

March 2021

Statement regarding harmful biological effects of communication radiofrequencies

The recent concerns of citizens and scientists around the world regarding the harmful effects of radiofrequency electromagnetic radiation (RF-EMR) associated with existing wireless technologies and the 5G rollout have been routinely dismissed in many countries. This is because world authorities have been guided by a handful of scientists connected with industry, who have claimed that no established health effects occur below the ICNIRP RF-EMR safety limits. The only way to test this claim is by using the true weight of evidence from scientific research.

To this end, the Oceania Radiofrequency Scientific Advisory Association (ORSAA)¹ has collated the scientific research publications, presented in the summary report below. This evidence-based communication is offered in order to clarify the state of the art and science on this topic, thereby empowering world governments and authorities to make informed decisions that are independent of industry-biased advisors.

The main points are:

1. The weight of evidence points to a range of concerning biological and health effects;
2. These effects occur at power levels that are typical of everyday exposures that sit far below international thresholds recommended by industry-friendly guidelines developed by the International Commission on Non-Ionising Radiation Protection (ICNIRP);
3. To allow the levels and frequencies of exposures to continue unfettered is to put the world population and the environment at great risk, especially young people.

The ORSAA Database on EMF Bioeffects (ODEB) as an objective source of evidence

The ORSAA database is the world's largest categorised database concerning RF bio-effects research. It was originally seeded using the extensive research collection of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), kindly transferred on request. Over the last 5 years, ORSAA has continued to expand on this collection to build ODEB, using a non-biased selection process, sourcing papers from internationally renowned research databases and libraries including the National Library of Medicine, Pubmed, MEDLINE and EMF-Portal (Aachen University). In addition, Prof. Henry Lai, a renowned researcher in the field of EMF effects and one of the first to show low-intensity RF-induced DNA damage, donated his complete collection of RF-EMF papers to ODEB. Interestingly, Prof. Lai had classified his papers into "Effect" and "No Effect" categories, a very similar procedure to the one that has been independently used by ORSAA to add papers to ODEB. When adding Prof. Lai's collection of research papers, ORSAA researchers noted a very high consistency in classification decisions (98%) between the papers common to both collections. This finding engendered confidence in the reliability of the ODEB classification system.

There are now over 2200 RF-EMR scientific publications collated within ODEB, providing a balanced and comprehensive representation of the existing research. The majority of these papers (90%) are focused on RF exposures operating below ICNIRP occupational and public limits. Capturing papers

¹ ORSAA is an independent organisation of researchers who are not aligned with industry or government.

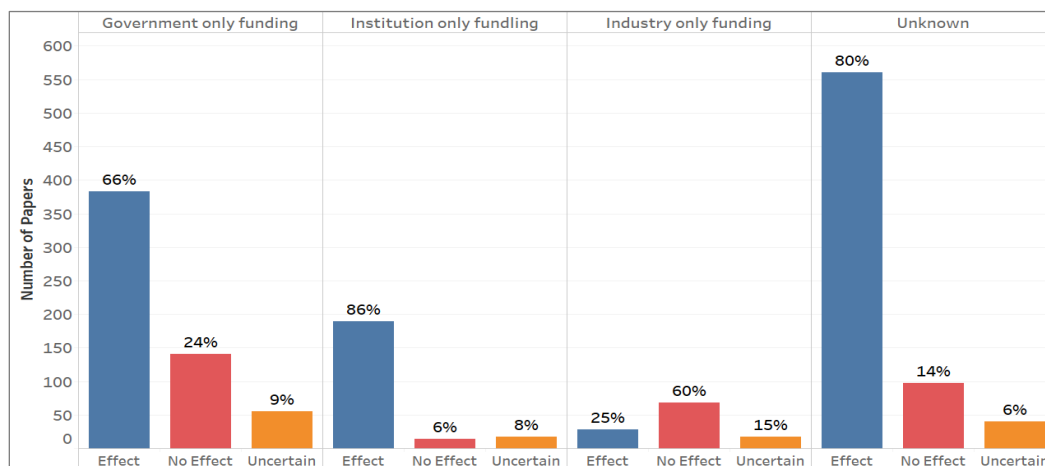
with this focus was a strategic choice, intended to assist ORSAA with weighing up the evidence for biological effects at exposure levels that sit within current ICNIRP “safety” limits.² It was anticipated that the weight of evidence that emerged from this exercise would then allow ORSAA and other researchers to gauge whether or not there really was any established evidence for biological harm. On this basis, policy makers could then make informed choices about future directions. As shown below, the weight of evidence emerging from the ODEB research collection is compelling, allowing an overall scientific consensus statement to be made:

Biological harm occurs from everyday levels of manmade radiofrequency exposures.

Weight of evidence: Analysis of the ODEB classifications provides the following important insights:

- There are 2065 papers collated in ODEB that investigate the effects of RF-EMR exposures lower than ICNIRP exposure limits. Of these, 69% show effects, 22% show no effects and 9% draw uncertain conclusions regarding effects. This provides clear evidence that biological and health related effects are occurring below ICNIRP RF limits.
- The breakdown of ‘effects’ versus ‘no effects’ as findings against the source of funding reveals a clear interaction between conclusions drawn from papers and their funding source (see Figure 1). A publication bias is apparent, whereby industry funded studies have a strong tendency to report no effects. This is in direct contrast to, and vastly outweighed by, the pattern of evidence from studies funded by government, or institutions, or even undeclared funding, that mostly find effects.

Figure 1: Proportion of papers in ODEB drawing conclusions of effects, no effects and uncertain effects, according to funding source.



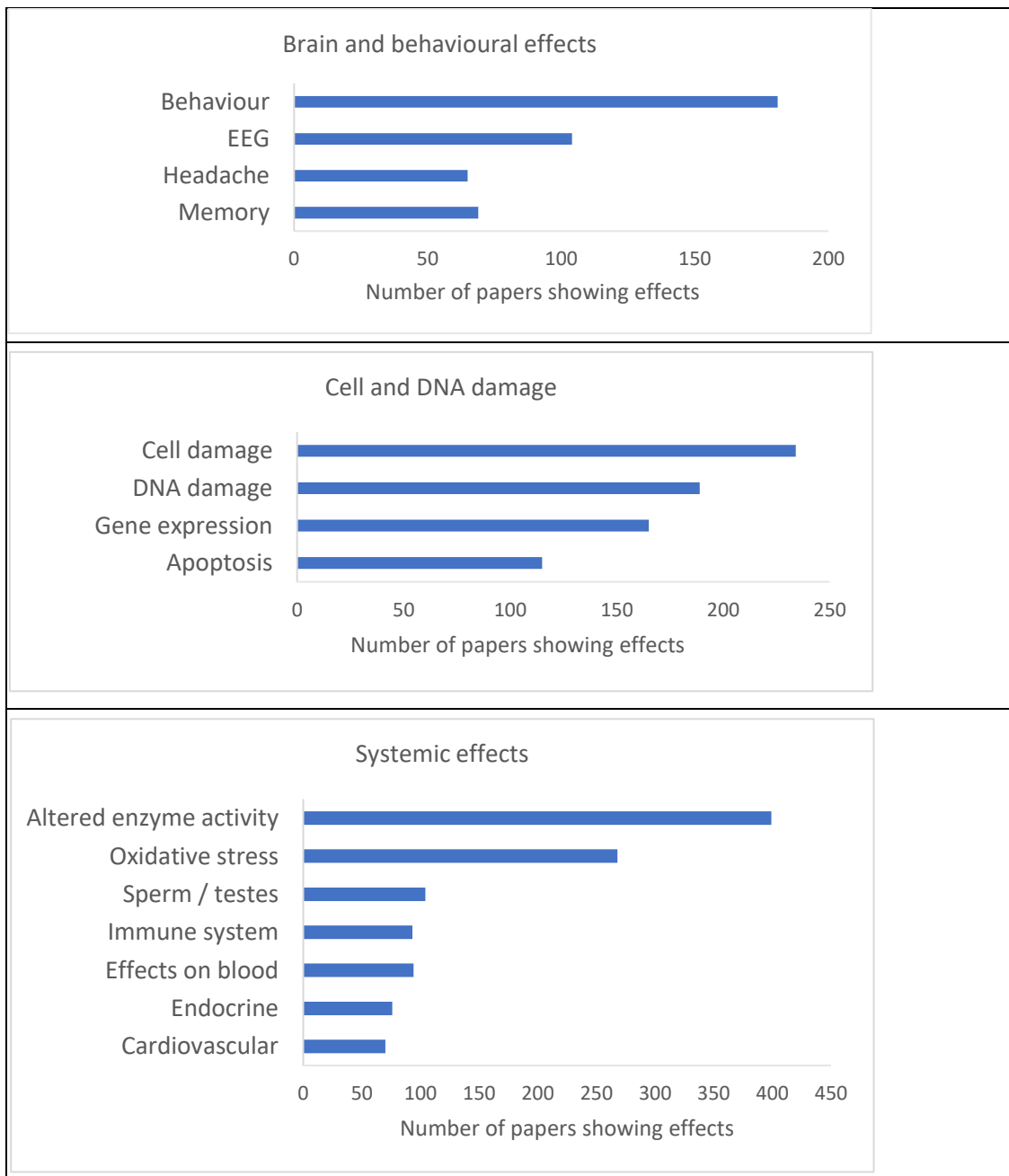
Notes:

- These figures are of February 2021. New papers are continually being added to ODEB.
- An “Effect” classification is made when a statistically significant biological effect has been noted. “No Effect” means no statistically significant findings were established. An “Uncertain” effect is when an effect was noted but the authors were unsure or questioned the relationship between effect and exposure.
- There are other papers that are funded by combinations of sources or other sources; however, these constitute a small number of papers relative to the major categories, and have no effect on the pattern of effect findings. Therefore, these papers have been omitted from the analysis in order to simplify communication.
- The interaction between conclusions drawn and funding source is statistically significant ($\chi^2_6 = 194; p < .001$), confirming that different funding sources show different patterns of results.

² The current safety threshold for RF radiation is set to a specific absorption rate (SAR) for nearfield exposures where the body’s core temperature will not rise by more than 1 degree Celsius for 6 minutes of localised exposures or 30 minutes for whole body exposures.

The ODEB classification system also identifies some of the significant and common biological endpoint categories such as oxidative stress, cell damage, neurotransmitter effects, and endocrine changes. Figure 2 summarises the proportion of papers showing effects for biological and health categories where ODEB contains more than 70 papers for that category. The figure below clusters the categories into three pertinent themes: 1. Brain and behavioural effects 2. Changes to cells and DNA and 3. Systemic effects. Given that the evidence for these biological end points is so strong, these endpoints can be considered to be “established” effects for exposures to RF radiation at low intensity levels.

Figure 2: The number of papers in ODEB showing effects for the endpoint categories containing over 70 papers.

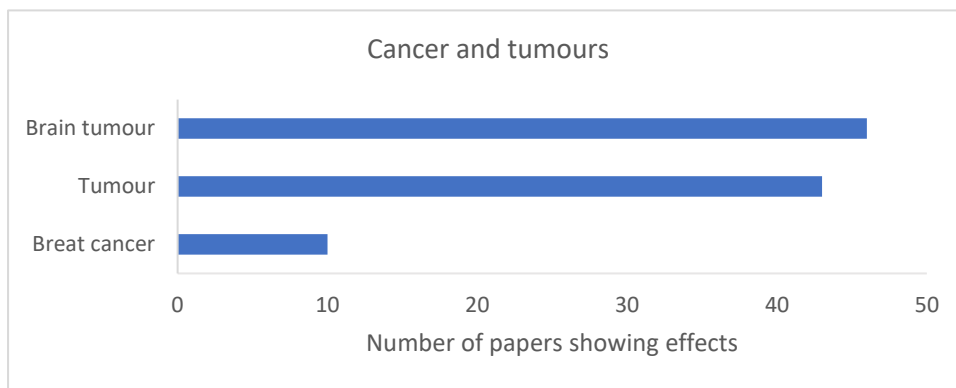


Biological and health effects: The above data summaries use endpoints for biological effects, some of which are clear health effects. While some biological effects do not necessarily translate to health effects they cannot be ignored because they indicate biological interference. Importantly, many of the biological effects identified as induced by RF-EMR are known to be involved in the

pathophysiology of diseases. For example, DNA damage is involved in cancer, and neuronal damage underlies neurodegenerative diseases. Some biological effects identified above also provide further information on the mechanisms of cellular damage and chronic disease onset, such as oxidative stress (an unfavourable physiological state with the accumulation of excess reactive oxygen species). If this state persists, it can lead to chronic inflammation and chronic diseases such as diabetes, atherosclerosis, depression, and Alzheimer’s Disease. Those with existing medical conditions and older people with low antioxidant defences are likely to be affected more readily by such RF-induced oxidative stress. This claim is not unique and has been recently reinforced by the Swiss expert group on electromagnetic fields and non-ionising radiation in a special issue newsletter (BERENIS, 2021).

Cancer: It is well established that DNA damage and other forms of cell damage such as metabolic dysfunction from mitochondrial damage can lead to cancer. RF exposure has been linked to these types of damage. Furthermore, various types of cancer have been found in well conducted studies using low intensity exposures to RF-EMR. There are over 100 papers in ODEB pertaining to cancers or tumours associated with RF-EMR exposures, as shown in Figure 3.

Figure 3: The numbers of papers in ODEB showing tumour or cancer effects.



Need for biological safety limits indicated: The above results emerging from ODEB demonstrate a number of biological effects that are not caused by heat damage. The mechanisms for harm are biochemical and biophysical, and cannot be explained by thermodynamics (Belyaev & Markov, 2015; Giuliani & Soffritti, 2010). Unfortunately for humanity, the current “safety” limits for RF exposures ONLY protect against effects due to heating of tissue. In contrast, the above results show a range of non-thermal effects that occur many orders of magnitude below the public RF exposure limits. Therefore, the RF Guidelines and Standards that have been adopted by many countries do not provide sufficient protection against biological harm, and cannot assure “safety” in the long term.

Risk assessment required: A rigorous health risk assessment needs to be conducted by scientists and clinicians with strong ethical foundations, with no conflicts of interests. Researchers who have received industry funding or have worked for industry should be explicitly excluded due to potential biases and conflict of interest. Furthermore, those chosen experts need to be well qualified with medical and biological qualifications. Such expertise is essential for evaluating the health risks, in contrast with the current crop of physical scientists, psychology researchers and engineers dominating the prevailing non-ionising radiation protection organisations.

Future protection: Children and youth are a special group at risk. Their exposures to RF radiation are much greater than 30 minutes per day, and will be lifelong. While neurological and behavioural effects have been observed, the full effects of long-term exposures to this generation are yet to be fully realised. No precaution to address long-term exposures has been taken in the setting of current limits. The scientific evidence demands that policy makers act now so as to protect the next generation from the evident harm indicated by existing knowledge.

Yours sincerely,

ORSAA

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Database: https://n431.fmphost.com/fmi/webd#Research_Review_V4

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Giuliani, L., & Soffritti, M. (2010). *Non-thermal effects and mechanisms of interaction between electromagnetic fields and living matter*. Bologna, Italy: National Institute for the Study and Control of Cancer and Environmental Diseases "Bernardino Ramazzini".