Are cordless phones safer than mobile phones?

We tested eight different phones, including a special low-radiation ECO phone, to find some answers.

Keywords: cordless phone, mobile phone, microwave, radiation, EMF, DECT, ECO, ECO Plus, safety, health

Wireless phones and health

Cordless phones and mobile phones radiate microwaves. They do it during a call and some models also do when the phone is not actually used.

In 2011 the World Health Organization declared microwaves a Group 2B "possible carcinogen." This means there was good evidence — but no proof yet — that microwaves can cause cancer (IARC, 2013). Prominent scientists have since called for an upgrade of that classification (Carlberg, 2017).

The scientific findings of cancer and other health effects from the use of wireless phones is discussed in detail in the BioInitiative report by a large group of international scientists free of industry influences (Bioinitiative Group, 2012).

It is prudent to minimize exposures to microwave radiation. We recommend using a corded landline telephone whenever possible, especially by children, pregnant women or people who are electrically sensitive. However, this is not always possible. This report looks at wireless options that are less harmful, based on our measurements. Our detailed findings are available in a separate report that can be found via the link at the end of this article (EIwellspring, 2018).

What is a cordless phone?

A mobile phone communicates wirelessly with a nearby tower (base station) that serves many customers. If the mobile phone is moved out of range of the tower, another tower seamlessly takes over the call.

Cordless phones are limited to a small area, usually a building or even a part of a building. Instead of communicating with a tower, it talks to a privately owned base. The phone needs to stay within range of the same base to work. (There are cordless phones that have multiple private base stations. They are designed for business use in large buildings and are not marketed to consumers.)

The base also serves as charging station for the cordless phone.

How cordless phones radiate

We tested a number of cordless phones and simple (not “smart”) mobile phones to find out how much and how often they radiate.

We found that today’s typical DECT cordless phone radiates nonstop. The handset constantly transmits to the base and the base constantly transmits to the handset. This is regardless of whether there is an active call or not.

Cordless phone in its base.

We also found that the radiation it emits is the same whether the handset is placed in its cradle on the base, or the handset is somewhere well away from the base. The distance doesn't matter. (This matches industry-provided information, such as Bergqvist, 2001).

The reason for this constant communication is so they will know if the handset is too far away from the base so incoming calls cannot be answered. The handset will typically alert the user when out of range.

This also means that a DECT handset and base exposes people near them to constant radiation 24 hours a day.

The designers assume the cordless phone will be charged in its cradle all the time, so they did not install an off switch (we haven't found any models with a switch).
The only way to turn them off is to disconnect the battery, which is not practical.

Of the five cordless phones we tested, only one had an outlet for a headset. A headset may sometimes reduce the microwave radiation to the brain, though a test by the British Consumer Association showed they could also make it worse (CNN, 2000), though the *British Medical Journal* said it seems to depend on how the phone is held (Dobson, 2000).

In our tests we found that the cordless phones could reach from 120 to 720 ft (38 to 230 meters) when outdoors. It will be less indoors.

How mobile phones radiate

Mobile phones are designed quite differently than cordless phones. Like cordless phones they radiate microwaves, but they do it differently. In some cases, they will expose the user to less radiation than a cordless phone.

Mobile phones are designed to be away from their charging station for hours every day. They therefore have to conserve their battery more than a cordless phone needs to.

Mobile phones must be able to "talk" to a tower more than ten miles (16 kilometers) away, so they are able to radiate much stronger than a cordless phone (up to about 20 times stronger). However, most of the time there is a base station much closer. To conserve the battery, a mobile phone will limit its transmission power to what is needed. If the tower is close, the mobile phone may not radiate much more than a cordless phone when there is an active call.

Also to conserve the battery, and to limit congestion on the tower, a mobile phone doesn't "talk" to the tower (base station) more than strictly needed, when there is no active call.

In our tests, we found that basic (non-smart) mobile phones waited at least 10 minutes between each time they checked in with the base station. The rest of the time they just listened for an incoming call or text message.

This confirms a conversation we had with an engineer working for one of the major manufacturers of the base stations. He said a basic phone waits 15 minutes between each check-in.

Two basic mobile phones that wait at least ten minutes between each transmission when not in use.

If a mobile phone is in a moving vehicle, it will need to communicate somewhat more frequently in order to transfer to another tower. Otherwise it does not need to. In our tests we verified that simply walking around with a mobile phone, even inside a house or in an area with marginal reception, does not cause the phone to talk more frequently with the tower.

We did not test this in a dense urban setting, where there are more towers to choose from, which might entice a phone to switch more often.

Smart phones

A smart phone is a portable computer that also can be used as a telephone. They are quite different from a basic phone that can just be used for talking and maybe texting (SMS).

A smart phone can have a lot of apps running on it that require more communication with the base station. More communication will mean more radiation from the phone.

It can be as simple as an app that displays the current temperature. How often will that update itself? Each update requires multiple transmissions from both the base station and the smart phone.

The more apps there are on the phone, the more transmissions will be taking place, i.e. the more radiation. The only way to stop them is to power down the phone, set it to airplane mode, or stop all the apps. Even with no apps running, we suspect the smart phone radiates more frequently than a basic phone, but we have not actually tested that yet.

Smart phones are often able to talk to Wi-Fi (WLAN) networks as well. This feature may allow calls to be routed through the local network for free, instead of using the nearest mobile phone tower and be billed for airtime. However, Wi-Fi is much more "chatty," so if it is enabled the phone will transmit very frequently.

Smart phones are very convenient, and provide addictive instant gratification. Many people can't see how they can live without them, even though using a corded computer a few times a day will often do the same job with a lot less stress and a lot less radiation exposure. If you're looking to reduce your radiation exposure, avoid smart phones.

Low-radiation ECO cordless phones

A few European manufacturers, including Siemens, Phillips and Swissvoice, make cordless phones that radiate less. There are two modes:

"ECO" mode is the most common. Here the phone doesn't radiate more than necessary to reach the base station, so the user is exposed to less radiation if near the base. In this mode the phones still radiate 24/7 regardless of whether there is an active call or not. In our testing we found that these phones offer little benefit, except for people who talk a lot on the phone.

Phones with "ECO Plus" mode or "Full ECO" mode are much better. They do not really radiate when there is no active call, other than the radiation from the power supply or other electronics. Few models with this feature are available and they are only sold in some countries.

The Swissvoice ePure cordless phone, which has ECO Plus when sold in Europe, and just ECO when sold in the United States.

We tested one ECO phone from Swissvoice, which is sold both in Europe and in the United States. In Europe the ECO Plus feature is available, but in America only the ECO function can be used.

We have not been able to find out why the ECO Plus feature is unavailable in North America. Attempts to contact two manufacturers of these phones went unanswered. We have not found anything on official websites.

Some theories circulate, but we have not found anything of substance. It may simply be a marketing decision.

The only downside we can think of with ECO Plus is that the phone will not be aware if it is too far away from the base to receive a call. This limitation may not be acceptable to an American audience, in the minds of the marketing people?

Ordering the phone with ECO Plus from another country is illegal if the frequency bands are different. The countries in the European Union use the same frequencies, so someone in France or Sweden can order a phone from Germany.

But the frequencies are different in the United States, so there it is illegal to use a phone bought in Europe, as using it could interfere with other users.

The Swissphone ePure phone we tested had a “booby trap” feature. When there is a power outage, so the base is off, the handset mounts a supreme effort to reconnect to its base and radiates much more powerfully than any other handset we tested. We consider this to disqualify it as a low radiation phone.

The 900 MHz cordless phones

The 900 MHz cordless phones were available in North America from 1994 until about 2005. They are no longer manufactured but are still available new or used from online vendors.

In our testing we found that these phones radiate much less than the DECT phones that replaced them. They do not radiate when there is no active call, and their radiation is sometimes less during a call. The downside is that they have a shorter range than a modern DECT phone and there is no warning when getting out of range of the base.

Two American 900 MHz cordless phones.

Europe went to the DECT phones in the 1990s (the system was designed there). Before that they had analog cordless phones called CT1 that used the 900 MHz band (Bergqvist, 2001). We don't know if that is the same as the American 900 MHz phones or whether they are even legal to import. If you want to import a phone from outside the region (such as the EU), check with the authorities to be sure the frequency band the phone uses is not restricted, i.e. the phone is legal to use.

Fixed wireless

Yet another option is the fixed wireless. This is essentially a mobile phone that mimics a telephone landline. The fixed wireless device has an outlet for a telephone extension cord, that goes to an ordinary landline phone. The landline phone can be at least 50 ft (16 meters) from the wireless part, so there is little exposure.

The landline phone is used the same way it would be used if connected to a true landline.

The fixed wireless devices were invented to serve households that wanted to continue using landline phones instead of mobile phones. This was not out of any kindness to electrically sensitive people, but a way to lure more customers away from the traditional telephone companies.

Some vendors give them away in return for a long-term contract. It may be cheaper to buy a used one and set up a monthly contract.

A fixed wireless device creates a "landline" where there otherwise isn't one. The box on the right is the Verizon Home Phone Connect, which has no Wi-Fi or local network.

The fixed wireless device needs an electrical outlet for power. This also means it can be easily turned on and off using a power strip, and even a long extension cord.

Be aware that some of these devices *require* a computer network in the house. Some have a Wi-Fi transmitter built-in. These include the AT&T Home Base and the T-Mobile LineLink. The Verizon Home Phone Connect we tested (pictured) does not have these problems, but check if buying a new one. (This is all as of 2018.)

Which phone to choose?

We recommend using a basic landline phone whenever possible, especially by children, pregnant women and people who are electrically sensitive.

If that is not possible, then it depends on the situation which phone will work best and is acceptable. If you live in an apartment in a big city, the ambient radiation level may already be so high that it makes little sense to insist on a phone setup that emits no amount of radiation. A little extra won't make a difference.

There is virtually no research on whether low levels of radiation all the time is as harmful as short bursts of much higher levels of radiation. Is the radiation from a cordless phone sitting on the table all day as problematic as the shorter times when the phone is held up to the head?

Is there such a thing as a cumulative dose, just as there is for radioactivity? Some researchers think so.

It seems prudent to minimize all exposures, especially at night. Having a wireless phone on the night stand does not seem like a good idea.

For sensitive people who minimize their use of wireless technologies, it becomes more important to look at how much the handset and base radiate when not actively used, since that is the dominant exposure.

In our tests we found that today's DECT cordless phones radiate non-stop, 24/7, regardless of whether they are used or not. And they are difficult to turn off. We recommend not using DECT cordless phones at all.

The Swissvoice ePure ECO DECT phone we tested was a disappointment. We can't recommend that model either.

If you live in Europe, an ECO Plus phone may be a good option, though we've not been able to test one.

If you live in North America, an old 900 MHz cordless phone may work well.

A basic (non-smart) mobile phone is easy to power off and doesn't radiate more frequently than once per ten minutes or less when not in use. If the nearest base station is close by, the radiation level when calling may be similar to the better cordless phones.

The fixed wireless system allows you to move the wireless part away from you, and this system also radiates less than once every 10 minutes when not in use. But this option is fixed in place and cannot be carried around.

If you live or work in a metal building, you may enjoy the shielding it provides against outside transmitters, but the metal will also trap microwaves from sources inside. If you share a metal room with a cordless or mobile phone the radiation level can be at least a hundred times higher than if the walls were not metal. And the radiation does not diminish with distance, since the waves bounce around. (EIwellspring, 2018). In this

situation you really need a landline from outside the metal room (either a true landline or from a fixed wireless device placed outside the room).

More information

The detailed report about our testing of cordless and mobile phones, as well as other articles about low-radiation phone technologies, is available at www.eiwellspring.org/telephone.html.

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