

# A summary of research into the biological and ecological effects of radiofrequency radiation (RFR)

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**"Lack of definitive proof that a technology is harmful does not mean the technology is safe," Mark Hertsgaard & Others**

## Introduction

In this summary I am looking primarily at RFR via wifi, sometimes referred to in studies as wireless communications radiation (WCR). The full range of RFR includes that from electrical wiring, both within the home and work-places as well as high-power sources such as transmission lines and pylons. Through a spectrum of (eg) microwave ovens, tablets, fitbits and computers to X-Rays right up to the mega-devices such as HAARP and its offshoots, including underwater arrays (probably the most recent development). It also includes that other invisible phenomenon, light.

WCR is invisible, and to most of us, undetectable. We really should be grateful to those who are particularly sensitive as they show us that we are all being effected but just below our own personal threshold.

All RFR is invisible and silent so most people find it hard to appreciate that it can have an effect on them. Despite sunlight also being invisible, we know it has a heating and a tanning effect and that too much or too strong we will get sunburnt, which is very painful. Most people have not drawn a parallel with WCR: **yet**

## Problems of Scientific Study

With thousands of published studies on the effects of RFR on biological tissue (including on animals and humans), it is impossible to make a proper analysis of all of it individually, yet it may turn out to be the single most devastating omission of humanity.

Probably the biggest problem with current research on WCR is that the vast majority are studied under controlled conditions, often in the lab. As **S Cucurachi** et al wrote in their meta study, few studies

*"emulate the complex modulation patterns and intensity variations typical to real RF-EMF exposure. Few of the studies found were performed in the field and engaged in real exposure conditions ..."*

Simultaneously this comment makes the observation that the exposure in the 'real world' really **is** complex. The scientific method of attempting to isolate from and eliminate co-factors is sound in as far as it goes. Science is still not very good at looking at complex, multi-faceted situations as exist today in every city and town of the world and increasingly in many rural locations. To some extent epidemiology does correct this but gives correlation and not cause so is often considered an inferior science if a science at all. That is unfortunate as it is the best way to allow for such natural complexity.

A notable recent (2022) exception is the long-term observational study by **Diana Kordas** on the reduction and loss of insects and other species in an otherwise unpolluted Greek island of Samos. This study in and of itself must be a wake-up call for the world. I recommend that every reader of this summary read that paper in full.

Another problem is that science likes reproducibility. Biological tissue and animals, including people, are not consistent. The 'higher' up the chain we go the greater is the

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inconsistency. Science does not like that and often dismisses the outliers such as those sensitives mentioned in the introduction. This is short-sighted in the extreme, especially in sickness and health. We do not expect a 120kg adult to be given the same drug dose as a 30kg child or a baby. There is a similar relationship with WCR and you do not need a science degree to realise it.

### Funding and Politics

"He who pays the piper calls the tune" - an instructive proverb in this context. The organisations paying are usually the industry and/or the Government. There is a clear case of Conflict of Interest (Col) with industry funding, less so with Governments in a direct sense, but where politicians or committee members have some financial or other relationship (often related to ego or career) there can be an indirect or hidden Col.

Funding of a study is rarely cited in meta analyses yet one such study some years ago (2006) by **Professor Henry Lai** showed that results did vary according to the funding. In some cases, when the research gave the 'wrong' result the study was closed, funding stopped and the study never released. **Mark Hertsgaard** writes *"He analysed 326 safety-related studies completed between 1990 and 2006, he discovered that 44% of them found no biological effect from mobile phone radiation and 56% did; scientists apparently were split. But when he recategorised the studies according to their funding sources, a different picture emerged: 67% of the independently funded studies found a biological effect, compared to 28% of the industry-funded studies."*

Government policy is also itself subject to questions of Col and **Dr Sarah Starkey** did excellent research a few years ago (2016) on the links between standard setting bodies such as ICNIRP, AGNIR, PHE<sup>1</sup> where her report

*"describes incorrect and misleading statements from within the [AGNIR] report, omissions and conflict of interest, which make it unsuitable for health risk assessment. The executive summary and overall conclusions did not accurately reflect the scientific evidence available."*

She notes the many people who were on more than one of these committees and some of the research that was omitted when decisions on exposure levels were decided. Although published in 2012, it failed to recognise the 2011 report of the International Agency for Research on Cancer (IARC) which classified RFR as a *"possible human carcinogen"*.

In an analysis of Starkey's report, **Annelie Fitzgerald**, a member of the Safe Schools Information Technology Alliance (SSITA) wrote:

*"There is an obvious conflict of interest in allowing scientists who are members of the body pronouncing on safe exposure guidelines to sit also on panels tasked with evaluating the science relating to the adequacy of the guidelines."*

Unfortunately not obvious enough for everyone since there is a large body of support on the negative influence of Col on science and other research. We might ask why the UK Government quietly closed AGNIR after the publication of Starkey's research.

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1 The International Commission on Non-Ionising Radiation (part of the WHO as is IARC), the Advisory Group on Non-ionising Radiation and Public Health England.

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### Three Notable Studies (as examples):

#### 1, Corona Virus Disease 19 (2021)

<http://dx.doi.org/10.18053/jctres.07.202105.007>

In a 2021 study on the possible effects of WCR on Covid-19, **Rubik and Brown** noted *"several mechanisms by which WCR may have contributed to the COVID-19 pandemic as a toxic environmental cofactor."*

Notice how careful they are with their words. They are **NOT** writing that WCR, or 5G specifically, **causes** Covid-19. They list several mechanisms which I have attempted to put into plain language:

1. Changes to the red cells in the blood
2. Impair micro-circulation of the blood leading to reduced oxygen to tissue (hypoxia)
3. Increase dysfunction of the immune system including excess inflammation
4. Increase cellular oxidative stress (free radicals)
5. Increase (via Calcium) the intra-cell entry, replication and release of viruses
6. Affect heart rhythms and other heart disorders

In short they class WCR as a *"ubiquitous environmental stressor"*. Ubiquity is a major point of concern with RFR since none of us can escape its influence.

They explain the epidemiological triad of disease: **cause**, ie the agent or pathogen (eg virus), the **environment** and the **health** of the host (person).

Very quickly the SARS-CoV-2 virus was blamed and that it most seriously affected people with chronic illnesses, especially the elderly, but no-one has taken account of possible environmental factors. This is despite the fact that Wuhan, as well as having much industrial pollution, was the first city globally to be bathed in WCR and fully covered by 5G signals. Northern Italy where it appeared next was also heavily radiated and it could have been a consideration but was ignored.

In conclusion they argue:

*"Our review highlights that there is a clear need for the study of the effects of RF-EMF on more species and organisms and, by means of field studies, on populations and interactions between species."*

#### 2. An Observational Study on Species Decline (2022)

<https://safetechinternational.org/wp-content/uploads/2022/03/5G-causes-massive-insect-declines-on-Samos.pdf>

**Diana Kordas** lives in a remote spot on the Greek island of Samos. She is an inveterate observer and, with her husband, had noticed whilst walking around the island that the insect populations she was used to seeing were no more. As she succinctly observes in the paper, it is more difficult to notice when something is no longer present than when something makes its first appearance. Once she noticed the trend she made careful recorded observational notes over several years before publishing an article in 2022. Her article contains tables of species identified.

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She comments that all of us of a certain generation will have noticed that we no longer get dead insects on the car windscreen as we drive around in the summer. I'm sure that I am not the only one here in the UK who has noticed this. For Kordas, she reports it occurred shortly after the introduction of 4G/LTE.

She adds, *"This fact that this phenomenon is worldwide also demonstrates another important point: high or low RF radiation standards do not matter. ... power levels of RF radiation are not the driving factor"*

As an aside she notes that bees, an important pollinator, have already gone extinct in 5 USA states, and she asks rhetorically, "Why is RF radiation not classified as a pollutant?" I can answer that and report that by some scientists and organisations it **is** classed as a pollutant.

She argues for more observational studies as they can be done without killing the very animals of concern, and, as she wryly writes, *"insects do not mind being observed"*. Where she lives is a rural area with no large farms; no-one uses pesticides; local people all grow vegetables organically and there is a rich diversity of plant life. A near perfect environment for all wildlife - apart from the WCR.

She presents a compelling case.

### 3. A meta Analysis (2012)

<https://www.sciencedirect.com/science/article/pii/S0160412012002334>

In "a review of the ecological effects of radiofrequency electromagnetic fields", **S Cucurachi** et al made a (self confessed) limited study of 113 published, peer reviewed studies, the majority of which (90%) were laboratory based.

*"In 65% of the studies, ecological effects of RF-EMF (50% of the animal studies and about 75% of the plant studies) were found both at high as well as at low dosages. No clear dose-effect relationship could be discerned."*

The report speaks for itself and the researchers note:

*"... a radical modification has also taken place in the exposure of beings to man-made electromagnetic fields. A continuous, chronic, exposure to a wide range of modulated radiofrequency electromagnetic fields (RF-EMF) burdens all species and groups across the globe."*

*"... it became clear that, especially under higher dosages, effects of RF-EMF may be observed."* [Higher dosage with WCR would mean a longer time exposure.]

*"many human related biological studies using animal models (e.g. rats and rabbits) may provide also relevant information about potential ecological effects."*

*"it is then plausible to link biological studies with ecological endpoints at the individual animal level to ecological interpretations at a higher organisation level."*

They also note that, at that time there was a large gap in research. 10 years on now in 2022 that gap may have been filled but at the very least there is much more research.

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The strength of this and similar meta studies is that it can cover a range of animals; insects, birds and mammals. The weakness of this particular study is that most of it was laboratory based and as the researchers themselves noted in the comment quoted in my "Problems" section above; it is not the 'real world' of everyday living. However:

*"The impossibility of conducting laboratory experiments into the effects of RF-EMF on humans steadily increased the number of scientific studies on laboratory vertebrate models. As suggested by the WHO (2006), **studies conducted on immature animals can, for instance, provide a useful indicator of possible cognitive and behavioural effects on children.**"*

### **Final Thoughts**

Maybe now you can see that there is a strong body of evidence that WCR / RFR **does** have effects on biological, tissue and thus on humans. Just as does the sun. Even from these three studies it becomes clear that the industry is not being open and neither are our Governments. For what reasons our Governments might not be entirely truthful I leave you to speculate.

My final, personal, comment is that most of the nay-sayers are physicists, electrical engineers or computing scientists who know little or nothing about biology.

As a final non-science comment it is worth noticing that a Guardian article by **Mark Hertsgaard** (author and environment correspondent) wrote:

*"One key player has not been swayed by all this wireless-friendly research: the insurance industry. In our reporting for this story, we found not a single insurance company that would sell a product-liability policy that covered mobile phone radiation. "Why would we want to do that?" one executive asked with a chuckle before pointing to more than two dozen lawsuits outstanding against wireless companies, demanding a total of \$1.9bn in damages."*

Shouldn't that tell us everything?