



5G MMW and Health Effects

Larger Picture & Those Outcomes

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Introduction

We have long since been discussing the potential health effects of 5G on the human system. To review and summarize the newest publications individually is one way to reach out to the public. This is a continuation of that story. The effects of 5G in our current world, mis-truths that have been told and what it means. As well as why no one else cares will all be discussed using current literature.

1 5G in the Real World

Currently, SAR standards are set to 1.6 W/kg in the US and Canada and in the EU 2.0 W/kg. These are based on thermal levels of exposure and effects and determined to be well within those 'safe' levels. The authors [3] observed a great many studies including Vilagosh et al where they determined there was no thermal effect at 30 GHz on the tympanic membrane [3]. This is fair but not the appropriate response. There is no thermal effect, however there is still an effect that leads to potential cancer. Beyond that of a thermal effect there is a link between mobile phones and acoustic neuromas and schwannomas[2]. It doesn't matter if in the real world you base your effects on current standards, then ignore real world observations.

The authors, Morelli et al, determined that the SAR rates were within acceptable levels for all users in the three standard use modalities of calling, texting and scrolling. They did however note that there were specific localizations of exposure that were significant. The authors note that this could become an issue for certain tissues, such as the eyes, that are not only at the surface but less perfused to blood and cannot redistribute heat as well [3].

In their protocol for the study they based real world exposure on the outer ear for phone use and finger tips for browsing. This study does not include non-use exposure such as carrying your

phone in your pocket and testicular/ ovarian exposures.

The authors do however note that exposure for children is potentially different than the adult models the standards have been based on. They also note that when it comes to mmW technology it will be of little difference between adults and children since the absorption will be go to minimal depths. They do note that as water increases absorption the elderly may have a greater risk due to exposure [3].

1.1 Thermal Effects Thresholds

We can all agree that the current safety standards are well within the safety limits of the probable exposure levels. Although many studies do not include durations that are probable for real world exposures.

1.1.1 Ocular Exposure

However, the potential heating effects have been modelled. Such as the ocular tissue effects modelled in Foster et al [1]. They cite experiments showing tissue damages at unexpectedly low threshold for unknown reasons.

1.1.2 Skin & Subcutaneous Tissue

For the skin exposures during the testing there was minimal data, and what was presented was at incredibly high power levels.



Cutaneously, temperature pain thresholds have been measured extensively. The results were variable depending on heat source, assessment method and subject. RF specific exposure for pain measurements was for 94 GHz at 37.5 kJ/m² which is 6 times higher than ICNIRPs exposure limits. An animal study however, produced results for 35 Ghz at 5-75 kW/m² for up to 30 seconds of exposure. This was within the expected human ranges as well [1].

Now there is something else that is interesting. Pain response is sometimes a requirement, but tissue damage is always considered bad. Such as with the US ADS (Active Denial non-lethal weapons system). This purposefully elicits a pain response in its victims, and is considered to be safe to use. The exposure limits are not required as it is a weapon [1].

Now for chronic exposure there may not be a pain response known as EAI (Erythema ab igne). Long term exposures of greater than 20 minutes with skin temperature above 43° C. Thermal pain aversion is not enough to protect tissue. This was an issue for those working with fireplaces, or stoves and became known as "toasted skin" syndrome. This has become an issue and cases of EAI have been reported from individuals with extended use of portable electronics held against the body. There are several incidents reported and a couple of studies on the duration of exposure, and temperatures required to cause damage [1].

ICNIRP considers current safety standards to be acceptable and there there is a wide enough margin to ensure safety under all conditions. These conditions include, subject mass, clothing, air conditions and many more. That individuals who have suffered from extreme exposures experienced levels far above safety standards and that it was an issue of safe work practices not exposure safety limits [1].

2 Meta Analysis of 5G

Wood et al conducted a meta-analysis on all currently published literature for MMW totalling 107 experimental and 31 epidemiological studies for review. The authors determined there were significant quality issues in current publications. Such as the laboratory studies where the multivariate analysis showed that there were increases in effect size in four laboratories out of thirty. Two of these showed significant decreases in quality score which is a concern for the assessment of impact on human health. The authors note that many of the studies were for the purpose of therapeutic devices and not for potential negative outcomes. As well, most were deemed safe by the SAR whole body exposure limits. The precise relationship between reported power density and absorbed PD is difficult to evaluate, which simply further emphasises the difficulties in extrapolating in vitro and in vivo exposures and human relationships [5].

The authors do make note that SAR, where it was successfully modelled, is absolutely required. Such as in studies where accurate electromagnetic modelling revealed a range of approximately fourfold in SAR at regions where biological material was situated where there was minimal temperature changes due to thermal conduction [5].

Their meta-analysis showed there was no dose-response relationship between exposure (PD or SAR) and effect size and counter-intuitively higher exposure counter showed lower ES. Most studies with high ES were in the 40-55 GHz range and therefore likely therapeutic investigations. The authors suggest future research focus on the higher frequency 5G rollout frequencies of 26-28 GHz and the higher bands. The authors note that there is little evidence to support the likelihood of biological effects below ICNIRP safety limits [5].

3 5G & Covid 19

Now for the big news of 2020 / 2021, the potential link between COVID-19 and 5G. This is not a conspiracy theory, and there is no direct cause, 5G does not cause COVID-19. That being said, we can now dive into what the authors discussed.

Rubik and Brown reference the epidemiological triad (agent-host-environment) which is applicable to all diseases as the reason for pursuing this avenue. They reviewed the detrimental bio-effects of WCR and determined the mechanisms by which WCR may have contributed to the pandemic as a toxic environmental cofactor. The authors determined that the potential pathways that WCR may have an effect were the following [4]:

1. morphological changes in erythrocytes including echinocyte rouleaux formation contributing to hypercoagulation
2. impairment of microcirculation and reduce erythrocyte and haemoglobin levels exacerbating hypoxia
3. amplification of immune system dysfunction, including immunosuppression, autoimmunity and hyperinflammation
4. increased cellular oxidative stress and the production of free radicals resulting in vascular injury and organ damage
5. increased intracellular Ca^{2+} essential for viral entry, replication and release in addition to promoting pro-inflammatory pathways
6. worsen heart arrhythmias and cardiac disorders

The authors go on to elucidate exactly how these mechanisms take place and how these potential outcomes can lead to decreased ability to fight

infection. Their recommendation is that individuals suffering from SARS-CoV-2 infection reduce WCR as much as reasonably achievable [4].

The authors review many potential causes of over-exposure to WCR many of which have been reviewed prior to this and remind of the various symptoms of COVID. Both of which present with a wide array of symptoms and can be diagnosed clinically. They concede that there are many factors involved and postulate that WCR contributed to early spread and the severity of symptoms. The authors go on to reiterate the history of EMF research and policies. WCR is a widespread yet often neglected environmental stressor [4].

4 Conclusions

The safety standards are set for a reason. Sometimes that reason is sound, sometimes it comes to pass it has its flaws. Why it remains, in all of its flawed glory, set to something that evidence proposes could be dangerous is a matter of money. The effect of the infrastructure that would need to change, our lives would be altered and companies that would need to change or risk being sued would be massive. Using the precautionary approach would mean change was required. We as humans are obligated to be cautious. So why aren't we?

Why would you hide that there is a link to causation in this environmental toxin and the world largest pandemic? It is easier to make the notion sound crazy than admit that RF-EMF is indeed a toxin. There are many factors present that could cause the aforementioned effects, so there is the excuse not to produce a change. This goes against the precautionary approach to medicine to "do no harm" and science.

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