5G: Understanding Health Risks

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What does science have to say about the health risks of 5G Technology?

The World Health Organization (WHO) classifies non-ionizing radiofrequency radiation (RFR) as a possible human carcinogen. It is, therefore, incredible that not a single, peer-reviewed, scientific study has been carried out on the health risks associated with 5G technologies that emit low frequency (700MHz), high frequency (3.4-3.8 GHz, centimetre (CM)) or extremely high frequency millimeter (MM) (26 GHz and above) RFR. Neither the telecommunications industry, nor the World Health Organization (WHO), nor the International Commission on Non-ionizing Radiation Protection (ICNIRP), nor any government regulatory agency conducted empirical experimental research on the biological or physical effects of real-life 5G communication signals (as opposed to artificially generated signals), in the low, high or extremely high frequency millimeter bands currently being deployed in the UK, Europe or the US. If this sounds incredible, just check PubMed/Ovid Medline, or EMBASE, or the Cochrane Library, or Google Scholar, the databases of record when it comes to medical research. There is not a single study recorded in any of these.

There are, however, a significant number of published peer-reviewed papers that identify the risks of 5G technology based on the findings of thousands of peer-reviewed empirical studies on microwave non-ionizing RFR from 2-4G and WiFi technologies (see Di Ciaula, 2018; Miligi, 2019; Russell, 2018; and Kostof et al. 2020 for examples). There are also a number of reviews and general studies focusing on extremely high frequencies up to 100GHz that may be used in 5G (Neufeld and Kuster, 2018; Simkó and Mattsson, 2019). All find a high risk of adverse biological effects.

What are the health risks of non-ionizing RFR?

A recent research review on the health risks of microwave RFR, involving independent verification based on 5,400 studies in the MedLine database, concludes that *"the literature shows there is much valid reason for concern about potential adverse health effects from both 4G and 5G technology"* and that extant research *"should be viewed as extremely conservative, substantially underestimating the adverse impacts of this new technology"* (Kostoff et al. 2020).

Kostoff et al. report that peer-reviewed studies show the following adverse health effects well below the safety limits set by the UK based on ICNIRP guidelines:

- *"carcinogenicity (brain tumors/glioma, breast cancer, acoustic neuromas, leukemia, parotid gland tumors),*
- *genotoxicity (DNA damage, DNA repair inhibition, chromatin structure), mutagenicity, teratogenicity,*
- *neurodegenerative diseases (Alzheimer's Disease, Amyotrophic Lateral Sclerosis),*
- *neurobehavioral problems, autism, reproductive problems, pregnancy outcomes, excessive reactive oxygen species/oxidative stress, inflammation, apoptosis, blood-brain barrier disruption, pineal gland/melatonin production, sleep disturbance, headache, irritability, fatigue, concentration difficulties, depression, dizziness, tinnitus, burning and flushed skin, digestive disturbance, tremor, cardiac irregularities,*
- *adverse impacts on the neural, circulatory, immune, endocrine, and skeletal systems."*

What is the scientific consensus on health risks?

It is significant that the vast majority of independent original experimental and epidemiological research studies and scientific review papers identify the health effects documented above (cf. Belpomme et al. 2018; Belyaev et al. 2016; Miller et al., 2018; for examples of the latter). In addition, following its own extensive empirical research on 2-3G radiation, which identifies clear evidence that RFR is carcinogenic (Lin, 2019), the US National Institute of Environmental Health Sciences' National Toxicology Program (NTP) is investigating whether 5G poses similar risks to human health (National Toxicology Program, 2018b). Inter alia, *"NTP scientists found that RFR exposure was associated with an increase in DNA damage. Specifically, they found RFR exposure was linked with significant increases in DNA damage in: the frontal cortex of the brain in male mice, the blood cells of female mice, and the hippocampus of male rats"* (NTP, 2018b). These concerns are echoed and amplified in the conclusions of other systematic reviews (see Di Ciaula, 2018; Russell, 2018), which argue that precautionary approaches need to be adopted by governments, given the known risks (Miligi, 2019). Significantly, Italian medical consultant and researcher Agostino Di Ciaula (2018) underlines concerns and concludes from his review of the scientific and medical literature that 5G technology is of great concern as the ***"available findings seem sufficient to demonstrate the existence of biomedical effects, to invoke the precautionary principle, to define exposed subjects as potentially vulnerable and to revise existing limits."*** Thus, the majority of peer-reviewed scientific studies conclude that 2-4G and WiFi, and by logical generalization, 5G, puts those exposed to RFR signals at significant health risks, even at exposure levels 100,000 times lower than PHE/ICNIRP safety guidelines. However, the European Academy for Environmental Medicine (EUROPAEM) EMF Guidelines (Belyaev et al. 2016) indicates a non-thermal safety level of 1,000,000 to 100,000,000 times less than PHE and ICNIRP guidelines.

Is 5G RFR carcinogenic?

Few policymakers and healthcare professionals understand why in 2011 the WHO's International Agency for Research on Cancer (IARC) classified non-ionizing RFR a Class 2B possible carcinogen. RFR's status as a major environmental toxin and carcinogen has been confirmed in numerous studies since. A recent scientific review of RFR studies and the links with cancer is unequivocal and states that "[m]obile phone radiation causes brain tumors and should be classified as a probable human carcinogen (2A)". However, new experimental and epidemiological research has scientists conceding that it should be reclassified as a Class 1 human carcinogen. Accordingly, an IARC Advisory Group of 29 scientists from 18 countries recommended that non-ionizing radiation be prioritized by the WHO's International Agency for Research on Cancer (IARC) Monographs programme during 2020–24. It is significant that former ICNIRP members are now recognizing this and also calling on the IARC to review its classification (see Lin, 2019). 5G RFR's status as a carcinogen is played down by the media and its relative risks as such is not understood, particularly by scientists and medical practitioners advising PHE.

What is the primary biological mechanism that leads to toxinogenic and carcinogenic effects?

Non-ionizing RFR is considered by the majority of independent scientists as a potent environmental toxin, due to its ability to cause oxidative stress in animal and human cells (Belpomme et al. 2018). The relationship between non-ionizing RFR, the increase in free radicals/reactive oxygen species, the reduction in anti-oxidants, and oxidative stress in human cells of all types is significant. The vast majority of studies identify oxidative stress as the mechanism through which cancer and a range of other health ill-effects occur through exposure to most environmental toxins, including RFR. Of particular concern here are the effects on children's neurological and psychological development caused by RFR exposure—paradoxically, these impact learning.

Why are the health risks of exposure to RFR significant?

As with any environmental toxin, the risks related to RFR exposures increase with the frequency and duration of such exposures over time. Unlike other carcinogens, RFR is truly ubiquitous: it radiates from multiple personal and WiFi devices, routers, access points, in the home, public spaces, hospitals, cars, in schools, and a web of antennae across the built environment. Thus, exposure to this carcinogen and general toxin is of high frequency and long, if not continuous, duration. This maximizes the risk of persistent and continuous oxidative stress and, hence, exposure to ALL the health risks listed earlier. Children are particularly vulnerable to such threats, which have a high impact, and therefore significant risk. Hence, scientists and medical practitioners globally are of the opinion that ubiquitous 5G sources, not just antennae in cell stations, present high levels of risk to human health and well-being (5G Appeal, 2019).

Why doesn't the UK Government and the Fourth Estate act to protect the public?

UK policymakers look to Public Health England (PHE) to assess the safety of non-ionising RFR. The PHE's position on this draws heavily upon two reports by the Advisory Group on Non-ionising Radiation (AGNIR). These were published in 2012 and 2017. The Department of Health's Committee on Medical Aspects of Radiation in the Environment (COMARE) also looks to the AGNIR reports for guidance. It is therefore incredible that when it issued its last report, ICNIRP members, from an NGO based in Munich, constituted 30% of the 18 member UK committee. Note that AGNIR's primary role is to assess the ICNIRP's safety guidelines, which reflect industry interests not those of public health. In no other regulated sector or area of business activity would this be acceptable from a conflict of interest or governance perspective.

The ICNIRP's current guidelines, published in 1998, focus on technical issues and present safety recommendations for the thermal effects of non-ionizing RFR on adults only. They effectively ignore or deny the existence of non-thermal effects on adults and children. Both the ICNIRP and the related EU Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) are 'captured' organisations—that is they are heavily influenced by industry-funded researchers and industry itself. Take, for example, that scientists from the ICNIRP, who are also members of SCENHIR, have well-acknowledged conflicts of interest due to their close ties with industry. An Italian court judgment recently recognised this. The court ruled that research reviews carried out by the ICNIRP were biased and could not be trusted in determining whether there was a causal link between wireless cell phone use and brain cancer.[1] The court decided that there was, and its judgment was based on extant independent scientific studies.

Independent peer-reviewed research continues to identify significant research deficiencies, omissions, inaccuracies, and distortions in both ICNIRP and SCENIHR reports (Starkey, 2016; Belpomme et al. 2018). Former ICNIRP members are now recanting (see Lin, 2019). Because of the over-reliance on flawed ICNIRP guidelines, PHE and UK policymakers possess a fundamental ignorance of the large body of extant research on the significant non-thermal health effects of non-ionising RFR. There is an increasing body of evidence by peer-reviewed academic research which confirms that governments and policy-makers are being misled by the ICNIRP, or are turning a blind eye for economic reasons related to national digital transformation strategies. As in other areas of UK life, the state ends up either ignoring or is deficient in protecting the rights and well-being of its citizens and its children.

The UK press and public media, such as the BBC, are complicit in this failure, due to their tendency to sensationalize public concerns, on one hand, and failure to conduct proper investigative journalism, on the other. Journalists fail to question the credentials and possible conflicts' of interest their selected 'experts' possess. The result is more often than not inaccurate and false news and reporting in almost all media, including, for examples, the BBC and The Guardian, who are particularly egregious in this regard.

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[1] https://www.radiationresearch.org/wp-content/uploads/2020/01/Turin-Verdict-ICNIRP_Judgment-SUMMARY-of-the-Turin-Court-of-Appeal-9042019_EN-min.pdf