One of the perks of being a science writer is that, during the weekends when you're trying to relax and unplug from the world, crazy people harass you on social media. Sure, you might think that Sundays are meant for spending time with family, but they think Sundays are for spreading lies and conspiracy theories.

An activist organization called Environmental Health Trust contacted me on Twitter to boldly declare that 5G wireless technology is the "tobacco of the 21st Century." They even sent a photo that explains everything. Talking on the phone is "first-hand" exposure; being in a room with wi-fi is "second-hand" exposure; and I suppose walking around outside is "third-hand" exposure.
The consequences of ignoring their warning are dire. According to their website, cell phones and other wireless devices cause breast cancer in women, lower sperm counts and mutated sperm in men, and autism and ADHD in children. As I wrote previously, this is quite an indictment: Not even an atomic bomb can do all that.

The website is also promoting a documentary by Jennifer Durant and Thomas Henry Durant of Bellingham, Washington. Called 5G Beware, the video is full of outright misinformation.

For instance, the video begins (at 1:36) with an electrical engineer taking measurements of
electromagnetic radiation (presumably, in the radio spectrum). He is appalled to learn that he is being exposed to 600 milliwatts/cm² of radiation. (To put that into perspective, sunlight produces about 100 milliwatts/cm² of electromagnetic radiation.) What the documentary doesn't tell you is that the radio spectrum is completely harmless to humans.

As astrophysicist Dr. Ethan Siegel explained to me in an email, three things must be considered to determine if a source of radiation is dangerous: (1) the energy per photon, (2) the total amount of energy, and (3) the ability of the exposed object to absorb the radiation. The photons associated with the radio spectrum are too weak to break chemical bonds, which means they cannot cause cancer. Likewise, the total amount of energy to which our bodies are exposed by radiofrequency radiation is low. And our bodies aren't good at absorbing that radiation, anyway. That's why 5G, not to mention your AM/FM car radio, isn't giving you cancer.

Besides, electrical equipment is very sensitive to electromagnetic radiation. If it really was true that radiation from things like cell phones and towers was causing cancer, your phone would burn up long before anything bad happened to you.

The documentary makers don't just get physics wrong. They also get basic biology wrong, too. They found a medical doctor who was willing to say (at 5:41) that the "structure of the water in our body is very important for normal function," and that electromagnetic radiation from outside affects that. She tells her patients to turn off their wi-fi routers if they feel bad. All this is pseudoscientific gibberish. If it was true, then sunlight would have killed us by now. And the alleged ill effects of wi-fi are due to the nocebo effect [4].

The entire documentary is 24 minutes long, but I gave up about one-third of the way through when they compared 5G technology to smoking cigarettes. I don't get paid enough to put my brain through that kind of trauma.

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So, who are the Durants, the folks who made the documentary? Well, they are "paranormal consultants." If you need help with a haunting [5], they have an online form for you to fill out. (Please, please do so.)
But you probably won’t be happy to know that your intrepid, real-life Ghostbusters are afraid of iPhones.

Notes

(1) Incidentally, Bellingham is where the Non-GMO Project [6] is headquartered. What is it with that town?

(2) Here is a diagram showing all the different technologies that use the radio spectrum. If these waves were dangerous, we would have died from AM/FM radios, TVs, GPS, and garage door openers a long time ago.

Inside the radio wave spectrum

Almost every wireless technology – from cell phones to garage door openers – uses radio waves to communicate. Some services, such as TV and radio broadcasts, have exclusive use of their frequency within a geographic area. But many devices share frequencies, which can cause interference. Examples of radio waves used by everyday devices:

- **Auctioned spectrum**
- **2.4 GHz band**
  - Used by more than 300 consumer devices, including microwave ovens, cordless phones and wireless networks (Wi-Fi and Bluetooth)

Most of the white areas on this chart are reserved for military, federal government and industry use.

- **Semi-permeable zone**
  - Difficult for signals to penetrate dense objects

- **Line-of-sight zones**
  - Signals in this zone can travel long distances, but could be blocked by trees and other objects

The electromagnetic spectrum

Radio waves occupy part of the electromagnetic spectrum, a range of electric and magnetic waves of different lengths that travel at the speed of light. Other parts of the spectrum include visible light and x-rays; the shortest wavelengths have the highest frequency, measured in hertz.

What is a hertz?

One hertz is one cycle per second. For radio waves, a cycle is the distance from wave crest to crest.

- 1 kilohertz (kHz) = 1,000 hertz
- 1 megahertz (MHz) = 1 million hertz
- 1 gigahertz (GHz) = 1 billion hertz

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