HEALTH BASICS

Cell phones and cancer

An explanation of what research shows about cell phone radiofrequency energy and cancer risk.

WHAT IT IS
Research on whether phone radiofrequency energy affects cancer risk

WHERE IT COMES UP
Questions about everyday wireless-phone use

WHY IT MATTERS
Puts possible cancer risk and exposure choices in context

WHAT IT IS NOT
Not a disease or cancer diagnosis

WHO TO ASK
Primary care clinician for personal health concerns

HOW IT IS CHECKED
No clinical test measures cancer risk from phone use

Overview

Cell phones send and receive information using radiofrequency electromagnetic fields. These are often called radio waves or radiofrequency energy. Researchers have studied whether this exposure can cause cancer, especially tumors in or near the head.

Radiofrequency energy is non-ionizing radiation . It does not carry enough energy to damage DNA directly in the way that X-rays, gamma rays, and other forms of ionizing radiation can. At high enough levels, radiofrequency energy can heat body tissue. Safety limits for phones are designed to keep exposure below levels that cause harmful heating.

Current human evidence does not show that ordinary cell phone use causes cancer. Large studies and cancer-rate trends have not found a clear increase in brain tumors linked to phone use. Research cannot rule out every small or very long-term risk, particularly for rare tumors or technologies used over many decades.

In 2011, the International Agency for Research on Cancer classified radiofrequency electromagnetic fields as "possibly carcinogenic to humans." This category means that limited evidence raised a question that needed more study. It does not mean cell phones are known to cause cancer.

How it works

A phone uses radiofrequency energy when it connects to a cellular network. The amount of energy it sends changes during use. It may transmit more energy when the signal is weak, when data are being sent, or when the phone is moving between network areas.

Exposure falls quickly as distance from the phone increases. Holding a phone away from your head, using speaker mode, or using a wired headset generally reduces the radiofrequency energy reaching your head.

Phones are tested using a measure called the specific absorption rate , or SAR. SAR estimates how quickly the body absorbs radiofrequency energy under set laboratory conditions. A phone's maximum SAR value is not a measurement of your usual exposure. Real-world exposure changes with the network, phone design, signal strength, distance, and how you use the device.

Newer networks, including 5G, may use a range of frequencies. These remain non-ionizing. Higher-frequency signals tend to penetrate less deeply into the body, although exposure patterns and network designs differ. The same basic safety principle applies: exposure limits are intended to prevent established harmful effects, such as excessive tissue heating.

Why it matters for your health

Brain tumors are often a focus because people may hold phones close to the head. Researchers have examined glioma, meningioma, pituitary tumors, and vestibular schwannoma, also called acoustic neuroma. They have also studied salivary gland tumors and some childhood cancers.

A 2024 systematic review commissioned by the World Health Organization evaluated human observational studies. It found no increased risk for the most studied brain and head tumors with mobile phone use. Longer call time and longer years of use also did not show a consistent increase in risk.

These findings need context. Cancer can take years to develop, and some tumors are rare. Older studies often relied on people remembering phone use over many years. Memory may be inaccurate, especially after a diagnosis. Phone technology and patterns of use have also changed.

Animal studies allow researchers to control exposure more closely. US National Toxicology Program studies found some tumors in rats exposed to high levels of whole-body radiofrequency energy. The exposure conditions were different from normal human phone

use, including longer daily exposure and whole-body exposure. Animal findings can identify questions for further research, but they do not by themselves show that ordinary cell phone use causes cancer in people.

The clearest immediate health risk involving cell phones is not cancer. Looking at, reaching for, or using a phone while driving can cause distraction and serious crashes.

What can go wrong

Studies of cell phones and cancer can produce findings that seem to conflict. This may happen because tumors are uncommon, exposure is difficult to measure, and people with cancer may remember past phone use differently from people without cancer. A result from one study may also occur by chance, especially when many tumor types and exposure patterns are examined.

The conditions most often considered include:

These conditions are not signs of "cell phone exposure," and most people who develop them do not have an identifiable cause. Symptoms such as headaches, dizziness, or ringing in the ears are common and can have many explanations. They cannot show whether radiofrequency energy has affected you.

Fear about exposure can also lead to unnecessary scans. Brain imaging uses specific clinical indications; it is not a screening test for people who use cell phones. Scans can find harmless changes that require more testing without improving health.

Products sold as radiation shields may not provide the claimed protection. If a case or attachment interferes with the signal, a phone may increase its transmitting power to stay connected.

- Glioma: a group of tumors arising from supporting cells in the brain
- Meningioma: a tumor in the tissue covering the brain and spinal cord
- Vestibular schwannoma: a usually noncancerous tumor on a nerve involved in hearing and balance
- Salivary gland tumors: growths in glands that make saliva

What you can do

You do not need a medical test because you use a cell phone. There is no blood test, scan, or physical examination that can measure a personal cancer risk from past phone use.

If you want to reduce exposure while research continues, practical options include:

These steps are optional ways to reduce exposure. They are not a cancer prevention plan, and current evidence does not establish that ordinary phone use causes cancer.

For safety, put the phone out of reach while driving or use a setting that limits notifications. Hands-free calling can still be distracting.

Arrange a routine clinical appointment if you have a persistent new lump, ongoing hearing change, repeated unexplained headaches, or another concern that is not improving. These problems have many possible causes and are not evidence of harm from a phone.

Call emergency services for a first seizure, sudden weakness on one side, sudden trouble speaking, loss of consciousness, or a sudden severe headache. These require urgent assessment regardless of phone use.

- Use speaker mode or a wired headset for calls
- Text or use voice messages instead of holding the phone to your head
- Keep the phone away from your body when practical
- Make longer calls where the signal is strong
- Use airplane mode when you do not need a cellular connection, after checking which wireless functions remain active
- Avoid products that claim to block radiation without reliable evidence

Common questions

Does sleeping beside a phone cause cancer?

Current evidence does not show that sleeping near a phone causes cancer. A phone that is not actively transmitting usually produces much lower exposure than one used for a call. Distance also reduces exposure. You can place it farther from the bed or use airplane mode if this helps you feel comfortable.

Are children more vulnerable?

Children may use phones over more years of life, and their bodies are still developing. This is one reason research includes children and young people. Human studies so far have not shown an increased risk of childhood brain tumors from mobile phone exposure. Families who prefer to limit exposure can encourage speaker mode, messaging, and shorter calls.

Is 5G more dangerous than older networks?

There is no established evidence that 5G causes cancer. It uses non-ionizing radiofrequency

energy. Research continues because network frequencies and patterns of exposure change over time.

Should I compare phones by SAR value?

SAR confirms that a phone meets an exposure limit under test conditions. The maximum listed value does not reliably show which phone gives you the lowest exposure during daily use. Signal strength, distance, and how the phone manages power can matter more.

Do Bluetooth headsets create exposure?

Bluetooth devices use radiofrequency energy, usually at much lower power than a phone connecting to a cellular tower. A wired headset avoids radiofrequency transmission at the ear.

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