

Myth busting with Dr Karl

G'day, Dr. Karl here, and welcome to Part Two: Facts and Myths about Electromagnetic Emissions. First, I should explain how wireless communication works and how we use electromagnetic energy to send information like voice or movies. When you speak, your voice only travels about 50 metres. But you can send a radio wave 5 km or even around the world with shortwave.

The shape of the electromagnetic wave is like an ocean wave, smoothly going up and down. We call it a sine wave. Around 1900, we learned to add ripples on top of that smooth wave, adding information—originally just the human voice, but now also movies. So instead of a smooth up-and-down wave, we have one with little ripples blended in. You broadcast this ripply wave, and at the receiver end, you catch it, strip off the smooth wave, and are left with just the ripple, which is the voice. You run that into an amplifier, then into speakers, and bingo—you've invented radio.

Now for the myths. First, the big one: can living near a mobile phone tower give you cancer? No, it does not. Let me explain. Regulations for electromagnetic emissions from telecom infrastructure like towers and small cells specify that the radiation emitted is low, measured in power density between 2 and 10W/m². Remember from Part One that the sun already delivers about 1000W/m² down here on the ground, but with mobile phone towers, the power you receive is between 2 and 10W/m²—100 times less than what the sun gives us.

In fact, we've had nearly half a century of international and domestic peer-reviewed research—huge, expensive studies looking for any harmful health effects from exposure to electromagnetic emissions (EME) from telecoms. They have found no harm when operating within these safety regulations.

Second myth: does 5G harm flora and fauna, i.e., plants and animals? No, and we've been looking but found no evidence of harm—exactly what you would expect. But we will keep on looking.

Third myth: is 5G more harmful to human health than 3G and 4G? No, because none of them are harmful as they're all non-ionising radiation. While we're here, let's discuss the different G's in mobile phones. There's a trade-off between frequency and range. With low frequency like in 3G, you might have a range of 10-20 km, and it punches through vegetation and buildings well, but you can't transmit data quickly. Higher frequencies, like in 4G and 5G, allow faster data transmission but have a shorter range. In some cities, 5G's range can be as low as a couple of hundred meters, and it struggles more with vegetation and buildings. It's swings and roundabouts, which is why more infrastructure is needed to support these later G's.

Another myth: what about the dangers of Wi-Fi in schools to kids? Both Wi-Fi and Bluetooth run at around the same frequency as your microwave oven, with a wavelength of about 10 cm (the distance across your palm). The amount of EME school kids receive is very low, less than from radio and TV waves. And yes, we've been looking for harm from it, and we haven't found any.

And now for Part Three: The Benefits.