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Mobile

How harmful is 5G really?

5G to transfer huge amounts of data quickly. But it could also damage health. Europe's governments ignore the danger.

HARALD SCHUMANN ELISA SIMANTKE



Qualcomm is touting at the CES in 2019 in Las Vegas for 5G.

PHOTO: ROBYN BECK/AFP

An electric minibus curves on a deserted test site in the middle of Nowhere in the Rhenish province. Two passengers sit in the back seat. Then all of a sudden Nothing seems out of the another Person. Hannes Ametsreiter, the CEO of Vodafone Germany, joins the conversation as a hologram. Actually, he works at a Desk in a 70 kilometres away in Düsseldorf, but at the same time, he sits, seemingly in the flesh in the car. Facial expressions, Gestures and body language to let the electronic spirit almost look alive. Several Gigabytes per second must be transmitted, a transmitter of a new kind of power, it is possible. "The driver's seat in the car of the future will be for the TV couch or the office chair," glad the Manager attracts.



The Development of 5G is supposed to cost 500 billion euros.
PHOTO: TOBIAS HASE/DPA

Such and **similar Gags** staged in the telecommunications industry for months in the whole of Europe. Since Telecom Italia in Turin makes drones on the Piazza Vittorio fly to deliver medicine and to rid the streets of transporters. Or the Swedish High - Tech company, Ericsson, the automatic demonstrated remote monitoring of severely ill and surgical operations by a robot. Competitor to the Nokia shows, like robots to the beat of milliseconds networked together to solve a complex task.

500 billion Euro in investments for the competitiveness

The effort serves the attunement of the citizens to information, technical mega-project: **5G, the fifth Generation of mobile communications technology**, up to 1000-times more volume of data transferred than in the past. The number of devices connected to multiple hundred, and the rate of reaction be not even a millisecond. From the **Autonomous Driving** through intelligent refrigerators, and radiators up to complete with robots operated factories to the new technology, the entire life of the world to revolutionize. The necessary investments, according to estimates by the German Telekom about 500 billion euros, will be "of strategic importance for Europe", says Jyrki Katainen, Commissioner for Jobs and growth. The Development of 5G "is crucial for our global competitiveness," he says and agree with all of the governments of the EU member States.

A small insider circle a rating of the hazards

But the promises? And what are the risks? These are the questions the journalist Team **Investigate Europe** investigated and amazing contradictions encountered. Not only is completely unclear whether the planned billion investment will ever be profitable. Also carries a huge risk, the people in charge to ignore, while it is becoming ever more pressing: A growing number of studies suggests that the mobile phone used high-frequency electromagnetic radiation human health damage, by, for instance, **creates cancer** , or the male seed damage.

The competent institutions of the world health organization on the EU Commission to the German Federal office for radiation protection, but leave a small circle of insiders, the limit values for the protection of the population. However, the members of which hide many inconvenient new findings.

For the nationwide expansion, it takes tens of thousands of transmitters

5G would increase the "electrosmog", as critics call it, is still significant. Because the new technology operates with very high frequencies, their range is significantly lower than the previous antennas. For the filling of the **often complained of dead spots** is good for you. But they multiplied the number of necessary radio cells. Therefore, built around the Telekom alone in the five-kilometre-long **test strip in Berlin-Schöneberg** is currently equal to 71 new masts. It comes to the Expansion, the ceiling, the tens of thousands of

additional transmission facilities will require.

With "the implementation of 5G threaten to have serious, irreversible consequences for the people," to warn more than 400 physicians and natural scientists **in a recent appeal** for an expansion to a stop, the 5G technology, including the many years of German Environmental policy-makers and biologist Ernst Ulrich von Weizsäcker. "We don't know for sure if the mobile data transmission technology brings a health risk, but we can't rule it out yet," he explains.

Therefore, the policy must "insist that the health risks associated with the ubiquitous high-frequency radiation for mobile devices, will be explored before we expose the entire population to higher values of the electromagnetic fields from this technology."

A theme for Spinner? So far, it seemed so

Mobile phone radiation? That seemed to be only a theme for Spinner and people with delusions of persecution. Also, the authors of this report saw the first. Finally, there are already approximately 24,000 towers in Germany alone. Many millions of people use their Smartphones every day for hours. Of health damage, you don't notice anything.

The Team

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In mobile communications, high-frequency electric used magnetic fields for the wireless Transmission of data. Hertz (Hz) is the unit of measurement for the frequency and the number of vibrations of the electro-is-magnetic waves per second. In this case, the used frequency band, the following applies: The wider it is, the more data can be transferred. For LTE (4G) bands of 20 to 60 MHz not in use. The 5G technology is required, however, the same 100 MHz, for higher frequencies available. The Federal network Agency auctioned off first, the three bands between 3.4 and 3.7 GHz. A fourth Band up to 3.8 GHz is reserved for the local use in factories and research centres. Later tapes will be used from 22 to 25 GHz.

The high frequencies have a shorter range. For the closure of the often complained of radio holes must be removed so the LTE network, the 5G technology will not be needed. The strength of the fields is measured in volts/Meter. For the protection of the population frequencies between 400 MHz and 3 GHz for the currently used mobile radio in most EU countries limit values of 38 to 61 V/m prescribed. Because Health effects cannot be excluded at lower Strengths, in France, Italy, Belgium and Switzerland for public places and homes, a 10-times stricter limit. The Telecom industry calls for the Development of

the 5G network now, the easing of these limits.

However, as simple as day-to-day experience suggests it is not. This clears, a look at the "legal information", the information "are in many of the Smartphones" phone. "Keep this phone at least 1.5 cm away from the body," it says, and "you use to wear on body only accessories with a belt clip." In the case of "non-observance of your Smartphone could exceed the limit values specified". Apparently there is a problem.

Even more, the reads in the documents with which the concerned companies to educate their shareholders about the possible risks. Vodafone, for example, writes in the annual report for 2017: "electromagnetic signals emitted by mobile devices and base stations, can pose health risks, with potential impacts including: changes in national legislation, a reduction in mobile phone usage or litigation." Deutsche Telekom also warns its shareholders that it intervention was "the danger of regulatory, such as, for example, the reduction in the limit values for electromagnetic fields or the implementation of precautionary measures in mobile communications".

The science is divided over the question deeply

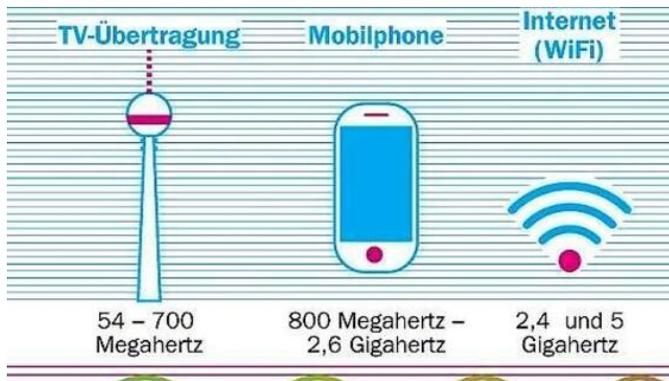
The warnings indicate how large the uncertainty is. For decades, biologists, physicians and engineers conduct research on the question of whether the high-damage frequency radiation for mobile health. In the world's largest database on the subject, the "EMF-Portal" of the University RWTH Aachen, there are more than 2,000 scientific studies listed. However, on the evaluation of the results, the scientists involved from all over the world are deeply divided until today.

At the core of this dispute is a unique Institution: the International Commission on Non-Ionizing Radiation Protection (ICNIRP). This is actually a private scientist association, without any official character. However, the legislation for the protection of the population against high-frequency radiation strictly follows their guidelines.

This is based on a controversial assumption, according to which the only proven adverse health effect of radiofrequency electromagnetic fields is heating of the tissue, such as occurs at high dosage, as happens in a microwave oven. In the opinion of the ICNIRP the only risk is when the radiation of the transmitted energy reaches more than two watts per kilogram of body weight, because it is only from this level that the temperature in the tissue rises measurably. ICNIRP established these levels as early as 1998, and until now all the legal limits to the transmission strength of base stations and mobile phones have been based on these levels. As a rule, they are reached only close to the transmission towers, so they are no problem for the industry.

High-frequency radiation affect cells, but is this dangerous?

The limitation on the effect of heat, however, appears arbitrary. High-frequency beams generate unavoidable additional, so-called non-thermal effects in living cells, even if they are low dosed. Finally, biological processes are always based on electro-chemical processes, such as in the transmission of nerve impulses. The members of the ICNIRP do not dispute this either. "We are just not convinced that these effects are proven to be harmful to health," explains their chairman, the Dutch biologist Eric van Rongen.



GRAPHIC: RITA BÖTTCHER/TSP

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Against this dictum of the critics have called a Organisation, registered in the USA "Bioinitiative". Also the 29 professors and medical researchers from eleven countries representing all the necessary disciplines such as cancer research, molecular biology, and epidemiology, and they published a counter-report to the ICNIRP Position.

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"The biological effects of mobile phone radiation prevent the body from healing damaged DNA, and lead to lower resistance to disease," write the authors, citing more than 1,000 scientific publications. This could affect the metabolic and reproductive functions in depth. According to the Swedish oncologist Lennart Hardell, one of the leading authors, studies with several thousand mobile phone users have also "proved that electromagnetic radio 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 surveys are not repeatable. Although an evaluation of 2,266 studies by an Australian group of researchers that 68 percent show "significant biological or health effects associated with exposure to anthropogenic electromagnetic fields". However, it is not clear whether and how often this actually makes sick. A specially appointed group of experts from the International Centre for Cancer Research at the WHO (IARC) therefore did not like to follow Hardell and his colleagues. Electromagnetic radio frequency radiation is only "possibly carcinogenic", they ruled in 2011.

More tumors grew in lab rats

However, this assessment is now outdated. As early as 2015, a research group at the private Jacobs University in Bremen made a disturbing discovery for the biologist Alexander Lerchl. Lerchl had long vehemently rejected all warnings of the mobile critics. But then he found that in mice, the tumors that were generated by a poison, grew under normal cellular radiation much faster and spread in the body than in animals without irradiation. This "tumour promoting effect "had" quite surprised", confessed Lerchl. A study published in November 2018, in which researchers have worked on behalf of the

U.S. Department of Health for more than ten years, is even more serious. For this purpose, the scientists of the National Toxicology Program spent about 7,000 rats and mice for nine hours on the day of mobile radio broadcasting. 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 in the nerve cells of the heart muscle than their non-irradiated counterparts. The number of brain tumors was also three percent higher than in the control group.

The team of chief toxicologist Michael Wyde was aware of the sensitivity of these results to be very aware of. This is why the US government's Institute specifically called on 15 external physicians and engineers to review the work. However, their verdict was clear. Thus, there is now a "clear proof" of the tumor-generating effect of high-frequency radiation in rats.

Not "possibly" but " probably carcinogenic"

This is precisely what the authorities in the USA and Europe had always denied until then. The director of the responsible Food and Drug Administration, Jeffrey Shuren, said Immediately: "we disagree with the conclusions of the report. "The researchers would have exposed their experimental animals to very high levels of high-frequency radiation. Therefore, the results "could not be applied to people's mobile phone use".

But this objection was already increased at the time of publication. In parallel to the US experiments, a team of renowned Italian cancer researcher Fiorella Belpoggi in Bologna conducted a very similar study. For this purpose, more than 2,000 experimental animals of the same rat species were exposed to life-long irradiation, but with field strengths such as the daily use of mobile phones. However, this also led to a significant increase in the same type of tumor as observed by the US researchers.

This is the first time that "the same carcinogenic effect of high-frequency radiation has been demonstrated in two independently conducted experiments according to verifiably strict standards of laboratory science", Belpoggio States-and calls for consequences. The WHO and its International Agency for the Research on Cancer (IARC) "must give priority to this issue". Electromagnetic radiation should no longer be classified as "potentially" but as "probably carcinogenic".

Why do critics find no hearing?

However, this is questionable. In contrast, the ICNIRP cartel. "Both studies have limitations that affect the benefits of their results in establishing exposure guidelines," said the club of experts immediately after their publication. Thus, "they do not provide a reliable basis for the revision of the existing guidelines for radio frequency exposure". And no radiation protection office, no EU commissioner and no Minister contradicts. For Europe's governments and their authorities, the 13 members of the self-appointed commission act as a kind of force majeure. But why? Why do all those warning about risks, even as prominent as the panel of experts for the US Health Authority, find no hearing?

Anyone who follows this question, encounters an intriguing phenomenon: the members of the ICNIRP are also simultaneously in all relevant institutions and, thus, control the official discourse (the ICNIRP cartel: Who's who in the EMF research world <https://www.kumu.io/Investigate-Europe/das-experten-netzwerk>). In legal terms, the scientific group is only a registered association, which itself recruits its members and

thereby avoids diverging opinions. But already at its address begins the interconnection with the state level. The secretariat of the association is located rent-free directly in the Federal Office for Radiation Protection in the Munich suburb of Neuherberg. And the scientific coordination for ICNIRP is practically done by the official head of the Department of electromagnetic fields, Gunde Ziegelberger. Her predecessor was the chairman of the club until 2016. At the same time, the federal government is promoting the NGO of scientists with around 100,000 euros per year.

The speaker rejects the impression that the private Organisation is practically part of the German authority as "not applicable". The office only supports the international networking of research. In addition, the ICNIRP is officially recognized by the WHO, giving it the legitimacy. That's right, but it doesn't make it less questionable.

Links with the World Health Organisation and the EU Commission

After all, the UN Health Organization in Geneva has not only recognized the association as a consultant, but has in fact completely transferred to it the study of the health risks of radio frequency radiation. The WHO'S "International EMF Project" is tasked with evaluating ongoing research and making recommendations. Because of the many new findings, a comprehensive WHO study is to be produced soon. However, four of the six members of the core group are working for ICNIRP, including chairman van Rongen. The members of this association, however, have long since determined that even the more recent research results do not justify any additional protective measures, as van Rongen has confirmed to Investigate Europe. The question of whether this does not entail a manifest conflict of interest left unanswered the head of the WHO project, the Dutch engineer Emilie van Deventer, and not by chance. She herself is officially part of the ICNIRP network as an "observer".

The same goes for the EU Commission. There, the Scientific Committee on New Health Risks (SCENIHR) was responsible for assessing the dangers of radio frequency radiation. Once again, ICNIRP represented four of the twelve members. This panel also promptly concluded in 2015 that there were no problems. And so the chief of the EU Directorate for public health refers to "the international bodies, ICNIRP and SCENHIR" and be assured that they have provided "consistent evidence that exposure to electromagnetic fields poses no health risk if it remains below the EU recommended limits".

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



Experimental rats in the laboratory of the Ramazzini Institute to be exposed to radiation.
PHOTO: RAMAZZINI INSTITUTE

Why are Germany and the EU doing nothing?

"The Union's environmental policy is based on the principles of preparedness and prevention", says Article 191 of the current EU treaty. In contrast to US law, citizens are to be protected in principle from products whose safety is not yet proven.

If the European Environment Agency (EEA) had done so, this principle would also apply to mobile communications technology. As early as 2007, the EEA warned against the risk of cancer. "In view of the millions of people exposed to this and the susceptibility of children in particular, we considered it justified to start an early warning," reports David Gee, then chief advisor to EEA. The result of the "late lessons from early warnings," says Gee, and is reminiscent of the debacle of asbestos, carcinogenic softener PCB and mad cow disease.

The Swiss government explicitly follows this council. "The federal council could not wait until science provides the desired answers," explains the federal office responsible: "the precautionary principle of the Environmental Protection Act requires that the burden should be as low as technically possible. "For this reason, the transmission masts in Switzerland can only produce one tenth of the usual EU radiation values at all places where people live for a long time, in order to "especially keep the long-term exposure low". This is not yet a major problem. "Because the performance of the antennas is lower, coverage with a high-quality mobile radio service requires comparatively more antenna locations," says a spokesman for Swisscom. This would increase the cost of expansion, resulting in higher prices for mobile phone users defeating. However, the limit values are now in the way of 5G expansion. That is why industry is pushing for a major easing. However, the Berne parliament rejected this request and upheld the precautionary principle.

"Too drastic a measure"

The German government, on the other hand, unreservedly follows the recommendations of the ICNIRP. This was independent and pursued "a high protection goal", assured a spokeswoman of the Ministry of Environment. It is the same for Europe's commissioners. "The application of the precautionary principle" to mobile technologies is "too drastic", explains the head of cabinet of the acting EU Health Commissioner Vytenis Andriukaitis. "The commission would rather wait for concrete evidence, but that is always too late," comments Gee. "If the damage is proven, then it has already occurred."

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. For 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 fees paid by users. However, it is no longer possible to expand this revenue source. The UK telecom expert and University Professor William Webb, who is in demand as a consultant worldwide, reports that 4G, also known as LTE, has not been able to impose higher fees on customers for this. Has the hype about 5G got out of control?

For Smartphone customers, the 5G technology offers little use anyway for the time

being. "The LTE/4G technology already allows for a great deal for Smartphone users," explains Thomas Magedanz, head of the Berlin-based Fraunhofer Institute for communication systems, 5G-research. "In the future, citizens will benefit more indirectly from 5G, for example through a secure networking of equipment in the hospital or a temporary 5G network at major events." Whether the network providers, however, stadium operators, hospitals and other industries such as the automotive industry or consumer goods manufacturers can win as customers is highly uncertain. They too would have to collect the fees again from their customers.

The vision of the mobile data future with 5G is therefore "only a myth", warns Webb. Only the system manufacturers such as Ericsson and Huawei, as well as, perhaps, the producers of new Smartphones would benefit, says industry expert Webb. At the same time "ministers want to decorate themselves with the latest digital technology, although they usually understand little of it," he observed. That's why the hype got out of control at 5G. "Whatever applications for 5G are commercially successful at the end of the day is currently completely open," confirms Fraunhofer expert Magedanz. So far, there have been "beyond automation in the factories no clear business models".

However, EU governments are now putting pressure on network operators to quickly buy licences for the necessary frequencies from governments, even if they do not know how they will earn the money again. In Germany and eight other countries of the European Economic Zone, auctions are still on hold this year.

In Italy, on the other hand, telecom companies have already paid 6.5 billion euros last year-an adventure with an uncertain outcome. The auction in Italy is "ruinous", warns about Jorge Graça, head of technology of the largest Portuguese network provider NOS. Overall, the EU'S 5G Plan is only driven by "a political Agenda", but "technologically not mature and counterproductive," warns Graça, expressing what many telecom managers just do not want to say publicly. "We don't want to be guinea pigs"

Trouble from its potential customers also threatens the industry. In many places, the resistance of the population to the Inflation of broadcasting systems germinates. For example, in 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 don't want to be the open-air guinea pigs for this technology," laments Gianmaria Umberto, one of the local doctors. Although the broadcast masts are built in the middle of residential areas, the health office recommended that "preventive " no longer than four hours to stay close. The outrage is appropriate.

In the Greek Patras, the citizens did not make it that far. After the government in Athens had chosen the city as one of the three planned test fields for the country, a civic committee objected to the allegedly planned Installation of 50,000 small transmitters for the many 5G cells. After months of negotiations, the city Council rejected the project on the grounds that the risks to the health of the population have not been clarified.

In French Rennes, on the other hand, citizens were surprised last autumn to learn that they were exposed to illegal radio-frequency radiation on the local subway. In France, unlike in most other EU countries, a precautionary limit for public places is applied, which is only about one tenth of the ICNIRP values.

A local member of Parliament had about the strength of the electromagnetic fields to

measure, after all subway stations were equipped with transmitters. It quickly became apparent that the radiation in nine of the 13 stations was far above the permitted value, in peak times even more than 1,000 per cent. The case aroused national attention and renewed the already sharp debate in France on the risk of electromagnetic radiation.

Even more controversial is the issue in Poland. There are strict limits for electromagnetic field radiation. But these are not compatible with the usual standards of manufacturers. Because there are no effective controls at the same time, protests are burning up again and again. Last year alone, in five Polish cities, the citizens took to the streets against new transmission masts and 5G experiments. For this reason, the central government has for the first time launched a nationwide Measurement Programme. This is not enough for the citizens of Krakow. There, the administration has set up a "programme to protect against EM radiation", which is currently being discussed.

Money for development - but not for risk research

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

In the United States, therefore, the discourse has now also reached the parliament, where the Senate gave the critics a Forum. "The naked and simple fact is that the health risks are unknown and not investigated," said Democratic Senator Richard Blumenthal in early December. This is "a sign of ignorance and disregard" on the part of the federal authorities. This is why he asked them to submit "evidence" for their claim that there is no danger – a demand that could only be fulfilled by an extensive research programme.

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



Tech-Hype. The acceptance in the population could fall.
Photo: Andrea Warnecke / dpa