inform their shareholders about the possible risks. As Vodafone notes in the 2017 annual report: "Electromagnetic signals emitted by mobile devices and base stations can pose health risks with potential consequences, including: changes in national legislation, a reduction in mobile phone use or litigation." Deutsche Telekom also warns its Shareholders said there was "a risk of regulatory intervention, such as lowering electromagnetic field limits or implementing precautionary measures in mobile communications".

### **Science is deeply divided over the question**

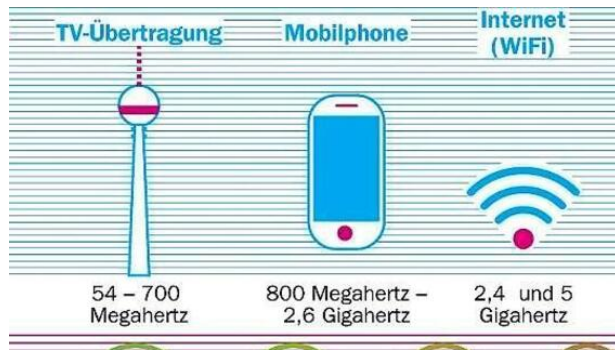
The warnings signal how great the uncertainty is. For decades, biologists, physicians and engineers have been researching the question of whether radiofrequency radiation for mobile radio could harm health. In the world's largest database on the subject, the "EMF portal" of RWTH Aachen University, more than 2000 scientific studies are listed. But the evaluation of the results, the scientists involved from all over the world are still deeply divided.

At the heart of this dispute is a unique institution: the International Commission on Non-Ionizing Radiation Protection (ICNIRP). This is actually just a private scientific association without any official character. However, legislation to protect people from high-frequency radiation strictly follows their guidelines.

These are based on a controversial assumption: Thus, the only proven adverse health effect of radiofrequency electromagnetic fields is the heating of the tissue, as occurs at high dosage, as it happens in a microwave oven. According to ICNIRP, there is a risk that the energy transmitted by the radiation will reach more than two watts per kilogram of body weight because it is only from this level that the temperature in the tissue rises measurably. The association set the value already in 1998, and based on that until today all legal limits to the transmission strength of base stations and mobile phones. As a rule, they are at best reached close to the transmission towers, so they are no problem for the industry.

### **High-frequency radiation acts on cells - but is that dangerous?**

However, the restriction on the heating effect seems arbitrary. High-frequency beams inevitably produce further, so-called non-thermal effects in living cells, even when they are low-dose. Finally, biological processes are always based on electrochemical processes, such as the transmission of nerve impulses. The members of ICNIRP do not deny that. "We just are not convinced that these effects have been proven to be harmful to health," explains its chairman, the Dutch biologist Eric van Rongen.



Against this dictum, the critics have also launched an organization called the "Bioinitiative" in the US. Their 29 professors and medical researchers from eleven countries also represent all of the required disciplines such as cancer research, molecular biology and epidemiology, and they published a counter-report to the ICNIRP position.

"The biological effects of cell phone radiation prevent the body from healing damaged DNA and reducing its resistance to disease," the authors write, citing more than 1,000 scientific publications. This could profoundly affect the metabolic and reproductive functions. According to Swedish oncologist Lennart Hardell, one of the lead authors, studies with several thousand cell phone users surveyed have "proven that high-frequency electromagnetic radiation increases the risk of brain tumors".

The problem with these alarming research results is that they cannot be confirmed by other scientists because the interviews are not repeatable. Although an evaluation of 2266 studies by an Australian research group showed that 68 percent of them "significant biological or health effects associated with exposure to anthropogenic electromagnetic fields" prove. However, whether and how often this actually causes illness is not clearly proven. A specially appointed group of experts from the International Center for Cancer Research at the WHO (IARC) did not like Hardell and his colleagues. Electromagnetic radio frequency radiation was only "possibly carcinogenic," she said in 2011.

### Laboratory rats grew more tumors

This rating is now outdated. Already in 2015, a research group at the private Jacobs University in Bremen around the biologist Alexander Lerchl made a disturbing discovery. Lerchl had long vehemently rejected all the warnings of the mobile phone critics. But then he found that in mice, the tumors that were produced by a poison grew much faster under common mobile phone radiation and spread in the body than in the animals without radiation. This "tumor-promoting effect" had him "quite surprised," confessed Lerchl.

Even more serious is a [study published](#) in [November 2018](#), in which researchers have worked for more than ten years on behalf of the US Department of Health. For this purpose, the scientists of the "National Toxicology Program" spent around 7,000 rats and mice lifelong for nine hours on the day of mobile phone radiation. To the surprise of the researchers, they not only found damage in the DNA strands of the brain cells in mice, but the irradiated male rats also developed significantly more malignant tumors on the nerve cells of the heart muscle than their non-irradiated conspecifics. The number of brain tumors was three percent higher than in the control group.

The team of the chief toxicologist Michael Wyde was very aware of the explosive nature of these results. That's why the US government institute specifically appointed 15 external physicians and engineers to review the work. Their verdict was nonetheless clear. Accordingly, there is now "clear evidence" of the tumorigenic effect of radiofrequency radiation in rats.

### **Not "possibly", but "probably carcinogenic"**

That's exactly what the authorities in the US and Europe have always denied. Director of the Food and Drug Administration, Jeffrey Shuren, stated immediately: "We deny the conclusions of the report." The researchers exposed their experimental animals to very high levels of radiofrequency radiation. Therefore, the results "could not be applied to the mobile phone use of people".

But this objection was refuted already at the time of publication. Parallel to the US experiments, a team around the renowned Italian cancer researcher Fiorella Belpoggio in Bologna had carried out a similar investigation. In addition, more than 2,000 experimental animals of the same rat species were exposed to lifelong irradiation, but with field strengths as generated by everyday mobile phone use. Nevertheless, this also led to a significant increase in the same type of tumor as observed by the US researchers.

For the first time ever, "the same carcinogenic effect of radiofrequency radiation is documented in two independently performed experiments according to verifiable strict standards of laboratory science," states Belpoggio - and calls for consequences. The WHO and its International Agency for Research on Cancer (IARC) must "give priority to this issue". Electromagnetic radiation should no longer be classified as "possibly" but as "probably carcinogenic".

### **Why do not the critics hear?**

That it comes to this, however, is questionable. This is opposed by the ICNIRP cartel. "Both studies have limitations that affect the usefulness of their results in establishing exposure guidelines," the expert club claimed immediately after its publication. Thus, "they do not provide a reliable basis for revising the existing guidelines for radiofrequency exposure". And no radiation protection office, no EU commissioner and no minister contradicts. For Europe's governments and their agencies, the 13 members of the self-proclaimed commission act as a kind of higher scientific force. But why? Why do not all Warner, even celebrities such as the Expert Panel for the US Department of Health, have a say?

If you look into this question, you will encounter a startling phenomenon: the members of the ICNIRP are also active in all relevant institutions and thus control the official discourse ([you can find a guide through the network here](#)). Legally, the group of scientists is merely a registered association that recruits its members themselves, avoiding dissent. But even at its address begins the amalgamation with the state level. The secretariat of the association resides rent-free directly in the Federal Office for Radiation Protection in the Munich suburb of Neuherberg. And the scientific coordination for ICNIRP is conveniently done by the official director of the Department of Electromagnetic Fields, Gunde Ziegelberger. Her predecessor even chaired the club until 2016. At the same time, the Federal Government is funding the scientists' NGO with around € 100,000 a year.

The impression that the private organization is part of the German authority, rejects the speaker as "not applicable". The Office only supports the international networking of research. Moreover, the ICNIRP is officially recognized by WHO, which gives it the legitimacy. That's right, but do not make it less questionable.

### **Links to the World Health Organization and the European Commission**

After all, the UN Health Organization in Geneva has not only recognized the association as a consultant, but has de facto completely transferred the investigation of the health risks of high-frequency radiation. The "International EMF Project" of the WHO has the mission to evaluate the ongoing research and to derive recommendations from it. Because of the many new findings, a comprehensive WHO study will soon be prepared. But four out of the six core group members work for ICNIRP, including chairman van Rongen.

However, the members of this association have long since decided that even the more recent research results do not justify additional protective measures, as van Rongen confirmed to Investigate Europe. The question of whether this does not involve an obvious conflict of interest left the director of the WHO project, the Dutch engineer Emilie van Deventer, unanswered, and not accidentally. She herself is officially an "observer" part of the ICNIRP network.

The situation is similar for the EU Commission. There, the Scientific Committee on New Health Risks (SCENIHR) was responsible for assessing the dangers of radiofrequency radiation. Again ICNIRP presented four of the twelve members. This committee also promptly came to the conclusion in 2015 that there were no problems. And so, the Head of the EU Public Health Directorate invokes "the international bodies ICNIRP and SCENHIR" and assures that "they have provided consistent evidence that exposure to electromagnetic fields poses no health risk if they are below those recommended in the EU Limits remains".

The unity of views created in this way is convenient for everyone involved, the telecom industry and its customers as well as the responsible politicians who rely on growth and jobs through mobile data technology. But it breaks with a central promise of the EU Constitution: the precautionary principle.



Experimental rats in the laboratory of the Ramazzini Institute are exposed to radiation.



"The Union's environmental policy is based on the principles of precaution and prevention," [Article 191 of the current EU Treaty states](#) . According to this, unlike in US law, citizens are generally protected against products whose safety has not yet been proven.

If it had gone according to the will of the European Environment Agency (EEA), this principle would also apply to the mobile radio technology. Already in 2007, the authority warned about the risk of cancer. "Given the millions of people exposed to it and the vulnerability of children in particular, we considered it justified to start an early warning," said David Gee, then the agency's chief advisor. This follows the "late lessons from early warnings," says Gee, reminiscent of the debates on asbestos, the cancer-causing plasticizer PCB, and mad cow disease.

The Swiss government explicitly follows this advice. "The Federal Council could not wait for the science to provide the desired answers," [explains the competent Federal Office](#) : "The precautionary principle of the Environmental Protection Act requires that the load should in principle be as low as it is technically possible." Therefore, the transmission towers in the In all places where people spend a long time, Switzerland produces only one-tenth of the usual EU radiation levels in order to "keep long-term pollution low" above all else. This is not a major problem yet. "Because the performance of the antennas is lower, the coverage with a good quality mobile service comparatively more antenna sites requires," says a spokesman for the company Swisscom. This have increased the cost of the expansion, which is reflected in higher prices for the mobile phone users But now stand in the way of the 5G expansion, which is why the industry is pushing massively for a relaxation, but the Bernese parliament rejected the request and stick to the provision.

### **"Too drastic measure"**

The government in Germany, on the other hand, unerringly follows the recommendations of the ICNIRP. This is independent and pursues "a high protection goal", insure a spokeswoman of the environment ministry. The same is true of Europe's commissioners. "Applying the precautionary principle" to mobile technologies is "too drastic a measure," says the head of cabinet of the current EU Health Commissioner Vytenis Andriukaitis. "The Commission would rather wait for concrete evidence, but that's always too late," Gee comments. "If the damage is proven then it has already arisen."

There would be enough time, at least for the massive expansion of the burden of the 5G technology, to impose a moratorium before it is too late. Because so far it is not clear whether the many technical promises are economically viable at all. The possible applications from the "Internet of Things" to autonomous driving do not fit the business model of the telecom industry. This is based on the monthly paid user fees. However, this source of revenue can no longer be expanded. Already with the introduction of 4G, also called LTE, it had not been able to impose on the customer for higher fees, reports the British telecom expert and university professor William Webb, who is in demand worldwide as a consultant.

### **Is the hype around 5G out of control?**

For smartphone customers, the 5G technology anyway provides little benefit anyway. "The LTE / 4G technology already enables a great deal for smartphone users," explains Thomas Magedanz, who heads 5G research at the Berlin-based Fraunhofer Institute for Communication Systems." Citizens and citizens will benefit more indirectly from 5G in the future, for example, by securely networking devices in the hospital or a temporary 5G network at major events." But

whether the network providers stadium operators, hospitals and other industries such as the car industry or It is highly uncertain that consumer goods manufacturers will be able to win customers, and they too would have to collect the fees from their customers.

The vision of mobile data future with 5G is therefore "just a myth", warns Webb. Only the equipment manufacturers such as Ericsson and Huawei and perhaps the producers of new smartphones would benefit, says industry expert Webb. At the same time, "ministers want to adorn themselves with the latest digital technology, although they usually understand little about it," he observed. That is why "the hype around 5G out of control" advised. "Which applications are ultimately commercially successful for 5G, is currently completely open," confirms Fraunhofer expert Magedanz. So far, there are "beyond the automation in the factories, yet no clear business models."

However, EU governments are now putting network operators under pressure to quickly buy licenses for the frequencies they need from governments, even though they do not know how they will recoup their spending. In Germany and eight other countries of the European Economic Zone, the auctions are still pending this year.

In Italy, on the other hand, the telecoms companies have already paid 6.5 billion euros for this last year - an adventure with an uncertain outcome. The auction in Italy is "ruinous", warns about Jorge Graça, chief technology officer of the largest Portuguese network provider NOS. Overall, the EU's 5G plan is driven only by "a political agenda," but "technologically not mature and counterproductive," warns Graça, saying that many telecom managers just do not want to say publicly.

### **"We do not want to be guinea pigs"**

Unbill threatens the industry also from its potential customers. In many places the resistance of the population against the inflation of the transmitter plants germinates. For example, in the Italian L'Aquila. In the provincial capital of Abruzzo, more than 1500 inhabitants protest against the use of their city as a test area for 5G experiments. "After the earthquake drama, we do not want to become the outdoor guinea pigs for this technology," complains Gianmaria Umberto, one of the local doctors. Although the transmission towers are being built in the midst of residential areas, the health department recommended that there should be no more than four hours of "preventive care" in the vicinity. The outrage is corresponding.

In the Greek province of Patras, the citizens did not even get that far. After the government in Athens had chosen the city as one of the three planned test fields for the country, raised a citizens' committee objection to the allegedly planned installation of 50 000 small transmitters for the many 5G cells. After months of negotiations, the city administration finally rejected the project on the grounds that the health risks to the population had not been clarified.

In the French town of Rennes, last autumn, citizens were amazed to learn that they were exposed to unlawful high-frequency radiation in the local subway. In France, unlike in most other EU countries, there is a precautionary limit for public places, which is only about one-tenth of ICNIRP.

A local MP simply had to measure the strength of the electromagnetic fields after all the subway stations were equipped with transmitters. It quickly turned out that the radiation in nine of the 13 stations was well above the permitted value, in peak times even more than 1000 percent. The



case caused a sensation nationwide and fueled again the sharp debate in France about the risk of electromagnetic radiation.

Even harder is the issue in Poland. There are strict limits for electromagnetic field radiation. But these are not compatible with the usual standards of the manufacturers. Because there are no effective controls at the same time, protests continue to flare up. Last year alone, in five Polish cities, citizens took to the streets against new transmission towers and 5G experiments. That is why the central government has initiated a nationwide measurement program for the first time. That's not enough for the citizens of Krakow. There, the administration has set up a "program for protection against EM radiation", which is currently being discussed.

### **Money for development - but not for risk research**

All these are so far only selective resistances, which can quickly disappear again. But they show what would happen if the research produced more bad news. The acceptance for the 5G expansion could suddenly disappear and billions of investments would be lost.

In the US, the discourse has now also reached the Congress, where the Senate gave the critics a forum. "The bare and simple fact is that the health risks are unknown and unexamined," said Democratic Senator Richard Blumenthal in early December. This was "a sign of ignorance and disrespect" on the part of the federal authorities. Therefore, he asked them to present "evidence" for their claim that there was no danger - a requirement that only an extensive research program could fulfill.

That would make sense in Europe. The EU is currently pumping more than € 700 million into 5G development projects, but not one of them is for risk research. Maybe it is time for Europe's parliamentarians to change the priorities of the program.



Tech hype. Acceptance in the population could decline.

## The team

Investigate Europe is a pan-European journalist team that researches topics of European relevance and publishes the results across Europe. The project is supported by the "Hübner & Kennedy" Foundation, GLS Treuhand, the Rudolf-Augstein-Foundation, the Norwegian Fritt Ord Foundation, the Italian Foundation Cariplo and the Open Society Initiative for Europe as well as a private donor. Further donations come from readers. The team cooperates with the NGOs Journalismfund and N-Ost. Among the media partners for the report on 5G include "Newsweek Polska", "Diario de Noticias", "Il Fatto Quotidiano", "De Groene Amsterdamer", "Efimerida ton Syntakton", "Aftenbladet" and the "Falter". In addition to the authors, Crina Boros, Wojciech Ciesla, Ingeborg Eliassen, Juliet Ferguson, Nikolas Leontopoulos, Maria Maggiore, Leila Minano, Paulo Pena and Jef Poortmans contributed to this. More about the project:

<https://investigate-europe.eu>

Original story in German:

<https://www.tagesspiegel.de/gesellschaft/mobilfunk-wie-gesundheitsschaedlich-ist-5g-wirklich/23852384.html>