

# Cell Phone Use—Is it Safe?

An Interview with Devra Lee Davis, PhD, MPH

*Devra Lee Davis, PhD, MPH, is president of the Environmental Health Trust, Teton Village, Wyoming, and is the author of three books including her recent book Disconnect<sup>1</sup> on the controversial topic of cell phone safety. Among her many accomplishments, Davis—an award-winning scientist—was appointed by former President Clinton to serve on the Chemical Safety and Hazard Investigation Board during 1994–1999, and she is the founding director of the Board on Environmental Studies and Toxicology at the U.S. National Academy of Science. Dr. Davis spoke with us about her concerns regarding cell phone safety and shares her opinions and recommendations on this important topic.*

## Q: What are your concerns regarding the safety of cell phone use?

**Devra Lee Davis:** Let me start by saying that cell phones have changed our lives, often for the better, and these phones have radically improved our ability to respond to emergencies and to connect with each other. Cell phones have also fundamentally changed the nature of commerce in developing countries, so I recognize that cell phones have very important value in society, and I own and use cell phones.

However, I also think that we should take simple precautions that may protect our health when we use cell phones. I believe cell phone use has the potential to increase our risk for a number of serious diseases if we hold the phones on our bodies and next to our brains. That is why we at The Environmental Health Trust, this small nonprofit organization that I have set up, are promoting a global campaign along with 12 countries around the world that agree that we need to promote the sensible policy of precaution when it comes to cell phone use. Policies of precaution have already been put into place in Israel, in Finland, and in France—countries that are fairly sophisticated in their use of radar and modern technology.

The bottom line is that a cell phone is a two-way microwave radio, and the industry has used the term to describe what comes out of the cell phone as “radiofrequency energy.” Now, a radio makes music, and energy is something we all want more of, but, in fact, radiofrequency energy is just another word for microwave radiation. So, the language that we use to talk about cell phones misleads people into thinking that they are benign.

As I have documented,<sup>1</sup> when cell phones were first proposed to be introduced in the United States, it was assumed that they had to be safe, and therefore there was no requirement that they should be shown or tested for safety at all. If cell phones were drugs, these phones would be illegal, because, as you know, drugs have to be shown to be efficacious and safe. Cell phones have not been proven to be safe.

## Q: What are some specific health risks that you are particularly worried about regarding cell phone use?

**DLD:** Well, the specific issue of the effects of cell phone use on brain metabolism has been raised most recently by the work of Nora D. Volkow [MD], chief of the National Institute of Drug Abuse and a very distinguished brain modeler and neuroscientist. Her study showed increased brain glucose metabolism in the region of participants’ brains that was closest to the cell phone antennae—and this was after just 50 minutes of cell phone exposure.<sup>2</sup>

We need to consider the long-term impact of extra glucose in the brain. Glucose is the brain’s fuel, but what is the effect of too much fuel over time? The brains of people with Alzheimer’s have been described as being “full of sugar.” So, too much sugar in the brain, just like too much sugar in the blood, could well be pathological, and it certainly augurs for serious concern about long-term cell phone use because, in Volkow’s study, these changes took place after only 50 minutes of use.

It is important to understand that, when a phone is turned on and whether a person is talking on the phone or not, the phone is constantly sending microwave radiation from the phone to the nearest tower. Because of the nature of antennae built into the back of phones today, whenever a phone is on and sending a signal—it is a symmetrical signal—half of that signal gets into the body. That is why we are promoting not holding the phone directly next to the brain or body, and instead recommend using a speakerphone or headset. Distance is a friend when it comes to cell phones. As my colleague Om P. Gandhi [ScD, chair of the Department of Electrical Computer Engineering at the University of Utah] has shown, every millimeter that one holds a phone away from the body reduces the absorption of microwave radiation into the brain or body by 15%.

In addition to changes in brain metabolism, several different studies—including one at the Cleveland Clinic by one of the world’s most distinguished researchers on male reproductive

health, Ashok Agarwal [MD]—have found that sperm exposure to cell phone radiation may lead to a significant decrease in sperm morphology, motility, and viability.<sup>3-5</sup>

Now, this may not seem like a big deal, but we know the reason why healthy men need about a half a billion sperm at one time is because we want the absolute healthiest sperm to fertilize eggs. If a man's sperm count is reduced or quality of sperm is compromised, then the chances that he will have less healthy sperm are increased.

**Q: Do you believe that cell phone use can increase a person's risk of brain cancer?**

**DLD:** Yes, and so does the World Health Organization [WHO] in its recent review of the evidence.<sup>6</sup> We have experimental evidence showing that cell phone radiation in cell cultures of animals and humans can: damage DNA; produce reactive oxygen species; weaken the blood-brain barrier; and increase micronuclei and other markers that we know predict an increased risk of cancer. So we have experimental evidence in in vitro systems.

One must realize that the latency for brain cancer in the general population actually turns out to be about 40 years, and the reason we know that is that, when the bombs dropped at the end of World War II, ionizing radiation caused an increase in brain cancer that did not show up until 40 years later.

The situation with cell phones is as follows: If we combine all of the epidemiologic studies that have been done, there is no risk. Most of those studies have looked at people who have used a cell phone for 5 years or less. But, if we examine the studies that have looked at people who have used a cell phone heavily for 10 years or more—the studies have one thing in common—they all find about a doubled risk of brain cancer.

The fact that we start to see this doubled risk after 10 years, I think, is very disconcerting. As a cancer epidemiologist and toxicologist, and looking at environmental health hazards for many years as I have done for national and international groups, very few environmental causes of cancer show up as having an impact in 10 years. Even the effects of tobacco smoke and asbestos can certainly take up to 40 years. So, understanding that we are starting to see evidence of an increased risk in heavy users after 10 years makes me very worried about what else we are going to see down the road.

The World Health Organization INTERPHONE study, in Technical Appendix 2 of that study, which you can find on our Environmental Health Trust website [See Learn More About Cell Phone Safety] as well as the Hardell studies that have been done in Sweden, find that people who have used phones a half an hour a day for 10 years have a significantly greater risk of developing malignant brain tumors—a finding that spurred the WHO to conclude that cell phone radiation is a possible cause of human cancer.<sup>7,8</sup>

A number of people—and I am one of them—agree that, at this point, with the human data that we have on people with 10-year usage or more, we would be foolish not to take simple precautions. That is a position that the governments

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Devra Lee Davis, PhD, MPH,  
Environmental Health Trust. Photo credit: Paula Beezhold.

of France and Finland and Israel and China and Russia are taking, as well as the WHO review that was just concluded on May 31, 2011.

**Q: What are the boundaries for distance and amount of time spent on a cell phone in terms of what might be safer cell phone use practices by the general public?**

**DLD:** First of all, in our modern society, we accept some risks. There is no free lunch, right? Think about cars, guns, or alcohol. We now have rules, and sometimes laws, for the safer use of cars. If someone were to put a baby in the front seat of a car without a seat belt, that person could get arrested. We have made cars safer over time. We have made guns with locks, and we have rules about use of alcohol.

We need to take the same approach to cell phone use. We need to recognize that they play a valuable function in society, but there should be limits, particularly, on their use by children. In France, the French National Assembly passed a law making it illegal to design or advertise a cell phone for a young child. We are full of advertisements with eTrade babies talking trash and young children running businesses with cell phones. People are giving kids iPhones, and they are giving babies apps of white noise— playing the sounds of the ocean or the waves or the rain—and putting the phones underneath the babies' heads to go to sleep. These are bad ideas.

Again, it is important to know that every millimeter away from the body gives a person 15% less exposure, and that is based on studies that were originally done for industry. So, frankly, if a person holds the phone in hand, or, better yet, keeps it on the table in front of the person, then that individual is reducing exposure several-thousand-fold. But if a person keeps it in the breast pocket or pants pocket, that person is getting more exposure than is safe. On a website about *Disconnect* [see Learn More About Cell Phone Safety], a person can click on [Cell Phone Safety](#), [Fine Print Warnings](#), and there will be the warnings that come with all phones that say that phones cannot be used safely on the body. In fact, the safest way to use a phone is to put it on the desk in front of the individual. With any wireless device, distance is a friend. So, a lot of people find it nicer to turn wireless routers off at night. But certainly, one should never have a wireless router in a bedroom. Cordless phones also need to be turned off.

**Q: What other recommendations do you have for how people might optimize their safety when using cell phones?**

**DLD:** Do not hold a cell phone next to the head or keep the phone turned on and next to the body. Use a speakerphone or a headset or put it on the desk or table in front. Do not sleep with a phone under the pillow or next to the head, because when sleeping, an individual needs the rest. Young girls, in particular, have adopted this habit of sleeping with their phones and should not be allowed or encouraged to do so.

When the signal is weak, one should not use the phone unless it is an emergency, because, whenever the signal is weak, the phone needs to use more energy to try to reach the tower. That is what phones do as long as they are on unless they are in airplane mode.

Whenever a phone is getting a weak signal, it should be turned off, because, if one uses it next to the head, at that point, that person is going to get a lot more radiation exposure than one would otherwise—and most people do not realize that. When signals are weak, phones run out of battery faster because they are using up their energy by continually seeking a better signal.

We are not telling people to stop using phones, but I think simple precautions are in order.

**Q: How would you like to see government and industry experts respond to what you are saying? What are some significant steps you would like to see them take?**

**DLD:** For starters, cell phones should come with warning labels that say: “This device emits microwave radiation and should not be used next to the brain and body.” The fine-print warnings that come with cell phones today tell users that we should use the phones 2.54 cm from the body, or 0.98 inches for a Blackberry. But people do not see the warning because it appears in fine print. This information should be made clearer and more public, and, frankly, the safe distances involved need to be expanded because the original data were developed for a 6’2”-tall man with an 11-lb head, which is about 3% of U.S. men.

We have got to recognize that, if we are going to have teenagers using cell phones, teenagers have smaller heads, and their brains are not fully protected with myelin yet, and we need to take precautions. It is not that hard. I would like to see warning labels and fine-print warnings made clearer. I would also like to see phones that are designed that could only be used with a headset or a speakerphone. If a phone only worked with a headset or a speakerphone, one would not be able to hold it smack against the brain, right? That could be a very simple solution.

**Q: Are there populations that are at more risk for these dangers that you speak about than others?**

**DLD:** The younger population is certainly at risk for the long term. But as we know, right now, 50% of the population over age 85 shows signs of dementia. We do not understand why. Certainly, we do not know what the normal rate of de-

## Learn More About Cell Phone Safety

### Book

*Disconnect: The Truth About Cell Phone Radiation, What the Industry Has Done to Hide It, and How to Protect Your Family*  
By Devra Lee Davis, PhD, MPH  
New York: Dutton Penguin, 2010

### Websites

#### Disconnect

[www.disconnectbook.com](http://www.disconnectbook.com)

#### Environmental Health Trust

[www.environmentalhealthtrust.org](http://www.environmentalhealthtrust.org)

#### Safer Phone Zone

[www.saferphonezone.com/](http://www.saferphonezone.com/)

mentia should be. There are a lot of different theories out there. However, given that that is the case right now, I certainly think we want to be careful, and that nobody should be holding a microwave radio directly next to the brain or body when it is on.

**Q: Do you have any final thoughts on this topic that you would like to share?**

**DLD:** This is not a topic that is going away, because, as we speak today, in the California State Legislature, Senator Mark Leno [D-CA] is introducing new legislation on the right to know about cell phone radiation. Similar legislation is being introduced in Pennsylvania, and, at the national level, we already have such legislation in France, Israel, and Finland, and we will soon have it in Turkey and Greece.

On our website [see Learn More About Cell Phone Safety], we have a 30-second YouTube video about how to practice safe cell phone use. The video shows a young woman who was the ski champion for the state of Wyoming in 2009 skiing downhill and riding her bike, and she says:

When I ski or ride my bike, I always wear a helmet to protect my brain. When you use a cell phone, you need to protect your brain, too, by making sure that you use a headset or speakerphone. Most people do not realize that a cell phone is a two-way microwave radio that should never be held directly next to the body. I am not going to stop using my phone. But I want to be smart about it.

Now that I am a grandmother, and I have been in science for more than 3 decades, I look at this problem as an epidemic in slow motion that we can actually do something about. I come at this issue as someone who played a role in seeing that both active and passive smoking were clearly understood to be health hazards. So, I go back to the time when people actually debated the dangers of tobacco, and I saw what happened in that debate. I also saw what happened in the debate about asbestos and whether it was actually harmful to people if one was exposed to a small amount of asbestos. Today, as readers may

be aware, 1 in 3 cases of a very rare tumor called mesothelioma occurs in someone with no workplace history of exposure to asbestos at all. That is telling us that the environment, unfortunately, is important.

Looking at these experiences, it is often only after evidence becomes irrefutable that action is taken to prevent future dead bodies—and that is too late. I really feel that this issue is one that we have to act on now. We cannot afford to go through the same things that we have gone through with tobacco and asbestos. To me, it is the most compelling global public health threat that we face that we generally do not recognize. Simple steps may save lives and spare our grandchildren from a potentially massive epidemic of completely avoidable disease.

It is really important to understand that international groups are way ahead of the United States on this issue. The Israelis live and die by radar. I document in my book that radar first gave birth to the microwave oven and then gave birth to cell phones. It is a form of radar that we are using here. The Israelis know they need radar, for obvious reasons, and that country's government was one of the first governments to issue warnings about the safer use of cell phones. In Israel and in France, phones must have information about the amount of radiation they absorb on the box or on the phone so that people know about this.

In the United States, there are many simple steps that we could and should be taking to protect people from possible health risks associated with cell phone use. ■

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