

The International Commission on Non-Ionizing Radiation Protection: Conflicts of interest , corporate capture and the push for 5G

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The International Commission on Non-Ionizing Radiation Protection: Conflicts of interest, corporate interests and the push for 5G

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Foreword by Klaus Buchner and Michèle Rivasi

This report deals with an issue of which the importance cannot be overrated: the possible health effects of Radiofrequency Radiation (RfR) or electro magnetic fields (EMF); It deals more specifically with how the scientific debate has been hijacked by corporate interests from the Telecom industry.

After having read the reports of a journalistic collective called Investigate Europe, the many articles from Microwave News as well as all the publications from independent scientists from around the world, who for years have all been ringing alarm bells on adverse health effects from the use of mobile phones and EMF, we decided that we needed to dig deeper into this strange, unknown to the public but powerful scientific NGO based in Germany called the 'International Commission on Non-Ionizing Radiation Protection' (ICNIRP).

The findings of this report ('The International Commission on Non-Ionizing Radiation Protection: Conflicts of interest and the push for 5G') give us an uncomfortable déjà-vu: many facts and processes that lead to the actual situation whereby European authorities – from the European Commission to most of the member states – simply close their eyes for real scientific facts and early warnings. We have seen exactly the same scenario in the debate on Tobacco, asbestos, climate change and pesticides.

Also in it's latest guidelines from March this year, ICNIRP assures the world that there is no scientific evidence of adverse health effects from the radiation that comes with the new communication technologies, within the limits it proposes. But at the same time a growing number of scientists and also citizens are worried that EMFs do cause health problems. ICNIRP pretends to be scientifically neutral, and free from vested interests of the Telecom industry. We show with this study that this is 'playing with the truth' or simply a lie.

Already in 2011 Dr. Jacqueline McGlade, Executive Director of the European Environment Agency said on mobile phones and the potential head cancer risk for EMF: "The European Parliament has responded (resolution of April 2009) to this public concern with a resolution on EMF in 2009 which, among other things, called for lowering exposure to electromagnetic fields and for lower exposure limits that would better protect the public from health hazards. We share these recommendations."

McGlade pleaded interim actions to protect public health, particularly for children on the basis of the precautionary principle, as central to public policymaking where there is scientific uncertainty and high health, environmental and economic costs in acting, or not acting, when faced with conflicting evidence of potentially serious harm. "This is precisely the situation that characterises EMF at this point in its history. Waiting for high levels of proof before taking action to prevent well known risks can lead to very high health and economic costs, as we have seen with asbestos, leaded petrol and smoking," said McGlade.

The EEA plea for a precautionary approach to policy making in this area, is based on an evaluation of the existing evidence and on the lessons from earlier hazards, analysed in the EEA "[Late Lessons from Early Warnings](#)" project. David Gee, EEA Senior Advisor on Science, Policy and Emerging Issue and on the drivers of this project said: "Mobile phones have numerous social, economic and even environmental benefits", said. "However, there is significant disagreement in the scientific community about whether mobile phone use increases the risk of head cancers. We recommend using the precautionary principle to guide policy decisions in cases like this. This means that although our understanding is incomplete, this should not prevent policy makers from taking preventative action".

In a recent discussion Gee stated that there are “several striking similarities” between 5G/radiofrequency radiation and many of the technologies or substances that featured in the “Late Lessons” case studies. Gee pointed to “a lot of hubristic hype surrounded the introduction of the new technology”. Gee rightfully points to a “marketing hype which is widespread” on 5G and “a failure to systematically and independently scrutinise the claimed benefits and costs of the new technology”. He sees a “gross imbalance between research on developing and promoting the technology and on anticipating and reducing potential harm to people and environments” as well as a “failure to ensure independent research into health and environmental effects that can help combat manufactured doubt”.

Gee was tough for the scientific community because scientists fail to acknowledge what they do not know and “to properly understand and embrace knowledge from other relevant disciplines”. Gee also sees “a failure of scientists to be transparent about the paradigms, assumptions, judgements and values used in academic science and in their evaluations of scientific evidence in regulatory science. A failure of scientists and policymakers to appreciate complex and variable realities; multi-causality; and the likelihood of inconsistent scientific results. A failure by policymakers to understand the difference between the high strength of evidence needed to establish robust scientific knowledge and the case specific appropriate strength of evidence needed to justify timely preventive action.”

Late lessons from early warnings, is indeed also a clear pattern that rises from this report. And there have been more and more warnings (but unfortunately so far no lessons learned).

Also the Council of Europe adopted in May 2011 a strong resolution on “the potential dangers of electromagnetic fields and their effect on the environment” in which it called upon governments to take all reasonable measures to reduce exposure to electromagnetic fields and said about ICNIRP: “It is most curious, to say the least, that the applicable official threshold values for limiting the health impact of extremely low frequency electromagnetic fields and high frequency waves were drawn up and proposed to international political institutions (WHO, European Commission, governments) by the ICNIRP, an NGO whose origin and structure are none too clear and which is furthermore suspected of having rather close links with the industries whose expansion is shaped by recommendations for maximum threshold values for the different frequencies of electromagnetic fields”.

In an article, [‘Planetary electromagnetic pollution: it is time to assess its impact’](#), published in *The Lancet* (December 2018) scientists from the Australian research group ORSAA state that out of 2266 studies on EMFs, no less than 68 percent found “significant biological effects or health effects”. Significant biological effects do not necessarily mean that human health will be harmed, but is an important indicator for risk assessment and then for risk evaluation by regulators. To us the argument that that there is insufficient scientific evidence for regulators to act is factual not correct and simply not true.

The International Agency for Research on Cancer (IARC), a global authority on cancer, concluded in 2011 that radiation from mobile phones is a ‘possible’ head cancer risk. [And recently an Advisory Group has recommended](#) that IARC should reassess the cancer risks associated with non-ionizing radiofrequency radiation with high priority. According to the panel’s report, published in *The Lancet*, the group suggests that the new evaluation should take place between 2022 and 2024.

In 2012 a group of 29 independent scientists and health experts from around the world warned in an update of their [Bio Initiative 2007 Report](#), about “possible risks from wireless technologies and electromagnetic fields”. However, they acknowledge that “sometimes, science does not keep pace with new environmental exposures that are by-products of useful things we want to buy and use in

society. So, the deployment runs ahead of knowledge of health risks. It is an old story. This is the case for EMF (electric and magnetic fields) and RFR (Radiofrequency radiation).”

The Bio Initiative report underscores the “critical need to face difficult questions, make mid-course corrections, and try to repair the damage already done in this generation, and to think about protecting future generations”.

And they state that the existing public safety limits as formulated by the US regulator FCC and by ICNIRP do not sufficiently protect public health against chronic exposure from very low-intensity exposures: “If no mid-course corrections are made to existing and outdated safety limits, such delay will magnify the public health impacts with even more applications of wireless-enabled technologies exposing even greater populations around the world in daily life.”

In 2017, more than 200 doctors and scientists from various countries launched the, so-called [5G Appeal](#), that has since received more endorsements and whose mission statement starts with : “We the undersigned scientists and doctors(...), recommend a moratorium on the roll-out of the fifth generation, 5G, for telecommunication until potential hazards for human health and the environment have been fully investigated by scientists independent from industry.”

Since then there have been five replies on this Appeal by the European Commission, the last one dating from December 2019. The first reply, the Commission states that ‘the Commission is not aware of any conflicts of interests of members of international bodies such as ICNIRP or the members of SCENIHR’. One of the leading figures of the appeal [professor Lennart Hardell](#) stated that this «does not represent the scientific evidence of inherent conflicts of interest both in ICNIRP and SCENIHR. The European Commission seems to be ill-informed or even misinformed, as the EU seems to take information mainly from these two fraudulent organisations, but not from independent researchers. The EU does not seem to rely on sound science and thereby downplays the RF-related risks.”

It is clear from this report that ICNIRP itself does not have a sharp definition of conflicts of interest (CoI's), nor does it have a well-developed policy to avoid these kinds of conflicts. It is a crying shame that under the pretext of ‘scientific uncertainty’ ICNIRP, but especially the European Commission and member states keep on failing to protect their citizens.

We very much agree with the title and content of the latest publication on Microwave News, which reads [“The Lies Must Stop, Disband ICNIRP - Facts Matter, Now More Than Ever”](#). There are two major casualties in this polarised debate: the truth and public health. Both are too important not to protect with all that we have. That is what we consider as our responsibility as elected politicians .

By MEP's Michèle Rivasi (Europe Écologie) and Dr. Klaus Buchner (Ökologisch-Demokratische Partei)

Introduction & Scope

In the last few decades, since the introduction, and rapid expansion, of new communication technologies, there has been a proliferation of electromagnetic fields worldwide. A lot of countries are now about to roll out 5G networks. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) assures the world that this can be done safely and that there is no scientific evidence of adverse health effects within the limits it proposes. But at the same time a growing number of scientists and also citizens are worried that EMFs do cause health problems.

It is therefore high time to look into the workings of ICNIRP. If the European Commission and national governments keep relying on this commission, as is currently the case, we must be completely sure that it functions wholly independently and that there is no evidence of its members being in situations of conflicts of interest.

ICNIRP is a non-governmental organisation (NGO) or association, registered in Munich, specialising in non-ionizing radiation protection. One of the organisation's tasks is to determine exposure limits for electromagnetic fields used by devices such as cellular phones. On its website, ICNIRP states that it is a non-profit organisation with a scientific mission, and that it is “formally recognised as an official collaborating non-state actor by the World Health Organisation (WHO) and the International Labour Organisation (ILO). ICNIRP is consulted by the European Commission and is linked to many organisations engaged in non-ionizing radiation (NIR) protection worldwide through diverse collaborative projects”.

ICNIRP states that its “aim is to protect people and the environment against adverse effects of NIR.” To this end, it “develops and disseminates science-based advice on limiting exposure to non-ionizing radiation.” ICNIRP works with experts from all over the world, from a wide variety of disciplines, including biology, epidemiology, medicine, physics, and chemistry. ICNIRP’s also states that its protection advice is based on current scientific knowledge about the biological effects, and the action mechanisms, of radiation for the whole NIR frequency range.

To a large extent, the European Commission, as well as the WHO, depend on the “exposure guidance” and safety advice given by ICNIRP. Furthermore, many EU member states look to the EC and WHO for (European) advice on this issue. Therefore, it goes without saying that ICNIRP has a significant role to play in ensuring the general public is protected against any possible health risks related to electromagnetic fields (EMF).

In March 2019, in a comprehensive report, [How much is Safe?](#), by *Investigate Europe*, a collective of investigative journalists from all over Europe, ICNIRP is described as follows:

“ICNIRP is a particularly influential group, as it not only evaluates radiation and health risk research, but also provides guidelines for radiation safety limits that most countries use. It is a private, German-registered organisation located outside Munich, behind a yellow door on the premises of the German Federal office for radiation protection. Decisions on who to invite in, are taken by ICNIRP itself.”

The report highlighted the close links that exist between ICNIRP and other important organisations in the field of health protection.

Most European governments and radiation protection authorities rely mainly on these four scientific bodies for advice on non-ionizing radiation protection:

- The international commission on non-ionizing radiation protection, ICNIRP.
- The EU Scientific Committee on Health, Environment and Emerging Risk, SCENIHR / SCHEER.
- The World Health Organisation WHO's International EMF Project.
- The WHO Cancer Unit IARC, International Agency for Research on Cancer.

Investigate Europe showed the close links between especially the first three bodies. "The groups, however, are to a remarkable degree, staffed by the same experts," it stated. "Of 13 ICNIRP scientists, six are members of at least one other committee. In the WHO group, this applies for six out of seven (members)." The SCENIHR [Working Group on EMF](#) also counts two ICNIRP-members.

In view of the rapid expansion of EMF's, in particular in the context of the planned deployment of 5G networks in which telecom and media operators have huge financial and economic vested interests, and given the evidence of closed circles of experts involved in determining health guidelines in this field, critical scrutiny on the functioning of ICNIRP is important and necessary.

New guidelines

In March 2020, ICNIRP published its latest '[Guidelines on Limiting Exposure to Electromagnetic Fields](#)', designed for "the protection of humans exposed to radiofrequency electromagnetic fields (RF) in the range 100 kHz to 300 GHz. The guidelines cover many applications such as 5G technologies, Wi-Fi, Bluetooth, mobile phones, and base stations."

This [publication](#) replaces and supersedes earlier publications from 1998 and 2010. In a [press release](#) from March 11th 2020, the then ICNIRP Chairman, Dr Eric van Rongen (now co-chair) said: "The new electromagnetic field guidelines have taken seven years to develop and are more appropriate than the 1998 guidelines for the higher frequencies that will be used for 5G in the future. We know parts of the community are concerned about the safety of 5G and we hope the updated guidelines will help put people at ease. When we revised the guidelines, we looked at the adequacy of the ones we published in 1998. We found that the previous ones were conservative in most cases, and they would still provide adequate protection for current technologies."

Van Rongen's main message was that when the new ICNIRP guidelines are followed 5G is absolutely safe. He stated: "The new guidelines provide better and more detailed exposure guidance, in particular for the higher frequency range, above 6 GHz, which is of importance to 5G, and future technologies using these higher frequencies. The most important thing for people to remember is that 5G technologies will not be able to cause harm when these new guidelines are adhered to."

So, this is how ICNIRP presents itself: an independent organisation that gives sound scientific advice on safety guidelines with respect to non-ionizing radiation and that ensures citizens remain safe.

However, this description raises doubts on two levels: Firstly, is ICNIRP really independent and also, are its assurances that non-ionizing radiation is absolutely safe when their guidelines are applied correct? Our report will focus on the question of ICNIRP's independence, but first, we will briefly outline the current debate around the safety guidelines.

The health debate

The possible adverse health effects of non-ionizing radiation, mainly microwave radiation from mobile phones and other wireless devices/infrastructure, is a highly sensitive and polarising issue. In some countries citizens and scientists plead for the application of the 'pre-cautionary principle' in relation to the rolling out of 5G networks, whilst associations such as [ICNIRP maintain that](#) "the most important thing for people to remember is that 5G technologies will not be able to cause harm when these new guidelines are adhered to."

In 2012 a group of 29 independent scientists and health experts from around the world published an update of their [Bio Initiative 2007 Report](#), about "possible risks from wireless technologies and electromagnetic fields". The scientists, of which ten holding a medical degree, still update their "rationale for Biologically-based Public Exposure Standards for Electromagnetic Fields (Extremely low frequency, ELF and radiofrequency, RF)" by assessing the latest scientific research and reporting on it. However, they acknowledge that "sometimes, science does not keep pace with new environmental exposures that are by-products of useful things we want to buy and use in society. So, the deployment runs ahead of knowledge of health risks. It is an old story. This is the case for EMF (electric and magnetic fields) and RFR (Radiofrequency radiation)."

The Bio Initiative report underscores the "critical need to face difficult questions, make mid-course corrections, and try to repair the damage already done in this generation, and to think about protecting future generations".

And they state that the existing public safety limits as formulated by the US regulator FCC and by ICNIRP do not sufficiently protect public health against chronic exposure from very low-intensity exposures: "If no mid-course corrections are made to existing and outdated safety limits, such delay will magnify the public health impacts with even more applications of wireless-enabled technologies exposing even greater populations around the world in daily life."

In an article, ['Planetary electromagnetic pollution: it is time to assess its impact'](#), published in *The Lancet Planetary Health* in December 2018, scientists (from the Oceania Radiofrequency Scientific Advisory Association, ORSAA, and the Institute for Health and the Environment, of the University at Albany) state that out of 2266 studies on EMFs, no less than 68 percent found "significant biological effects or health effects". Significant biological effects do not necessarily mean that human health will be harmed, but is an important indicator for risk assessment and then for risk evaluation by regulators.

The authors stated that it is high time for a wide-ranging debate on the rapid global proliferation of artificial electromagnetic fields. “The most notable is the blanket of radiofrequency electromagnetic radiation, largely microwave radiation generated for wireless communication and surveillance technologies, as mounting scientific evidence suggests that prolonged exposure to radiofrequency electromagnetic radiation has serious biological and health effects.”

Unfortunately, this mounting evidence did not result in policy changes, the authors from ORSAA observe. “However, public exposure regulations in most countries continue to be based on the guidelines of the *International Commission on Non-Ionizing Radiation Protection* and Institute of Electrical and Electronics Engineers, which were established in the 1990s on the belief that only acute thermal effects are hazardous. Prevention of tissue heating by radiofrequency electromagnetic radiation is now proven to be ineffective in preventing biochemical and physiological interference”.

“For example, acute non-thermal exposure has been shown by NIH scientists, to alter human brain metabolism, electrical activity in the brain and systemic immune responses. Chronic exposure has been associated with increased oxidative stress and DNA damage, and cancer risk. Laboratory studies, including large rodent studies by the US National Toxicology Program and Ramazzini Institute of Italy, confirm these biological and health effects in vivo. As we address the threats to human health from the changing environmental conditions due to human activity, the increasing exposure to artificial electromagnetic radiation needs to be included in this discussion.”

The results of the National Toxicology Programme (NTP) the mentioned Lancet-authors referred to, were presented at the end of 2018. The U.S. Food and Drug Administration (FDA) nominated radio frequency radiation (RFR) used by cell phones for an NTP study because of the widespread public use of cell phones and the limited knowledge about potential health effects from long-term exposure. The study found that high exposure to RFR (900 MHz) used by cell phones was associated with:

- Clear evidence of tumours in the hearts of male rats. The tumours were malignant schwannomas.
- Some evidence of tumours in the brains of male rats. The tumours were malignant gliomas.
- Some evidence of tumours in the adrenal glands of male rats. The tumours were benign, malignant, or complex combined pheochromocytoma.

However, ICNIRP criticised the NTP-study, saying that it did not prove a link between Radio Frequency, Electro Magnetic Fields and carcinogenesis. But according to scientists like Lennart Hardell, an oncologist, professor and researcher at the University hospital in Örebro in Sweden, the ICNIRP rebuttal of the NTP-study was unfounded. The NTP-study leading scientist Ronald Melnick recently also published a comment on the ICNIRP-note in which he criticizes ICNIRP’s “incorrect statements” and “false claims”.

James Lin, professor at the University of Illinois in Chicago and also editor of the online journal, *Bioelectromagnetics*, published a remarkable and nuanced review of the NTP-study in late 2019. The review is remarkable because, from 2004 to 2016, James Lin was himself a member of ICNIRP. As stated above, ICNIRP basically dismisses the NTP-study. However,

basing his conclusions partly on the NTP-study, Lin now questions if the existing safety guidelines are still adequate: “An outstanding question persists on the adequacy of these guidelines for safe long-term exposure to RF radiation at or below 1.6 or 2.0 W/kg. Perhaps, the time has come to judiciously reassess, revise, and update these guidelines.”

Lin’s review is nuanced in so much as he uses the peer-review process to analyse the conception and all possible methodological ‘problems’ of the NTP-study in depth: “This project is the largest NTP animal cancer study ever. It was nominated by the Food and Drug Administration (FDA) in 1999. The supposedly 5-year project was sole sourced in 2004 to an industrial research firm as the project’s principal investigator. The work began in 2005. However, the project had been protracted for more than a dozen years with huge budget overruns, and an estimated eventual price tag of \$25 million.”

Somewhat surprisingly, at the end of his review, Lin advocates for wireless radiation to [“get a more stringent cancer risk class”](#): “Now that the NTP review panel has concluded that there is clear evidence of carcinogenicity from long-term RF exposure in rats, is it conceivable that IARC would upgrade its epidemiology-based classification of RF exposure to the next higher levels of carcinogenicity to humans?” Lin seems to suggest that IARC should put cell phone radiation in WHO-hazard class 1 (carcinogenic), instead of today’s 2B (possibly carcinogenic).

Worldwide, there is rapidly growing concern and a proliferation of publications about EMF, specifically concerning the out-roll of new generation 5G. On this subject, we will only cite a 2019 in-depth report called [“5G Deployment: State of Play in Europe, USA, and Asia”](#)¹. It reads: “Increased exposure may result, not only from the use of much higher frequencies in 5G, but also from the potential for the aggregation of different signals, their dynamic nature, and the complex interference effects that may result, especially in dense urban areas. (...) The 5G radio emission fields are quite different to those of previous generations because of their complex beam-formed transmissions in both directions – from base station to handset and for the return.”

The authors state that with 5G we are entering unknown territory. “Although fields are highly focused by beams, they vary rapidly with time and movement and so are unpredictable, as the signal levels and patterns interact as a closed loop system. This has yet to be mapped reliably for real situations, outside the laboratory. (..) The problem is that currently it is not possible to accurately simulate or measure 5G emissions in the real world.”

The debate on the safety of non-ionizing radiation is fascinating, heated and important, and has been on-going for at least 30 years. This paper however does *not* go further into the scientific debate on the possible levels of harm to public health caused by non-ionizing radiation, mainly from mobile phones. We will focus on the independence of ICNIRP and the possible existence of conflicts of interest of its members.

¹ A study requested by the ITRE committee of the European Parliament, published in 2019 by the Policy Department for Economic, Scientific and Quality of Life Policies - Directorate-General for Internal Policies.

The importance of funding

ICNIRP claims it is “free of vested interests”. ICNIRP's funding relies on grants from public bodies. Additionally, ICNIRP members and ICNIRP SEG members may not be employed by industry.

But not being “employed by industry” is not, in itself, sufficient to avoid conflicts of interest. It is also important to ascertain to what extent ICNIRP research activities may be funded by industry.

It is a well-established fact that the source of funding for scientific research can have an influence on the outcomes of research. A clear and precise explanation of how this is may occur can be found on the [website of UC Berkeley](#):

“In a perfect world, money wouldn't matter — all scientific studies (regardless of funding source) would be completely objective. But of course, in the real world, funding may introduce biases — for example, when the backer has a stake in the study's outcome. A pharmaceutical company paying for a study of a new depression medication, for example, might influence the study's design or interpretation in ways that subtly favour the drug that they'd like to market. There is evidence that some biases like this do occur. Drug research sponsored by the pharmaceutical industry is more likely to end up favouring the drug under consideration than studies sponsored by government grants or charitable organisations. Similarly, nutrition research sponsored by the food industry is more likely to end up favouring the food under consideration than independently funded research.”

“This does not lead to the conclusion that we should ignore any research funded by companies or special interest groups”, Berkeley says. But it is a reason for the need “to scrutinize studies funded by industry or special interest groups with extra care. *So, don't, for example, brush off a study of cell phone safety just because it was funded by a cell phone manufacturer — but do ask some careful questions about the research before jumping on the bandwagon. Are the results consistent with other independently funded studies? Does the study seem fairly designed? What do other scientists have to say about this research? A little scrutiny can go a long way towards identifying bias associated with funding source.*”

“A little scrutiny” is perhaps an understatement. In the 2013, the [‘Late lessons from early warnings’](#) report produced by the European Environment Agency (EEA), a chapter written by Lisa A. Bero, describes the various opinions on how to deal with private funding of scientific research without compromising an independent non-biased outcome and/or publication of that research.

For example, various researchers argue that it is logical for industry to fund research, in so much as it is about their products that concerns exist. Former ICNIRP scientist Norbert Leitgeb, professor at the Institute of Health Care Engineering at the Graz University of Technology in Austria, told *Investigate Europe* that what is crucial is the putting in place of effective firewalls to ensure that “private partners cannot interfere with researchers and influence scientific outcomes or conclusions”.

That the source of funding has an important influence, is also something various ICNIRP-researchers acknowledge. For example, in 2009 two scientists who are now members of the ICNIRP-commission – Anke Huss and Martin Röösl – where co-authors of a [systematic](#)

review that showed that “industry-sponsored studies were least likely to report results suggesting effects”. They concluded that the correlation between the “source of funding and conflicts of interest are important in this field of research.”

in his evaluation of the NTP-study, another former ICNIRP-member, professor James Lin, also pointed to the dominance of the telecom industry in the research: “The FDA should be applauded for nominating, and NIEHS/NTP should be lauded for having sponsored the research and conducted the Cell Phone Radio Frequency Radiation (RFR) Studies. It’s important for the U.S. government to step in to conduct such a research program, and not leave the matter entirely to the cell phone industry. The wireless industry has had nearly free reign to develop and roll out cellular mobile phones and related RF devices as they see fit. (...)”. Lin goes on to quote figures from the ‘systematic review’: “A systematic review of 59 published studies of controlled exposure to RF radiation with health-related outcomes [10] showed that public agencies or charities funded 11 (19%), the wireless communications industry funded 12 (20%), mixed sources (including industry) funded 14 (24%), and in 22 (37%) the source of funding was not reported.”

This specific debate has been ongoing for many years, as *Investigate Europe* reports: “At least three studies over the years have documented that there is often a link between conclusions of studies and the source of the money that paid for the research. Science funded by industry is less likely to find health risks than studies paid for by institutions or authorities.”

In ‘[How much is safe?](#)’ by *Investigate Europe*, Lennart Hardell, an oncologist, professor and researcher at the University hospital in Örebro in Sweden, a critical EMF researcher, warns that although funding for research often goes to universities with “firewalls” put in place between the individual scientist and the funder, the problem is, that researchers can come to depend on this private funding to safeguard the future of their research.

Hardell carries out research on the possible links between long-term mobile use and brain cancer and has published results that indicate that there are correlations between the two. Hardell was a member of the IARC committee that researched EMF-effects, but is not a member of (any) other committees concerned with the effects of non-ionizing radiation. *Investigate Europe*: “According to Hardell, his research is funded through his salary from the hospital, as well as by funds raised by local cancer foundations and national organisations. “Of course, I have also worked a lot on my free time”, he says.”

There are some ICNIRP-researchers who acknowledge that it is possible for the source of funding to influence conclusions, but they say that they are very aware of this and cautious to avoid it. For example, Gunnhild Oftedal, - associate professor at the Norwegian University of Science and Technology, who specialises in research on the effects of electromagnetic fields on humans, and is a member of ICNIRP and therefore part of “the small international network that determines what science to trust” said to *Investigate Europe* that “today we are concerned about it. I have the impression that scientists are much more cautious about receiving support from the industry – at least direct support.”

What about the direct funding received by ICNIRP itself? ICNIRP states that its “funding stems from subsidies granted by national and international public institutions such as the German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety

(BMU), the European Union Programme for Employment and Social Innovation (EaSI) 2014-2020 (EC - Directorate General Social Affairs), and the International Radiation Protection Association (IRPA).”

“Occasionally, ICNIRP also receives support to organise meetings or workshops from national ministries or radiation protection agencies, such as the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), and the Turkish Ministry of Health (MoH). Funding is reported yearly in the ICNIRP annual reports”. ICNIRP also acknowledges that it receives funding from national or international public organisations and via private donations. But ICNIRP claims that in order to safeguard its independence, “only donations from private individuals or from businesses not related in any way to the field of non-ionizing radiations can be accepted. For reasons of transparency, donations cannot be anonymous and are listed in an ICNIRP donors' report.”

According to the ICNIRP 2018 [annual report](#), it received € 132,150 in subsidies. The Australian research group ORSAA points out that these kinds of funding sources are not always as neutral as they may seem: “ICNIRP funding partly comes from government regulatory bodies, such as, for example, the Australian Radiation Protection & Nuclear Safety Agency (ARPANSA). What is actually going on is best described as 'money laundering' by the Telecom industry through government (ARPANSA) and onto WHO's International EMF Project and ICNIRP.”

In Australia, as is the case for many countries worldwide, the government issues spectrum licences to Telecom operators for large sums of money – often in the billions. In Australia, this licensing is the remit of the industry regulator ACMA, the Australian Media Communications Authority. ORSAA explains that ACMA also collects a separate levy, or tax, from the wireless industry, money that is earmarked for scientific research on RF-EMR health effects: “This has remained a set amount of \$1M per annum since 1997, despite the massive increases in wireless industry revenues.”

According to ORSAA, ACMA then diverts \$300,000 to another government body, ARPANSA (Australian Radiation Protection & Nuclear Safety Agency) for its public information campaign, and \$700,000 to the National Health & Medical Research Council (NHMRC). From the \$300,000 received annually by ARPANSA, a portion goes to the WHO's IEMFP (some years ago this was around \$50,000 a year), and finally, it appears that a portion goes to ICNIRP. So, after a long trajectory, money from the Telecom industry does end up with ICNIRP, which is contrary to the statement on the ICNIRP website: “Only donations from private individuals or from businesses not related in any way to the field of non-ionizing radiations can be accepted.”

Still according to ORSAA, “the money that [the Australian NHMRC](#) receives in order to provide grants for medical research has mostly gone to industry-friendly researchers who have direct links with the wireless industry. For example, the largest recipient of these NHMRC research funds is Prof. Rodney Croft, a psychology researcher at the University of Wollongong, who held the role of Director of the Australian Centre for Electromagnetic Bio-effects Research (ACEBR) for many years². Rodney Croft has essentially been the head of RF-EMR health research in Australia, despite his questionable qualifications for this health research role.

² See also portrait of Rodney Croft on page 50 of this report.

Notably, he has led ICNIRP's RF-EMR exposure guidelines development team and now he has been elected as the next Chairman of ICNIRP as from May 2020. Prof. Croft has received ample direct industry funding in addition to his lucrative NHMRC grants, which should be termed indirect industry funding.”

Finally, ICNIRP states on its website that all its experts “are required to comply with the ICNIRP policy of independence and declare their personal interests. (...) These are key elements to ICNIRP's commitment to independence and transparency, which ICNIRP believes is fundamental to carrying out its scientific mission.”

Whether those declarations of interests are really checked is something that the Italian ‘Vallisoletana Association of people affected by mobile phone antennas’ (AVAATE) questioned [in their public statement from July 2015](#), attacking ICNIRP: “It is hard to understand whether ICNIRP investigates the Declarations filed by appointed members of the ICNIRP Commission and Scientific Expert Committee, since in some cases these members report that they work or have worked for these organisations but do not specify what they have done or whether they [are paid](#). [It is also hard to understand how ICNIRP controls the content of the declarations by the appointed members of their Expert Committees, when in most cases the most](#) contentious aspects of the biographical statement are not reported in these statements.”

The citizens behind AVAATE also ask “how ICNIRP controls the content of the declarations by the appointed members of their Expert Committees when, at least in five cases, the persons concerned have not signed their statements”.

Corporate capture

In the debate on EMF and possible health effects, terms like ‘corporate capture’ of scientific research and [‘war game science’](#) are often used, and references to the tactics of the tobacco industry are often made. According to several authors, these tactics also influence organisations like ICNIRP and WHO’s International EMF Project.

In the 2013 [‘Late lessons from early warnings’](#) report produced by the European Environment Agency (EEA), in collaboration with a broad range of external authors and peer reviewers, these tactics are described in detail in the chapter entitled ‘Tobacco industry manipulation of research’. The focus is on “the strategies used by the tobacco industry to deny, downplay, distort and dismiss the growing evidence that, like active smoking, ETS causes lung cancer and other effects in non-smokers.” Author Lisa A. Bero concentrated “on the ‘argumentation’ that was used to accept, or reject, the growing scientific evidence of harm. Who generated and financed the science used to refute data on adverse health effects? What were the motivations? What kind of science and information, tools and assumptions were used to refute data on the adverse health of tobacco?”

Bero says: “The release of millions of internal tobacco industry documents due to law suits in the US has given insights into the inner workings of the tobacco industry and revealed their previously hidden involvement in manipulating research. However, this insight is not available for most corporate sectors.”

Bero also discusses the possibilities of ‘full disclosure’ of funding sources and special interests in research and risk assessment in order to secure independence and prevent bias

towards particular viewpoints. She states that “while smoking bans are now being introduced in more and more countries, other industries are drawing inspiration from tobacco company strategies, seeking to maintain doubt about harm in order to keep hazardous products in the marketplace.”

With respect to the EMF-debate, according to Bero, public institutions or authorities should adhere to the following: “when data on risk appear to be controversial, users of the data investigate the sources of the controversy. Does the controversy exist only because the findings of interest group-funded research are contrary to data collected by others? Is the controversy supported primarily by evidence published in interest group-supported publications? (...) Policymakers should apply these questions to all situations in which a company has an interest in creating controversy about the risks of its products.”

According to Bero, the tobacco industry's methods for influencing the design, conduct and publication of research are similar to those of other corporate interests.

One of the leading researchers in the US who defends the viewpoint that the same tactics are being used by Telecom companies is Theodora Scarato, Executive Director of the US based [Environmental Health Trust](#) (EHT). As a policy analyst, Scarato manages and updates the comprehensive EHT database on international policy that documents the 20+ nations that have protective policies in place to reduce public exposure to cell phone and wireless radiation.

Scarato and EHT claim that “Just as the Tobacco Industry created a ‘Playbook’ to defend cigarettes and manufacture doubt about the health effects of cigarettes, the Wireless Industry seems [to have a fine-tuned the “Playbook” of advertising, public relations and industry-funded science](#) to defend wireless products and falsely reassure the public that cell phones and wireless products are safe.”

“Key to this public relations effort are industry created resources, websites and materials that communicate the myth of no proof of harm from wireless products. These are all part of the Playbook to manufacture doubt that a problem exists. Examples of such propaganda range from glossy brochures, Questions and Answers on Hot Topics such as “children and cell phones”, websites on EMF and Health and research forums.”

And according to Scarato, “these materials are paid for, designed and prepared by ‘non-profit’ organisations that are created by telecom and wireless companies pooling money together. When citizens raise concerns about a particular product or when research comes out indicating a health risk, companies can simply pull from these materials to respond as if there are no concerns”.

These kind of tactics, used to influence science and risk assessment, also have their repercussions for standard-setting bodies like ICNIRP and WHO’s International EMF Project, according to scientific researcher Don Maisch (in his PhD thesis ‘An examination of the manipulation of telecommunications standards by political, military, and industrial vested interests at the expense of public health protection’): “In an ever increasingly globalised world the reliance on international organisations to set standards to protect public health seems inevitable. Proposed internationalised standards such as ICNIRP’s recommendations act as an aid to economic development by not hindering trade that might conflict with

stricter national standards (such as the Russian Federation, the Czech Republic's former standard and China for example). In the delicate trade-off between economic benefits and adequate health protection, international organisations should ideally be “eternally vigilant” to ensure that their tasks are not co-opted by vested interest groups that are the producers of risks to be regulated.”

This appears to be a global issue. US researcher, Norm Alster, in [his report](#) ‘Captured Agency’ describes what this kind of corporate capture can lead to by referring to the workings of the FCC (Federal Communications Commission), which is the main official US institution that deals with Telecom issues, and is sometimes mentioned in critiques of ICNIRP: “That is a term that comes up time and time again with the FCC. Captured agencies are essentially controlled by the industries they are supposed to regulate. A detailed look at FCC actions—and non-actions—shows that over the years the FCC has granted the wireless industry pretty much what it has wanted”.

“As a result, consumer safety, health, and privacy, along with consumer wallets, have all been overlooked, sacrificed, or raided due to unchecked industry influence. (...) Most insidious of all, the wireless industry has been allowed to grow unchecked and virtually unregulated, with fundamental questions on public health impact routinely ignored. (...) Industry control, in the case of wireless health issues, extends beyond Congress and regulators to basic scientific research. And in an obvious echo of the hardball tactics of the tobacco industry, the wireless industry has backed up its economic and political power by stonewalling on public relations and bullying potential threats into submission with its huge standing army of lawyers. (...) Industry behaviour also includes self-serving public relations and hyper aggressive legal action. It can also involve undermining the credibility of, and cutting off funding for, researchers who do not endorse cellular safety. It is these hardball tactics that recall 20th century Big Tobacco tactics.”

Conflicts of Interest

In 2017, almost 200 doctors and scientists from various countries launched the, so-called [5G Appeal](#), that has since received more endorsements and whose mission statement starts with : *“We the undersigned scientists and doctors(...), recommend a moratorium on the roll-out of the fifth generation, 5G, for telecommunication until potential hazards for human health and the environment have been fully investigated by scientists independent from industry.”*

Since then, as professor Hardell describes in [his article "Appeals that matter or not on a moratorium on the deployment of the fifth generation, 5G, for microwave radiation"](#) published in January 2020, there have been five replies on this Appeal by the European Commission, the last one dating from December 2019. The first reply, by the Commission (from October 13, 2017 by the Directorate-General Health and Food Safety) states that *‘the Commission is not aware of any conflicts of interests of members of international bodies such as ICNIRP or the members of SCENIHR’*.

However, according to Hardell, “that does not represent the scientific evidence of inherent conflicts of interest both in ICNIRP and SCENIHR. The European Commission seems to be ill-informed or even misinformed, as the EU seems to take information mainly from these two

fraudulent organisations, but not from independent researchers. The EU does not seem to rely on sound science and thereby downplays the RF-related risks.”

Given the important effects of funding on research outcomes described above, there can be no doubt that it is extremely important for ICNIRP to ensure it avoids any possibility of conflicts of interests in the way that it, or any of its members, function. In its statutes, it writes: ‘No member of the Commission shall hold a position of employment that, in the opinion of the Commission, will compromise its scientific independence.’

The crucial words here are ‘*in the opinion of the Commission*’. The Commission evaluates itself about possible conflicts of interest. There are no clear rules by which the Commission judges if any of its members interests compromise its scientific independence. In its statement on the declarations of interests ICNIRP writes:

“The evaluation of personal integrity is very complex and might never be achievable in a perfect way. It is the duty of the ICNIRP Commission to carefully consider and decide if the declared interests potentially constitute a conflict of interest.”

It is clear from this that ICNIRP itself does not have a sharp definition of conflicts of interest (Col’s), nor does it have a well-developed policy to avoid these kinds of conflicts.

It is useful to refer to [a recent study](#) requested by the European Parliament’s Petitions (PETI) committee which, as a key message, said that “EU institutions and agencies lack a consistent definition of conflicts of interest and common rules on transparency’. This same study also stated that “a coherent policy should be developed for the required length of time between working in the industry and being called to a committee among agencies with a similar function, i.e. risk assessment”.

In the online newsletter, *Politico*, the Greek MEP Alexis Georgoulis said: “There is a legal inconsistency between the definitions of the conflicts of interest that should clearly cover any conflicts between public and private functions, but also public functions with other public functions,” The report recommends clear clarifications on whether conflicts of interest are potential or also perceived.

So, we will have to look at other, similar, organisations that have more stringent policies in this field. The European Food and Safety Authority (EFSA) seems to be a good candidate. In June 2017, EFSA, after a long history of accusations of Col’s, sharpened its definition and its policy to avoid Col’s.

EFSA defines a conflict of interest as “any situation where an individual has an interest that may compromise or be reasonably perceived to compromise his or her capacity to act independently and in the public interest in relation to the subject of the work performed at EFSA”.

This definition is also somewhat broad and vague. EFSA’s solution was to set clear rules to which its experts have to comply. For example: Research funding from the private sector benefiting EFSA’s experts should not exceed 25% of the total research budget.

The EFSA-rules are minimum requirements. According to *Corporate Europe Observatory* they are not strict enough to completely avoid conflicts of interest. So, it is reasonable to say that

ICNIRP, that presents itself as an independent, scientific advisory board, should, at the very least, comply with the EFSA rules.

In this paper, we will therefore:

- * Give an overview of the history and all existing knowledge on the independence of, and the conflicts of interest within, ICNIRP. These chapters provide the context in which we have a closer look at the ICNIRP-members.
- * Try to identify all the potential sources of conflicts of interest of ICNIRP-members. Such as: research funding from the private sector; financial investments in, and employment by, telecom business operators; consultancy work for the telecom industry.
- * Try to find out if the ICNIRP-members comply to the EFSA-rules on conflicts of interest and give an assessment on the independence of ICNIRP.

These are the ICNIRP experts whose professional backgrounds we will research (see the portraits of each member in Part V):

As from December 2019, the composition of the ICNIRP Commission for the term of office 2020-2024 is [as below](#). The new term of office starts in May 2020.

MEMBERS OF THE ICNIRP COMMISSION:

GUNDE ZIEGELBERGER (SCIENTIFIC SECRETARY), GERMANY

RODNEY CROFT (CHAIR), AUSTRALIA

ERIC VAN RONGEN (VICE-CHAIR) , THE NETHERLANDS

TANIA CESTARI, BRAZIL

NIGEL CRIDLAND, UNITED KINGDOM

GUGLIELMO D'INZEO, ITALY

AKIMASA HIRATA, JAPAN

ANKE HUSS, NETHERLANDS

KEN KARIPIDIS, AUSTRALIA

CARMELA MARINO, ITALY

SHARON MILLER, USA

GUNNHILD OFTEDAL, NORWAY

TSUTOMU OKUNO, JAPAN

MARTIN RÖÖSLI, SWITZERLAND

SOICHI WATANABE, JAPAN

MEMBERS WHO HAVE LEFT THE ICNIRP COMMISSION IN MAY 2020

Maria Feychting

Adèle Green

Zenon Sienkiewicz

MEMBERS OF THE SCIENTIFIC EXPERT GROUP (SEG):

JACQUES ABRAMOWICZ - PG COSMETICS, PG ULTRASOUND
ANSSI AUVINEN - PG DATA GAPS
CHRISTIAN CAJOCHEN - PG SHORT WAVE LIGHT
JOSE GOMEZ-TAMES - PG HF DOSIMETRY REVIEW
PENNY GOWLAND - PG DATA GAPS
JOHN HANIFIN - PG SHORT WAVE LIGHT
JUKKA JUUTILAINEN - PG DATA GAPS
KEN KARIPIDIS - PG COSMETICS, PG DATA GAPS
MASAMI KOJIMA - PG LASER POINTERS
ILKKA LAAKSO - PG HF DOSIMETRY
ISABELLE LAGROYE - PG DATA GAPS
SARAH LOUGHRAN - PG SHORT WAVE LIGHT, PG HF GUIDELINES
JACK LUND - PG LASER GUIDELINES
SIMON MANN - PG HF DOSIMETRY
RÜDIGER MATTHES - PG HF DOSIMETRY
JOHN O'HAGAN - PG LASER GDL, PG LASER POINTERS, PG LED, PG SHORT WAVE
CHIYOJI OHKUBO - PG DATA GAPS
MARGARETHUS PAULIDES - PG HF DOSIMETRY
KENSUKE SASAKI - PG HF DOSIMETRY REVIEW
DAVID SAVITZ - PG ULTRASOUND
KARL SCHULMEISTER - PG DATA GAPS, PG LED, PG LASER GDL, PG POINTERS
DAVID H. SLINEY - PG LASER GDL, PG LASER POINTERS, PG LED, PG SHORT WAVE LIGHT
RIANNE STAM - PG COSMETICS
BRUCE STUCK - PG HF GDL, PG DATA GAPS, PG LED, PG LASER POINTERS, PG LASER GDL
JOHN TATTERSALL - PG HF GUIDELINES
TIM TOIVO - PG COSMETICS
ANDREW WOOD - PG DATA GAPS, PG HF DOSIMETRY
TONGNING WU

I- Historic overview of ICNIRP and accusations of COI

In this chapter, we give an overview of the history of ICNIRP as an organisation and examples of accusations of Conflicts of Interests (COI) and other controversies concerning the organisation's work. The authors do not want to suggest that this overview is, by any means, complete or comprehensive.

About [ICNIRP's history](#), on its website, the organisation simply states that its beginnings go back to 1973 "when, during the 3rd International Congress of the International Radiation Protection Association (IRPA), for the first time, a session on non-ionizing radiation protection was organized. In 1977 the International Non-Ionizing Radiation Committee (INIRC) was created. This Committee was the immediate forerunner of ICNIRP that was chartered as an independent Commission in 1992 during the IRPA 7th International Congress."

In a speech in Rio de Janeiro, in 2008, Paolo Vecchia, the Italian former ICNIRP-chair (2004-2012), [explained in more detail](#): "In June 1974, IRPA President, Italian Carlo Polvani (1973-1977), proposed "a possible role of IRPA in establishing criteria and standards in the field of health protection against non-ionizing radiations" and the IRPA Executive Council decided to set up a Working Group to review the health protection problems arising from different non-ionizing radiation (NIR)."

One could argue that IRPA itself, and then much later its spin-off ICNIRP, came into existence as a "fall-out" of the first US atomic bomb testing. On its website, on the subject of its historical background, IRPA states: "Before the Second World War, radiation protection had been a largely secondary concern of radiologists and radiological physicists. With the concentration of effort under the [Manhattan Project](#) it was soon realised that this would involve working with quantities and types of radiation and radioactive materials that had not previously been envisaged. As a result, a distinct group of scientists within the project were assigned full time to what was termed "Health Physics"."

In [an article from 2017](#) on the history of of ICNIRP, at the occasion of its 25th anniversary founder Mike Repacholi wrote: "Concern about health risks from exposure to non-ionizing radiation (NIR) commenced in the 1950s after tracking radars were first introduced during the Second World War. Soon after, research on possible biological effects of microwave radiation in the former Soviet Union and the U.S. led to public and worker exposure limits being much lower in Eastern European than in Western countries, mainly because of different protection philosophies." As we will see further in this chapter this divide between Russia and the West on safety measures on non-ionizing radiation exists till today.

At the end of its conference in 1955, the US Atomic Energy Commission voted overwhelmingly to form a professional Health Physics Society and the first IRPA Congress was held in Rome between 5-10 September 1966. It is interesting to see that many of the 12 Executive Council Members of IRPA in 1966 remained in position for many years; a fact that echoes like a prelude to criticism that ICNIRP functions like an 'old-boys network'.

In 1974, IRPA President Polvani insisted that "a separate and independent International Commission on NIR Protection (later ICNIRP) should be established...The ICNIRP would look

to IRPA as the sponsoring international scientific organization in a similar way that ICRP looks to the International Congress of Radiology.... And “IRPA should consider broadening its institutional authority to include NIR”.

So Carlo Polvani got what he wanted: the General Assembly amended the Constitution of IRPA so that it could “also apply its objectives and purposes in the field of non-ionizing radiation protection”. Then the General Assembly created an International NIR Committee [...] “with the objective of developing background documents and internationally accepted recommendations”. This became INIRC, set up in 1977, that went on to become ICNIRP, in 1992. Already four years earlier, Mike Repacholi (more on him later), a member of IRPA, had begun writing the charter for ICNIRP which was signed in 1992.

But why elaborate so much on IRPA, before turning to ICNIRP itself? Critics often ask from where ICNIRP got its self-acclaimed international and institutional authority? Well, partly from IRPA, which still plays a role in the actual composition of ICNIRP. The IRPA Charter for the creation of ICNIRP, from 1992, says: "The election of the members of the Commission shall be made by the Commission from current members of the Commission and from nominations submitted by the Commission itself, the Executive Council of IRPA and the IRPA Associate Societies, with regard to an appropriate balance of expertise. Attention shall be paid to geographical representation."

At the end of the 15th International Congress of IRPA, planned for 11-15 May 2020, in Seoul, Korea, the new term of office of the new ICNIRP commission (2020-2024) would officially start. This occurred, despite the [international congress in South-Korea](#) being postponed until 2021 due to the corona-crisis. This international congress counts [telecom companies of all kinds among its sponsors](#) (platinum, silver, bronze as well as others). Since ICNIRP was born from IRPA, and that, like any parent, IRPA still exerts a strong influence over ICNIRP, and considering ICNIRP claims to function free of any vested interests, it seems important to us to look more closely at IRPA.

And maybe also because of the actual role that IRPA wants to play in the ongoing debate around safety and health in relation to EMF. Current IRPA-president, Roger Coates, [writes that](#) “a lot of effort over recent times has gone into preparing the IRPA Guidance for Engagement with the Public on Radiation and Risk”. This seems to be the typical type of response given by bodies like IRPA, ICNIRP and others concerning public worries about possible health effects: *let’s explain things better, because the public doesn’t understand (...that everything is safe)*. It is the same kind of response given in the past by the nuclear sector when people started to become worried about nuclear safety issues (for example after Chernobyl).

Some governments – at various levels – try to put into practice a guiding principle of radiation safety, called “ALARA”, which stands for “As Low As Reasonably Achievable”. This principle means that even when being subjected to a small dose, if receiving that dose has no direct, practical or medical benefit, you should try to avoid it. IRPA-boss Roger Coates states that “the interpretation of what is ‘Reasonable’ in the implementation of optimisation of radiation protection is one of the key issues for our profession and is one of IRPA’s current key themes. It is central to practical protection and is the dominant factor controlling exposures in any well-developed system of protection. But what does ‘reasonable’ mean?

There are growing concerns within our profession that we are giving more emphasis to ‘as low as’ and ‘minimisation’ rather than truly being ‘reasonable’.”

On the subject of safety: before Roger Coates became IRPA-president he had [a life-long career in the British nuclear industry](#): he started working in 1975 at the Health Physics and Safety Department at the Sellafield site of *British Nuclear Fuels plc* (BNFL) and did so for over 30 years, “holding radiation protection roles covering operations, environmental protection and emergency planning. His responsibilities broadened to encompass nuclear safety, together with conventional safety and environmental issues. He completed his industry career as Director of Environment, Health and Safety for both BNFL and its British Nuclear Group subsidiary.” Over the years, [BNFL has had to face up to](#) quite [some issues](#) in the field of safety and was the subject of a “[damning report into the falsification of safety data at the Sellafield reprocessing plant](#)” at the start of this century.

This year, [on its website, IRPA published](#) the first new safety guidelines of ICNIRP since 1998, of which ICNIRP-chair Van Rongen said, as we mentioned earlier: “The new guidelines provide better and more detailed exposure guidance in particular for the higher frequency range, above 6 GHz, which is of importance to 5G and future technologies using these higher frequencies. The most important thing for people to remember is that 5G technologies will not be able to cause harm when these new guidelines are adhered to.”

Self-declared legitimacy

Since the signing of IRPA-charter in 1992, ICNIRP is based in Munich, Germany and registered as a self-governed NGO (non-governmental organisation) that was formally recognized as “an official collaborating non-state actor by the World Health Organization (WHO) and the International Labour Organization (ILO).” ICNIRP is consulted by the European Commission and is linked to many organizations engaged in NIR protection worldwide through diverse collaborative projects.

As mentioned in the introduction of this report, [extensive reporting by Investigate Europe](#), in March 2019 (updated on June 10th 2020), showed that there are many close links between ICNIRP and other leading organisations in the field of health protection. Many ICNIRP-members are, or were, also members of one of these three scientific bodies (from which most radiation safety authorities in Europe and governments, seek their advice) and it is important to mention them again, because these are the bodies that guide government policies in most countries:

- The [EU Scientific Committee on Health, Environment and Emerging Risk, SCENIHR / SCHEER](#).
- The [World Health Organization \(WHO\) International EMF Project \(IEMFP\)](#).
- The [WHO Cancer Unit IARC, International Agency for Research on Cancer](#).

It is worth underlining, however, that IARC does not really fit into this “gang of four” because it has a much more critical and independent approach. IARC published a report in May 2011 which concluded that radiofrequency (RF) radiation is “possibly carcinogenic” to humans.

The IARC cancer classification includes all sources of RF radiation, of which the long-term exposure can come from mobile phone base stations, Wi-Fi access points, smart phones, laptops and tablets.

However, IARC may now have a solid reputation as independent scientific body, some years ago, IARC also got into trouble. Anders Ahlbom, senior professor of Epidemiology at the Karolinska Institute in Stockholm, and a long standing, influential member of ICNIRP (Commission Member and ICNIRP SCI working group (Epidemiology)), and ICNIRP Chairman from 1996 until 2008, was also part of the IARC panel of experts in 2011. Ahlbom was, until very recently, doing assessments of environmental health risks as chair of the Swedish Radiation Safety Authority's (SSM), the scientific council on electromagnetic fields, as a member of ICNIRP and of the EU advisory body SCENHIR.

But he was asked to step down from IARC after a journalist exposed him as being on the board of his brother's consulting firm in Brussels, which helps clients on telecoms issues. He had not made IARC aware of this. As the Swedish investigative reporter, Mona Nielsson, wrote: "Furthermore, Anders Ahlbom's brother, Gunnar Ahlbom, was for a long time a lobbyist for Swedish telecom giant Telia (previously TeliaSonera) in Brussels. At the same time Anders Ahlbom served as an "independent expert" on several important expert panels, in Sweden as well as at the WHO and EU. At a meeting organized by the European Commission in cooperation with GSM Association and Mobile Manufacturers Forum in Brussels in 2004, Anders Ahlbom was an invited expert to speak on health effects, while his brother Gunnar Ahlbom sat in the audience representing TeliaSonera."

There was, and is, more controversy and division on this topic within the WHO. In a 2017 article, ["A hard nut to crack"](#), professor Lennart Hardell draws attention to a [Fact Sheet issued by WHO](#) in June 2011, only two months after the IARC's report adapting the cancer classification of RF radiation, which stated that "to date, no adverse health effects have been established as being caused by mobile phone use". According to Hardell, this statement was "not based on scientific evidence at that time on a carcinogenic effect from RF radiation. And it was certainly a remarkable conclusion by WHO since IARC is a part of WHO, although seemingly independent". And he goes on to conclude: "Considering the WHO statement of 'no adverse health effects' the aim might have been to undermine the IARC decision and give the telecom industry a 'clean bill' of health."

One of the main reasons for this schizophrenic approach within the WHO is to be found in the figure of ICNIRP-founder, Mike Repacholi, and the WHO's International EMF Project, IEMFP) (see more below). At least [four ICNIRP-members](#) were, or are, also members of the WHO-EMF Group.

In January 2019, in [the German newspaper Der Tagesspiegel](#), investigative journalists described ICNIRP as "a Cartel", that systematically refutes all studies that show possible harm: "And no radiation protection agency, no EU commissioner and no minister, contradicts this. For European governments and their authorities, the 13 members of the self-appointed Commission act as a kind of force majeure. But why? Why are all the warners, even prominent figures like the panel of experts for the US Health and Safety Executive, not heard?"

The Investigative journalists describe an “astonishing phenomenon: the members of ICNIRP are simultaneously active in all the relevant institutions and thus have control over the official discourse.” They then go on to note that, legally speaking, ICNIRP is an association that auto-controls itself and thus avoids dissenting opinions, but in the first instance, the connection with the German state begins with the chosen address of ICNIRP which is the same as the [German Federal Office for Radiation Protection \(BfS\)](#).

Is it just a strange coincidence that ICNIRP’s secretariat is located in the building of the BfS in Munich. The scientific coordination for/of/within? ICNIRP has, for the last few years, been the responsibility of a BfS official: Gunde Ziegelberger. “Her predecessor even chaired the club until 2016. At the same time, the German government supports the NGO of scientists with about 100,000 euro a year. The spokesperson rejects the impression that the private organization is almost part of the German authority as "not applicable". The office only supports the international network of research, she said. Moreover, the ICNIRP is officially recognised by the WHO, which gives it legitimacy.”

We have asked Mrs Ziegelberger via email if she would agree to answer our questions on ICNIRP in writing, but we have, to this date, received no response (the ten questions can be found in Annex I)

This self-declared sense of legitimacy was carefully created by the Australian scientist, Michael Repacholi, who co-founded ICNIRP and also, a few years later, in 1996, the EMF Project of the WHO (officially the WHO’s International EMF Project, IEMFP) of which he became the head. The WHO’s International EMF Project (IEMFP) basically based itself on ICNIRP’s guidelines and by doing so gave itself a “quality label”.

ICNIRP under Michael Repacholi’s chairmanship

Since 1978, the Australian biophysicist, Repacholi, [has been a member of the International Non-Ionizing Radiation Committee \(INIRC\)](#), a part of the International Radiation Protection Association (IRPA), and between 1988—1992 he was chairman of INIRC, which then became into ICNIRP. Between 1996 and 2006, Repacholi called the shots at the WHO by creating, and then leading, the WHO EMF Project, to study the health effects of electric- and magnetic-field radiation (EMF).

So, almost simultaneously with his leadership of ICNIRP, Repacholi was able to set up the EMF Project of the WHO (officially the WHO’s International EMF Project, IEMFP) in 1996, and became its head (see more below) until 2006. From the very beginning, [the WHO EMF Project and ICNIRP have been intertwined](#), as Louis Slesin wrote in *Microwave News*. Given the central role of Repacholi, it might explain why, from very early on, ICNIRP was officially recognized by the WHO. From 1996 until today, Repacholi has been “Member Emeritus” of ICNIRP and today, still has access to the organisation he founded.

As early as 1992, ICNIRP [adopted Repacholi’s 1984 IRPA proposal](#) that the only health issue to address in standard setting was the short-term effects due to the absorption of RF/MW energy of sufficient power to be converted to heat, based on the IEEE’s (Institute for Electrical and Electronic Engineers) Radiofrequency standard philosophy. Since then it seems to be carved in stone that ICNIRP only recognises the ‘thermal effects’ of radiation as a

serious concern. This is a crucial element to understand the position of ICNIRP, it was built on the logics and thinking of electrical and electronic engineers and completely lacking biomedical expertise.

In 1998, ICNIRP published its first “Guidelines on limits of exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz)”, still largely produced under the chairmanship of Repacholi.

A fierce and long-standing critic of the first ICNIRP guidelines was Dr Neil Cherry, Associate Professor of Environmental Health. In November 1999, Dr Cherry was invited by the Ministry of Health/Ministry for the Environment of New Zealand to carry [out a peer-review of the proposal to adopt the ICNIRP guidelines](#) for cell sites in New Zealand.

Cherry: “The ICNIRP guidelines were covered by a published assessment in 1998. This review shows that the assessment had ignored all published studies showing chromosome damage. It was highly selective, biased and very dismissive of the genotoxic evidence and the epidemiological evidence of cancer effects and reproductive effects. The assessment gives the strong impression of being predetermined in the belief that the only effects were from high exposures that cause electric shocks and acute exposures that cause tissue heating. For, example, they cite two studies saying that they do not show any significant increased effects of Brain/CNS cancer from microwave exposures when the actual published papers, Grayson (1996) and Beall et al. (1996), both do show significant increases of Brain/CNS cancer.”

In September 2000, he [presented evidence](#) of Health Effects of Electromagnetic Radiation to the Australian Senate Inquiry into Electromagnetic Radiation. The Inquiry Chairperson, Senator Lyn Allison, described Cherry’s evidence as the only independent professional evidence with no relation to industry. The conclusions from this evidence are strongly contrasted with the position of Dr Michael Repacholi, the WHO, ICNIRP, the Australian Radiation Laboratory and many other organisations around the world.

Twenty years ago, Cherry said: “This issue has been so politicized. There are two major casualties, the truth and public health. On these matters, I have no respect for the position of ICNIRP, nor that of the WHO. The WHO position is taken solely by Dr Repacholi. ICNIRP is a small self-appointed, self-promoted group that claims standing by having WHO recognition. In other words, a body formed in part and led by Dr Repacholi, claims its standing by being recognized by Dr Repacholi.”

Cherry used harsh words for ICNIRP under Repacholi's chairmanship. “They consistently misquote and misrepresent the published research results. They reject all epidemiological evidence because every single epidemiological study occurs with mean exposure levels and orders of magnitude below their thermally-based standard. They are highly selective, using only a small proportion of the available studies in order to construct and defend their own case. They prefer author's conclusions that there are no effects, even when the data and analysis in the paper clash with this and contradict it. They dismiss large, reliable and well-defined studies as ill-defined and unreliable. They state that studies don't show significant increases in CNS cancers when they actually do, even when the papers include significant dose-response relationships. Both the WHO and ICNIRP, under Dr Repacholi's leadership, have maintained the thermal view to the present, despite the large and ever-growing body of scientific research that firmly and conclusively challenges this.”

He also accused Repacholi of maintaining close links with industry. “He not only appeared in New Zealand in two court cases for industrial clients, in Vienna he was taken to an industry sponsored press conference where he stated that there was no evidence that GSM cell phones were hazardous to health. At the conference, he presented his paper on the Telstra (Telstra is Australia's largest mobile network operator and telecom company) funded project that showed that GSM cell phone radiation at quite low non-thermal levels, doubled the cancer in mice. When challenged by the conference chairman, Dr Michael Kundi, Dr Repacholi said that a study is not evidence until it is replicated. The conference rejected this. A study is evidence. Replication provides confirmation and establishment.”

The fact is that Repacholi has followed a remarkable career path, from member of IRPA and working in an Australian hospital, to holding a dominant position in the international debate on EMF risks. He also developed as a scientist, from [publishing a study](#) in 1997 on lymphoma incidence in mice exposed to RF radiation, to becoming a consultant for telecom and power companies ten years later.

In 2017, he published ‘[A History of the International Commission on Non-Ionizing Radiation Protection \(ICNIRP\)](#)’ in the scientific review *Health Physics*, in which he stated: “ICNIRP’s guidelines have been incorporated into legislation or adopted as standards in many countries. While ICNIRP has been subjected to criticism and close scrutiny by the public, media, and activists, it has continued to issue well-received, independent, science-based protection advice. This paper summarizes events leading to the formation of ICNIRP, its key activities up to 2017, ICNIRP’s 25th anniversary year, and its future challenges.”

It is quite revealing that Repacholi writes, “ICNIRP has been subjected to criticism and close scrutiny by the public, media, and activists”, and yet, forgets to mention, *and also by scientists*. Because, since the first publication of guidelines by ICNIRP in 1998, there has been a never-ending stream of critical academics publishing harsh analysis on the scientific work of ICNIRP. The issue is that Repacholi has not only been a dominant figure, but also a very divisive figure, in the international EMF-debate and he has been able to make sure that independent scientists who do not agree with the ICNIRP-dogma of ‘thermal effects only’ have not become part of ICNIRP nor of the WHO EMF Project.

The fact that, in his article for the 25th anniversary of ICNIRP, Repacholi makes no mention of the criticism and close scrutiny by scientists is quite telling. Because basically, the story of ICNIRP and the ongoing controversy and ever deeper divisions within the scientific community in the EMF-debate, started around the persona of Michael Repacholi himself.

‘Good science’ and the EMF Project (IEMFP)

As we have stated above, Repacholi was not only ICNIRP chairman, but also the leader of the WHO EMF Project. In his [own words](#): “The WHO established the [International EMF Project](#) to provide a mechanism for resolving the many and complex issues related to possible health effects of EMF exposure. The Project assesses health and environmental effects of exposure to static and time varying electric and magnetic fields in the frequency range 0 - 300 GHz, with a view to the development of international guidelines on exposure limits.”

In 1999, Repacholi published [the Proceedings of an International Seminar on EMF Risk Perception and Communication](#) that took place in Canada. The event was not only sponsored by the WHO, some government ministries and the Faculty of Medicine at the University of Ottawa, but also by the Cellular Telephone Industry Association, the Canadian Wireless Telecommunications Association and some electricity companies. The almost 300-page document published by Repacholi's "International EMF Project" (part of the WHO's Department of Protection of the Human Environment) kicks off with this statement: "Possible health effects of exposure to electromagnetic fields (EMF) have led to concerns among the general public and workers that appear to go well beyond those that are attributed to well-established risks. It is necessary to understand why this occurs and to deal with it through an effective communications programme. People have the right to access reliable, credible and accurate information about any health risks from EMF exposure."

In his review, "[A hard nut to crack](#)", professor Hardell writes: "Michael Repacholi immediately set up a close collaboration between WHO and ICNIRP (being head of both organizations) inviting the electric, telecom and military industries to meetings. He also arranged for large part of the WHO EMF project to be financed by the telecommunication industry's lobbying organisations; GSM Association and Mobile Manufacturers Forum, now called [Mobile & Wireless Forum \(MWF\)](#)." Hardell states [that Repacholi acted like](#) "a representative for the telecom industry while responsible for the EMF health effects department at the WHO"

An investigative article in US magazine, [The Nation](#), stated: "Although Repacholi claimed on disclosure forms that he was "independent" of corporate influence, in fact Motorola had funded his research: While Repacholi was director of the WHO's EMF program, Motorola paid \$50,000 a year to his former employer, the Royal Adelaide Hospital, which then transferred the money to the WHO program. When journalists exposed the payments, Repacholi denied that there was anything untoward about them because Motorola had not paid him personally."

According to [The Nation](#), "eventually, Motorola's payments were bundled with other industry contributions and funnelled through the Mobile and Wireless Forum, a trade association that gave the WHO's program \$150,000 annually. In 1999, Repacholi helped engineer a WHO statement that "EMF exposures below the limits recommended in international guidelines do not appear to have any known consequence on health."

In a [Microwave News article](#), Repacholi claims that he always followed the WHO rules on funding and that, "NO funds were EVER sent to me." But the article's author, Louis Slesin goes on to say that "this is financial *legerdemain*. As [Microwave News](#) has previously reported, Repacholi arranged for the industry money to be sent to the Royal Adelaide Hospital in Australia, where he used to work. The funds were then transferred to the WHO. Seven years ago, Norm Sandler, a Motorola spokesman, told us that, "This is the process for all the supporters of the WHO program." At the time, Motorola was sending Repacholi \$50,000 each year. That money is now bundled with other industry contributions and sent to Australia by the Mobile Manufacturers Forum (MMF), which gives the project \$150,000 a year."

A scientist who is very critical about the activities of Repacholi is American Professor Andrew A. Marino (who used to work at the departments of Orthopedic Surgery, Neurology, and

Cellular Biology & Anatomy at the LSU Medical School in Louisiana) wrote: “In 1996 the World Health Organization began what it said was a program to assess the scientific evidence of possible health effects of EMFs. But the project was corrupted from the start because it was controlled by the power- and cell-phone companies in the industrialized countries. The companies designated Michael Repacholi as the project head. He had long been a consultant and spokesman for power companies, so it was unrealistic to expect him to conduct an open and honest inquiry, but his performance in office was even more miserable than could have been anticipated based on his known conflict-of-interest.”

Marino: “While heading the EMF program at WHO, Repacholi dealt almost exclusively with experts on the payroll of cell-phone and power companies. Scientists who disagreed with the viewpoint of the EMF companies were excluded from the EMF evaluation process. The public was also excluded from participation even though it was a major stakeholder in the EMF debate. Only pro-industry spokesmen were heard in Repacholi’s star-chamber processes, which ultimately resulted in reports and evaluations that exonerated the companies from any responsibility for human disease produced by their EMFs.”

Marino saw Repacholi at the Annual Meeting of the Bioelectromagnetics Society (BEMS) in Cancun, Mexico, in June, 2006: “The Mobile Manufacturers Forum, a consortium of the world’s major cell-phone companies, were “Gold Sponsors” of the BEMS meeting, and the leaders of BEMS, had invited Repacholi to give a talk entitled “Results from 10 Years of WHO’s International EMF Project,” which he delivered at a plenary session of the meeting. Unsurprisingly, his talk was a paean to his EMF activities at WHO. He was proud of having successfully stemmed the tide of concern regarding the link between environmental EMFs and other human diseases, and of having defended the principle that man-made environmental EMFs were harmless. He touted model legislation that he had drafted, and said that he hoped it would be enacted by various governments so that the fact that environmental fields were safe would be enshrined in law.”

In 2006 Repacholi stepped down as director of WHO’s EMF Project.

Not much later [Microwave News](#) announced: “It’s Official: Mike Repacholi Is an Industry Consultant And He’s Already in Hot Water”: “Just months after leaving his post as the head of the EMF project at the World Health Organization (WHO), Mike Repacholi is now in business as an industry consultant. The Connecticut Light and Power Co. (CL&P), a subsidiary of Northeast Utilities, and the United Illuminating Co. (UI) have hired Repacholi to help steer the Connecticut Siting Council away from a strict EMF exposure standard.”

To strengthen his testimony on behalf of the two electric utilities, Repacholi cited the findings of an unfinished WHO report —Environmental Health Criteria (EHC)— on EMF risks. Twenty invited experts drafted this report at a meeting in Geneva in October 2019. The final version was expected to be made public months ago but it's still being edited by the WHO staff.

According to Chris Portier, who chaired the expert EHC panel for the WHO, Repacholi has misrepresented the group's conclusions: "The paraphrasing sometimes has gone a bit far and may be misleading". Portier is the associate director for risk assessment at the National Institute of Environmental Health Sciences (NIEHS)." (see below).

Portier cites a couple of examples. For example, in a summary of the WHO report, Repacholi states that the EHC panel concluded that "The epidemiological evidence cannot be used as a basis for standards (exposure limits)". Portier retorts, "Such a statement is absurd, since they obviously can be used."

Repacholi has since also been involved in an [industry propaganda video](#) and [interviews](#) with GSM Association and Hydro Quebec where he clearly speaks in favour of the telecommunications and the power industries, respectively.

A year later, in 2007, [Microwave News](#) reported that "Mike Repacholi has now revealed that up to half of the funds raised for his EMF Project came from industry. This admission was made in an interview with *Resource Strategies Inc.* in an effort, he states, to "set the record straight." While Repacholi has acknowledged in the past that he raised funds from industry, the extent of the industry support is much greater than anyone has previously suspected. Repacholi has never disclosed how much money he received nor from whom. He insists that the EMF Project was not "influenced by industry."

According to an e-mail seen by *Microwave News*, Repacholi touts the interview as an example of "where the press finally got it right": "*Resource Strategies*, however, can hardly be considered "the press" in the usual meaning of the term. *Resource Strategies* is a corporate consulting firm that prepares briefing papers for clients, which are almost exclusively in the wireless and electric utility businesses. Among them are *EPRI*, *FGF*, *GSM Association* and *MMF*. All of these industry groups supported the EMF Project during Repacholi's tenure. And to bring it all full circle, the WHO is also on *Resource Strategies'* client list."

Some current ICNIRP members, such as the new chair, Rodney Croft, also declare doing work for EPRI.

Researcher Don Maisch [wrote that Repacholi harmed the credibility of the WHO](#): "It is acknowledged that in an ever increasingly globalized world the reliance on international organisations to set standards to protect public health is an irrefutable fact of modern life. It is also a fact that international organizations charged with this task need to be "eternally vigilant" to ensure that their organisations are not co-opted by vested interest groups – as exemplified by Big Tobacco and WHO. However, when it comes to non-ionizing radiation issues (in this case for power frequency health risk assessment) the evidence is clear that Michael Repacholi has used his standing in both WHO and ICNIRP to stack the WHO's Environmental Health Criteria Task Group for power frequency exposures with representatives of the power industry in contravention of WHO policy."

Maybe one of the most telling episodes in the professional life of Repacholi is his open fight with his former boss, Gro Harlem Brundtland, who was director-general of the WHO. In interviews and [a speech](#), Brundtland admitted that she is 'electrically sensitive': "I never place a mobile phone next to my head because in one second I would develop a bad headache." [Repacholi was not amused](#). In 2012, several Norwegian newspapers reported that the "Former head of WHO's EMF project and ICNIRP chairman says that Brundtland has created "fear of mobiles" in the population". He offered to examine her, as if she had a psychological problem.

Very seldom were critical voices heard within the WHO. From the minutes of the Sixth International Advisory Committee meeting in May 2001, we read that Russian professor Yuori Grigoriev (the one from the 'angry letter' mentioned below) tabled a document outlining EMF activities in Russia, and the difficulties with standards harmonization "particularly because of the inadequate consideration of non-thermal effects by ICNIRP and other national authorities".

Dr Paolo Vecchia, of the National Institute of Health in Italy, and later ICNIRP chair, reacted to this by saying that "it is important to be able to recognize what good science is. WHO should be a reference point or clearinghouse for good science and good scientific review. It is important to recognize that science and legal measures follow the technology – it is not possible to do a mobile phone epidemiological study before the introduction of the technology! Given the pace of new technological development it is not possible, even now, to envisage the complete set of new research that will be needed."

Vecchia also claimed to be personally very concerned about 'defensive science', speaking of over-cautiousness and an over-emphasis on uncertainties. "Scientists should be more confident 'about the state of art'". He is now doing consultancy work and [speaks at Telecom-conferences](#).

IEEE/ ICES

[In 2008, Vecchia wrote](#): "Guidelines for safe exposure to electromagnetic fields have also been developed by other international organizations, in particular the Institute of Electrical and Electronics Engineers (IEEE). Apart from some differences in terminology and numerical values of the limits, these guidelines are based on the same methodological approach, the same structure, and the same scientific database as ICNIRP."

In his thesis on "an examination of the manipulation of telecommunications standards by political, military, and industrial vested interests at the expense of public health protection" ORSAA-member and scientist, Don Maisch, compares the ICNIRP and IEMFP with the American based IEEE. It is interesting because while ICNIRP claims to be free from the influence of private interests, IEEE/ICES has always openly had members of the military and of the telecom industry among its ranks.

Maisch writes: "On the part of both IEMFP and ICNIRP, a disregard for their own stated principles on independence from industry and following questionable criteria for evaluating science, suggests an agenda to cut off the scientific controversy over EMF human health hazards by less than scientific means. It could be argued that IEEE's openly industry and military dominated standard-setting process is at least more honest than WHO / ICNIRP masquerading as independent scientific voices free of vested interest machinations."

Dariusz Leszczynski, Adjunct Professor at the University of Helsinki, [writes](#) about conflicts of interest concerning ICES: "ICES, equivalent of ICNIRP, prepares safety recommendations for the exposures of users by radiation emitted by cell phones. Unlike ICNIRP, anyone can apply for membership of ICES and all members of ICES participate in the decision-making process. Sounds nice... Not a "private club" as ICNIRP where participation is by invitation only and the invitees have to have the same opinion on radiation safety – this helps in reaching unanimous decisions... But ICES has another problem that caused me, member of ICES for a

couple of years, to resign my membership in 2009. The problem is that the ICES membership is [clearly dominated by scientists working or consulting for telecoms.](#)"

And in another [blogpost](#) Leszczynski wrote: "The membership of the IEEE-ICES-TC95 consists predominantly of the industrial scientists and the committee is chaired by C.K. Chou since the time he was employed by Motorola. This means that all safety standards being developed by IEEE-ICES-TC95 are, in practice, developed by the industry scientists for the use by the industry they are employed by. The industry scientists have the majority on the committee and upper-hand in any process involving democratic voting. To me this is clear Conflict of Interests".

In the portraits of ICNIRP chair, Croft, and co-chair, Van Rongen, we describe (from page 50) how they worked on establishing closer relations between ICNIRP and ICES.

From [the minutes of a meeting by the IEEE/ICES TC95](#) working groups at a Motorola headquarters, a few interesting things got clear: In 2017 Repacholi was still a member of the "ICES literature systematic review working group". And ICES-chair Faraone Antonio from 'Motorola Solutions' proudly announced that ["ICNIRP has delayed finalizing their conclusions to give full consideration of ICES's recommendations"](#).

Former Motorola employee Chou stated at the same meeting on the interaction with World Health Organization (WHO EMF Project) that "in response to C-K Chou, the WHO has agreed to encourage international harmonization of RF Safety Limits, especially between ICNIRP and ICES"

And concerning the WHO EMF Project, Hardell [describes](#) how Repacholi recruited Emilie Van Deventer to the WHO EMF Project in 2000, and to this day, she remains project manager at WHO for the EMF project: "She has been a long time member of the industry dominated organization [Institute of Electrical and Electronics Engineers \(IEEE\)](#). IEEE has prioritized international lobbying efforts for decades especially aimed at the WHO." Hardell states that [Van Deventer is an electrical engineer](#) and has no formal or earlier knowledge in medicine, epidemiology or biology, so it is surprising that she was selected for such an important position at the WHO. Hardell: "The very same year she was recruited to the WHO EMF Project, [Toronto University Magazine wrote](#) about Emilie van Deventer's work, stating that it was 'invaluable' to industry: 'The software modelling done by teams like van Deventer's is invaluable.' 'The industrial community is very interested in our research capabilities,' says Van Deventer. 'It always needs to be working on the next generation of products, so it turns to universities to get the research done'."

The importance of this work is reflected in [the research funding](#) van Deventer and her team received from the Natural Sciences & Engineering Research Council of Canada (NSERC), Communications & Information Technology Ontario (CITO), and their major industrial partner, Nortel. "We are fulfilling a very real need in the industry today, which will only increase as technology creates more opportunity. In the process, consumers will continue to enjoy faster computers, lighter cell phones, smaller electronic organizers and the vast array of other electronic gadgets the high-tech world has to offer."

In 2016, during a [seminar at the SSI](#), concerning health effects of EMF, former Swedish investigative journalist, Mona Nilsson, asked both Emilie van Deventer, Head of the WHO

EMF Project, and Eric van Rongen, the then chair of the ICNIRP, “whom the citizens should believe: them or the opinion of 220 scientists who signed an [Appeal](#) submitted to the United Nations and the WHO?”. Both Van Rongen and Van Deventer [answered the question without defending their position](#). Apparently, neither Van Rongen or van Deventer are willing to fully defend the reliability of the evaluation of science by ICNIRP, because as Leszczynski points out, neither of them said that ICNIRP evaluation of science is reliable and that the Appeal’s conclusions are unreliable. “This clearly demonstrates that there is no scientific consensus on the health effects of radiation emitted by wireless communication devices. This situation should be taken into consideration when the WHO selects expert group for preparation of the final version of the Environmental Health Criteria for RF-EMF. Scientists with diverse scientific opinions should and must be appointed in order to facilitate an unbiased scientific debate.”

We have sent questions to Van Deventer, but have, to date, received no answer.

Angry Russian letter

Although ICNIRP was recognised as “an official collaborating non-state actor by the World Health Organization (WHO) and the International Labour Organization (ILO)”, from the early days, ICNIRP has also been criticized for industry-bias and indisputable situations of conflict of interest.

Hardell notes that the Ethical Board at the Karolinska Institute in Stockholm, Sweden, concluded, already in 2008, that “being a member of ICNIRP may be a conflict of interest that should be stated officially whenever a member from ICNIRP makes opinions on health risks from EMF.”

Nevertheless, for the WHO, this does not appear to pose a problem. After [the IARC publication](#) in 2011, the WHO announced a new 'formal risk assessment' in 2012, which was launched in 2014 and was then open for public consultation until the end of 2014.

The WHO stated “the drawing of conclusions from the literature and the drafting of these chapters is the remit of a formal Task Group that will be convened by WHO at a later stage in the process.”

Hardell disclosed that “it turned out that of the six members in the WHO Core Group, four are active members of ICNIRP and one is a former member.” Indeed, in [a research paper](#) from 2016, Sarah J Starkey concludes that “the anticipated WHO Environmental Health Criteria Monograph on Radiofrequency Fields, due in 2017, is being prepared by a core group and additional experts, with 50% of those named, being, or having been, members of AGNIR or ICNIRP (Table 2).”

In another [research paper](#), from 2017, Hardell notes: “It is striking how ICNIRP has infiltrated the WHO Monograph core group, making it less likely that the conclusions in that Monograph will differ from ICNIRP’s conclusions.” And according to him, only one person seems to be independent of ICNIRP and “several persons also have affiliation(s) to other advisory groups, authorities and/or committees. Six of the 20 additional experts are affiliated with ICNIRP”.

In March 2017, professor Oleg A. Grigoriev, Chairman and Head of the Scientific Department of Non-Ionizing Radiation, Federal Medical Biophysical Centre of Federal Medical Biological Agency (RNCNIRP) of Russia [wrote an angry letter](#) to Maria Neira, Director of Public Health and Environment at the WHO, in which he openly attacks ICNIRP: “It has just come to our attention that the WHO RF Working group consists mainly from present and past ICNIRP members. In general, the WG is not balanced and does not represent the point of view of the majority of the scientific community studying effects of RF. In particular, the private self-elected organization, ICNIRP, similar as majority of the current WHO RF WG members, does not recognize the non-thermal RF effects, which represent the main concern of widespread exposure to mobile communication and upholding guidelines from 1996, which are based on RF thermal effects only.”

The Russian scientist concludes that “the guidelines of ICNIRP are irrelevant to the present situation when majority of population over the world is chronically exposed to non-thermal RF from mobile communication. Based on multiple Russian studies and emerging number of studies coming from other countries, the Russian equivalent of ICNIRP has consistently warned against possible health effects from mobile communication. This point of view of RNCNIRP (Russian radiation protection agency) is supported by hundreds of new publications including well known recent RF studies in human and animals.”

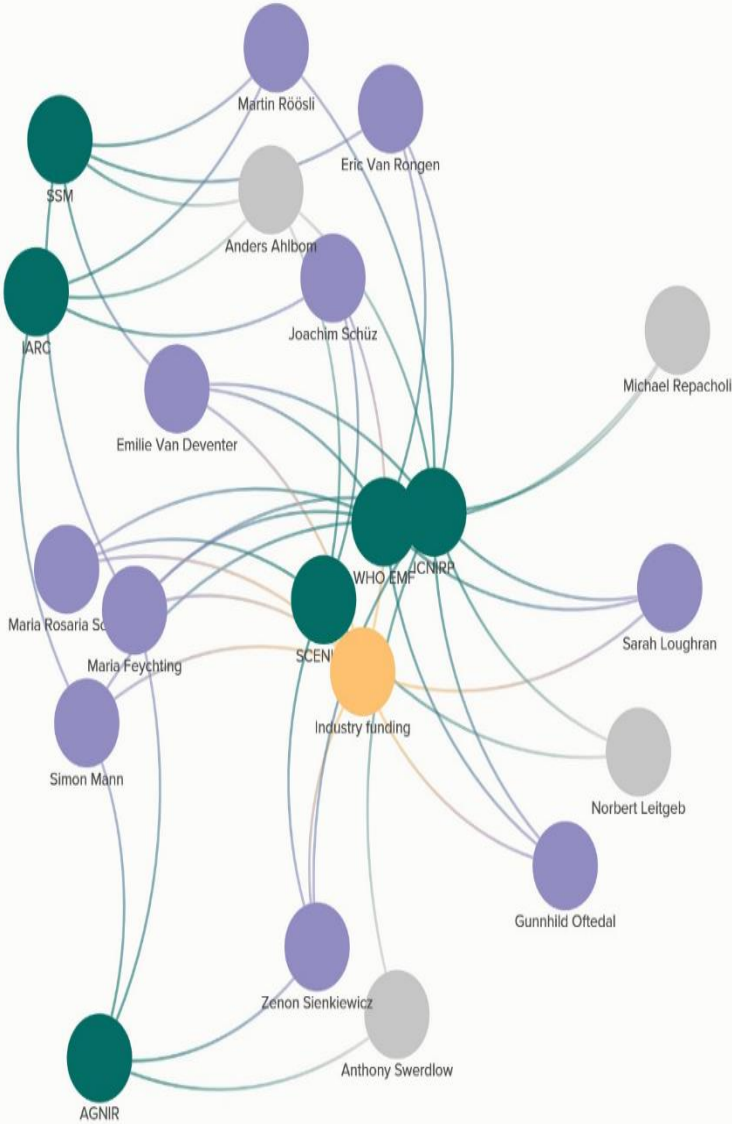
Apparently, this angry Russian letter, in addition to other outcries, did have some effect on the WHO, because it [relaunched a Call for Expressions of Interest for systematic reviews \(2020\)](#) for an ‘Environmental Health Criteria Monograph’: “The World Health Organization’s (WHO) Radiation Programme has an ongoing project to assess potential health effects of exposure to radiofrequency electromagnetic fields in the general and working population. To prioritize potential adverse health outcomes, WHO conducted a broad international survey in 2018. Ten major topics were identified for which WHO will now commission systematic reviews to analyse and synthesize the available evidence.”

We wonder if this time the WHO will try to avoid conflicts of interests and whether, for example, there will also be Russian experts and other non-ICNIRP affiliated scientists on the panels of experts.

Investigate Europe wrote that the conflicts in EMF research run deep: “Historically, science in this field has been associated with the telecom sector and the military. ICNIRP’s safety limits primarily take into account the needs of the telecom industry, claims Dariusz Leszczynski, former long-time researcher at the Finnish radiation protection agency. In 2011, he sat on the committee of IARC, the cancer body of the World Health Organisation, when it decided that EMF is “possibly carcinogenic” to humans. ICNIRP’s goal is to set safety limits that do not kill people, while technology works – so something in between”, says Leszczynski.”

Dariusz Leszczynski, has written about [this many times](#) on his blog and has often referred to an unbalanced expert composition: “ICNIRP can, and should, be considered as a “private club” where, members of the new Main Commission are selected by the members of the outgoing Main Commission. It is a self-perpetuating and self-promoting German NGO that is not accountable for its actions at all. Nobody controls it. Nobody supervises it. Nobody checks it for conflicts of interests. Nobody checks it for the scientific accuracy. In all what and how ICNIRP does, we, the general public, must rely on the self-assurances, from the

ICNIRP, that all is in order. One may ask whether such self-assurances are sufficient when ICNIRP is preparing advisories “enforced” world-wide by the WHO and applied by the numerous governments and by the multi-billion industry.”



The following Graphic – made by *Investigate Europe* shows the interlinkages between renowned ICNIRP-members and other scientific bodies. These groups, are to a large extent staffed by the same experts. “Of 13 ICNIRP scientists, six are members of at least one other committee. In the WHO group, this applies for six out of seven,” *Investigate Europe* writes.

III - Discussion & Controversies

An observation one could make based on what has been discussed above, is that ICNIRP is simultaneously one of the most powerful and one of the least-known non-governmental organisations (NGO's) in the world. Powerful, because for almost three decades, ICNIRP has enjoyed a monopoly in the regulation of exposure to EMFs through their guidelines thanks to the stamp of approval of the WHO. For the past 30 years, and currently, this advice and these guidelines, are to a large extent followed by governments all over the world. In every annual report, by any major telecom company, you will find references to ICNIRP in any discussion or statement on the safety of their mobile phones. ICNIRP garners huge influence worldwide, functioning on a modest yearly budget of around 140.000 euro, and yet ICNIRP is largely unknown by the general public.

ICNIRP presents itself, and is described by the European Commission and in the media, as an independent commission that gives advice based on scientific evidence. Our research shows that there are several reasons to question this (self)-image.

Biased composition

The composition of ICNIRP is very one sided. As one can read in the portraits of the members of the ICNIRP commission and of the Scientific Expert Group (SEG), they all share the same position on the safety issues: non-ionising radiation only poses a health threat at thermal levels.

Prominent ICNIRP-members therefore denounce the findings of the U.S. National Toxicology Program (NTP) that showed rats and mice contracted cancer when exposed to telephone radiation. In a scientific publication, Van Rongen and co-authors state, as we laid out in the portrait of the former chair of the ICNIRP-commission, that "substantial limitations (of the NTP-study) preclude conclusions being drawn concerning RF EMFs and carcinogenesis."

Professor Hans Kromhout of Utrecht University, who is leading a long-term study into the effects of mobile phone use on human health, and who is chairman of a special committee on Electromagnetic Fields of the leading Dutch Health Council, regrets the way ICNIRP minimalizes the conclusions of the NTP study. "[You can see that certain groups are trying to reason that away. But they are well-executed studies](#)", he said in [a Dutch newspaper](#).

According to Kromhout, a deep controversy divides the scientific community that researches EMF: "Two camps have arisen in science, with the two groups shouting at each other from their trenches. It has become impossible to conduct a normal conversation." This observation is [also made](#) by ORSAA-scientists.

And one of these two camps, is not represented at all inside ICNIRP. "It would seem that the Commission is composed only of 'non-believers,'" Kromhout wrote in an email to us. In the Dutch newspaper, he had earlier stated: "It's a bit of an opaque club. How candidates are elected is not clear. Call it self-indulgent. In that sense, it doesn't really have an independent status."

In more recent exchanges with us, he re-iterates that the use of the word “self-indulgent” is justified. He refers to the sentence in the [ICNIRP Charter](#): “The election of the members of the Commission shall be made by the Commission from current members of the Commission and from nominations submitted by the Commission itself, the Executive Council of IRPA and the IRPA Associate Societies, with regard to an appropriate balance of expertise. Attention shall be paid to geographical representation.” The first part – that it is the members of the Commission who elect its new members – puts the Commission at risk of remaining a closed circle made up only like-minded scientists.³

The unbalanced composition of ICNIRP is further demonstrated by the lack of expert-members with training and experience in medical and/or biological sciences. As one researcher pointed out, of the outgoing ICNIRP commission only one member was trained in medicine, and only three in biological sciences. Furthermore, the sole medical professional, Adele Green, was not an expert researcher in RF-EMR (with a single original research article back in 2005), but was specialised in UV-radiation and skin cancer. She also left ICNIRP in May 2020. It seems a good thing she has been replaced by Dutch scientist, Anke Huss, assistant professor at the [Institute for Risk Assessment Sciences](#) (IRAS) at Utrecht University (NL), who seems to be rather critical. Tania Cestari has replaced Adele Green ICNIRP in May 2020, although, like Green that she has collaborated with, her expertise seems to be on UV radiation in dermatology. Interestingly, a search on the PubMed database showed that she has no publications for radiofrequency or other EMFs so she is not an expert on wireless radiation.

The system of cooptation of ICNIRP and the resulting excessively homogeneous composition clearly favors such biases. In 2013, in his article "[Not Entirely Reliable : Private Scientific Organizations and Risk Regulation - The case of Electromagnetic Fields](#)", Gabriel Domenech Pascual, Professor Administrative Law at the University of Valencia, states in his conclusions : "That lack of plurality tends to reduce both the quantity and the quality of the available information that serves the basis of their judgments, to stifle critical dialogue, to exacerbate the common biases and positions of their members and to produce extreme outcomes, polarized in the direction of those biases and points of view."

We can safely say that ICNIRP has been, and is still lacking people with a relevant medical background and over represented by physical scientists, which may not be the wisest composition when your remit is to offer advice on human health and safety to governments around the world.

Dr. Chris Portier, former director of the National Center for Environmental Health and international expert in the design, analysis, and interpretation of environmental health data with a focus on carcinogenicity, writes to us that the ICNIRP Council and SEG “appear to have a very wide balance of experience”. However, what they are lacking, according to Portier, “is representation by scientists who have a history of working in risk assessment for chemicals. This leads to their having different risk assessment approaches than the rest of the area.”

³ For a better understanding of IRPA and functioning of ICNIRP, we refer you to the historical section of this report

Portier argues that risk assessment for chemicals is “well-established and has been used for many, many years”. This standard of assessing risks of chemical substances, governs how to judge the quality of various types of scientific studies and how to incorporate them into the final risk assessment decisions.

Portier: “I have long felt that experts from EMF-research have been incorrectly arguing that this exposure is different and must be handled separately. But ionizing radiation is handled the same way as chemicals in risk assessment, why not EMF?” Portier states that ICNIRP could “expand their expertise in epidemiology and toxicology and experts who understand the challenges of biomedical study design and interpretation in a general sense.

And Portier states that “it would also be good to have a few scientists who are more outspoken about potential risks.” Portier writes that these improvements “would” challenge ICNIRP to “be exact about their dismissal of some of the positive findings” in research on health effect of EMF, that do exist.

The composition of ICNIRP is also one sided in another sense: there is a lack of representatives from the Middle East, Russia, China and India who have outstanding research contributions in the RF research and also (in many cases) have more stringent standards.

For Gabriel Domenech Pascual "this lack of plurality is not fortuitous at all, but caused by the system used to elect the members of the ICNIRP. As everybody knows, cooptation tends to produce homogeneous, conservative, immobile and not sufficiently innovative groups."

"This stands in sharp contrast with the principles underlying current European Union Law", Domenech Pascual adds. "As stated in [the Communication from the Commission on the collection and use of expertise](#), pluralism is a determinant of the quality of the scientific advice. Therefore, “wherever possible, a diversity of viewpoints should be assembled. This diversity may result from differences in scientific approach, different types of expertise, different institutional affiliations, or contrasting opinions over the fundamental assumptions underlying the issue. Depending on the issue and the stage in the policy cycle, pluralism also entails taking account of multi-disciplinary and multi-sectorial expertise, minority and non-conformist views".

Various EMF-experts have pointed out on many occasions in the past years that ICNIRP is wrongfully dismissing certain scientific studies showing adverse health effects and sticking, in an almost dogmatic way, to the conviction that “non-ionising radiation poses no health threats and the only effects it has are “thermal”. Two leading experts, Kromhout and Portier confirm to us that ICNIRP is a closed, non-accountable and one-sided organisation. As concluded earlier, “a closed circle of like-minded scientists” has turned ICNIRP into a self-indulgent science club, with a lack of biomedical expertise as well as a lack of scientific expertise in risk assessment and risk management philosophies (similar to those used for ionizing radiation and for chemicals), which might lead to “tunnel-vision”.

Will world safety standards really be safe?

Several ICNIRP-members are, or were, also members of the International Committee on Electromagnetic Safety (ICES) of the IEEE. This is an organisation in which many people from the media and telecom industry and from the military are actively and openly involved. The former chair of the ICNIRP-commission was a member of an ICES-committee. As we mentioned in his portrait, ICES thanked Van Rongen for improving the relationship between ICES and ICNIRP and for his willingness to discuss the harmonisation of ICNIRP-guidelines and IEEE-exposure limits. In its latest published annual report (2016), ICES states: "ICES will maintain its collaborative relationship with ICNIRP with the goal of setting internationally harmonized safety limits for exposure to electromagnetic fields at frequencies below 300 GHz. This interaction with ICNIRP is considered a major step forward."

In 2016 Van Rongen invited members of ICES to give their comment on the new guidelines for HF Fields. And ICNIRP took these comments very seriously. In 2017 during the annual meeting of ICES it was stated that "ICNIRP has delayed finalizing their conclusions to give full consideration of ICES's recommendations".

The new chair of the ICNIRP-commission Croft was also member of ICES until December 2015. Seven other ICNIRP-scientists - Guglielmo d'Inzeo, Akimasa Hirata, Jose Gomez-Tames, Ilkka Laakso, Kensuke Sasaki, John Tattersall and Tongning Wu – were or are also members of an ICES-committee.

This clearly shows that ICNIRP has been working very closely with IEEE/ICES on the creation of the new RF safety guidelines that were published this year. And this implies that large telecom-companies as Motorola and others, as well as US military, had a direct influence on the ICNIRP guidelines, which are still the basis for EU-policies in this domain.

Kromhout comments that he was unaware of the fact that several ICNIRP-members also participate in ICES/IEEE. ICES/IEEE is not one of the organisations that is mentioned as a collaboration partner on the ICNIRP-website. On the subject of the IEEE, the Dutch professor writes that "this is not really an independent organisation when it comes to electromagnetic fields and health."

Portier sees the membership of ICES as a potential conflict of interest. He indicates as an example that the declarations of interests of some ICNIRP-members mention membership in ICES, but no mention of the travel costs associated with that membership being covered by ICES: "This has two consequences. Travel cost reimbursement is a perk and it could be removed if the member fails to give the right answer, hence a potential Conflict of Interests. Secondly, being a member in ICES gives industry access to the ICNIRP member which would not be available to the general public and can thus bias opinions."

A membership of and close cooperation of ICNIRP-members with ICES, which for several years held its annual meetings at a Motorola's branch, can be considered as a possible conflict of interest. As described, during the current leadership of ICNIRP, these ties got even closer "with the goal of setting internationally harmonized safety limits for exposure to electromagnetic fields".

Ties that bind

A lot of ICNIRP-scientists have also participated in research work that was funded, or partly funded, by the telecom industry.

The International Agency for Research on Cancer (IARC) has a strict policy when it comes to inviting scientists to assist it in the writing of the famous monographs – like the one from 2011, that classified radiofrequency electromagnetic fields as, “possibly carcinogenic to humans (Group2B), based on an increased risk for glioma, a malignant type of brain cancer associated with wireless phone use.” In the final Monograph 2012 report, it is stated that each scientist must disclose pertinent research, employment, and financial interests during the past 3 years, unless that a grant from for example a company does not exceed more than 5% of total research budget: “All grants that support the expert’s research or position and all consulting or speaking on behalf of an interested party on matters before a court or government agency are listed as significant pertinent interests.”

In our introduction, we wrote that the European Food and Safety Authority (EFSA) has slightly less stringent member-selection criteria: “Research funding from the private sector benefiting EFSA’s experts should not exceed 25% of their total research budget.”

It seems that this percentage is not exceeded by most of the members of the ICNIRP-commission and Scientific Expert Group, insofar as we can trust their Declarations of Personal Interest. But these declarations are often not complete. Anssi Auvinen, for example, mentions that he received € 100,000 from the Mobile Manufacturers Forum for the Finnish section of the COSMOS-study. But he does not mention what percentage of his total research budget that amount constitutes. And Maria Feychting, former vice-chair of the ICNIRP-commission, did not mention any research support received from commercial entities in her Declaration of Personal interest, although a lot of her research actually was, as we showed in her portrait, funded by industry. Some of the member’s DOI’s are also somewhat out of date. For example, the last DOI available for Isabelle Lagroye, published on the ICNIRP-website, is dated October 2015.

The majority of ICNIRP-scientists did perform research partly funded by industry. But is this important information? As we argue in the introduction, we believe it is. Scientific publications, co-authored by two ICNIRP-scientists – Anke Huss and Martin Rössli, confirm the importance of funding. In 2006 and 2009 they did a systematic review of the effect of the source of funding in experimental studies of mobile phone use on health, and their conclusion was that, “industry-sponsored studies were least likely to report results suggesting (adverse health) effects”.

And theirs is not the only study that showed this kind of bias. Portier agrees in writing to us that this is a problem: “There have been numerous studies of the differences in reporting from industry-funded research versus publicly-funded research that suggest a strong bias.”

David O. Carpenter, professor of Environmental Health Sciences at the University at Albany, explains the mechanism behind this claim in the preface of the book [Corporate Ties That Bind - An Examination of Corporate Manipulation and Vested Interest in Public Health](#): “One of the greatest problems in scientific discovery,” he writes, “is the perversion that can result due to conflicts of interest. While there are other possible bases for conflicts of interest,

most are financial. Individual scientists may have financial conflicts of interest that influence the design of the studies they perform so that they obtain a result similar to that which they, or their funders, want. When funding for scientists comes from an organization or corporation with desires to present a clean bill of health to the public, there is strong motivation to give the funder what they want, if only to continue receipt of funding.”

The Australian researcher, Don Maisch, claimed in his PhD-thesis, *The Procrustean Approach: Setting Exposure Standards for Telecommunications Frequency Electromagnetic Radiation* (2010), that the dismissal by ICNIRP of all studies that show health effects of non-ionizing radiation shows the influence industry exercises on ICNIRP: “Such dismissal may, on the surface, appear to be objective expert opinion, but an examination of ICNIRP’s risk assessment processes finds, however, that power industry influence is endemic to the process. This influence appears to be aimed at ensuring economic protection for the industry against the need to spend enormous amounts of money on upgrading distribution networks as well as the risks of litigation if more restrictive limits were ever put in force.”

According to Maisch, the essence is that the thermal limitations of the IEEE standards and the ICNIRP RF Guidelines “can be said to be little more than an outdated artefact from a half-century ago, maintained by a scientific elite who have long staked their scientific credibility on maintaining that viewpoint. From their perspective, to retreat from that paradigm would be to admit that they had it wrong after all.”

Ten years after Maisch’ publication and many other similar criticisms, ICNIRP still adheres to the paradigm that the only proven effects are thermal. “ICNIRP appears to take into account only the warming of tissue and uncontrolled muscle contractions, although they claim in the most recent advice, that they also evaluated other mechanisms”, writes Kromhout.

As many scientists and critical observers have pointed out, it seems as if ICNIRP members are either oblivious or ignoring scientific studies that find possible adverse health effects where there is an absence of heating. Even when some ICNIRP-members themselves acknowledge that industry-funding of scientific research tends to have less positive findings, and publicly funded studies – like the NTP-study – does find significant links between EMF and adverse health effects, this does not seem to influence one iota the views of ICNIRP-members.

A mixed bag of responsibilities

In an e-mail we received from Lloyd Morgan, Senior Research Fellow of the [Environmental Health Trust](#) and Director of the Central Brain Tumor Registry of the United States, is very critical of both ICNIRP and governments: “Who are ICNIRP? The International Committee on Non-Ionising Radiation Protection (ICNIRP) are a private, self-appointed body or NGO who together with the Advisory Group on Non-ionising Radiation (AGNIR) and Public Health England (PHE), have somehow ended up effectively setting microwave radiation exposure 'safety' standards for the populations of large parts of the world since the 1990s,” he writes. “What amazes me, and simultaneously sickens me, is how did ICNIRP convince a large number of "independent" nations to adopt ICNIRP's so called "standards"?”

Morgan suspects that high-level persons in the government’s administration was “able to have the legislation passed because almost no-one in the government understood what was happening.”

ICNIRP only publishes guidelines. It is then up to national governments to decide if they pass these guidelines into law. According to Lloyd Morgan, “that places the burden on each national government, should its citizens file a lawsuit”.

Clearly, the Telecom sector as a whole, and the auctioning off of bandwidth and selling of Telecommunication licenses, are an important source of cash income for governments. The analogy with the Tobacco sector has often been made by scholars who study ‘regulatory capture’, but there is also an important similarity between the tobacco and telecom sectors in terms of their importance for State budgets.

The [auctioning off of Radio frequency spectrums](#) brings in billions of euros for European countries. Telecom companies also earn billions of euros thanks to these spectrum acquisitions, since ‘owning the right’ to use a specific radio frequency spectrum is an essential resource for telecommunication services such as mobile telephones, TV and radio broadcasting, satellite and broadband communications.

The *European 5G Observatory* [notes that](#), “Germany’s Federal Network Agency announced that the 5G auction, which started in March 2019, ended with 6.55 billion euros offered in total by the four bidders. *Deutsche Telekom* and *Vodafone* Germany criticized high prices of the country’s auction”. In the [5G Action Plan](#) as adopted by the EU in 2016 it says; “from September 2016, member states will be required to authorise the 700 MHz-band by 2020, unless there are justified reasons for delaying it until mid-2022 at the latest”, reports the *European 5G Observatory*. The Observatory also stated, in April 2020, that “exceptional circumstances caused by the Covid-19 epidemic have forced some countries in Europe to postpone 5G auctions scheduled in the first months of 2020. Four EU countries, Austria, France, Spain and Portugal have postponed spectrum auctions for 5G due to the Covid-19 epidemic so far.”

The European Commission selected the consultancy firm, [Idate-digiworld](#) to carry out the *European 5G Observatory*, to monitor the rolling out of the 5 G Action Plan. IDATE-DIGIWORLD is a smart-looking consultancy company and self-declared “European think-tank for members, policy-makers and players of the digital transformation”, with some of the largest telecom operators and producers as its clients.

One of those clients, isn’t a Telecom giant, but a governmental regulator, Ofcom in the UK. *European 5G Observatory* reports that ‘Ofcom opened a consultation on human exposure to Electromagnetic Field Emissions (EMF) in the UK. The consultation started on February 21th 2020 and ended on May 15th 2020: “The regulator proposes to include a specific condition in telecom licences requiring licensees to comply with ICNIRP guidelines. (...) At the same time, Ofcom released the results collected close to 16 5G base stations in 10 cities across the UK and to 60 GHz fixed wireless equipment in Liverpool. In all cases, the measured EMF levels from 5G base stations were far below the ICNIRP Guidelines (the highest level was approximately 1.5% of the relevant level); the 5G share of the total emissions level observed was currently very low.”

To the question, “Is ICNIRP responsible?”, Paolo Vecchia, former Chairman for ICNIRP (2004-2012) [answered very clearly at a conference in September 2008](#) that “the ICNIRP guidelines are neither mandatory prescriptions for safety, the “last word” on the issue, nor are they defensive walls for Industry or others.” This statement makes it clear that the decision to adopt these guidelines into national legislation as “sufficient to protect public health” is

political. The possible misuse by governments of ICNIRP and its guidelines seems to be another key question, that still needs looking into and answering.

On the other hand, ICNIRP presents itself as the provider of scientific truth. For example, in [a report](#) for the Irish government, under the heading, “Recommendations International Guidelines” it states that “there should be strict compliance with ICNIRP guidelines: The ICNIRP guidelines on exposure limits have been recommended by the European Commission to its Member States, and they provide science-based exposure limits that are applicable to both public and occupational exposure from RF and ELF fields. They also provide sound guidance on limiting exposure from mobile phones and masts, as well as for power-line fields. The ICNIRP guidelines provide adequate protection for the public from any EMF sources. While the guidelines were published in 1998, they are constantly under review and still have appropriately protective limits. The guidelines are based on a weight of evidence review from all peer-reviewed scientific literature and not on the conclusions of any single scientific paper.”

Even as ICNIRP has been positioning itself during the last 25 years as the sole scientific truth when it comes to possible relation between EMF and adverse health effects, it would not be correct to hold this scientific NGO accountable if one day it would be undisputed that EMF causes health problems. National governments have their own responsibility to protect their citizens, just as the European Commission has, which after all is the ‘Guardian of the Treaty’ and therefore should also take the legally binding ‘precautionary principle’ into account.

The telecommunication industry applauds ICNIRP

In most policy fields, industry keeps reiterating that the limits scientific advisory committees propose are too strict. But in the case of the exposure limits for non-ionizing radiation the telecom industry seems very content with the norms ICNIRP proposes. In many reports over the past twenty years, the Telecoms lobby in Europe has always referred to the safety assurances published by ICNIRP.

In its Environmental Report of 2005, the European Telecommunications Networks Operators’ Association (ETNO) wrote: “Concerning the European Union’s legislative and policy framework on EMF, ETNO has been in direct contact with EU institutions. The association has provided a steady stream of facts and advice to legislative bodies in order for the EU to base its Directive concerning ‘minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields)’ on a sound scientific basis as provided by the International Commission on Non-Ionising Radiation Protection (ICNIRP).”

Thirteen years later, the Boston Consulting Group, in [a report](#) with the ominous title, ‘[A playbook for accelerating 5G in Europe](#)’, pleads for the harmonized limits ICNIRP (and also IRPA and the WHO EMF project) proposes, and criticizes governments that apply stricter limits. Exactly the same point was made by ETNO in a public consultation by the European Commission. ETNO was in favour of the “harmonised ICNIRP limits”.

The same word, *harmonised*, comes back in a plea for [“a harmonised EU approach to 5G security”](#) that ETNO launched on 29 January 2020. “We therefore welcome today’s publication of the “5G Security Toolbox”, presented by EU Member States with ENISA and the European Commission. Europe’s decision-making on 5G should continue being based on

facts, it should be proportionate to threats and build on a solid understanding of technology reality. In this context, we invite National Governments to avoid disproportionate actions that negatively impact the investment climate, and which could in turn harm both Europe's competitiveness and its strategic position in 5G development."

ETNO argues that rules and regulations should not hamper but support European investment and innovation, because "regulatory pressure still risks holding back European investment and innovation on many fronts"... "The speed of 5G rollout is significantly slowed by excessive spectrum prices and challenging license conditions."

ETNO continues to explain the policy-wish list: "The opportunity of fully unleashing fibre deployment awaits a pro-investment implementation of the European Electronic Communications Code. Regulatory asymmetries, especially in the field of data, still hold back European innovation. Market fragmentation still affects Europe's full potential in network investment. European institutions and national governments both have a major role to play in removing such barriers."

Yet again, ETNO does not lobby for lowering the ICNIRP standards, these are not seen as part of the "regulatory pressure" that hampers technological development. On the contrary: the norms ICNIRP proposes are the "harmonised limits" that ETNO welcomes.

All in all, the telecom-sector seems to be quite pleased with ICNIRP's positioning. This is deviating from the standard procedure in EU-policy making where a specific industry concerned will on essential aspects always try to influence laws and regulations in their favour through various ways of lobbying. Apparently in case of ICNIRP there is simply no need to do so.

The Telecom Lobby

In order to promote a continuation of favourable policy-making, European telecom companies have many lobby-meetings with the European Commission, and no doubt also at national political levels. According to [the EU transparency Register](#), ETNO has a [budget of over one million euros for lobbying and representing](#) Europe's telecom companies. With at least seven registered lobbyists, ETNO had 70 registered lobby meetings with the European Commission (EC) in 2019. "ETNO's primary purpose is to develop top-level policy papers and support members in promoting a positive policy environment allowing the EU telecommunications sector to deliver best quality services to consumers and businesses. We also organize some of the main European events for discussing telecom and digital policy."

But of course, the individual telecom companies also have lobbying budgets and lobbyists representing them at the European institutions in Brussels. [Ericsson had a lobby budget](#) of 700.000 euros and five accredited lobbyist in 2019, [Telefonica had a lobbying budget of 1,8 million](#) euros and 6 lobbyists who covered no less than 83 meetings with the EC, [Deutsche Telekom had a 1,5 million lobbying budget](#), with 5 lobbyists and a total of 110 lobby meetings with the EC.

In early December 2019, [a large delegation of CEOs from ETNO met with Margrethe Vestager](#), Executive Vice-President of the European Commission responsible for "[Europe fit for the Digital Age](#)". The delegation included: Tim Hoettges from *Deutsche Telekom*,

Stephane Richard from *Orange*; Thomas Arnolder from *Telekom Austria*, Salvatore Rossi from *TIM*, Alexandre Fonseca from *Altice Portugal*, as well as the Chairman of ETNO, Steven Tas, the Director General of ETNO, Lise Fuhr, and senior representatives from *Telefonica* and *Telenor*.

At the end of January 2020, an important event was held, the [European 5G conference](#). It welcomed more than 250 delegates, who discussed “the necessary next steps to ensure the success of 5G in Europe”. Eric Van Rongen, at the time still ICNIRP-Chair, was among the speakers who provided “the audience with insightful views on their areas of expertise.” The purpose, apparently, was not to discuss the sagacity and safety of rolling out 5G, but rather to ensure the success of 5G deployment.

It is important to note that the efforts of the telecom industry to influence regulatory agencies often take illegal forms. Telecommunications companies are high [on the list](#) of the companies that were penalised in the U.S. for corrupt practices. European companies like *Ericsson*, *Alstom* and *Telia* are in the top ten.

Also significant, is the fact that more and more [world leading insurance companies](#) are backtracking from insuring telecom companies concerning the risks around EMF. In March 2019, in its [“SONAR Emerging risk insights”](#) report, one of the world’s largest insurance companies, *Swiss Reinsurance Company* (Swiss Re), classified “unforeseen consequences of electromagnetic fields” into the highest risk class, together with endocrine disrupting chemicals. “The ubiquity of electromagnetic fields (EMF) raises concerns about potential implications for human health, in particular with regard to the use of mobile phones, power lines or antennas for broadcasting. Over the last decade, the spread of wireless devices has accelerated enormously. The convergence of mobile phones with computer technology has led to the proliferation of new and emerging technologies. This development has increased exposure to electromagnetic fields, the health impacts of which remain unknown.”

The lobby power of the telecom-industry in Brussels, the decision-making heart of the EU, is enormous. Yet the corporations involved do not have to lobby the guidelines and health advice related to their technology, because ICNIRP has been providing the “safety certification” for over 25 years. At the same time the insurance sector is not very assured and does not want to pay possible litigation costs once telecom companies would get sued, which is [happening more and more frequently](#).

The call for more independent scientific assessment in this area

Almost ten years ago, in May 2011, the Council of Europe adopted a report from Mr Jean Huss on [“The potential dangers of electromagnetic fields and their effect on the environment”](#). It stated that the findings of scientific research on the possible risks of electromagnetic fields were inconclusive and contradictory. In the light of the correlation between origin of funding and the findings it called for “genuine independence on the part of the expert appraisal agencies and for independent, multidisciplinary and properly balanced expert input. There must no longer be situations where whistle blowers are discriminated against and renowned scientists with critical opinions are excluded when

experts are selected to sit on expert committees or no longer receive funding for their research.”

In the meantime, not a lot seems to have changed. In a letter, [published this year in Bioelectromagnetics](#), three researchers - Steven Weller , Victor Leach and Murray May - of the Australian “Oceania Radiofrequency Scientific Advisory Association” (ORSAA) write: “Half a century of scientific research into the safety of EMFs (from static to 300GHz) has not resulted in any substantial policy advice changes. The question that we believe needs to be asked is as follows: Is the continuing unchanged policy advice on EMFs occurring because those who are trying to advocate change have no voice in the process and because the process is dominated by groups with self-interests in maintaining the status quo?”

The three researchers point to the fact that radiofrequency electromagnetic radiation is “a booming multi-trillion-dollar industry globally, and changing current prescribed safety levels to more stringent standards would bring about unfavourable financial consequences and affect industrial and military functions. In some countries, such as Australia, the regulator, which has a health protection responsibility, also sells RF spectrum licenses, which represents a clear conflict of interest. The very same agencies with responsibility for providing safety advice to the public are also considered by some to have been captured by the industry.”

The huge financial weight and power of the telecom companies is something the industry itself also stresses. In its report from January 2020, ‘[The State of Digital Communications 2020](#)’, ETNO boasts that “its Telecom members are thriving and business is booming: Telecom is Europe’s major technology business, with a €136.9 billion per year value added and training on the rise. (...) Of the 17 Europe-based companies figured in the 2019 Forbes Digital 100 index, 11 are either telecoms operators or telecoms equipment vendors, and more than half of them are ETNO members.”

Whether or not ICNIRP is ‘captured by industry’, a remarkable fact is that the organisation that appears to be the world’s most important body responsible for advice on non-ionizing radiation is a private organisation, not a public authority.

“To me it seems wiser if the EU and national governments stop relying only on the advice of ICNIRP. A committee of its own is not an unnecessary luxury,” Hans Kromhout writes. When we ask him if it would seem to him more logical that it be a public organisation giving advice on non-ionizing radiation, he answers: “I completely agree.”

But this is not what is happening in the heart of the European Union. [According to ICNIRP’s website](#) there is a [contractual partnership](#) between the European Commission, which is the Guardian of the Treaty, and thus also of the legally enshrined [precautionary principle](#). It states: “The European Commission and ICNIRP collaboration over the years, relies on annual or specific contracts, such as the Concerted Action within FP5 - Life Quality, Key action Environment and Health. ICNIRP also takes part, in consultation together with other stakeholders, on the development of directives and liaises, upon request, with different EC entities, such as the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). Support to ICNIRP is provided by the European Commission through its Directorate General Health and Safety at Work as part of an EC grant agreement, as laid down in the ICNIRP reports.”

Given the experience with ICNIRP of the past 25 years, the growing body of evidence that there are serious concerns on adverse effects of EMF on public health and the huge economic interests involved, it seems not very wise for the European Commission and national governments to base their policies solely on the ICNIRP guidelines and advice.

Chris Portier agrees by saying that “governments have no say in the governance or membership of ICNIRP. In addition, without their own review committees, governments do not have their own experts to advise them about these topics. I believe it would be best if such an entity was run by a trusted organization that has some form of government oversight.”

Portiers adds in writing to us: “I have been in the position of managing, running, chairing and/or being a member of dozens of national and international committees. These were always government committees or WHO-related entities. When run properly, governments can get excellent advice on issues. There is usually a place for interested parties (industry, concerned citizens) to express their opinions to these committee members at public forums. And there are legal consequences to providing false information on Conflict of Interest forms, etc. All of these reasons lead one to believe a government managed Commission would be better.”

We think that the call for more independent scientific assessment in this area is, for all the arguments mentioned in the above, fully justified.

IV - Conclusion

ICNIRP presents itself, and is described by the European Commission and in the media, as an independent international commission that gives advice based on scientific evidence. We believe that there are various reasons to question this (self)-image.

The composition of ICNIRP is very one sided. With only one medically qualified person (but not an expert in wireless radiation) out of a total of 14 scientists in the ICNIRP Commission and also a small minority of members with medical qualifications in the Scientific Expert Group, we can safely say that ICNIRP has been, and is still, dominated by physical scientists. This may not be the wisest composition when your remit is to offer advice on human health and safety to governments around the world.

As one can read in the 45 portraits of the members of the ICNIRP commission and of the Scientific Expert Group (SEG), they all share the same position on the safety issues: non-ionising radiation poses no health threats and the only effects it has are thermal. ICNIRP says "non-ionising radiation poses no health threats if it does not heat the tissue by more than 1 °C", by which it admits that there are possible health effects, but only if exposure levels to strong radiation are too high".

Over the past years, and on many platforms, various EMF-experts have stated that ICNIRP is wrong to continue dismissing certain scientific studies showing adverse health effects – like the American NTP-study - and is mistaken in its almost dogmatic conviction that “non-ionising radiation poses no health threats and the only possible health effects it has are thermal in case of strong radiation”.

Even after much criticism from members of the global scientific community, ICNIRP still adheres to the paradigm that the only proven effects (on health) are thermal. “ICNIRP appears to take into account only the warming of tissue and uncontrolled muscle contractions, although they claim in the most recent advice, that they also evaluated other mechanisms”, writes Dutch Professor Hans Kromhout, who is currently leading a long-term study (in the Netherlands) into the effects of mobile phone use on human health, and who is chairman of a special committee on Electromagnetic Fields of the leading Dutch Health Council, which advises the Dutch government.

It seems that “a closed circle of like-minded scientists” has turned ICNIRP into a self-indulgent science club, with a lack of bio-medical expertise, as well as a lack of scientific expertise in specific risk assessments. Thereby, creating a situation which might easily lead to “tunnel-vision” in the organisation’s scope. Two leading experts, Hans Kromhout and Chris Portier, confirmed to us that ICNIRP is a closed, non-accountable and one-sided organisation.

As many scientists and critical observers have pointed out, it seems that ICNIRP members are either oblivious to, or are ignoring, scientific studies that find possible adverse health effects in the absence of heating. Even though some ICNIRP-members have themselves acknowledged that industry-funded scientific research tends to produce less findings showing adverse health effects of EMF, whereas publicly funded studies – like the NTP-study – do find significant links between EMF and adverse health effects, this does not seem to influence one iota the views of ICNIRP-members.

The majority of ICNIRP-scientists have done, or are doing, research partly funded by industry. Is this important? As we argue in the introduction, we believe it is. Scientific publications, co-authored by two ICNIRP-scientists – Anke Huss and Martin Rössli, confirm the importance of funding. In 2006 and 2009 they did a systematic review of the effects of the source of funding in experimental studies of mobile phone use on health, and their conclusion was that, “industry-sponsored studies were least likely to report results suggesting (adverse health) effects”. And theirs is not the only study that showed this, as there have been numerous studies of the differences in reporting from industry-funded research versus publicly-funded research that suggest a strong funding bias on the results.

In addition to the fact that certain members of ICNIRP, are simultaneously members of the International Committee on Electromagnetic Safety (ICES) of the US-registered Institute of Electrical and Electronics Engineers (IEEE), we have seen further evidence of a close cooperation between ICNIRP and ICES, an organisation in which many people from the media and telecom industries, as well as from the military, are actively and structurally involved. During the current leadership of ICNIRP, these ties have become even closer “with the goal of setting internationally harmonized safety limits for exposure to electromagnetic fields”. This must surely be considered as a situation in which conflicts of interest are a real possibility.

It is clear [from ICES minutes](#) that ICNIRP worked very closely with IEEE/ICES on the creation of the new RF safety guidelines that were published in March 2020. And this implies that large telecom-companies such as Motorola and others, as well as US military, had a direct influence on the ICNIRP guidelines, which are still the basis for EU-policies in this domain.

Although there is a lot of lobby-power by the telecom sector in the European Union (both in Brussels and in the member states), the European Telecommunications Networks Operators’ Association (ETNO) does not lobby for lowering the ICNIRP standards, as these are not seen as part of the “regulatory pressure” that hampers technological development. On the contrary: the norms ICNIRP proposes are the “harmonised limits” that ETNO welcomes. All in all, the telecom-sector seems to be quite pleased with ICNIRP’s positioning. This deviates from the standard procedure in EU-policy making, where a specific industry concerned will, on essential aspects, always try to influence laws and regulations in its favour through various lobbying strategies. Apparently, in the case of ICNIRP, there is simply no need to do so. At the same time, the insurance sector does not, at present, seem very reassured and does not want to be put in a situation of having to pay potential litigation costs, if and when telecom companies get sued, something that is happening more and more often.

Despite ICNIRP positioning itself, during the last 25 years, as the sole purveyor of scientific truth when it comes to possible relation between EMF and adverse health effects, it would not be right to hold this scientific NGO solely accountable if, one day, it were to become undisputed that EMF do cause health problems. National governments, as well as the European Commission, which is, after all, the ‘Guardian of the Treaty’, have a duty of care and protection of their citizens, and therefore should also take the legally binding ‘precautionary principle’ into account.

We think that the call for more independent scientific assessment in this area is, for all the arguments mentioned above and in what follows, fully justified.

That is the most important conclusion of this report: for really independent scientific advice we cannot rely on ICNIRP. The European Commission and national governments, from countries like Germany, should stop funding ICNIRP. It is high time that the European Commission creates a new, public and fully independent advisory council on non-ionizing radiation. The funds currently allocated to ICNIRP could be used to set up this new organisation. And given the overall rise in R&D funding via Horizon Europe, with a foreseen budget (for 2021-2027) of between 75 and 100 billion euros, funding should in no way constitute an insurmountable hurdle to setting up this new, truly independent, body.

V - PORTRAITS OF THE ICNIRP-MEMBERS

ICNIRP COMMISSION:

Gunde Ziegelberger (Scientific Secretary)

Biography

On ICNIRP's website we read that Gunde Ziegelberger holds a PhD in Biology and after a career at the Max-Planck-Institute, she joined the Federal Office for Radiation Protection (BfS) in 2002, where she works on "Non-Ionizing Radiation". Since 2004 she also worked as Scientific Secretary for ICNIRP- she replaced Rüdiger Matthes, who became a commission member - and in that function, she is also a member of the ICNIRP Board together with the Chair (see Croft) and Vice Chair (see Van Rongen). ICNIRP's website clarifies: "The three Board members represents ICNIRP externally and mostly in its relations with the international and national partners and the press. The Scientific Secretariat is in charge with some specific scientific projects mostly related to workshops and with all administrative and operational tasks."

Position

In February 2019 Dr Ziegelberger gave a [short interview](#) in which she stated that when the limit values are respected so far scientific findings show that human beings don't run any risk from electromagnetic radiation.

Ziegelberger functions as Scientific Secretary of ICNIRP, she co-authors many scientific publications with ICNIRP-members. In September 2016 for example Ziegelberger was co-author of [a publication](#) 'A Closer Look at the Thresholds of Thermal Damage: Workshop Report by an ICNIRP Task Group'. The article concludes the workshop – co-organised by the WHO and financed by the European Commission, the Turkish Ministry of Health, the International Radiation Protection Association (IRPA), the German Federal Ministry for the Environment (BMUB), and the Finnish Radiation and Nuclear Safety Authority (STUK). The conclusion shows that the workshop "will provide valuable input into the revision of the guidelines being formulated by ICNIRP for limiting human exposure to RF fields." It was also clear that only thermal (adverse) effects were discussed as was the case in the new ICNIRP guidelines from 2020.

She co-authored as BfS -researcher [a study](#) within the ARIMMORA risk assessment which concluded that "the relationship between exposure to the agent ELF-MF and risk of childhood leukaemia is considered consistent with "IARC Group 2B" classification of possibly carcinogenic to humans (Fig. 1). This category is the result of limited evidence of carcinogenicity in humans and inadequate evidence of carcinogenicity in experimental animals."

Possible conflicts of interest.

Although Ziegelberger plays an important role for ICNIRP, given her position in the board and the fact that she works in an important department for radiation protection (BfS) of the German government, we could not find any DOI.

Rodney Croft (chair as of May 2020)

Biography

Rodney Croft is a psychology researcher. He works as professor of Health Psychology at the School of Psychology, University of Wollongong, Australia.

He joined the ICNIRP Biology Standing Committee in 2008 and the Main Commission in 2012, to become chair in May 2020.

ICNIRP's website states that his research focuses on the delineation of human brain function, as well as psychiatry more generally. He participates in a variety of national and international scientific and government committees, was Executive Director of the Australian Centre for Radiofrequency Bioeffects Research ((ACRBR 2004-2011) and is currently Director of the Australian Centre for Electromagnetic Bioeffects Research.

In June 2011, Rodney Croft as Executive Director of ACRBR [announced that](#) the organisation would cease operations because "it had been unable to secure further funding to continue its research activities". But many of the ACRBR Directors would be able to continue their Rf research but under the banner of the Bioelectromagnetics Research Group, part of the Brain and Psychological Sciences Research Centre (BPsyC) at the Swinburne University of Technology, which has for many years very close ties to Telstra, Australia's biggest Telecom company.

In August 2012 Croft received new funding when Australian Minister for Health, Tanya Plibersek, announced the establishment of a new \$2.5 million NHMRC Centre of Excellence: the Australian Centre for Electromagnetic Bioeffects Research (ACEBR) to be based at the University of Wollongong and led by Professor Croft. One of the central university partners of the ACEBR research Swinburne University.

Position

Croft is a typical ICNIRP member and has been defending for years and from different positions the point of view that there are no dangers associated with the use of mobile phones. On the ABC Lateline program (April 4, 2009) Dr. Rodney Croft, then Director of ACRBR, stated: "There really has been a lot of research done to date and the research has very clearly shown that there aren't any effects. With children, I really don't think there is any evidence suggesting that this might be a problem. There isn't anything to suggest that we may have to be a little bit more cautious."

Much earlier in 2003 the Australasian College of Nutritional and Environmental Medicine (ACNEM) [published a paper](#) by Don Maisch "that detailed reasons why extra precautions

needed to be taken for children and cell phone use. The paper included a number of statements of concern specific to this issue from scientific and medical organizations internationally and concluded with the question: “Is it worth the risk” to continue to allow unrestricted cell phone use by children.”

In 2008 the [Russian National Committee on Non-Ionising Radiation Protection \(RNCNIRP\)](#) issued official advice that the “health of the present generation of children and future generations is under danger” from cell phone use and therefore the committee has recommended that cell phone use be restricted for people under 18 years of age.

Croft said in 2011: “With children, I really don’t think there is any evidence suggesting that this might be a problem. There isn’t anything to suggest that we may have to be a little bit more cautious” And to visually back up ACRBR’s on children and cell phone use on the [ACRBR web site](#) published “an animated image that included images of children happily using cell phones”.

In 2009 [a scientific review paper](#) with Van Rongen and Croft as first and second authors respectively stated. “Subjective symptoms over a wide range, including headaches and migraine, fatigue, and skin itches, have been attributed to various RF sources both at home and at work. However, in provocation studies a causal relation between EMF exposure and symptoms has not been demonstrated, suggesting that psychological factors such as the conscious expectation of effect may play an important role in this condition.” The article mentions that “all authors are either current or former members of the Standing Committee on Biology of the ICNIRP” but does not mention anything on funding of the study.

During an [International Workshop on RF Measurements, Research Studies & Standards Development](#) in 2018 Croft downplays scientific research that shows effect from EMF by saying that “Counterbalancing is necessary to enable appropriate interpretation of data” and “Conclusions must be based on the scientific literature, not just a data set”.

In 2019, Croft and a researcher (expert in antipsychotics) were awarded 1.2 Million\$ for a project entitled "Exposures of mobile phone radiofrequency electromagnetic energy in juveniles: effects on brain development and behaviours." Neither of the two researchers are experts in the area of brain development, developmental psychology or juvenile behaviour.

Within ICNIRP, Rodney Croft was the chair of the Project Group that was tasked with preparing the new ICNIRP Guidelines, published early 2020. [According to critics](#), ICNIRP still dismisses completely: the existence and significance of non-thermal effects, existence of the risk of cancer in long term avid users of mobile phones, [IARC’s classification of RF](#) as a possible human carcinogen (the IARC monograph review of science was not included in list of science reviews used by ICNIRP in preparation of the new guidelines).

Possible conflicts of interest

Just like his predecessor Van Rongen, Rodney Croft provides unpaid services to the IEEE ICES SC/4 Standards committees, a US version of ICNIRP, with a broad number of representatives from both military and telecom industry; ICES boasted that they had “at least two members of ICES as members of the new 13 person ICNIRP Project Group (PG) on HF guidelines (up to 300 GHz), of which the PG Chairman (Croft), is now very willing to work with ICES to develop

science based safety standards. This will enhance the possibility of harmonizing international RF safety standards.”

Croft also advises the EMF reference group, and a community group managed by the Australian Government organization, ARPANSA. He receives [funding from the Electric Power Research Institute EPRI](#) for a project investigating RF effects on EEG and thermoregulation.

To possibly answer this question a brief examination of ACEBR’s Science & Wireless 2013 seminar “Health & Future RF Technologies” is an indication. In the seminar acknowledgements, the following was stated: “The ACEBR gratefully acknowledges the financial support of the National Health & Medical Research Council of Australia and Telstra Corporation, which has enabled SW2013 to run”.

In Rodney Croft’s introduction to the presentation by Mr. Mike Wood from the Australian Mobile Telecommunications Association (AMTA) on "4G telecommunications technologies", he said the following, in part: “Clearly what we see here is a whole lot of new technologies which are going to come about. How do we know what’s going to be most relevant to us? Well, in the short term I think that our industry representatives are going to give the best indicator of this”

Croft was appointed in 2014 an Associate Editor of the BEMS journal of the Bioelectromagnetics Society (BEMS); The annual meetings of [BEMS are a heavily industry sponsored event](#). The [annual meeting celebrating](#) the Bioelectromagnetics Society (BEMS) and the European Bioelectromagnetics Association (EBEA) was in 2015 in California (USA), had sponsors including companies such as, the Electric Power Research Institute (EPRI), Mobile Manufacturers Forum (MMF), Korean Institute of Electromagnetic Engineering Society (Mobile EMF Consortium) and, GSM-ATM5.

Croft also held talks and [expert opinion](#) on behalf of industry and for [the Mobile Manufacturers Forum](#), a consortium of the world’s major cell-phone companies. At a 5G Conference in Dubai In December 20, 2019, Croft held a lecture on behalf of ICNIRP alongside ICES Chairman Jafar Keshvari and TC95 Chairman C-K. Chou.

He joined the conference organized by the Telecommunication Regulatory Authority (TRA) of the United Arab Emirates held on December 8-9, 2019 in Dubai. Three presentations were on RF exposure safety limits: “5G RF safety concerns: New IEEE StdC95.1TM-2019” by C-K. Chou; “Scientific Basis of 5G Exposure Limits IEEE C95.1:2019 Standard” by Jafar Keshvari, and “Ensuring 5G Safety with the New ICNIRP Guidelines (100 kHz to 300 GHz)” by Rodney Croft of ICNIRP.

Croft has also actively [collaborated in research with Ray McKenzie](#), who is a manager at the Mobile Carriers Forum (MCF) which is a special division of the Australian Mobile Telecommunications Association (AMTA) dealing with the policy, regulatory, public communications and health and safety aspects of the deployment of mobile networks in Australia.

On his website Croft's disclosure statement says: Rodney Croft has consulted to a range of organisations such as Shelharbour City Council, Department of Defence, Comcare and Optus. According to [his ICNIRP declaration of interests](#) he received personal remuneration for

providing data analysis services to Heptares Therapeutics Ltd, a pharmaceutical company. And Croft received personal remuneration for providing advice to Australian Bureau of Statistics (ABS) on effects of RF devices used by field staff on field staff, resulting from a contract between University of Wollongong and ABS. He also received personal remuneration for “providing advice to Victorian Government on conducting bioelectromagnetics research, resulting from a contract between University of Wollongong and Victorian Government”.

As explained before in this report the Australian government receives billions from issuing spectrum licences to Telecom operators. In Australia, this licensing is carried out by industry regulator ACMA, the Australian Media Communications Authority. ACMA also collects a separate levy or tax from the wireless industry, money that is earmarked for scientific research on RF-EMR. ACMA then diverts \$300,000 to the other government institution ARPANSA (Australian Radiation Protection & Nuclear Safety Agency) for its public information campaign) and \$700,000 to the National Health & Medical Research Council (NHMRC).

According to the Australian research group ORSAA “the money that [the Australian NHMRC](#) receives in order to provide grants for medical research has mostly gone to industry-friendly researchers who have direct links with the wireless industry. For example, the largest recipient of this NHMRC research funds is Prof. Rodney Croft. He has essentially been the head of RF-EMR health research in Australia, despite his questionable qualifications for this health research role. Prof. Croft has [received ample direct industry funding](#) in addition to his lucrative NHMRC grants, which should be termed indirect industry funding.” Croft was the only Australian who played a part in determining what NHMRC research on EMR and health should be funded.

He used his international contacts at the WHO to get more Australian funding. This is how it worked behind the scenes: Croft was invited [from Australia to the WHO for an expert consultation](#) to determine which areas of medical research was needed; The Australian NHMRC research on EMR then looked to the WHO guidelines (co-influenced by Croft and ICNIRP or [hi-jacked as some critics say](#)) in order to decide their funding priorities (the 2010 WHO RF Research Agenda is the basis of funding for NHMRC research grants). Croft's laboratory then received the funding and has continued to get most of the research money over many years.

Croft had [good relations](#) with [an influential industry man, Dr K. Joyner](#). Which researchers or research groups have been granted the NHMRC funds has been influenced to a large extent by Joyner, who was [Motorola's Director of "Global EME Strategy and Regulatory Affairs"](#) and also represented the Australian Mobile Telecommunications Association, an industry group, on the telecommunications standards committee and the Mobile Manufacturers Forum ; Notwithstanding these ties Joyner was a longstanding member of the Standards Australia TE/7 Committee: Human Exposure to Electromagnetic Fields, and later on he was on the ARPANSA committee that set the current Australian Radiofrequency/Microwave human exposure standard. He was regarded by the cell phone companies as Australia's foremost authority on the industry's position on health issues with EMR and has represented Motorola and the Australian cell phone industry on several international standards-setting

bodies. Joyner also had connections with Burson Marsteller, the PR firm representing the cell phone industry in Australia.

In October 2003 Ken Joyner, the key Motorola representative gave a presentation at the Annual Conference of the Australian Radiation Protection Society called: "A Review of RF Bioeffects Studies Relevant to the Use of Mobile Phones by Children". Don Maisch writes in an article [Motorola's Micky Mouse Review](#): "The Motorola review's conclusions as to a lack of scientific evidence of possible harm to children using mobile phones ignores a large body of expert opinion calling for a precautionary approach when it comes to children and mobile phone use."

As [reported in Microwave News \(1999\)](#) in Europe there was some discontent with scientists with Motorola's involvement with the EC research and telling European scientists how to spend research funds. As Don Maisch writes in 'Corporate ties that bind: An Examination of Corporate Manipulation and Vested Interest in Public Health' (2017): "In January 2009, Dr. Joyner announced that he was leaving his Director position at Motorola after 12 years and was "looking for new opportunities to work in the telecommunications industry". In that same year, Dr. Joyner was listed on the NHMRC's Peer Review Honour Roll which acknowledged its many peer reviewers and external assessors who had exhibited "excellent track records and wide-ranging expertise in Australian and international health and medical research fields". However, under the section "Administering Institution/Employer" he was listed as simply "consultant" and nothing about possible conflicts of interests. He later was appointed as the sole non-radiation expert on the 14-member Victorian government's Health department's Radiation advisory committee.

ORSAA calls this "pure corruption at a huge cost to public health everywhere. This system of funding and promoting an in-club of industry friendly researchers has kept a small number of people in powerful positions within the WHO, ICNIRP, ARPANSA etc., influencing decision making for most of the world."

Eric van Rongen (Vice Chair ICNIRP-commission, until May 2020 chair)

Biography

Eric Van Rongen is a biologist. He is a staff member of the Dutch Health Council since 1992, where he focuses on non-ionizing radiation.

Van Rongen is a member of ICNIRP since May 2001. In 2016, he became the chair of the ICNIRP-commission. Since the beginning May 2020 he is no longer chair but vice-chair.

He also a member of the International Advisory Committee WHO EMF Project since 1995.

Van Rongen [did not publish](#) original research studies on EMF himself, only opinions or review articles.

Position

Van Rongen systematically, in scientific publications and in press articles, defends for more than twenty years the point of view that there are no dangers associated with the use of mobile phones. According to him, even for children there are no reasons to apply the precautionary principle. In 2004 for example he published [an article](#) in which he stated: 'The Health Council therefore sees no reason to recommend limiting the use of mobile phones by children.'

He systematically criticizes all studies that seem to show that non-ionizing radiation poses a problem. Recently the National Toxicologic Program (NTP) study on Cell Phone Radio Frequency [concluded](#) that there was clear evidence of tumors in the hearts of male rats. But in an ICNIRP-publication Van Rongen and others [stated](#) that 'substantial limitations (of the NTP-study) preclude conclusions being drawn concerning RF EMFs and carcinogenesis.'

Possible conflicts of interest

The WHO EMF project was severely [criticized](#) in 2007 for being for a large part financed by the telecom industry, for example by the Mobile Manufacturers Forum (now [Mobile & Wireless Forum](#)), a lobby organisation of the industry.

Since 2000 Van Rongen is a member of the International Committee on Electromagnetic Safety (ICES) of the IEEE. This committee is dominated by people from industry and military. The ICES chairman Jafar Keshvari works at Intel, the chairman of one of the main committees C.K Chou at Motorola. ICES clearly is an industry lobby and standard setting organisation. Maybe Van Rongen decided for that reason to become a 'non active member' according to his [declaration of personal interests 2019](#).

In previous years there was some competition between ICNIRP and ICES/ IEEE – at the time when the chair of ICES was still Dr. Ralf Bodemann, topshot of Siemens and Dr. B Jon Klauenberg from US Air Force Research Laboratory was the chair of ICES working group TC95. (Klauenberg was the US counterpart of former ICNIRP-chair Repacholi [to lead the very start of the WHO EMF](#) in the 90'ies.) According to [an annual report of ICES](#) it was thanks to the arrival in 2016 of Van Rongen as chair of ICNIRP that the relations with ICES improved significantly, as they were not so cordial before: "In May 2016, there was a change of leadership and some members of ICNIRP. The new ICNIRP Chairman and one of the new members of the 14-member committee are also ICES members and ICNIRP is now willing to discuss harmonization of the exposure limits found in IEEE Stds C95.1 TM -2005 and C95.6 TM -2002 and the ICNIRP Guidelines."

The ICES annual report further mentions that thanks to the invitation to do so by Van Rongen, ICES has been able to comment on the proposed new guidelines by ICNIRP. ICES workgroup TC95 formed a 19-member task group to draft a document to comment on the ICNIRP proposed guidelines on time. "ICES will maintain its collaborative relationship with ICNIRP with the goal of setting internationally harmonized safety limits for exposure to electromagnetic fields at frequencies below 300 GHz. This interaction with ICNIRP is considered a major step forward."

A year later [during the annual meeting of ICES](#) in 2017 it was stated that “ICNIRP has delayed finalizing their conclusions to give full consideration of ICES’s recommendations”. And Van Rongen gave a presentation saying that there is “No evidence that HF-EMF causes such diseases as cancer, no evidence that HF-EMF impairs health beyond effects that are due to established mechanisms of interaction.”

Scientist Dariusz Leszczynski was a member of TC95, but resigned. He explained why on [his blog](#): “My problem was that the membership of the IEEE-ICES-TC95 consists predominantly of the industrial scientists and the committee is chaired by C.K. Chou since the time he was employed by the Motorola. This means that all safety standards being developed by IEEE-ICES-TC95 are, in practice, developed by the industry scientists for the use by the industry they are employed by.” According to Leszczynski this is a clear conflict of interests.

The latest [minutes](#) of TC95 that ICES published on its website (August 2019) show that the committee is still dominated by industry scientists.

In October 2019 Van Rongen [spoke](#) at the GSMA Europe EMF Forum. The GSM Association is a lobby organisation that defends the interests of mobile operators worldwide. In 2018, he also was a guest at the Forum. Then he [defended](#) ideas that GSMA received with pleasure: "The ICNIRP limits provide a high level of protection for all people against known adverse health effects. Dr van Rongen explained that there is no scientifically substantiated evidence that radio signals cause diseases such as cancer and that ICNIRP had considered studies such as that of the American National Toxicology Program."

In November 2019 Van Rongen [presented](#) the “ICNIRP RF guidelines revision” at 23rd GLORE (Global Coordination of Research and Health Policy on RF Electromagnetic Fields) conference held on 4th – 6th of November in Lima, Peru. GLORE is an initiative to coordinate research and policy initiated by Japan and Korea in 1997 and joined by Europe and then by USA, Australia and Canada. Main speakers were also his ICES-colleagues Jafar Keshvari and TC95 Chairman C-K. Chou.

Van Rongen recently [assured](#) the Dutch press that there are no conflicts of interest inside ICNIRP right now. He stated: 'In the past certain members maybe received co-funding from the private sector, but currently no member has ties with the telecom sector.'

Of course, it depends on what you consider as a 'tie with industry', but his own involvement in ICES is already shows that it is not true that 'currently no member had ties with the telecom sector'. He also published articles together with researchers who did receive industry funding, for example with Bernard Veyret, who is 'a member of the Scientific Council of the French mobile operator Bouygues Telecom. His laboratory has received research funds from the same operator.' This information can be found in the footnotes of [this article](#).

Tania Cestari

Biography

Tania Cestari received her medical degree from the University of Rio Grande do Sul and completed her medical Residency in Dermatology in Porto Alegre, Brazil and since 1995 she works as Professor of Dermatology at the same university, where she studies predominantly on clinical aspects and skin response. Dr Cestari has authored 112 scientific peer-reviewed publications, 42 book chapters and joined the ICNIRP Commission in May 2020.

Position

Dr Cestari has been doing mainly research into skin allergies and dermatological problems; We could not find any publication linked to EMF.

Possible conflicts of interest

In her 'Declaration of Interests' it is mentioned that she received research grants via the Medical Foundation of her hospital from Pfizer, Abbvie Pharmaceutical and Vichy Laboratoires for drug research.

Nigel Cridland

Biography

Nigel Cridland is Senior Group Leader at Public Health England. He joined what was to become the Public Health England (PHE) already in 1990, where he specialised in non-ionising radiation. He was member of the project team that wrote the European Commission guide to implementation of the Artificial Optical Radiation Directive (2006) and leader of the project team that developed the guide to implementation of the EMF Directive (2013).

He was Scientific Co-ordinator Mobile Telecommunications and Health Research (MTHR) Programme 2001 - 2012. Cridland was a member of the Independent Expert Group on Mobile Phones (2000). On [LinkedIn](#) he states that he was also member of the management committee of the European COST 281 action Potential Health Implications from Mobile Communications Systems.

Position

The [2000-report](#) of the Independent Expert Group on Mobile Phones stated that 'the balance of evidence to date suggests that exposures to RF radiation below NRPB and ICNIRP guidelines do not cause adverse health effects to the general population'. But at the same time, it said: "the gaps in knowledge are sufficient to justify a precautionary approach".

The MTHR-programme (2001-2012) of which he was the Scientific Co-ordinator [concluded](#) that no association between cancer and mobile phone use was found. We can now be, said

professor David Coggon, the chairman of the MTHR-programme, 'be much more confident about the safety of modern telecommunications systems.' Curiously enough the authors stated that: 'We see no need for need for further research in any of the areas addressed by the research that is summarised in this report.'

Possible conflicts of interest

The MTHR-programme was funded by government and industry together, both for half of it. The final report states that to ensure that any of the funding organisation could not influence the outcome of the Programme an independent Programme Management Committee was set up. But there can be doubts about the independence of its members. From 2001 until 2007 Mike Repacholi (ICNIRP-founder, see the chapter on the history of ICNIRP) was for example member of the committee.

Guglielmo d'Inzeo

Biography

On ICNIRP's website it reads that Guglielmo d'Inzeo is a Professor of "Bioelectromagnetic Interaction" at "La Sapienza" University of Rome since 1990. He researched active and passive microwave component design and bioelectromagnetism, mainly the interaction of electromagnetic fields with biological tissues, the effects of microwaves and ELF fields on biological samples and humans. He is author or co-author of more than seventy papers in international refereed journals and books.

He became a member of the European Bioelectromagnetics Association EBEA in 1989, and then President from 1993 to 1998. From 1992 to 2000 he was an Italian representative for the [COST 244 and 244Bis projects](#) on "Biomedical Effects of Electromagnetic Fields". From 1998 to 2004 he chaired the Italian ICEmB (Inter-University Centre Electromagnetic Fields and Biosystems). From 2001 to 2006 he was an Italian National representative in COST 281 project "Potential Health Effects from Emerging Wireless Communication Systems" and from 2007 in COST BM0704 related project.

Position

He has been active in the IEEE since the 80'ies, served as secretary-treasurer of 'the IEEE Middle and South chapters' and was from 2004 to 2009, also a member of the Technical Committee 95 (TC95) of IEEE International Committee on Electromagnetic Safety (ICES), of which Eric Van Rongen and Rodney Croft are also members. He published in the past 20 years [a number of studies in IEEE Transactions on Biomedical Engineering](#) and other IEEE publications, in which several times ICNIRP-founder Mike Repacholi was heartily thanked for his help.

In 2005 he was responsible for the Italian chapter of [the report "European Information System on Electromagnetic Fields Exposure and Health Impacts"](#) published on behalf of DG SANCO (European Commission), which was coordinated by the Joint research Centre (JRC of the EU); Alongside this project the "JRC developed during 2003-2004 the EIS-EMF project on behalf of DG SANCO with the overall objective of promoting cooperation among policy makers on public health and EMF risk communication issues in the EU". What these projects basically reflect is the idea that concerns about possible health effect occur because people

do not understand the issue well enough and that the concerns can be taken away by better communication.

Possible conflicts of interest

As we stated before (see Van Rongen and Croft), ICES is dominated by people from industry and military.

His declaration of personal interest 2019 is signed but only partly completed. d'Inzeo did some paid consultancy for an Italian legal office called Trifirò & Partners and for a Environmental Measurement Report Managers & Partners - Actuarial Services S.p.A in Rome. His [DOI from 2016](#) mentions that he has been doing work for the "[Marconi Foundation](#)". The Guglielmo Marconi Foundation states to "promote research in the field of telecommunications and carries out activities devoted to the knowledge and diffusion of Guglielmo Marconi's scientific activity". The Marconi Foundation further states that "professional training and teaching play a major role" in its activities and that "their research focuses on two major fields: 1) mobile and personal communication systems, with a special focus on radio access and propagation; and 2) the computer-assisted design of non-linear microwave devices".

What is not declared in his DOI is that d'Inzeo, is [a director of the scientific committee of Elettra 2000, a consortium](#) of Marconi and other foundations. The self-declared aim of Elettra 2000 is to "spread knowledge of Bioelectromagnetics and start a dialogue between science, politics, industry and citizens, involving young people and schools." And "Elettra 2000 promotes researches and studies related to specific areas of interest. In particular, the consortium co-finances a number of national and international projects devoted to the study of the effects of electromagnetic fields on human health, in order to provide an authoritative scientific answer, fair and independent to the problem."

Elettra 2000 provides "[advice to enterprises](#)" and "owns a modern fleet of instruments for measuring electromagnetic fields in both low and high frequency" which "are available to both institutional and private entities in order to promote the improvement of standards of protection and safety of people and environment."

This paper from 2008 ([The Italian national electromagnetic field monitoring network](#)) is an example of the kind of research projects that is financing. The conclusions reads: "The monitoring campaign, combined with the travelling communication campaign contributed to create a different and more constructive approach to the problem by the citizens. This is demonstrated by the analysis of the data press that shows criticality and greater negative involvement in those areas where the monitoring campaign has been less efficient or less intense".

Furthermore, in 2019 an Italian journalist of Investigative Europe wrote the following in // *Fatto*: "He has done multiplied scientific opinions for companies such as Vodafone, participated in European projects - all funded by industry, such as Interphone, Cosmos, Cefalo, and since the late 90s participates in the Efran portal, where among the financiers are Deutsche Telecom and the European Association of GSM producers."

Akimasa Hirata

Biography

Akimasa Hirata is professor of Electrical and Electronic Engineering at the Nagoya Institute of Technology and Director of Center of Biomedical Physics and Information Technology.

He also is an Administrative Committee Member and [Subcommittee Chairperson](#) (SC6 EMF Dosimetry Modelling) in IEEE International Committee on Electromagnetic Safety (ICES). The latest committee (also called TC95) is the one of which Eric Van Rongen and Rodney Croft were also members.

Position

In November 2019 TC95 once again came to conclusion that the IEEE standards are safe. The authors, among which Hirata, [wrote](#):

“a) The weight-of-evidence provides no credible indication of adverse effects caused by chronic exposures below levels specified in IEEE Std C95.1TM-2019.

b) No biophysical mechanisms have been scientifically validated that would link chronic exposures below levels specified in IEEE Std C95.1TM-2019 to adverse health effects.”

Possible conflicts of interest

As we stated before (see Van Rongen and Croft), ICES is dominated by people from industry and military.

Hirata conducted research [published](#) in *IEEE Transaction* in 2010 partly funded by KDDI Foundation. KDDI Corporation is a Japanese telecommunications operator.

But according to [a recent publication](#) Hirata himself judges that he has no conflicting interests.

Anke Huss

Biography

ICNIRP’s website states that Anke Huss is an assistant professor at the [Institute for Risk Assessment Sciences](#) (IRAS) at Utrecht University, the Netherlands. “Her research focuses on environmental and occupational exposure assessment to environmental factors including electromagnetic fields and their health”.

Huss is also involved in the GERoNiMO project, cancer and neurodegenerative diseases such as Parkinson’s disease, Alzheimer’s or ALS in the NOCCA (Nordic Occupational Cancer Study) and SNC (Swiss National Cohort) studies and on electromagnetic hypersensitivity. She is a

member of the Dutch Health council, and the Scientific Council for Electromagnetic fields of the Swedish Radiation Safety Authority (SSM).

Position

She is one of the rare members of ICNIRP who seems to be aware of an industry-bias; In the book "[Overpowered: The Dangers of Electromagnetic Radiation \(EMF\) and What You Can do about it](#)" by Martin Blank, Anke Huss is quoted on Industry bias in research to the possible health risks of EMF.

In a scientific paper Huss writes that 82% of the research funded by public agencies or governments and 71% of the research jointly funded by industry and public sources, report health effects from RF exposure. When the research is solely funded by industry only 33% finds such a link.

[Later Huss published another study](#) in which she and colleagues examined whether the source of funding of 59 studies of the effects of low-level RF radiation has an effect on the results of studies. "Of these 59 studies, 12 (20%) were funded exclusively by the telecommunications industry, 11 (19%) were funded by public agencies or charities, 14 (24%) had mixed funding (including industry), and in 22 (37%) the source of funding was not reported." Huss et al conclude that "there is widespread concern regarding the possible health effects associated with the use of cellular phones, mobile telephone base stations, or broadcasting transmitters. Most (68%) of the studies assessed here reported biologic effects. At present, it is unclear whether these biologic effects translate into relevant health hazards. Reports from national and international bodies have recently concluded that further research efforts are needed, and dedicated research programs have been set up in the United States, Germany, Denmark, Hungary, Switzerland, and Japan. Our study indicates that the interpretation of the results from existing and future studies of the health effects of radiofrequency radiation should take sponsorship into account."

In 2010, she published [a follow up study](#) which confirmed the previous findings: "Of 75 additional studies 12% were industry-funded, 44% had public and 19% mixed funding; funding was unclear in 25%. Previous findings were confirmed: industry-sponsored studies were least likely to report results suggesting effects.

She also published in 2018 [a meta-analysis](#) based on among others epidemiologic studies "to examine associations of occupational exposure to extremely-low frequency magnetic fields (ELF-MF)" with amyotrophic lateral sclerosis (ALS).

Possible conflicts of Interests

Her DOI says she gets funding from US based EPRI for a study called TransExpo on leukaemia in children. Ironically, she states that the contract does not mention complete independence from the funder, but she explains clearly why the data will be analysed independently and "that there is no way that the funders can have an influence on what we report to them."

Ken Karipidis

Biography

Ken Karipidis has been working as a scientist at the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) since 2000. He is, states ICNIRP, 'currently the assistant director of the Assessment and Advice Section at ARPANSA where he is heavily involved in the scientific and regulatory aspects of radiation protection from electromagnetic radiation sources.'

He is member of the Scientific Expert Group since August 2015. In May 2020, he became member of the ICNIRP Commission.

Position

In 2017 Karipidis published [an article](#) with the conclusion that the exposure to radiofrequency radiation due to Wi-Fi in schools was very low. In [a letter](#) to the editor three scientists criticized the study as 'of little practical use' and 'misleading'.

Karipidis and Rodney Croft were part of a subcommittee established by ARPANSA to look at EHS and the research in 2016/17. According to an ORSAA member present in these meetings both Karipidis and Croft ignored clinical/medical evidence "in favour of poorly conducted provocation studies performed by psychologists, some of whom were funded by industry".

At the end of 2018 Karipidis together with among others Rodney Croft published [a study](#) that claimed to prove that in Australia there has been no increase in any brain tumour that can be attributed to mobile phones. That study received a lot of [criticism](#) because it excluded the group of people above sixty, which is the largest segment of the population with brain tumours.

In August 2019 Karipidis advised 40,000 Australian doctors or general practitioners [via an article](#) on the website of Royal Australian College of General Practitioners (RACGP) in which he wanted "GPs and their patients to know there is no evidence to support the concern that 5G technology, which uses radio waves and emits low-level [radiofrequency \(RF\) electromagnetic energy \(EME\)](#), will cause harms to the public". He stated: "There's been a lot of research into whether radio waves cause adverse health effects, and the only established health effects of radio waves are very high-power levels, where they raise temperature. An everyday example of that is your microwave oven at home; inside the microwave is very powerful radio waves which make the water molecules in the food bounce very fast, heating them up."

Possible conflicts of interest

In the introductory chapter, we wrote about the financial relationship between ARPANSA and the telecom industry. ARPANSA every year has a meeting with the Australian Telecommunications Association (AMTA), a lobby-organisation of the telecom industry. [Minutes](#) of this meeting made public after a Freedom of Information Request show that the funding of research was also on the agenda. 'Industry remains supportive of continued funding,' it says.

Carmela Marino

Biography

Carmela Marino studied Biological sciences in Faculty of Sciences of "La Sapienza" University of Rome. According to ICNIRP she is currently Head of the Unit of Radiation Biology and Human Health, at Casaccia Research Center of Italian Agency for New Technologies, Energy and Sustainable Economic Development (ENEA).

On behalf of ENEA she coordinated the research activity Subprogram 3 *Interaction between sources and biosystems* (MURST/ENEA-CNR Italian National Program "*Human and Environmental Protection from Electromagnetic Emissions*") and was involved in several projects of the 5° and 6°FP, as member of steering Committee and Coordinator of research unit.

Position

On the one hand Marino seems to agree with the official ICNIRP position; On the other hand In May 2012, during ICNIRP's 7th International NIR Workshop in Edinburgh, [Marino held a lecture](#) on the advantages, challenges and limits of experimental studies, in which she said that there is a "large number of studies but with controversial results and also a limited number of studies in relation to particular endpoints." Marino asked her fellow ICNIRP members the rhetorical question, whether these studies "really able to give conclusive information?" ICNIRP's answer to that question was and is no.

Possible conflicts of interest

Her Declaration of Personal Interests does not mention anything. Notably, not that since April 2020 her university [holds a patent based on her research](#), not mentioned in her DOI 2019, although the worldwide application for this patent was filed years ago.

Sharon Miller

Biography

Sharon Miller works at the Food and Drug Administration (FDA) as optical engineer since 1981. According to ICNIRP she served on numerous committees of the International Commission on Illumination (CIE) and the International Organisation for Standardization (ISO).

Position

Miller publications are mainly in the field of ultraviolet radiation and optical issues. It is difficult to find scientific publications or public statements in which she says anything about the safety of non-ionizing radiation.

Possible conflicts of interest

In her Declaration of Personal Interest Miller does not state any possible conflict of interest and we did not find any.

Gunnhild Oftedal

Biography

Gunnhild Oftedal is associate professor at the Norwegian University of Science and Technology (NTNU). According to ICNIRP she is currently, working as Research Co-ordinator at the Faculty of Information Technology and Electrical Engineering, NTNU. “From the early 1990s, she has been involved in research on health effects of EMF in the ELF and the RF ranges, mainly with experimental human studies and observational studies.

She is member of international organisations in the field of non-ionising radiation and participates in the work of WHO (Environmental Health Criteria project) on the health risk assessment on RF fields.”

She was one of [the experts](#) on a government-commissioned study, published in 2012, of possible health risks with radiation from mobile phones, base stations and wireless networks in Norway.

Position

In 2004 [she answered](#) on the questions if electromagnetic radiation from mobile phones may well affect us in other ways, too “that scientists are skating on thin ice when discussing these issues. They know little about the cause-and-effect mechanisms involved, and hence cannot eliminate the possibility that the effect of electromagnetic fields, however weak in mobile phones, may cause health problems”.

But she sticks with the official ICNIRP position and [in a study](#) for the Norwegian government she suggests that this approach is the right one: “Only effects for which there was reliable scientific evidence were used (by ICNIRP) as the basis for the exposure restrictions.”

In another [recent study](#) she concludes that “overall, the evidence points towards no effect of exposure. If physical effects exist, previous findings suggest that they must be very weak or affect only few individuals with IEI-EMF. Given the evidence that the nocebo effect or medical/mental disorders may explain the symptoms in many individuals with IEI-EMF, additional research is required to identify the various factors that may be important for developing IEI-EMF and for provoking the symptoms.”

As [writes Leszczynski](#) the ‘nocebo’ hypothesis argues that people first become aware, e.g. from news and social media, of the possible health risks of EMF-emitting devices and then worries about the possible health risk lead to develop symptoms, which they attribute to EMF exposures.

Oftedal [denies in an article by IE](#) that the health debate is polarised: “In our field it is easy to put people in two camps, but the landscape is much more nuanced”. Also, the closed culture

at ICNIRP is being denied: “People who demonstrate that they are skilled are asked to contribute.”

Possible conflicts of interest

In the study on “Mobile phone headache: a double blind, sham-controlled provocation study” co-financed by The Research Council of Norway, Norwegian Post and Telecommunication Authority, Statnett, Telenor, Norsk tele- og informasjonsbrukerforening (NORTIB), Netcom. The study found no effects.

She is member of Bioelectromagnetics society (BEMS) according to the DOI and also of the European Bioelectromagnetics Association (EBEA)

Tsutomu Okuno

Biography

Tsutomu Okuno worked for the National Institute of Occupational Safety and Health, Japan from 1980 to 2015.

He became a member of the Scientific Expert Group in 2013 and is a member of the ICNIRP Commission since 2016.

Position

Okuno was one of the authors of the ICNIRP [note](#) that criticized the NTP-study that showed carcinogenicity in rats. For the rest, his work seems mainly to be on ultraviolet radiation, not on radiofrequency radiation.

Possible conflicts of interest

In his Declaration of Personal Interest there do not seem to be sources of possible conflicts of interest and we did not find information that contradicts this.

Martin Rössli

Martin Rössli is Professor for environmental epidemiology at [the Swiss Tropical- and Public Health Institute](#) in Basel and leads the Environmental Exposures and Health Unit. His background is situated in atmospheric physics and environmental epidemiology.

In the field of non-ionizing radiation Rössli did several exposure assessments and epidemiological studies on the health effects of electromagnetic fields “including population based studies dealing with cancer, neurodegenerative diseases and non-specific symptoms of ill health”.

He is the chair of [BERENIS](#), a Swiss expert group advising the government on electromagnetic fields and non-ionising radiation. He is a member of the advisory group of Cohort Study of Mobile Phone Use and Health ([COSMOS](#)) and between 2015 and 2018 of the [the Scientific](#)

[Council of the IARC](#), specifically [SC52](#). Since 2013 he is also a Member of the Editorial Board of Bioelectromagnetics.

He is still a member of the Expert Group for the Swedish Radiation Safety Authority (SSM), for which he gets 3000 Swiss francs yearly.

Relevant to this report Rösli was part of the Working Group of the IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 102: Non-Ionizing Radiation, Part II: Radiofrequency Electromagnetic Fields.

Position

Rösli has contributed to a study (see portrait of Anke Huss) which show that the funding of scientific research into EMF can influence the findings. Nevertheless, he confirms the general position of ICNIRP that no adverse health effects are proven.

In a [study](#) from 2010 (“Systematic review on the health effects of exposure to radiofrequency electromagnetic fields from mobile phone base stations”) Rösli concludes: “Our review does not indicate an association between any health outcome and radiofrequency electromagnetic field exposure from MPBSs at levels typically encountered in people’s everyday environment.”

In a recent [5G report for the Swiss government](#) Rösli et al conclude that “No health effect has been consistently proven,” which he repeated [in an interview](#).

In an [annual report prepared for the Swedish Radiation Safety Authority](#) (April 2020) by a nine-member panel of experts of which, ICNIRP vice-chair Eric Van Rongen and Rösli, which [according to MicroWave News](#) is published each year “as an annual update with the past year’s most important scientific developments on the health effects of EMFs and RF radiation” states very bluntly that “no new established causal relationships between EMF exposure and health risks have been identified.” The annual report simply does not mention the NTP report. “The two ICNIRP members and their seven colleagues made believe that the NTP report does not exist. It’s not mentioned, there is no citation. Nothing at all. For the record, the NTP final report was released on November 1, 2018.”

Louis Slesin of *MicroWave News* wrote: “There is a discussion of the NTP findings in last year’s Swedish update. But that was based on an earlier NTP draft where the staff had opted for a weaker designation, “some evidence” of cancer. Later, after an in-depth [public peer review](#), the NTP strengthened the conclusion to “clear evidence” of cancer. That was the headline news of 2018. “Clear evidence” was a game changer; leaving it out of the annual update is a sure sign of bias. The NTP conclusion was now qualitatively different from the earlier draft —it could well have been the title of the panel’s 2018 update. But van Rongen, Rösli and the others ignored it.”

On January 7, 2020 prof. Lennart Hardell and supported by 22 scientists researching EMF [wrote a remarkably critical, open letter](#) to Mrs. Simonetta Sommaruga, President of the Swiss Confederation, in which they conclude: “It is imperative that the chair and other experts evaluating scientific evidence and assessing health risks from RF radiation do not have such clear conflicts of interests or bias as Martin Rösli has. Indeed, being a member of ICNIRP and being funded by industry directly or through an industry funded foundation, constitutes clear conflicts of interest. Furthermore, it is recommended that the

interpretation of results from studies of health effects of radiofrequency radiation should take sponsorship from telecom industry into account.”

The group of scientists also point out to a strange contradiction in the positioning of Rösli: “Surprisingly [the IARC classification from 2011](#) of RF-EMF exposure as class 2B, ‘possibly’ carcinogenic to humans, was ignored in the background material to the new ICNIRP draft on guidelines. Remarkably one of the ICNIRP commission members, Martin Rösli, was also one of the IARC experts evaluating the scientific RF carcinogenicity in May 2011. Rösli did not abstain from the IARC Group 2B classification and should be well aware of that decision, but seems now to neglect that fact being an ICNIRP member. That may be due to the fact that the IARC classification contradicts the scientific basis for the ICNIRP guidelines.”

Hardell et al. suggest to the Swiss government that Mr. Martin Rösli should be released from his duties as a scientist who is not objective and has substantial conflicts of interest. On the letter Rösli reacted by saying: "It's not a scientific letter. It sounds like activists who do not use scientific facts but who just attack people. It would be much more compelling if Lennart responded to my criticism of him in a scientific way instead of derailing the debate”.

A recent [publication](#) of the COSMOS (October 2019) on the outcomes states reassuringly that “using mobile phones most extensively for making or receiving calls at baseline reported weekly headaches slightly more frequently at follow-up than other users, but this finding largely disappeared after adjustment for confounders and was not related to call-time in GSM with higher RF-EMF exposure. (See also the portrait of Anissi Auvinen)

Possible conflicts of interests

Rösli does “unpaid work” for the COSMOS study, which received considerable funding from telecom companies. In the 2019-publication on this study for example, Nokia and mobile network providers TeliaSonera and Elisa are mentioned in the category ‘funding’.

According to his DOI he gets 70,000 Swiss francs a year for the Berenis work, from the Federal Office for the Environment.

He also received 16,000 francs for assisting in the [Working Group Mobile Phone and Radiation](#) the Federal Office for the Environment of the Swiss government.

The Swiss Tropical and Public Health Institute in which he plays a leading role, has [a lot of corporate clients](#) of which Swisscom, the biggest telecom company in Switzerland, of which [the Swiss government holds 51% of the shares](#). In the [annual Report 2019](#) the institute states that of the total budget of roughly 90 million Swiss francs, 78.6 % was “competitively acquired” and 21.4 % came from “Core contributions”.

Studies selected or self-directed by Rösli, were directly funded by the ([Research Foundation for Electricity and Mobile Communication](#))

of which [Martin Rösli is a member](#) since 2011, according to his CV on the website of the Swiss Tropical and Public Health Institute. FSM is “a non-profit-making foundation with the purpose of promoting scientific research into the chances and risks of radio and electric power technologies that produce and use electromagnetic fields”. The [five founders of the FSM](#) are:

ETH Zurich, Swisscom, Salt, Sunrise, 3G Mobile (liquidated in 2011) and the current main sponsors are Swisscom and Swissgrid. The sponsors are also represented in the FSM Foundation Board with one delegate out of seven.

Soichi Watanabe

Biography

Watanabe is currently Director of the Electromagnetic Compatibility Laboratory of the “National Institute of Information and Communications Technology (NICT).

He was a member of ICNIRP Standing Committee III since 2004 and is a member of the Commission since 2012.

He is a guest lecturer of several universities and at the Central Research Institute of Electric Power Industry.

Position

All publications to which Watanabe contributed as author point in the same direction: no effect. For example, [this article](#) about tumorigenesis in rats.

In 2019, he was co-author of [an article](#) which stated: ‘To date, no adverse health effects of the EMF, linked to these applications, have been established.’

Possible conflicts of interest

As a guest lecturer at the Central Research Institute of Electric Power Industry he receives a small amount (about € 450 for each lecture, 1 or 2 a year).

He was co-author of the article with commission-member Hirata on the research funded partly by KDDI Foundation.

MEMBERS WHO HAVE LEFT THE ICNIRP COMMISSION IN MAY 2020

Maria Feychting

Biography

Maria Feychting is a Professor of Epidemiology at the Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden.

She joined the Commission in 2008 and was elected vice chair in 2012. She left the Commission in May 2020.

Position

Feychting was in charge of the Swedish part of the Interphone study which concluded that there was no link between brain tumours and mobile phone use.

Feychting also conducted the Swedish part of the COSMOS-study, which in 2011 came to the conclusion that there was no increase in glioma in the Nordic countries that could be attributed to the use of mobile phones.

She recently repeated this point of view in [the media](#) in an article on the risks of 5G, which were none according to her.

According to [this source](#) she criticized the NTP-study on false grounds.

Possible conflicts of interest.

In a 2019 [study](#) in the context of COSMOS, she declared a declaration of interest as “vice chairman of the ICNIRP”.

The telecom industry contributed [€ 5.5 billion](#) to the funding (total € 19.2 billion) of the Interphone Study.

A 2016 [publication](#) on the Interphone Study once again mentioned industry funding by among other the Mobile Manufacturers Forum.

The Swedish part of the COSMOS-study was [partly funded](#) by the telecom industry: TeliaSonera, Telenor and Ericsson. In [her Declaration of Interests](#) for 2015 she declares that her Institute received a grant from industry sources which constituted “no more than 4% of her unit of epidemiology total income.”

A 2011 [study](#) was partly funded by the Swiss Research Foundation on Mobile Communication, an [organisation](#) which is founded and funded by the telecom industry.

A 2012 [study](#) was funded by the Electric Power Research Institute (EPRI), an organisation funded by industry.

She did not mention these sources of funding in her [Declarations of Personal Interest](#).

Adèle Green

Biography

Green is an Australian epidemiological scientist at the Queensland Institute of Medical Research, Australia and is the institute's Head of Cancer and Population Studies Group. She specialised in UV and skin cancer causation, [harmful effects of UVR exposure in childhood](#) and the prevention of melanoma. Apart from various Australian research bodies, she was also member of many committees at the International Agency for Research on Cancer (IARC) and contributed to [the IARC monograph](#) that led to classification in

Position

Although she focussed mostly on UV radiation, Green seemed to agree with her ICNIRP colleagues on the ICNIRP position, for example [in this study](#) from 2005 where Green was first author the research did not find any consistent or biologically relevant effect of specific radiation on cells. And another study from 2009 [Epidemiologic Evidence on Mobile Phones and Tumor Risk](#), concludes by saying that “In the last few years, the epidemiologic evidence on mobile phone use and risk of brain and other tumors of the head has grown considerably. In our opinion, overall the studies published to date do not demonstrate a raised risk within approximately 10 years of use for any tumor of the brain or any other head tumor.” And despite certain methodologic shortcomings and limited data on long-term use, “the available data do not suggest a causal association between mobile phone use and fast-growing tumors such as malignant glioma in adults, at least those tumors with short induction periods.”

Conflicts of Interests

The declarations of interests of Dr Green have disappeared from the ICNIRP’s website. The IARC Monograph mentions that Dr Green received “research funds (not exceeding 5% of total research support) from L’Oréal which makes products intended to reduce the dose from solar radiation.”

Zenon Sienkiewicz

Biography

Sienkiewicz worked until his retirement in 2018 for Public Health England. There he led a research group that investigates the effects of ionizing and non-ionizing radiation. Since 2011 he has been a member of ICNIRP. He was also external expert for the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) report on ‘Potential health effects of exposure to electromagnetic fields (EMF)’, adopted in January 2015.

Position

Sienkiewicz systematically defends the position that there is no proof for any harm caused by non-ionizing radiation. In 2002, he said in the media: "The bottom line is there are no known mechanisms by which mobile phone radiation can increase the risk of cancer." Fifteen years later he still holds exactly the same position. In a 2017-[article](#) he stated that all the extensive research done has ‘not identified any public health risks with any degree of certainty.’ Moreover, it concluded that ‘animal studies investigating the carcinogenic potential of exposure to multiple RF frequencies should not be given a high priority for research at this time.’

Possible conflicts of interest

A remarkable fact in his latest [Declaration of Personal Interests](#) is that he has shares in telecommunications multinational BT Group, one of the largest telecommunications companies in the world from 2003 to the present day. The gain is very little: about 100

pounds a year. But still: if you want to avoid the impression of conflicts of interest buying shares in a telecom company doesn't seem to be a wise decision.

He himself acknowledges this is a potential conflict of interest. Under [an article](#) published in 2017 the 'Statement on the Conflict of Interest' is: The authors declare that this work was conducted in the absence of any commercial or financial relationships that could be constructed as a potential conflict of interest, *except Sienkiewicz declares that he has owned 440 ordinary shares in BT Group, a communication services company.*'

In his [2015 Declarations of Interests](#) he declares to have done since 2012 "Provision of research and scientific advice to UK government and other stakeholders". It is not specified who those other stakeholders were, but it can be assumed those were not civil society groups.

Also since 2009, he has been a consultant to the Rapid Response Group at the Japan EMF Information Center, which is funded by "Japan Electrical Safety & Environment Technology Laboratories, where he conducts reviews and analyses of recently published scientific studies

He was between 2001 and 2012 [member](#) of the Mobile Telecommunications Health Research (MTHR)-programme. The programme did not find any association between exposure to mobile telephone communication and an increased risk of developing cancer. In the final report of the programme we read that that the core funding was provided in approximately equal share by government and industry. He systematically defends the point of view that there are no health risks associated with non-ionizing radiation. He was co-author of the 2019 article which criticized the NTP-study.

SCIENTIFIC EXPERT GROUP

Jacques Abramowicz

Biography

Jacques Abramowicz is Professor of Obstetrics and Gynecology and the Director of the Ultrasound Services at the University of Chicago.

He is a member of the Scientific Expert Group since May 2016.

Position

Abramowicz is, says his personal page at Chicago University, "an expert in the use of ultrasound for prenatal diagnosis of foetal anomalies and screening for early detection of ovarian cancer."

As far as we could find out, he did not perform research into the health effects of mobile phone radiation.

Possible Conflicts of Interest

In his declaration of personal interests Abramowicz doesn't mention possible conflicts of interest and we did not find information that contradicts this.

Anssi Auvinen

Biography

Auvinen is currently a professor of Epidemiology at the School of Health Sciences, University of Tampere in Finland. He is a member of ICNIRP's Scientific Expert Group since 2013. He was also external expert for the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) report on 'Potential health effects of exposure to electromagnetic fields (EMF)', adopted in January 2015.

Position

In harmony with all ICNIRP-members Auvinen criticizes research that seems to show an association between health problems and mobile phone use. Although there have been individual reports of associations between MP-use and tumours, this research is not consistent and on balance does not provide evidence of an association,' he and his co-authors [wrote](#) in 2008. His own research systematically shows no association between health problems and non-ionizing radiation.

Auvinen participated in the Finish Cohort Study of Mobile Phone Use and Health (COSMOS). A recent [publication](#) (October 2019) on the outcomes states reassuringly that "using mobile phones most extensively for making or receiving calls at baseline reported weekly headaches slightly more frequently at follow-up than other users, but this finding largely disappeared after adjustment for confounders and was not related to call-time in GSM with higher RF-EMF exposure. Tinnitus and hearing loss were not associated with amount of call-time." In another [publication](#) on the COSMOS-outcomes (April 2020) an association between sleep quality and mobile phone use is also not found.

Possible conflicts of interest

In his [Declaration of Interests](#) he submitted to ICNIRP he states that he in 2014 and 2015 received research € 100,000 funding from the [Mobile Manufacturers Forum](#), an international organization founded in 1998 by leading manufacturers of mobile phones and radio equipment, such as Alcatel, Ericsson, Mitsubishi Electric, Motorola, Nokia, Panasonic, Philips, Sagem, Samsung, Siemens and Sony Ericsson.

The funding was for the COSMOS-study. In the 2019-publication on this study Nokia and mobile network providers TeliaSonera and Elisa are mentioned in the category 'funding'.

Another [recent article](#) states that Auvinen received 'consulting fees from Epid Research Inc.' According to his Declaration of Interest he received a fee of € 1000 in 2015 and 2017. Not in

his declaration of interest is that he received lecture fees from pharmaceutical companies Glaxo Smith Kline and MSD. Maybe one can argue that these companies do not operate in the field of non-ionizing radiation. But to avoid conflicts of interests it seems wise to be transparent about all fees and funding received from industry.

Christian Cajochen

Biography

ICNIRP's website states that Cajochen studied natural sciences followed by a 3-y postdoctoral stay at the Harvard Medical School in Boston, USA. He leads the Centre for Chronobiology at the University of Basel and focusses on the influence of light on human cognition, circadian rhythms and sleep, circadian related disturbances in psychiatric disorders, and age-related changes in the circadian regulation of sleep and neurobehavioral performance.

He serves as associate editor for established sleep-related scientific journals and is editor in chief for "Clocks&Sleep".

He started as a member of the Scientific Expert Group (SEG) in May 2018.

Position

As stated Cajochen focusses on the influence of lights and far as we could find out, he did not perform research into the health effects of mobile phone radiation.

Possible conflicts of interest

In his DOI it is stated that he studies the "effects of day LED on human performance, melatonin and sleep. Research studies in healthy human volunteers partially sponsored by Toshiba Materials." In the period from 2014-2018 that accounts for 120.000 (we assume euro), whereby Toshiba has the right "to request (i) revisions to the publication, so that no Confidential Information is inadvertently disclosed or a delay of not more than 60 days to allow for protection of any potentially patentable subject matter by filing of a patent application."

Toshiba does not focus on telecommunications, but rather on mainly infrastructure energy and Electronic Devices.

Jose Gomez-Tames

Biography

Gomez-Tames is Research Associate Professor in Nagoya Institute of Technology.

He is also Working Group Chair of the Subcommittee on EMF Dosimetry Modelling of the IEEE International Committee on Electromagnetic Safety from 2017.

Gomez-Tames is member of the Scientific Expert Group since 2018.

Position

Gomez-Tames work is more on the modelling of non-ionizing radiation than on the health effects.

Possible conflicts of interest

See Van Rongen and others on the role of IEEE/ICES.

In his [Declaration of Personal Interest](#) Gomez-Tames doesn't mention other sources of possible conflicts of interest and we did not find information that contradicts this.

Penny Gowland

Penny Gowland worked at the University of Nottingham School of Physics and Astronomy until 2016 and is now retired. She did a PhD in Magnetic Resonance Imaging from the Institute of Cancer Research in 1990.

According to ICNIRP's website "her work at high field and on foetal development as led her to take a strong interest in the interactions of EMF with the human body, and safety aspects of MRI."

Penny Gowland is a member of the ICNIRP Scientific Expert Group (SEG) since March 2013.

Position

She declared in her DOI that her "research interests are in MRI: but I am also academically and professionally interested in any biological effects of EMFs."

As stated Gowland focussed mainly on MRI and far as we could find out, she did not perform research into the health effects of mobile phone radiation.

Possible conflicts of interest

According to the [organisation AVAATE](#) her previous Declaration of Interests, she reported that she has held many research contracts with Phillips Electronics but without any money involved. Gowland has been part of the MR safety working group of British Institute of Radiology. According to the [British Institute of Radiology website](#), Phillips and Siemens are platinum sponsors.

In 2015 AVAATE also stated that the [European Society for Magnetic Resonance in Medicine and Biology](#) (ESMRMB), organization mentions that Gowland was a member of several committees, including the Committee on Security, and has received financial support from companies like Hitachi, Philips, Siemens, Toshiba and General Electric.

John Hanifin

Biography

John Hanifin is laboratory director of the Light Research Program at Thomas Jefferson University.

He is a member of the Scientific Expert Group since May 2018.

Position

Hanifin is specialized in the effects of light. A recent publication he contributed to is for example is about the effect on nurse and patient experience of the overnight use of blue depleted illumination. He did not conduct research on the health effects of mobile communications technologies.

Possible conflicts of interest

The Light Research Program [received](#) industry support from among others OSRAM, Philips Lighting and Panasonic.

His [PhD-thesis](#) (2015) was also partly funded by industry, by Philips Lighting, Apollo Lighting and OSRAM.

Hanifin's Declaration of Personal Interest shows that his laboratory earns about 5% of its yearly income by conducting clinical research for Bios Lighting. It mentions that his laboratory is obliged to submit a manuscript to the sponsor before publication for review and comment, 'however Sponsor shall not exercise editorial control over the publication'. The fact that the sponsor can review and comment the manuscript does not seem to be a strong guarantee of independence.

Jukka Juutilainen

Biography

He is a retired professor emeritus of Radiation Biology and Radiation Epidemiology, and Department Head of the Department of Environmental Science at the University of Eastern Finland. Juutilainen teaches generic courses on environmental health and risk assessment, as well as specific courses on non-ionizing and ionizing radiation

He is an Associate Editor of *Bioelectromagnetics*, effective immediately for which he was nominated by the European Bioelectromagnetics Association (EBEA) a non-profit scientific association with many current and former ICNIRP-members.

He was a member of the ICNIRP Standing Committee on Biology from 2004 until 2012 and became a member of the Scientific Expert Group (SEG) in March 2013.

Position

In 2007, [Microwave News](#) reported positively about a study published by Juutilainen: “Every now and then a new paper comes along that gives hope that one day we'll make sense of the conflicting results that have become the hallmark of EMF research.” [The study](#) was financed partly by the cell phone industry —the [MMF](#) and the [GSMA](#) and although Juutilainen suggested that needed a follow-up it never got one.

Another [study from 2007](#) concluded that “the data did not show any effects of radiofrequency electromagnetic fields on micronucleus frequency in erythrocytes. The findings were consistent in two mouse strains (and in a transgenic variant of the second strain), after 52 or 78 weeks of irradiation, at three SAR levels relevant to human exposure from mobile phones, and for three different mobile phone signals.” The study was co-funded by Nokia, Elisa Communications Corporation, Finland Benefon, Finland Sonera.

Juutilainen published [this study in 2009](#), together with Croft and Van Rongen, on the ‘Effects of Radiofrequency Electromagnetic Fields on the Human Nervous System’. The conclusion was that “However, in provocation studies a causal relation between EMF exposure and symptoms has never been demonstrated. There are clear indications, however, that psychological factors such as the conscious expectation of effect may play an important role in this condition.”

Possible conflicts of interest

In his past ICNIRP Declaration of Interests, he stated that he has received research funding from government organizations and foundations.

In his last non-signed DOI he indicates “The Department of Environmental and Biological Sciences of the University of Eastern Finland (UEF) has received funding from the Electric Power Research Institute (EPRI). Although EPRI is an independent, non-profit research organization (and therefore not reported above in research support received from commercial entities), this funding might be perceived as affecting my independence (Period: 2015-2019).”

[According to AVAATE](#) he had “numerous research programs funded by Nokia, Benefon, Sonera, Elisa, FINNET, the GSM Association and the Mobile Manufacturer Forum.” For example, the national research programme on possible health effects of mobile phones in Finland (from 1998 to 2003) which was coordinated by Juutilainen was mainly funded by TEKES, National Technology Agency a governmental organisation, and also supported by Nokia, Benefon, Sonera, Elisa, Radiolinja, Finnish 2G, Mobile Manufacturers Forum and the GSM Association.

He has participated in conferences and publications funded in part by organizations with interests in the telecommunications sector.

Masami Kojima

Biography

Masami Kojima is a professor of Kanazawa Medical University. He is specialized in ocular damage due to microwaves.

In the period 2001-2004 he was a consulting member for ICNIRP, since november 2014 he is a member of the Scientific Expert Group.

Position

Kojima's research is mainly on the effects of microwaves on the eye, often of rabbits. In his publications, we found no direct statements about possible effects on the eye within the ICNIRP-norms.

Possible conflicts of interest

He was co-author of the 2010 article partly funded by KDDI Foundation (see Hirata and Watanabe).

His [Declaration of Personal Interest](#) does not mention other sources of possible conflicts of interest and we did not find any.

Ilkka Laakso

Biography

He is Professor of Electromagnetics in Health Technologies at Aalto University, Finland and focuses on theoretical and computational bioelectromagnetics at both extremely low and radio frequencies. Laakso has been "combining computational electromagnetics with medical image processing and biological neuron modelling." The purpose of this research is to offer the medical and electrical engineering community new computational methods for individual physical modelling of the human body.

According to ICNIRP's website he is the "secretary of Subcommittee of EMF Dosimetry Modeling (SC6) of the IEEE International Committee on Electromagnetic Safety and a working group chairman since 2015."

Laakso became a member of the Scientific Expert Group (SEG) in 2016.

Position

A [study from 2009](#) (Assessment of the Computational Uncertainty of Temperature Rise and SAR in the Eyes and Brain Under Far-Field Exposure From 1 to 10 GHz) about the specific absorption rate (SAR) seems to suggest that the 'reference levels by ICNIRP and maximum permissible exposure limits by IEEE seemed to be conservative in the sense that at the reference levels the temperature rise in the eyes and brain was always less than 1°C."

Possible conflicts of interest

For IEEE/ICES see Van Rongen and others.

According to his DOI for ICNIRP he owns stocks of and is a board member of 'Fieldsim Oy', a consulting company in Finland that does computer simulations of electromagnetic fields, including electromagnetic field exposure.

Isabelle Lagroye

Biography

[Isabelle Lagroye](#) is a director of studies at the Ecole Pratique des Hautes Etudes (EPHE) and works at Bordeaux University. Her research, states a recent publication, 'deals mainly with the biological and toxicological effects of non-invasive electromagnetic fields.' She is currently member of the Bruxelles-Capitale expert committee on non-ionising radiations.

She was member of an ICNIRP committee in the period 2009-2012 and was elected member of the Scientific Expert Group in March 2013.

Position

In 2018 Lagroye together with two other scientists published an article in *European Scientist* in which she concluded that the NTP-study "consolidates current knowledge and reinforces the fact that when effects of mobile radiofrequency fields can be observed, it is at exposure levels that far exceeds the maximum permissible exposure values. In practice, these limits cannot be reached with commonly used wireless communication technologies (relay antennas, mobile phones, Wi-Fi ...)."

This statement seems to be in contradiction with findings from her own research. A [recent publication](#) of which Lagroye was co-author concludes: 'However, we found that exposure to GSM-modulated 1800 MHz signals at 2 W/kg decreased the PMA maximal efficacy to activate both RAS and ERK kinases' activity.' So, it influences the signaling between proteins.

This is an effect at 2 W/kg, while according to the new ICNIRP-norms health effects in head and torso are only above 20W/kg and the norm is, with a safety factor of ten, 2W/kg.

Lagroye was also co-author of the [final report](#) of the Geronimo-project. In this report, we do find indications for health effects. It says:

"Results suggest that increased RF dose to the brain and longer mobile phone call time may be associated with risk of hyperactivity and conduct problems."

And: "a meta-analysis among four birth cohorts (n=55,507) indicated that maternal cell phone use during pregnancy may be associated with shorter pregnancy duration and increased risk for preterm birth (Tsarna et al., 2019, accepted Am J Epidemiol)."

Interesting is also that research conducted by Lagroye seems to suggest non-thermal effects, while ICNIRP states that thermal effects are the only ones for which there is scientific evidence. In [this article](#) the authors write: "Altogether, our experimental findings provide

evidence for dose-dependent effects of RF signals on the bursting rate of neuronal cultures and suggest that part of the mechanism is non-thermal.”

In 2009, she co-authored [a scientific paper](#) with Van Rongen and Croft which stated on the ‘effects of radiofrequency electromagnetic fields on the human nervous system’ that “there are clear indications, however, that psychological factors such as the conscious expectation of effect may play an important role in this condition.”

Possible conflicts of interest

The latest [Declaration of Personal Interest](#) of Lagroye that can be found on the ICNIRP-site dates from 19 October 2015, almost five years ago. At that moment, she stated that she got 2,35% of the income of her research unit from a commercial partner, the Réseau de Transport d’Électricité (RTE).

A [study](#) published in 2010 which suggested that exposure to WiFi did not damage the brains of young rats was funded by France Telecom and [La Fondation Santé et Radiofréquences](#), an organisation that is for the half funded by industry.

This organisation also partly funded several other studies to which she contributed, like [this one](#) published in 2011 and [this one](#) published in 2012.

Another 2012 [publication](#) was partly funded by Bouygues Telecom.

Sarah Loughran

Biography

ICNIRP’s website states that Loughran is currently a researcher at the University of Wollongong in the Australian Centre for Electromagnetic Bioeffects Research (ACEBR) human neurophysiology research group, an NHMRC Centre of Research. She studied physiology and psychology and got a PhD in cognitive neuroscience/psychophysiology at Swinburne University of Technology, [investigating the effects of electromagnetic fields on human sleep](#), the electroencephalogram (EEG), and melatonin.

To this centre (ACEBR) also ICNIRP-chair Rodney Croft and ICNIRP-member Andrew Wood are connected. Swinburne university and in particular [the Radiofrequency Dosimetry Laboratory](#) is part of the ACEBR which has a very close relationship with and is co-funded by Telstra, the biggest Telecom company in Australia. (See also portraits on Woods and Croft)

Loughran is also a member of the current World Health Organisation (WHO) RF Environmental Health Criterion evaluation committee, and is on the board of directors for the Bioelectromagnetics Society (BEMS). She is a member of the ICNIRP Scientific Expert Group (SEG) since March 2013.

Position

A [2005 study](#) by Loughran and Woods on the effects of EMF on human sleep demonstrated that “a short exposure to mobile phone-type radiation has an effect on subsequent sleep EEG, although no conclusions can be made regarding adverse health consequences as the mechanisms of the effects are still unknown.”

In 2007 [Microwave News reports](#) that “the ability of mobile phone radiation to affect sleep is emerging as a robust low-level effect. A team led by Bengt Arnetz has reported that a three-hour exposure to GSM radiation at 1.4W/Kg an hour before bed can disrupt sleep.” This study supported earlier findings of Peter Achermann of the University of Zurich and Loughran at the time working at the Brain Sciences Institute at Swinburne University.

Because later findings of other studies got quite some media attention, Loughran, Peter Achermann & Niels Kuster [published a statement](#) to temper the seriousness of the findings.

Loughran worked for some years in Switzerland, where several scientists like Kuster do research on EMF and sleep. [The Nation reported that](#) Niels Kuster, a Swiss engineer co-authored in *The Lancet Oncology* a summary of the WHO’s findings of [the Interphone study](#) which was launched by the WHO’s International Agency for Cancer Research in 2000 (and to which two wireless trade associations contributed \$4.7 million or 20 percent of the \$24 million budget). Kuster had filed a conflict-of-interest statement affirming that his research group had taken money from “various governments, scientific institutions and corporations.” But after his publication *The Lancet* “issued a correction expanding on Kuster’s conflict-of-interest statement, noting payments from the Mobile Manufacturers Forum, Motorola, Ericsson, Nokia, Samsung, Sony, GSMA, and Deutsche Telekom. Nevertheless, Kuster participated in the entire 10 days of WHO-deliberations.”

In general, Loughran (ACEBR) is in agreement with Croft. [In an interview](#) with Computerworld: “*There are people that are suffering and yes, it’s **not due** to electromagnetic energy exposure, it’s more of a **psychosomatic** condition...*”

According to a 2017 [study](#) “IEI-EMF provocation case studies: A novel approach to testing sensitive individuals” of which Loughran is the second author “*the present experiment failed to show a relationship between RF-EMF exposure and an IEI-EMF individual’s symptoms*”. The [information on Electro hypersensitivity](#) from the WHO’s EMF Project (see also History chapter in this report) to which Loughran is connected has not been updated since 2005.

Possible conflicts of interest

In her DOI she declares for 2015 having received almost 16.000\$ from EPRI funding and NPF research Institute, which accounted “*approximately for 5% of her lab’s income*”.

In a 2016 [EPRI workshop](#) “Loughran provided an overview of the current state of knowledge in the field of human laboratory studies, an assessment of the critical gaps in knowledge, and recommendations for research priorities. Loughran and the session rapporteur, Rodney Croft, University of Wollongong, led the workshop participants in a discussion of human laboratory studies”.

See also portraits on Croft and Wood.

Jack Lund

Biography

Jack Lund was research physicist with the US Army Medical Research Command. There he studied the effect of laser radiation on ocular tissue and the visual system. He retired in 2018.

He was an ICNIRP Consulting Expert from 2002 to 2012. He joined the Scientific Expert Group in 2018.

Position

Jack Lund is an expert in laser safety issues. He did not publish article about the health effects of mobile communication technologies and did not make, as far as we could find out, make public statements about it.

Possible conflicts of interest

Lunds '[Declaration of personal interest](#)' is completely empty. We did not find other information about possible conflicts of interest.

Simon Mann

Biography

According ICNIRP's website Simon Mann is a chartered electrical engineer and heads the Physical Dosimetry Department at Public Health England's Centre for Radiation, Chemical and Environmental Hazards. Man is responsible for programmes of scientific work to develop health-related advice on exposures to electromagnetic fields (EMFs) and optical radiation across the UK.

He was secretary to the independent Advisory Group on Non-ionising Radiation (AGNIR), and member of the IARC Working Group that evaluated the carcinogenic potential of radiofrequency EMFs in 2011. He currently works with WHO EMF Project (see also history part) to develop its Environmental Health Criteria monograph on radiofrequency fields.

He is also active in technical standardisation and is a UK delegate to the CENELEC TC106X Committee.

During [a meeting of the WHO EMF Project](#) in 2013 Lindsay Martin from ARPANSA – (Australia) and Simon Mann (PHE - UK) were elected chair and vice chair respectively. In the meeting J. Keshvari from International Committee on Electromagnetic Safety (ICES) and the International Electrotechnical Commission (IEC) TC 106 said that "Maintenance work is in hand on several EMF exposure Standards. Harmonisation and avoiding duplication of effort,

between CENELEC, IEEE and ITU is encouraged where possible.” Keshvari also mentioned that IEEE/ICES “has been developing an RF safety Standard for NATO”.

He is a member of the ICNIRP Scientific Expert Group since 2015.

Position

Mann is part of the close network of ICNIRP and WHO EMF scientists that claim there are no real immediate health effects from EMF. For more on the WHO Project and EMF IEEE/ICES, see the history part of this report and the portrait of Croft and Van Rongen.

Possible conflicts of interest

We could not find a recent DOI on ICNIRP’s website: the link to Mann’s DOI on ICNIRP’s website is not functioning.

However, he did not mention in his former Declaration of Interests statement submitted to ICNIRP, that he has received research funding from the GSM association, the Mobile Manufacturer Forum and the UK’s [Mobile Telecommunication and Health Research Program \(MTHR\)](#), on which he still plays [a leading role](#). According to AVAATE [MTHR](#) in the past received funding from the Vodafone, a wireless company.

Since 2009 he has been a member of BEMS and the EBEA22.

Rüdiger Matthes

Biography

Rüdiger Matthes was from 1989 until his retirement in 2016 Head of the group "Non-Ionizing Radiation (Dosimetry)" at the German Federal Office for Radiation Protection. He became the Scientific Secretary of ICNIRP in 1993. He was Chairman of the Standing Committee on Physics and Engineering (SCIII) from 2004 to 2008. He became Vice-Chair in 2008, and Chair again in 2012. Since 2016 he is a member of the Scientific Expert Group.

Position

Matthes [defends the position](#) that there are no studies that prove the existence of non-thermal health effects of non-ionizing radiation and that no plausible mechanism has been described whereby these effects could take place. There is no evidence for a link between cancer and the use of mobile phones, [he said](#) in 2010.

Matthes was one of the authors of a [recent ICNIRP-publication](#) in which ICNIRP explains the principles for health protection on which its guidelines are based.

Possible conflicts of interest

In his [Declaration of Personal](#) Interests Matthes does not mention any possible conflict of interest and we did not find any information that contradicts this.

During [a meeting of the WHO EMF Project](#) in 2013 Matthes spoke on behalf of both BfS and ICNIRP by stating that: “Exposure recommendations have been developed by several organisations such as ICNIRP and IEEE/ICES, and there is good harmonisation between these on fundamental limits.”

John O'Hagan

Biography

On ICNIRP's website it says that John O'Hagan heads the Laser and Optical Radiation Dosimetry Group at Public Health England. This research group covers all aspects of optical radiation dosimetry, including both the beneficial and detrimental effects of optical radiation on people.

He is Vice-President Standard of the International Commission on Illumination (CIE), Convenor of the International Electrotechnical Commission Technical Committee 76 “Optical Radiation Safety and Laser Equipment” Working Group 9 “Non-coherent sources”, Chairman of the British Standards Committee EPL/76 “Optical Radiation Safety and Laser Equipment” and is a member of a number of other national and international committees.

According to his DOI he was also a member of EU SCENHIR/SCHEER Working Group on Potential risks to human health of Light Emitting Diodes (2016-2018) and is a Member of WHO Core Group on NIR Basic Safety Recommendations.

He joined the ICNIRP Scientific Expert Group (SEG) in March 2013.

Position

In 2017 O'Hagan co-wrote a chapter in [Clay's Handbook of Environmental Health](#) in which the general line of ICNIRP, SCENHIR and WHO EMF Project is repeated: no adverse health effects.

Possible conflicts of interest

In his DOI he states under activities “Provision of scientific support and advice to government and other stakeholders”, but fails to mention which stakeholders.

In his statement, he says that he is the President of the Committee EPL/76 Optical radiation safety and laser equipment, of BSI Standards Development (BSI is a company that sets rules to help organizations worldwide achieve excellence). Organizations that work with this committee include the Association of Industrial Laser Users, the Association of Manufacturers of Domestic Appliances, GAMBICA Association Limited (a UK national organisation representing the interests of companies in the instrumentation, control, automation and laboratory technology industry) the Institute of Physics, the Institution of Engineering and Technology, the Institution of Mechanical Engineers, and the Lighting Industry Association.

He also reports that he is the Vice President of the CIE-UK National Illumination Committee of Great Britain. This committee was established by the Illuminating Engineering Society of

Great Britain, the Institute of Electronic and Electrical Engineers, the Institute of Gas Engineers, and the NPL, in collaboration with industry and professional associations, government departments and lighting technicians.

Chiyoji Ohkubo

Biography

Chiyoji Ohkubo is Director of the Japan EMF Information Center (JEIC). This organisation was established in July 2008 'to facilitate communication on EMF issues among government agencies, industry, the media and the general public.'

In the period 2005-2007 he worked for the EMF WHO-project.

He is a member of Scientific Expert Group since March 2013.

Position

All his publications seem to fit into the same category: no effect. See for example [this study](#) in which the exposure of rats to RF EMF radiation did not alter their cerebral microcirculation.

Possible conflicts of interest

For criticism of the WHO EMF Project see among others Van Rongen.

The Japan EMF Information Center, [writes Ohkubo himself](#), 'has been financed from donations by stakeholders and governmental funds.' An information leaflet of the organisation says: 'The JEIC is founded to present in a neutral way the positions of industry, science and society, and to discuss the risk analysis.' It seems to be no coincidence that industry is mentioned first.

Ohkubo did [research](#) funded by the Association of Radio Industries and Businesses (ARIB), Japan.

Margarethus Paulides

Biography

Margarethus ('Maarten') Paulides obtained his MSc in Electrical Engineering at Eindhoven University in 2002 and his PhD in Medical Electromagnetics

He works as Associate Professor, Department of Electrical Engineering, Electromagnetics, at the university of Eindhoven as well as Associate Professor, Erasmus Medical Centre in Rotterdam.

The outcome [of his research were novel devices](#), patient-specific simulation technology and pioneering data and knowledge for improving EMF exposure guidelines.

Since 2015 he is board member of the Dutch National Antenna Research Framework (NARF). From 2017, he serves in the Electromagnetics Committee of the Dutch Health Council that advises the relevant ministers in the Netherlands on EMF related subjects. He also is a Management Committee member and Workgroup leader in COST action CA17115.

He is a Member of the ICNIRP Scientific Expert Group (SEG) since 2017.

Position

Most of his research is focussed on applications in health monitoring, disease diagnosis and therapy. We did not find much research on the health effects of radiofrequency radiation.

He did some research on thermal effects on tissue which resulted in this [2018 study](#) in which the authors basically state that the protection levels of ICNIRP and IEEE are conservative and safe: "To protect against any potential adverse effects to human health from localised exposure to radio frequency (100 kHz-3 GHz) electromagnetic fields (RF EMF), international health organisations have defined basic restrictions on specific absorption rate (SAR) in tissues. These exposure restrictions incorporate safety factors which are generally conservative so that exposures that exceed the basic restrictions are not necessarily harmful."

Possible conflicts of interest

According to the ICNIRP website he "also acts as advisor of start-up companies aimed at providing solutions for computer simulation and image guided interventions".

His DOI further states that he does paid consultancy for a company Sensus.biz, which in fact he co-founded, for an amount of 5000€. He also owns 4,9% in stocks of this company.

The same amount he got from a German company Sennewald Medizin Technic.

He received a 45.000€ research Grant from General Electric Research Centre in Germany.

For the contracting company Phillips he received a STW research grant of 10.000€ in cash and 66.300€ in kind.

Kensuke Sasaki

Biography

Kensuke Sasaki is a Researcher of the National Institute of Information and Communications Technology, Japan.

He is a member of Subcommittee of EMF Dosimetry Modelling of IEEE International Committee on Electromagnetic Safety. He is also an expert for a committee of the International Electrotechnical Commission.

He joined the Scientific Expert Group in November 2018.

Position

Most publications of Sasaki are about how to measure the effects of non-ionizing radiation and about the thermal effects of it on for example the eye. We did not find direct statements about the health effects.

Possible conflicts of interest

For information about IEEE/ICES see Van Rongen.

Together with Hirata and Watanabe (see above) he conducted research [published](#) in *IEEE Transaction* in 2010 partly funded by KDDI Foundation.

David Savitz

Biography

Savitz is currently Professor of Epidemiology and Obstetrics and Gynecology, at the American Brown University.

His teachings and research is focussed mainly on epidemiologic methods and, reproductive, environmental, and cancer epidemiology and he authored a book entitled “Interpreting Epidemiologic Evidence”.

He was a member of the ICNIRP Standing Committee on Epidemiology from 1997 until 2012 and then became a member of the ICNIRP Scientific Expert Group (SEG) in 2013.

Position

Given the fact that he has been connected to ICNIRP for 23 years we can safely assume that he agrees with the position of this NGO on health effects of EMF.

Possible conflicts of interest

His Declaration of Interests statement to ICNIRP, says that he does paid consultancy but “non-relevant to ICNIRP”.

According to [AVAATE](#) this is not really true: “He gave [expert witness testimony](#) on behalf of the defendants in a January 2012 lawsuit in Federal District court in Portland, Oregon.”

A company AHM Wireless sued the Portland Public School System, because it called for the removal of a Wi-Fi system in the schools. The testimony of Savitz was requested to assess the expertise of plaintiffs' claims that the implementation of wireless devices and wireless systems in the schools could possibly cause cancer or other adverse health effects.

In court, he states that the purpose of his contract with Battelle was to investigate relationships between environmental agents and human health and that he had a variety of sponsors, including some federal government agencies and other groups that he does not recall at this time.

Remarkably when he is asked about his ICNIRP membership he said that doesn't consider himself to be really an active member and that he contributed all those years to just four reports, together with Anders Ahlbom, who coordinated their advice work for ICNIRP and whom had also recruited Savitz to join ICNIRP (in 2011 was asked to step down from IARC panel after he was exposed to be on the board of his brother's consulting firm, which telecom clients). Savitz: "My understanding of the organization is really actually quite limited. My role in it has been much narrower to participate in the evaluation of evidence and the reporting of the results of that evaluation. I have not been involved in what's done with that evaluation."

When the lawyer of the public school asks "So the organization, though, it's involved with the protection of human beings from non-ionizing radiation; is that correct?" Savitz answers: "Again, my understanding is not much deeper than as you described it based on the name of the organization. My understanding is that they evaluate evidence and make recommendations that are intended to be protective of health."

When asked if he is paid to be part of scientific committees, he says that he remembers only travel expenses being reimbursed by ICNIRP. He says he doesn't even remember how many scientific committees he belongs to. He wasn't involved with what ICNIRP does in making decisions after it receives the results of the evaluation carried out by the Standing Committee on Epidemiology. He says that he has never read the ICNIRP Statutes, its mission, etc. He maintains that he is hired to help evaluate a particular line of research. Also, when asked if there was any relationship between ICNIRP and the WHO for the work in which he contributed to, he said he did not know.

It almost seems as if Savitz does not want to be remembered too much about ICNIRP and tries to distance himself from the NGO and its position. When the lawyer of the public schools asks "you would agree then that we need protection from non-ionizing radiation; is that correct?", Savitz answers: "Well, that's not something that I get involved in the technical judgment of the sort of guidelines or regulations or decision-making. If you're asking, obviously there are levels of exposure that I'm aware that can be harmful, so that I can understand in a general way that it makes sense that there be consideration of regulation."

AVAATE notes that "when asked whether he has been paid out of funds acquired from companies and/or telecom consultants and law firms that represent these companies, he replied that there are a few cases where he has done research funded by the electric utility industry. However, he emphasized that the funders tried to isolate his work from the source of funding. He says he once had done a study before realizing where the money came from."

Savitz also stated that he has done work sponsored by EPRI, as many ICNIRP members, which is funded by the electrical power industry.

There is no record of these kind of data in the Declaration of interests that he submitted to ICNIRP.

Karl Schulmeister

Biography

Karl Schulmeister is since 1994 head of the Laser, LED and Lamp Safety group at Seibersdorf Laboratories in Austria. On his [LinkedIn profile](#) he describes himself as 'Consultant on Laser and Optical Radiation Safety'.

He was a member of the ICNIRP Standing Committee on Optical Radiation in the period 2008-2012 and joined the Scientific Expert Group in March 2013.

Position

Karl Schulmeister is specialized in optical radiation. He did not perform research on the health effects of radiofrequency radiation.

Possible conflicts of interest

Seibersdorf Laboratories is a firm, not an academic institution. Schulmeister's group derives, according to his [Declaration of Interest](#), about 10% of its income from paid consultancy.

Research for [an article](#) published in 2015 and [a white paper](#) published in 2016 received both the support of the Laser Illuminated Projector Association, which [presents itself](#) as "a single industry voice in rationalizing laser regulations".

David H. Sliney

Biography

Sliney [serves as chair](#) of the IES Photobiology Committee and holds a Ph.D. in biophysics and medical physics from the University of London, Institute of Ophthalmology. He worked for the US Army Public Health Center for 42 years, serving as Program Manager, Laser/Optical Radiation Program, until retiring in 2007.

He still acts as Safety Director, American Society for Lasers in Medicine and Surgery; And he remains an associate faculty member of the Johns Hopkins School of Public Health, Department of Environmental Science and Engineering, Baltimore, MD.

He served as member, advisor and chairman of numerous committees that are active in the establishment of safety standards for protection against non-ionizing radiation (ANSI, ISO, ACGIH, IEC, WHO, NCRP).

He has been an ICNIRP Commission Member from the very start in 1992 until 2004 and as Chairman of ICNIRP SCIV (optical radiation) from 1998 until 2004. He is a member of the ICNIRP Scientific Expert Group (SEG) since November 2017.

Position

Sliney has been mainly focussing on safety and health issues of laser lights, UV light or other sources, important for safety for medical staff who work with laser application in surgery

and medicine. Also, scientists and military staff are risk groups for laser damage to the eye. We could not find research on the health effects of radiofrequency radiation.

Which does not mean that he is not involved in the scientific debate. In 2013 for example he participated in a webinar by the American Conference of Governmental Industrial Hygienists (ACGIH) on electromagnetic radiation.

In [an article from 2017](#) on the history of ICNIRP founder Mike Repacholi explicitly gives a special thanks to long-term INIRC and ICNIRP member David Sliney for his help with reviewing the article.

In [a book](#) from 2000 in 'the NATO Science Series' by B.Jon Klauenberg (US Air Force Research Laboratory) and also NATO-liaison, Sliney is described as "Dr Dave Sliney and army employee who serves on the ICNIRP". Klauenberg who in the first years [led the WHO EMF Project together with Repacholi](#), is a prominent figure from the US Department of Defense (DOD) and describes it as follows: "Because the US military services operates globally and with many different national partners, uniformity of the RFR exposure standards is a desirable goal." He then describe the various ways that the DOD contributes to "worldwide standards harmonisation". So, the DOD participates in the WHO EMF project for example "through active engagement of US Air Force Research Laboratory as well as US army personnel providing service on the IEEE". And Sliney thus seems to be the US army representative in ICNIRP.

Possible conflicts of interest

His DOI is signed in 2019 but does not mention much.

Rianne Stam

Biography

Rianne Stam is senior scientist at the National Institute for Public Health and the Environment (Bilthoven, the Netherlands) since 2007. There she performs risk assessments and policy research on the biological effects and possible health risks of electromagnetic fields (EMF).

She is a member of the Scientific Expert Group since March 2013.

Position

Stamm made in 2015 and [2019](#) overview reports of the long term effects of electromagnetic fields on the health of workers. The conclusion: 'Scientific research has not yet proven any links between the exposure of workers and the occurrence of cancer, disorders of the nervous system or other illnesses in the long term.'

Possible conflicts of interest

According to her 'Declaration of Personal Interest' Stam has no possible conflicts of interest and we did not find any information that contradicts this.

Bruce Stuck

Biography

Bruce E. Stuck He is now retired. He was from 1992-2010, the Director of the U.S. Army Medical Research Detachment of the Walter Reed Army Institute of Research, where he had responsibilities for the Army Medical Department's laser and radio frequency radiation biological effects research program. Until 2013 he was the Director of the Ocular Trauma Research Division at the U.S. Army Institute of Surgical Research in San Antonio, Texas.

Since 2012 Stuck is a part-time independent consultant on non-ionizing radiation bioeffects.

He has been a member of ICNIRP SC IV since 1999 and of the Commission from 2004 until 2016. Stuck is now supporting the work of the Project Group as a SEG member.

Position

His research focussed on laser and radio frequency radiation biological effects and "establishes protection strategies (e.g. exposure limits or physical protection products) and develops triage and treatment approaches for ocular injury from non-ionizing radiation and shock wave exposures from blast". During his 32 years-experience in laser hazards research experience he was author/co-author of numerous papers on ocular and cutaneous effects of laser and radio frequency radiation. His primary interests are in the biological effects of visible and infrared laser radiation on the retina and cornea and the assessment of laser-induced eye injuries and their treatment.

Possible conflicts of interest

His DOI states that he is "a consultant to Perfect Lens, LLC on a proprietary project under a signed confidentiality agreement to provide advice and written assessment on biological exposure limits as applied to their repetitively pulsed fem to second laser application for use in medical application in the eye". He delivered oral and written reports on the device hazard assessments. Income was less than 1% of personal income from his retirement annuity in 2018 tax year.

John Tattersall

Biography

John Tattersall is scientist in the Defence Science and Technology Laboratory, a government Agency which provides research and advice for the UK Ministry of Defence and other

government departments. He also is Honorary Senior Lecturer in Clinical Neurosciences at the University of Southampton.

He was a member of the IEEE International Committee on Electromagnetic Standards from 2012 until 2017.

He joined the Scientific Expert Group in March 2013.

Position

Twenty years ago, Tattersall did [research](#) that showed effects of RF Radiation on the brain of rats. *New Scientist* [wrote](#): “Last year, fears about mobiles affecting brain function received fresh impetus thanks to work by John Tattersall and his colleagues at the Defence Evaluation and Research Agency’s labs at Porton Down in Wiltshire. Tattersall exposed slices of rat brain to microwave radiation. He found that it blunted their electrical activity and weakened their responses to stimulation. Because the brain slices were taken from the hippocampus, a structure with a role in learning, the results were seized upon as further evidence that mobile phones could scramble human memories.”

But according to [later research](#) these effects were artificial, “may be explained by localised heating produced by interaction of the RF fields with the recording and stimulating electrodes”.

Tattersall was involved in the new guidelines that were published in 2020.

Possible conflicts of interest

For IEEE/ICES see Van Rongen and others.

Tim Toivo

Biography

Tim Toivo works as senior inspector for the Radiation and Nuclear Safety Authority STUK in Helsinki, Finland. He is mainly involved in regulatory, research and expert work in the area of safety issues of electromagnetic fields (EMF) and ultrasound.

He studied biomedical engineering at Tampere University of Technology 1996. And started his work at STUK–Radiation and Nuclear Safety Authority in 1998 as a scientist in the unit of non-ionizing radiation.

Part of his work is to inform users of EM fields and communicate with the general public about safety issues. He participated in the preparation of the EU directive (EU 2013/35/EU) as an expert for the Finnish delegation.

He is a member of the ICNIRP Scientific Expert Group (SEG) in February 2017.

Position

Toivo was quoted in the book 'Behind the Screen: Nokia's success story in an industry of navel-gazing executives and crazy frogs': "It is fairly easy to prove that something is hazardous, but it is extremely difficult to prove that something is totally safe under all circumstances. It may take 20-30 years before any meaningful results are available from people who have been exposed to low power radiation."

In 2009 STUK published a position that 'children's mobile phone use should be limited.

A publication in 2006 – 'Epidemiological risk assessment of mobile phones and cancer: Where can we improve?' - together with Anssi Auvinen, concluded that "the major opportunity to improve the quality of evidence is, however, through prospective studies. The major limitation of epidemiological studies addressing the health effects of mobile phone use is related to exposure assessment. These limitations are inherent in case-control studies."

A 2008, in Vitro study of Pulsed 900MHz GSM Radiation on human Spermatozoa showed no effect.

In [a 2009 publication](#) – 'Specific absorption rate and electric field measurements In the near field of six mobile phone base station antennas' - Toivo and colleagues seem to suggest that the ICNIRP safety standards are very conservative: "It was also shown that the ICNIRP basic restriction for local exposure could be exceeded before the basic restriction for whole-body exposure if the distance to the antenna is less than 240mm."

With several ICNIRP colleagues he published the '[Progress report: ICNIRP Statement on non-ionizing radiation for cosmetic purposes](#)' for the IEEE. They concluded that "'for cosmetic devices using radiofrequency EMF and optical radiation, there is the potential that occupational exposure limits can be exceeded if adequate protection measures are not applied."

Possible conflicts of interest

Hid DOI states that he gets funds from ministries which go directly to the Radiation and Nuclear Safety Authority STUK.

Andrew Wood

Biography

Wood is Professor in Bioelectromagnetic Research Group at Swinburne University of Technology in Melbourne. He also is a Chief Investigator with the new Australian Centre for Electromagnetic Bioeffects Research (a centre to which Rodney Croft and Sarah Loughran are also connected).

Wood used to work at Telstra Research Labs and is now a leading researcher at [Swinburne Radiofrequency Dosimetry Laboratory](#), which is a part of the Bioelectromagnetic Research

Group. Telstra is Australia's largest telecommunications company. [Swinburne university and in particular the Radiofrequency Dosimetry Laboratory](#) has close relationship with and is co-funded by Telstra, the biggest Telecom company in Australia.

The close working relationship between the Swinburne University and Telstra [is not new](#), as Don Maisch pointed out: "In fact the Chancellor of Swinburne University, Mr. Bill Scales (2005-2014) was previously Telstra's Group Managing Director, Regulatory, Corporate and Human Relations, and Chief of Staff at Telstra. He was also Telstra's Director of IBM Global Services Australia Ltd. and a Director of the Telstra Foundation."

Wood was a member of the Radiation Health Committee of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) for over ten years.

He is a member of the Scientific Expert Group since March 2013.

Position

Wood does not see dangers of 5G and [warns](#) for being too cautious: "Wireless technologies bring enormous benefits, and being over-cautious would potentially deny these benefits to needy communities."

In a [recent article](#) he stated that studies which show health effects have a poor quality: "There are some comprehensive reviews of these, demonstrating that the quality of the studies is very variable, and that, for example, results claiming to show increased genetic damage or other biological effects are much more common in studies of low quality, whereas higher-quality studies predominantly show no significant effects."

Possible conflicts of interest

In a [2016 publication](#) that gave an overview of the work Wood's group performed he and his co-authors wrote: "Over its 25-year history the Bioelectromagnetics Group has received support from national competitive grants and from industry research support schemes. It has been a node for both the Australian Centre for Radiofrequency Bioeffects Research (ACRBR) and the Australian Centre for Electromagnetic Bioeffects Research (ACEBR—see article in this edition). It has benefitted from industry collaboration and with national regulatory authorities."

The close collaboration with industry we see time and again. Just like the actual chair of the ICNIRP-commission Croft, Wood had actively collaborated with McKenzie, who is a manager at the Mobile Carriers Forum (MCF). See for more information the portrait of Croft.

In 2016, he published [an article](#) together with an employee of telecommunications company Telstra.

He has done [contract work](#) on the issue of smart meters for the private company EMC Technologies Pty Ltd.

According to his [Declaration of Personal Interests](#) he receives research support "from two engineers employed by Telstra Corp and one by the Australian Mobile Telecommunications Association."

Tongning Wu

Biography

According to ICNIRP's website Tongning Wu is a senior engineer in the Chinese Academy of Information and Communications Technology. His research focusses on electromagnetic dosimetry, anatomical modelling and biomedical applications of electromagnetic fields.

He is the member of International Advisory Committee (IAC) on Electromagnetic Fields of WHO. He also participated in the IEC/IEEE workgroups on EMF safety. He is currently the co-rapporteur of ITU-D Q7/2 (Strategies and policies concerning human exposure to electromagnetic fields).

He became a member of the ICNIRP Scientific Expert Group (SEG) in 2019.

Position

Wu agrees with the general ICNIRP assessment that “to date, no adverse health effects of the EMF, linked to these applications, have been established.” This was also one of the conclusions of [a study ‘Electromagnetic fields \(EMF\) exposure’](#) published in 2019.

In 2012 WU published [a study on ‘A large-scale measurement of electromagnetic fields near GSM base stations in Guangxi, China for risk communication’](#). The results were that “in general, the measurement mission promotes the science on EMF exposure among the general public. Risk-related public behaviours have been positively influenced. The mission also facilitates the cooperative conflict resolution. It helps strengthen the effectiveness of risk communication.”

Possible conflicts of interest

His DOI gives no information.

See Van Rongen and others on the role of IEEE/ICES.

Annex I

Questions put to ICNIRP's secretariat

1 - When will the ICNIRP Annual report 2019 be published?

2 - Are the 14 members of the Commission being paid for their work for ICNIRP (for "representing ICNIRP externally and mostly in its relations with the international and national partners and the press" as well as for their collaboration on specific Projects?)

3 - Same questions as n° 2 go for the Scientific Expert group and the Project Groups?

4 - If they are not paid, do you consider this as a normal practice that international renowned experts work for free, especially given the importance and influence of the work of ICNIRP?

5 - ICNIRP itself claims it is "free of vested interests". ICNIRP's budget relies on support granted by public bodies; Why is the income not specified in your annual reports? Is it possible to get specifications from which public bodies you get which amounts?

6 Who selects the 14 members of the Commission and how?

7 - ICNIRP's statutes state: 'No member of the Commission shall hold a position of employment that in the opinion of the Commission will compromise its scientific independence'

Do we understand it correctly that basically the Commission evaluates itself about possible conflicts of interest? What are the rules by which the Commission judges if interests of the members compromise the scientific independence?

8- In its statement on the declarations of interests ICNIRP states: "The evaluation of personal integrity is very complex and might never be achievable in a perfect way. It is the duty of the ICNIRP Commission to carefully consider and decide if the declared interests potentially constitute a conflict of interest."

By which criteria or protocol are these considerations and decisions being made?

9- Do you consider the membership of IEEE ICES by some ICNIRP-members as a possible conflict of interests?

10- How do you explain the fact that a private organisation like ICNIRP, which is not accountable in democratic terms to anyone, has the position to de facto "determine" via guidelines the EMF policies of most EU member states?

Several attempts to get a reaction to

these questions remained unanswered'

Annex II

Questions put to emfproject@who.int

On your website, you write: "Because disparities in EMF standards around the world has caused increasing public anxiety about EMF exposures from the introduction of new technologies, WHO commenced a process of harmonization of electromagnetic fields (EMF) standards worldwide. With 54 participating countries and 8 international organizations involved in the International EMF Project, it provides a unique opportunity to bring countries together to develop a framework for harmonization of EMF standards and to encourage the development of exposure limits and other control measures that provide the same level of health protection to all people. "

1 - Is there a time schedule for this process of harmonization of electromagnetic fields (EMF) standards worldwide?

2 - We see on your website that the last EMF -WHO meeting took place in 2018. Are there any new meeting planned and if yes when?

3 - Do you know what IARC is currently working on and if so when will IARC publish an update of the monograph?

<https://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-Identification-Of-Carcinogenic-Hazards-To-Humans/Non-ionizing-Radiation-Part-2-Radiofrequency-Electromagnetic-Fields-2013>

4 - How do you consider the debate on "conflicts of interests" in this specific research area? Would you agree that there has been and still is a lot of attention for this debate? Has his debate been useful in narrowing the divide in the scientific community? What is in your view the role of the WHO on this?

(see for example this recent letter published in "Bioelectromagnetics":
<https://onlinelibrary.wiley.com/doi/full/10.1002/bem.22225>)

These questions remained unanswered

The International Commission on Non-ionizing Radiation Protection: Conflicts of interest, corporate capture and the push for 5G

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