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 **(CNN)**The city of Berkeley, California, passed a law that goes into effect next month requiring cell phone stores to inform customers about safety recommendations. The move reopened a decades-old debate about whether mobile phones cause brain tumors.

The ordinance, called the Right to Know law, will start to require retailers to give customers a handout, or display a sign in the store, telling them about [federal guidelines](https://www.fcc.gov/encyclopedia/faqs-wireless-phones) on the amount of radiation that cell phones can emit and the instructions on safe phone use.

Lawyers and clinicians involved in creating the new law said that it is meant to make consumers aware of the already existing regulations. However, the information will also go beyond the current regulations by stating that children and anyone carrying their phone in a pocket or bra could be at increased risk of radiation exposure, said Joel M. Moskowitz, director of the Center for Family and Community Health at University of California, Berkeley School of Public Health. Moskowitz was involved in creating the law.

What the law does not require is that consumers be provided information about the specific health risks of being exposed to radiation. Although Moskowitz said that it is "highly probable" that long-term cell phone use causes brain tumors, many experts think that the evidence is far from definitive, or that it shows there is no risk.

In 2011, [the World Health Organization classified the kind of low-energy radiation that cell phones emit as "possibly carcinogenic"](http://www.cnn.com/2011/HEALTH/05/31/who.cell.phones/) because of a link between cell phone use and a type of malignant brain tumor called glioma and a benign brain tumor called acoustic neuroma.

Both types of brain tumors are rare. About [5 in 10,000](http://www.nature.com/nrneurol/journal/v2/n9/full/ncpneuro0289.html#t1) adults are diagnosed with glioma in the United States every year, whereas about [10 in a million](http://neurosurgery.uthscsa.edu/display_patients.php?ps_id=33&pg=) people develop acoustic neuromas every year.

Although the WHO classification sounds ominous, it puts cell phones on the same level of cancer risk as caffeine and pickled vegetables. The position of numerous health organizations, including the American Cancer Society and the Centers for Disease Control and Prevention, is even more measured, stating that current evidence is not conclusive and more research is needed.

**'A very gray zone'**

"(Since 2011), I don't think any evidence has come along that would necessarily move from this uncertain designation to something on one side or the other. ... In reality we are in a very gray zone with the evidence," said Jonathan M. Samet, chairman of preventive medicine at University of Southern California who led the WHO panel that determined the classification.

Many large studies have failed to detect an association between cell phone use and brain tumors. [One study of nearly 360,000 adults in Denmark](http://www.bmj.com/content/343/bmj.d6387) did not find an increase in the number of brain tumors even among those who had been using a cell phone for at least 13 years.

However, as Samet said, the WHO panel took into account studies that suggested that those who used cell phones did have higher rates of certain brain tumors.

[The Interphone study](http://thechart.blogs.cnn.com/2011/06/01/cell-phones-and-cancer-should-you-be-worried/) is the largest study to date looking at cell phones and brain tumors. It involves 13 countries, including Canada, the United Kingdom, Denmark and Japan. Researchers asked more than 7,000 people who had been diagnosed with a brain tumor and 14,000 healthy people about their previous cell phone use.

[The study found no association between cell phone use and glioma rates](http://www.pathophysiologyjournal.com/article/S0928-4680%2814%2900064-9/abstract) except in the group of participants who reported using their cell phone for at least 1,640 hours in their lifetime without a head-set. Those participants were 40% more likely than those who never used a cell phone to have a glioma. However authors of the Interphone study stated that people with brain tumors might be more likely than healthy people to exaggerate their cell phone use, and thus the link between heavy phone use and brain tumor risk in the study might not be real.

"It's quite plausible that there would be excess reporting in people who suffered a life-threatening disease. They are looking for an explanation for this tragic circumstance," said David A. Savitz, professor of epidemiology at Brown University, who was not involved in the Interphone study.

Another set of studies by researchers in Sweden also looked at reported cell phone use among people diagnosed with glioma and compared them to healthy peers. A recent analysis found that people who used a mobile phone were 30% more likely to have a glioma, and those whose use had lasted at least 25 years were three times more likely. The researchers also found that users of cordless phones, which emit less radiation than cell phones, had 40% to 70% higher glioma risk.

"There are individual studies and findings that do produce a risk, but on balance the judgment has to be made on the totality (of the evidence)," Savitz said, adding that there is error in even the best and biggest studies.

"We know quite a bit (about the risk) actually and it seems extremely unlikely that there is an effect. We are down to the range that there is no risk or a risk that is almost too small to detect," Savitz said.

Although Samet, the WHO panel leader, agrees that we probably know the risk is not great, he still thinks it could exist. "I think if it were terribly large, we would have more consistent results from epidemiological data. These pictures are compatible with perhaps a weak or moderate risk," he said.

**No increase in brain cancer overall**

Another[argument against the possibility that cell phones cause cancer](http://jnci.oxfordjournals.org/content/103/15/1146) is that there has not been an increase in the incidence of brain tumors in the United States, Denmark and Sweden over the last couple of decades despite heavy and widespread cell phone use. Although there has been[an increase in brain tumors](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3098028/) among 20 to 29-year-old females in the United States, they were not in a part of the brain that researchers predict would be affected by cell phone radiation.

In addition to the lack of strong evidence showing a link between cell phone use and brain tumors, Savitz said that it is difficult to imagine how this type of exposure could put people at risk. Cell phones (and to a lesser extent cordless phones) give off non-ionizing radiation, which unlike ionizing radiation such as X-rays, CT scans and radon do not have the potential to damage DNA. "There is no known pathway for any adverse health effects," Savitz said.

Even though non-ionizing radiation does not seem to affect the body in the way that ionizing radiation can, "there's a lot of gaps in knowledge," said University of Southern California's Samet.

[New studies are underway](http://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/cell-phones-fact-sheet#r14) that might provide a better idea of whether there are health risks associated with cell phone use. [The COSMOS study is looking at cell phone records and the long-term health](http://www.ukcosmos.org/faqs_1.html#1) of 290,000 participants in five countries in Europe including the United Kingdom and Sweden.

Studies such as COSMOS are important because they do not rely on participants to recall their cell phone use and will probably get more accurate data, Samet said. However it could take several studies on the scale of COSMOS to really feel more confident in whether there is a risk, he said.

Another question is whether cell phone use affects [the health of children](http://www.cancer.org/cancer/cancercauses/othercarcinogens/athome/cellular-phones), a group that has not been studied as much as adults and could at least in theory be more vulnerable to the effects of phone radiation. [The Mobi-Kids study](http://www.crealradiation.com/index.php/en/mobi-kids-home) is currently comparing cell phone use between 2,000 people who were diagnosed with brain tumors at 10 to 24 years of age with 2,000 healthy young people.

Despite these lingering questions, some experts say we know enough to put concerns to rest.

"There is no evidence for this (and) I'm surprised that it still keeps cropping up," said Eugene S. Flamm, chairman of the department of neurosurgery at Montefiore Medical Center and Albert Einstein College of Medicine.

"I wouldn't make the recommendation for my grandchildren that they shouldn't use a cell phone. I think there are many advantages of having close communication in our society, you have to weigh that against anything else."

Flamm worries that the ordinance in Berkeley is only going to fuel worry among people who are already suspicious.

Samet said: "It is not necessarily a bad thing to inform people so they can make precautionary decisions should they choose to do so." However because these warnings are not going to be accompanied by information about specific health risks, "some people will be concerned about this and perhaps look for answers that they won't be able to find," he added.

Before the Berkeley ordinance, San Francisco passed a Right to Know ordinance in 2010, but it was challenged by the CTIA-The Wireless Association, a wireless industry trade group. The city eventually reversed it. Unlike its neighbor Berkeley, San Francisco would have required cellphone retailers to post information about health concerns and carcinogenic potential of cell phone radiation.

"The idea behind the Berkeley ordinance is to learn from the experience of San Francisco and to develop an ordinance that would withstand any legal challenges," said Moskowitz, who was involved in the creating the Berkeley law. Moskowitz said he said that he hardly ever uses his cell phone, but when he does he uses a headset or speaker mode. He carries the phone turned off in his briefcase.

There are a number of ways to reduce exposure to cell phone radiation, if users are worried about the possibility of health risks, including using a headset and texting instead of talking.