Don’t Fall Prey to Scaremongering about 5G Scientific American

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Activists cite low-quality studies in arguing radio-frequency radiation is dangerous, but the weight of evidence shows no risk

- By David Robert Grimes on October 28, 2019

In a recent opinion piece for *Scientific American*, Joel M. Moskowitz warned of the ostensible dangers of radio-frequency (RF) radiation, stating bluntly that 5G technology could be dangerous, causing cancers and untold harm. Moskowitz concluded by insisting readers join his fellow activists petitioning against the new technology. His piece has resonated with the anti-5G movement, generating heated discussion online—but, alas, it is one that pivots on fringe views and fatally flawed conjecture, attempting to circumvent scientific consensus with scaremongering.

Firstly, science is not conducted by petition or arguments to authority; it is decided solely on strength of evidence. And claims such as Moskowitz’s are a complete misrepresentation of the evidence base. Far from being a harbinger of medical woe, the scientific consensus points starkly in the opposite direction. A multitude of quality studies conducted over the past few decades have found no measurable detrimental effect of RF radiation (RFR) on human health. In the words of the World Health Organization, “a large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established as being caused by mobile phone use.”

On the strength of epidemiological evidence, cancer fears are dangerously misguided: While American cell-phone usage has grown from virtually zero in 1992 to virtually 100 percent by 2008, there has been no indication that glioma rates have increased proportionally in the same period—a nonrelationship replicated by numerous other studies. Of course, not all studies are created equal. In biomedical science in general, low-quality, poorly controlled studies are far more likely to see ostensible effects than high-quality investigations, and RF research is no different. Many of the studies Moskowitz linked to are of poor quality, and more tellingly, at least one he listed flatly contradict his dire assertions.

In his piece, much was also made of a 2018 study by the National Toxicology Program (NTP) that ostensibly found increased rates of cancer in rats exposed to high-RF fields. This canard has found pride of place in

many feverish anti-5G polemics online but is, however, a completely misguided extrapolation. The methodology and low power of that work by the NTP have already been skewered by other authors. But more than that, a dire interpretation is profoundly misguided.

Not only was the paper's result weak, but the same analysis showed that male rats in the high-RF group lived significantly longer than the unexposed rodents. It would, of course, be utterly and equally fallacious to claim that RF exposure increases life span. Yet the fact that anti-5G activists are happy to gloss over this detail shows an alarming degree of cherry-picking afoot.

The most reliable data come from large and robust trials, with careful controls and large sample groups. The 13-country INTERPHONE study is one example: its unequivocal conclusion was that there was no causal relationship between phone use and incidences of common brain tumors such as glioblastoma and meningioma. The dose-response curve from this undertaking is telling, because it clearly does not betray any obvious signs of correlation. A similar Danish cohort study also did not reveal any obvious link between phone usage and tumor rates.

While it's pragmatic and laudable to constantly monitor for any potential emergent effects, the overwhelming weight of the evidence to date does not support the hypothesis that our current cellular technology is carcinogenic. Even at higher exposures, there is no reputable indication of carcinogenicity. Long-term studies of radar workers do not show a hint of increased cancer incidence, despite the exceptional levels of RFR to which these subjects are exposed.

This status shouldn't surprise us; we are not tethered to epidemiological data alone, nor is carcinogenesis a black box of which we are monolithically ignorant. We are capable of seeing but a tiny sliver of the electromagnetic spectrum. Beyond this visible portion is an invisible symphony of light, from low-energy radio waves to massively energetic cosmic rays that emerge from space. These photons are effectively particles of light, whose energy is proportional to their frequency. Those that are sufficiently energetic to eject electrons from an atom and cleave chemical bonds are known as ionizing radiation. Light that lacks this requisite energy is conversely known as nonionizing radiation.

Ionizing radiation is detrimental to our health, capable of damaging DNA and killing cells. Ultimately this can lead to cancer, with the same principle used in radiotherapy to kill cancer cells. That light can be marshalled to

obliterate cells understandably prompts confusion: If x-rays can kill cancer cells, then could 5G be doing similar damage to us? This is an assertion propagated by vocal anti-5G activists, but it betrays an alarming ignorance of both cancer and how unbelievably vast the electromagnetic spectrum truly is. RFR is undoubtedly nonionizing, being thousands of times less energetic than even visible light.

To put it in context, the weakest visible light is more than 17,000 times more energetic than the highest-energy 5G photon possible. Were they consistent, anti-5G activists should be orders of magnitude more concerned about light bulbs than cellular phones. The fact that they aren't is indicative of a gross misunderstanding.

The reality is that for RFR, there is no known plausible biophysical mechanism of action for harm, nor does the combined weight of epidemiological data support this conjecture. For all of Moskowitz's insistence, his position is most certainly a fringe view, wholly at odds with the stance of the WHO and numerous other public health bodies worldwide. His assertion the technology "could" be dangerous and implied insistence that others prove it safe is a complete inversion of the scientific method; the onus is on those making an assertion to provide reputable evidence for it, not on others to prove it wrong. The burden of proof always lies with those making a claim, and it is rather telling that the individuals engaging in the most scaremongering cannot justify their contentions with strong evidence.

The furor of the 5G issue, of course, goes far beyond *Scientific American*'s Web site: protests on the topics have erupted the world over, underpinned by disinformation perpetuated across social media. In this respect, is it a microcosm of a much greater problem, where online disinformation has poisoned discourse in everything from medicine to politics. Conspiratorial thinking is endemic in such circles, and we readily fall victim to the phenomenon of illusory truth, rendering us much more likely to accept falsehoods when repeatedly exposed to them. And perhaps worst of all, every one of us is vulnerable to motivated reasoning, lured into curating only information that chimes with our prejudices and jettisoning that which does not. To quote Paul Simon, "All lies and jest, still the man hears what he wants to hear and disregards the rest."

As the current debate illustrates, even scientists are certainly not immune to this very human temptation. But we most certainly have a responsibility to report the evidence as best as is possible and a duty to public health not to needlessly induce fear. In this new era of disinformation, scientists and

physicians must be at the vanguard of the fight against falsehoods, no matter where they derive from. Scaremongering narratives may hold more allure than less sensational scientific findings, but they are not harmless. One need only look to the alarming renaissance of once-conquered diseases, driven by anti-vaccine disinformation online—the human cost when superstition and mendacity outpace science.

In this age where myths perpetuate rapidly, it is increasingly difficult to differentiate fact from fiction, but it's crucial we hone our critical thinking and scientific scepticism rather than succumb to groundless falsehoods. Our collective well-being depends on it.

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