

Have You Seen This Warning Hidden Inside Your Cellphone?

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✓ Fact Checked

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STORY AT-A-GLANCE

- › A little-known warning from the manufacturer hidden within your cellphone manual advises you to keep the device at a certain distance from your body to ensure you don't exceed federal safety limits for radiofrequency (RF) exposure
- › Depending on the manufacturer, you need to keep your cellphone at least 5 to 15 (0.19 to 0.59 inches) millimeters away from your head and body at all times to avoid exceeding the safety limit for RF exposure
- › In the real-world, most people carry their phones close to their body, usually in a pocket or bra. When popular cellphones were tested in direct contact to the body, they all exceeded the safety limit
- › SAR is a measure of how much RF energy your body will absorb from the device when held at a specific distance from your body (ranging from 5 to 15 mm, depending on the manufacturer). It's important to realize that the SAR value is not an indication of how safe your phone is
- › SAR testing, which is modeled on a very large male head, was devised before cellphone usage became commonplace among toddlers and young children, whose skulls allow for far greater RF energy penetration

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In this special edition of CBC Marketplace, originally aired March 2017, journalist Wendy Mesley investigates the safety of cellphones, focusing on a little-known warning from the manufacturer hidden within your cellphone manual that advises you to keep the device at a certain distance from your body to ensure you don't exceed the federal safety limit for radiofrequency (RF) exposure.

In the real-world, however, most people carry their phones close to their body, usually in a pocket. Many women even tuck their phone right into their bra which, by the way, is the absolute worst area for a woman to put it, as it could raise their risk of both heart problems and breast tumors, their two leading risks of death.

What's more, while the safe use information is provided by all cellphone manufacturers, you'd be hard-pressed to find anyone who has actually been able to find the message on their phone, without detailed instructions on where to locate it.

What the Manufacturer's Warning Says

While the safe use warning may differ slightly from one phone to the next, the basics remain the same. Mesley reads the information from her iPhone:

"To reduce exposure to RF energy, use a hands-free option, such as speakerphone ... Carry iPhone at least 5 millimeters [mm] away from your body to ensure exposure levels remain at or below the as tested levels."

According to the report, "81% of Canadians have never seen the message in their phone or manual about carrying their phone 5 to 15 mm away (0.19 to 0.59 inches) from their body." What's more, few really understand what it all means. Is it dangerous to have the phone touching your body? Mesley sets out to discover what the warning means for consumers.

The Berkeley Controversy

Mesley visits Berkeley, California, where the city council passed a cellphone “Right to Know” ordinance,¹ requiring cellphone retailers to put up signage informing customers that carrying their cellphone in their pocket or bra when the phone is on may result in RF exposure that exceeds federal safety guidelines. The ordinance was initially proposed in 2010 and passed in 2015.

In response, the wireless industry (CTIA) sued Berkeley, claiming the ordinance violates free speech rights by forcing retailers to share this information. Considering the information in question is hidden in the manual of every cellphone sold, and is required by federal law, this legal wrangling sure makes it appear as though the manufacturers have hidden the warning on purpose, and really do not want consumers to find or know about it.

Berkeley mayor Jesse Arreguin believes the lawsuit was launched to prevent other areas from following suit. If Berkeley can require cellphone retailers to post warnings, before you know it, the safety message might be required to be posted in every store across the nation.

What You Need to Know About Your Phone’s SAR Value

As noted by Mesley, whether your phone should be kept 5, 10 or 15 mm away from your body in order to prevent RF exposure exceeding federal safety limits has to do with how the phone was tested. In the film she brings three newly purchased cellphones to RF Exposure Lab in San Marcos, California, one of several labs across the U.S. that conducts specific absorption rate (SAR) testing for cellphones.

SAR is a measure of how much RF energy your body will absorb from the device when held at a specific distance from your body (ranging from 5 to 15 mm, depending on the manufacturer). It’s important to realize that the SAR value is not an indication of overall safety. As explained by the Federal Communications Commission (FCC):²

“Many people mistakenly assume that using a cellphone with a lower reported SAR value necessarily decreases a user’s exposure to RF emissions, or is

somehow 'safer' than using a cellphone with a high SAR value.

While SAR values are an important tool in judging the maximum possible exposure to RF energy from a particular model of cellphone, a single SAR value does not provide sufficient information about the amount of RF exposure under typical usage conditions to reliably compare individual cellphone models.

Rather, the SAR values collected by the FCC are intended only to ensure that the cellphone does not exceed the FCC's maximum permissible exposure levels even when operating in conditions which result in the device's highest possible – but not its typical – RF energy absorption for a user.”

Why SAR Ratings Are Terribly Flawed

In a nutshell, the phone is tested to assess how much RF energy is emitted when used under the worst of conditions. “We’re transmitting as if you were as far away from a base station as you can get and still make a call. This is the worst case it could ever get to be for a cellphone,” the lab technician explains.

The testing itself was in fact devised long before cellphone usage became commonplace among toddlers and young children, whose skulls allow for far greater RF energy penetration. With the phone emitting at maximum power, a sensor is then used to measure the depth to which the RF energy is able to penetrate into the dummy head.

All the SAR rating seeks to measure is the short-term thermal effect of the radiation on your body, defined in terms of how much power is absorbed (watts) per unit of tissue (kilogram).

Different types of tissue, such as bone, brain, muscle and blood, all have differing levels of density and conductivity, which also affect the absorption rate. What this means is that a SAR rating is highly dependent on which part of your body is exposed to the radiation.

In the U.S. and Canada, the SAR limit for mobile devices used by the public is 1.6 W/kg per 1 gram of head tissue. There are several major problems with using SAR as our safety guideline.

For starters, the anthropomorphic mannequin (SAM) used to measure SAR is modeled after attributes of the heads of the top 10% of military recruits in 1989 — in other words, a 6-foot, 2-inch-tall, 220-pound male, which is larger than 97% of the American population. This means anyone smaller than SAM is more vulnerable to radiation penetration, especially children.

According to Om P. Gandhi, professor of electrical and computer engineering at the University of Utah:³

“RF exposure to a head smaller than SAM will absorb a relatively higher SAR. The SAR for a 10-year-old is up to 153 percent higher than the SAR for the SAM model. When electrical properties are considered, a child's head's absorption can be over two times greater, and absorption of the skull's bone marrow can be 10 times greater than adults.”

Secondly, the FCC uses SAM to determine safe levels of ionizing radiation, not nonionizing radiation. Because nonionizing forms of EMF have so much less energy than ionizing radiation, it had long been believed that nonionizing electromagnetic fields were harmless to humans and other biological systems. However, as discussed below, science has shown nonionizing radiation can indeed cause physiological damage.

What's more, the SAR of the radiation emitted by cellphones is only measured when the phone is actually on and in use, not when it's sitting idle in your pocket (when it is still communicating with nearby cellphone towers and/or seeking the nearest Wi-Fi signal). Lastly, SAR standards haven't been updated since 1996, despite the fact the cellphone technology has changed dramatically since then.

Government Research Confirms Safety Concerns

Mesley visits Devra Davis Ph.D., who first became aware of the dangers of RF from cellphones and began speaking out about them in 2007. Since then, the scientific literature has doubled in size, and Davis is now more convinced of the dangers than ever.

Among the more damning studies are two government-funded animal studies⁴ that reveal GSM and CDMA radiation has carcinogenic potential. The finalized report⁵ of these two studies — conducted by the National Toxicology Program (NTP), an interagency research program under the auspices of the National Institute of Environmental Health Sciences — was released November 1, 2018.

While the preliminary report released in February 2018 significantly downplayed the findings,⁶ subsequent peer review upgraded the findings of risk. The NTP rates cancer risk based on four categories of evidence: “clear evidence” (highest), “some evidence,” “equivocal evidence,” and “no evidence” (lowest). According to the NTPs final report, the two studies, done on mice and rats of both sexes, found:⁷

- Clear evidence for heart tumors (malignant schwannomas) in male rats. These types of tumors started developing around week 70, and are very similar to acoustic neuromas found in humans, a benign type of tumor that previous studies have linked to cellphone use.
- Some evidence of brain tumors (malignant gliomas) in male rats. Glial cell hyperplasias — indicative of precancerous lesions — began developing around week 58.
- Some evidence of adrenal gland tumors in male rats, both benign and malignant tumors and/or complex combined pheochromocytoma.
- Equivocal or unclear evidence of tumors in female rats and mice of both genders.

The studies also found evidence of DNA damage and damage to heart tissue in exposed male and female rats, but not mice, as well as prostate, liver and pancreatic tumors in both rats and mice.

While the NTP insists the exposure — nine hours a day for two years, which is the lifetime of a rodent — is far more extensive than that of heavy cellphone users, I would strongly disagree, seeing how many, especially the younger generation, have their cellphones turned on and near their body 24/7. Many are literally sleeping with their phone beneath their pillow.

What's more, cellphones are not the sole source of RF. Tablets, computers, smart TVs, wireless baby monitors and smart meters, just to name a few, are also sources of similarly harmful radiation.

NTP Findings Reproduced at Power Levels Below FCC Limits

Corroborating evidence was also published by the Ramazzini Institute just one month after the NTP released its preliminary report in February 2018. The Ramazzini study⁸ reproduces and clearly supports the NTP's findings, showing a clear link between cellphone radiation and Schwann cell tumors (schwannomas)^{9,10} — but at a much lower power level than that used by NTP.

While NTP used RF levels comparable to what's emitted by 2G and 3G cellphones (near-field exposure), Ramazzini simulated exposure to cellphone towers (far-field exposure). Ramazzini's rats were exposed to 1.8 GHz GSM radiation at electric field strengths of 5, 25 and 50 volts per meter¹¹ for 19 hours a day, starting at birth until the rats died either from age or illness.

To facilitate comparison, the researchers converted their measurements to watts per kilogram of body weight (W/kg), which is what the NTP used. Overall, the radiation dose administered in the Ramazzini study was up to 1,000 times lower than the NTP's — and below the U.S. limits set by the FCC — yet the results are strikingly similar.

As in the NTP studies, exposed male rats developed statistically higher rates of heart schwannomas than unexposed rats. They also found some evidence, although weaker, that RF exposure increased rates of glial tumors in the brains of female rats.

Where Are All the Brain Tumors?

To investigate whether brain tumors are something you need to be concerned with as a cellphone user, Mesley visits neuro-oncologist Dr. Jay Easaw in Edmonton, Canada, who shows her images of one of the worst brain tumors he's ever seen, located on the side of the brain where the patient — a very heavy cellphone user — held his phone.

Easaw has been part of the creation of a brain tumor registry, in the hopes of identifying causes. He believes we'll see more studies showing a correlation between cellphone use and brain tumors as time goes on and heavy users since childhood start entering adulthood. "There's no question that we're seeing more young people coming into the clinic with brain tumors," he says. "And the question is why."

Incidence of glioblastoma multiforme (the deadliest type of brain tumor) more than doubled in the U.K. between 1995 and 2015.^{12,13} According to the authors of the NTP analysis, this dramatic increase is likely due to "widespread environmental or lifestyle factors" — which would include cellphone usage.

Mitochondrial Dysfunction Is the Primary Hazard

While brain tumors may indeed be a concern, in my view, it's not the primary one. The evidence suggests the primary hazard of cellphone radiation is really systemic cellular and mitochondrial damage,^{14,15,16,17} which can contribute to any number of health problems and chronic diseases.

While an estimated 84,000 U.S. men, women and children were diagnosed with a brain tumor in 2021,¹⁸ an estimated 787,000 people die from heart disease each year.¹⁹ So, while the relative rarity of brain cancer may lead you to believe that cellphone use is safe, that's only because you're looking at a less prevalent outcome.

The process of harm begins when low-frequency microwave radiation activates voltage-gated calcium channels (VGCCs),²⁰ channels in the outer membrane of your cells. Once activated, the VGCCs open up, allowing an abnormal influx of calcium ions into the cell.

This increased intracellular calcium and the accompanying increase in calcium signaling appears to be responsible for a majority of the damage that occurs.

This is reviewed in more detail in my interview with professor Martin Pall below. For example, excess calcium activates nitric oxide, and while nitric oxide has many health benefits, massively excessive nitric oxide reacts with superoxide to produce peroxynitrites — extremely potent oxidant stressors.²¹

Peroxynitrites in turn modify tyrosine molecules in proteins to create nitrotyrosine and nitration of structural protein.²² Changes from nitration are visible in human biopsy of atherosclerosis, myocardial ischemia, inflammatory bowel disease, amyotrophic lateral sclerosis and septic lung disease.²³ Peroxynitrites can also cause single-strand DNA breaks.²⁴

This pathway of oxidative destruction — triggered by low-frequency radiation emitted from mobile devices — may partially explain the unprecedented growth rate of chronic disease since 1990,²⁵ and is a far greater concern than brain tumors.

Heart Problems, Neurological Disorders and Infertility

Cellphone radiation has also been shown to have a significant impact on neurological and mental health,²⁶ contributing to and/or worsening anxiety, depression and dementia, for example, and all of these conditions are rampant and growing more prevalent, even if brain cancer cases are lagging. (This also makes sense as brain dysfunction will occur much faster than a tumor, which can take decades.)

Research also suggests excessive EMF exposure is contributing to reproductive problems. For example, researchers have found prenatal exposure to power-frequency fields can nearly triple a pregnant woman's risk of miscarriage.²⁷

According to lead author and senior research scientist at Kaiser Permanente's research division, Dr. De-Kun Li,²⁸ "This study provides fresh evidence, directly from a human population, that magnetic field exposure in daily life could have adverse health impacts,"

adding his findings “should bring attention to this potentially important environmental hazard to pregnant women.”

According to Li, there are at least six other studies, in addition to two of his own, showing this link.^{29,30,31,32,33} EMF exposure may also play a significant role in testicular cancer and male infertility.

Studies have linked low-level electromagnetic radiation exposure from cellphones to an 8% reduction in sperm motility and a 9% reduction in sperm viability.^{34,35} Wi-Fi equipped laptop computers have also been linked to decreased sperm motility and an increase in sperm DNA fragmentation after just four hours of use.³⁶

Government Is Not Spearheading Public Safety Measures

Again, the harms of RF are not related to heating of tissue but, rather, a result of a cascade of molecular events resulting in severe oxidative damage. As noted earlier, the evidence shows damage can occur even at levels far below the safety limit set for the U.S. and Canada.

According to Mesley, more than 200 studies have been submitted to Health Canada showing harm from RF radiation at levels below the safety limit for which cellphones are tested.

Health Canada claims many of these studies simply aren't good enough to base a decision on, and that “the totality of the science does not support a link to harm.” According to Mesley, Health Canada has even stated that “Even if a small child were exposed to a cellphone 24 hours a day, 365 days a year, there would be no adverse health effects.”

Rarely do absolute statements turn out to be accurate, and to unequivocally claim there are no health risks even for small children is taking a tremendous risk. As noted by Davis, “We should not insist on proof that we have made people sick before taking steps to protect others.”

How to Limit Your RF Exposure

While saying there's no cause for concern, Health Canada still recommends replacing calls with texts, using hands-free devices and limiting use for children if you're concerned about potential effects.

The U.S. has taken an identical approach. The U.S. Food and Drug Administration says that while any potential risk is "probably very small," you can reduce your RF exposure by limiting the amount of time you spend on your cellphone and using the speaker or a headset to create more distance between the phone and your head.³⁷

There's no doubt in my mind that RF exposure from cellphones and other wireless devices is a significant hazard to your health that will damage your DNA and contribute to chronic disease and premature aging. It needs to be addressed if you're concerned about your health, and that of your family.

To protect yourself and your family from cellphone radiation and other sources of harmful electromagnetic fields, consider taking the following precautions:

Avoid carrying your cellphone on your body unless in airplane mode and never sleep with it in your bedroom unless it is in airplane mode. Even in airplane mode it can emit signals, which is why I put my phone in a Faraday bag.³⁸

When using your cellphone, use the speaker phone and hold the phone at least 3 feet away from you.

Seek to radically decrease your time on the cellphone. Instead, use VoIP software phones that you can use while connected to the internet via a wired connection.

Connect your desktop computer to the internet via a wired Ethernet connection and be sure to put your desktop in airplane mode. Also avoid wireless keyboards, trackballs, mice, game systems, printers and portable house phones. Opt for the wired versions.

If you must use Wi-Fi, shut it off when not in use, especially at night when you are sleeping. Ideally, work toward hardwiring your house so you can eliminate Wi-Fi altogether. If you have a notebook without any Ethernet ports, a USB Ethernet adapter will allow you to connect to the internet with a wired connection.

Shut off the electricity to your bedroom at night. This typically works to reduce electrical fields from the wires in your wall unless there is an adjoining room next to your bedroom. If that is the case you will need to use a meter to determine if you also need to turn off power in the adjacent room.

Use a battery-powered alarm clock, ideally one without any light. I use a talking clock for the visually impaired.³⁹

If you still use a microwave oven, consider replacing it with a steam convection oven, which will heat your food as quickly and far more safely.

Avoid using “smart” appliances and thermostats that depend on wireless signaling. This would include all new “smart” TVs. They are called smart because they emit a Wi-Fi signal and, unlike your computer, you cannot shut the Wi-Fi signal off. Consider using a large computer monitor as your TV instead, as they don’t emit Wi-Fi.

Refuse smart meters as long as you can, or add a shield to an existing smart meter, some of which have been shown to reduce radiation by 98 to 99%.⁴⁰

Consider moving your baby’s bed into your room instead of using a wireless baby monitor. Alternatively, use a hard-wired monitor.

Replace CFL bulbs with incandescent bulbs. Ideally remove all fluorescent lights from your house. Not only do they emit unhealthy light, but more importantly, they will actually transfer current to your body just being close to the bulbs.
