

Response to: *Human Exposure to Radiofrequency Electromagnetic Fields A Proposed Rule by the Federal Communications Commission.*

Docket No. 19-226

All Links in text and attached pdf hereby incorporated by reference

For the record.

To whom it may concern –

In seeking to establish new rules on exposure to ultra high frequencies (above 100 GHz), the FCC argues that as body penetration diminishes at higher frequencies, "there is no apparent reason to expect that thermal effects will effectively change" at higher frequencies, and to extend current RF limits up to the 3 THz range.

Although both the Telecom industry and the FCC have made extensive use of this argument, does this line of reasoning make scientific sense?

No - this just seems bad science - without testing, without actual evidence, a theory remains just that - a theory. And this particular theory promotes the idea that if the outside of your body gets exposed in a concentrated way to high levels of millimeter radiation, where most (but not all) of it will get absorbed, that this somehow makes it "safe".

It does not, for the following reasons.

First, while the skin does absorb a higher percentage of shorter mm RF waves than it does of longer RF waves, decreasing RF intensity for the tissues below, it does not eliminate exposure to deeper tissues. Even visible light - a much higher frequency - with wavelengths much much shorter than mm RF (10^{-3} meters) - 450 to 780 nanometers (10^{-9} meters) - penetrates deeply - as a flashlight held to ones palm in a very dark room - once your eyes have dark adapted! - visibly demonstrates when you look at the other side.

5G mm waves do penetrate all the way through, but the deeper they go, the more attenuated they become. So, at what level of intensity does exposure become safe?

Industry advocates tacitly and covertly assume that when mm RF 5G falls below the FCC RF thermal absorption limit of 1.6W/kg that this makes them safe, just as safe as if the tissue did not get exposed at all. Yet animal studies have shown for example that even RF exposures less than 1 thousandth of that can cause leakage of the blood brain barrier and a host of other harmful biological effects. (See my ["RF Health and Safety Research: 2018 Science Summary"](#), pdf also filed, with additional references and links.)

Second, unsafe penetration and bioactivity depends not just on the frequency of the RF exposure, and on the intensity of RF exposure, but as Panagopoulos pointed out in a 2019 comprehensive review (["Comparing DNA damage induced by mobile telephony and other types of man-made electromagnetic fields"](#) *Mutation Research-Reviews in Mutation Research* **781 (2019)** 53–62), on the degree to which RF carrier signals emit variable information moment to moment, which in turn makes the emission variable in intensity, frequency, waveform etc.

5G will, as Panagopoulos documented in the review paper cited above, **expose users to potentially more harmful bioactive RF**, given the higher variability and complexity of 5G signals due to the marked increase of information transmitted per unit time.

Third, in focusing on the skin and the surface of the body for mm RF, both the telecom industry AND many safety advocates have somehow forgotten that the body has HOLES through which mm RF can enter. Ear canals, nostrils, and of course the mouth - of particular importance to people using a cell phone - or any other mm RF device when talking!

As Dr. Joel Moskowitz (Director Center for Family and Community Health School of Public Health. at U.C. Berkeley) put it in a 2019 *Scientific American* article "We Have No Reason to Believe 5G Is Safe."

<https://blogs.scientificamerican.com/observations/we-have-no-reason-to-believe-5g-is-safe/>):

“Millimeter waves are mostly absorbed within a few millimeters of human skin and in the surface layers of the cornea. Short-term exposure can have adverse physiological effects in the peripheral nervous system, the immune system and the cardiovascular system. The research suggests that long-term exposure may pose health risks to the skin (e.g., melanoma), the eyes (e.g., ocular melanoma) and the testes (e.g., sterility).”

I believe Dr. Moskowitz underestimates the problem and the potential human impact. First, **exactly because** millimeter waves *“are mostly absorbed within a few millimeters of human skin and in the surface layers,”* these layers will have much higher and more concentrated doses of RF radiation from 5G devices than they have ever gotten exposed to before. And second, because the areas of the body which would have the highest exposure, and where mm RF would have its major biological impact, includes not just the sensory nerves in the skin, or the cornea of the eye, but the eardrum in the ear, and the sensory nerves in the nose and in the tongue.

In short, the areas that will have the greatest exposure to mm RF - without precautionary safety testing - puts at potential risk user’s ability to see, to hear, to smell, to taste, and to touch. Without setting exposure guidelines based on actual research, rather than on a disproven theory that at best only applied to longer and less penetrating RF, it seems plausible to expect that long term human exposure may well cause blindness, deafness, and peripheral neuropathies of all kinds. In short, impairment of almost all of the senses that make life worth living.

I ask the FCC to **disapprove** expanding the range of frequencies for which the current radiofrequency (RF) exposure limits apply to higher frequencies, and to also disapprove the averaging of exposures over time with respect FCC exposure limits **until testing by the National Toxicology Program** has confirmed the safety of such exposures, and has clearly demonstrated they have no harmful biological effects, either alone, or in combination with other frequencies already in use.

Thank you.

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