



# Is Your Life on the Line?

As scientists test whether cellphones cause tumors, they're receiving lots of static from the telecom industry. Here's what you need to know before you point a loaded phone at your head

BY PAUL SCOTT • PHOTOGRAPHS BY BARTHOLOMEW COOKE

**L**LOYD MORGAN, AN OLD MAN with a hole in his head, had no business discovering the fatal flaw. After all, this was a \$30 million effort to answer the question of whether cellphones can give you brain cancer. • Morgan, 68, is a survivor of brain cancer. Based in Berkeley, California, this retired electronics engineer and self-trained epidemiologist has made it his mission to spread the message that cellphone radiation is carcinogenic. He does this more or less as a wireless communications vigilante, however. The American Cancer Society, the National Cancer Institute, the U.S. Food and Drug Administration, and the World Health Organization all regard the radio waves emitted from cellphones as safe. But another growing body of experts believes cellphone use can promote tumors, and momentum

has been shifting to their side. A researcher in Sweden, for instance, recently reported that people who started using cellphones before the age of 20—including 80 percent of the readers of this magazine—have four to five times the odds of developing one type of brain tumor. An unpublished (and therefore

not peer-reviewed) analysis by researchers at the University of Pittsburgh Cancer Institute shows an increase in brain tumors among Americans in the under-30 age group.

And according to new research, studies showing that cellphones are safe tend to be (a) less rigorously designed and (b) funded by

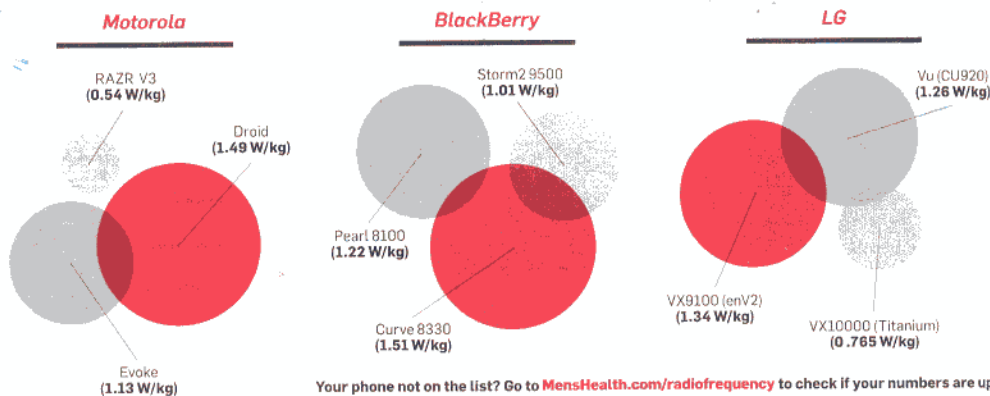
the cellphone industry, while studies showing that cellphones carry risks are (a) produced with better science and (b) have no financial conflicts of interest.

And if the slow spread of distress within the halls of government means anything, the topic no longer causes eye-rolling among lawmakers. The National Institutes of Health (NIH), for example, has recently authorized a \$25 million study to analyze rats that have been bathed in cellphone radiation for a period of 2 years. Both houses of Congress have held hearings on the issue. And in Maine, legislation may soon require warning labels on cellphones sold in that state.

The cellphone industry has responded with studies, mind you—ones that exonerate

## How much radiation are you absorbing?

The Federal Communications Commission limits the output of U.S. cellphones to 1.6 watts/kilogram of radiofrequency energy per gram of tissue. But outputs vary depending on a phone's design and function, so you can shop for lower numbers. Other strategies: Hold your phone farther from your ear, use a headset, and avoid calling when your phone shows only one or two bars: Straining for a signal boosts the radiofrequency output. Another solution: Talk less. MARIA MASTERS





If cellphone radiation researchers are right, the brain-cancer epidemic will strike in the mid-2030s.



cer commissioned an epidemiological study in 1998 big enough for cellphone critics to choke on. The 13-nation Interphone project asked more than 6,000 patients with brain tumors about their cellphone use, and then compared their answers with those of a matched group with no brain cancer.

So what did they find? Nobody knows.

While partial results have been published, the report's final conclusions are in limbo 4 years after its completion. Press accounts have asserted that the coauthors are bitterly divided over what the study found. Published sections have reported no connection between cellphones and cancer, but most of the patients studied used their cellphones for less than 10 years. That matters, because brain tumors could take decades to develop, and widespread cellphone use in the United States began only in the mid-1990s.

"It took 40 years for brain tumors to show up after Hiroshima," says Devra Davis, Ph.D., M.P.H., founding director of the center for environmental oncology at the University of Pittsburgh Cancer Institute (UPCI). "How can you expect to see effects from cellphones in 10?"

Studies that look at cellphone use for more than 10 years are less comforting. According

mobile-phone habit—these patients had used their cellphones for only a 1-year minimum.

Brain cancer is rare, affecting just 27 in every 100,000 U.S. men. It's also an illness of middle age, with 56 being the median age of diagnosis. But the significance of Dr. Hardell's latest finding, if it's true, is pretty stunning. With 277 million cellphone accounts in the United States alone, a quintupling of brain-cancer risk has the potential to translate into hundreds of thousands of preventable cancers.

The critics of cellphone radiation compare our position today—at the dawn of wireless communication—to that of our grandparents upon the widespread introduction of tobacco and asbestos into the environment in the past century. It took decades for these carcinogens to leave a mark on official health statistics, but the body counts grew exponentially: few cancers in the beginning, then a sharp slope upward. If this scenario's cost in human suffering doesn't bother you, consider its financial repercussions: It can cost \$200,000 to treat a brain tumor.

#### LLOYD MORGAN'S PATH TO CELLPHONE

evangelism was personal. In 1995, when he was 53 and working in Silicon Valley, he suf-

fered a grand mal seizure. Doctors removed a softball-size meningioma from his left frontal lobe, and told him he may have raised his risk of brain cancer from having been around electromagnetic radiation on the job. (He'd also raised his risk by having full dental x-rays as a child and by using a ham radio as a teenager.) Today there is a dimple in his scalp, and MRIs show a hole in the space where his tumor was removed.

Morgan immersed himself in brain-cancer research, and his self-education eventually led to his discovery, 2 years ago, of a baffling characteristic buried deep within Interphone statistical tables. Not only do cellphones not cause cancer, argued some of the project's dozens of authors, but according to their results, the brain-cancer risk associated with cellphones routinely produces an "odds ratio" of less than one. That means, incredibly, that Interphone has quietly found that cellphones protect you from brain cancer.

"They never say it that way," says Morgan. "They always just say, 'We found no increased risk of cancer.'" One Interphone study even found that using cellphones keeps brain tumors smaller. "Either holding a radio transmitter up to your head protects you from

to a 2002 study of more than 1,400 brain-tumor patients by Swedish cancer epidemiologist Lennart Hardell, M.D., Ph.D., as well as a review by Dr. Hardell of data from other researchers' studies, regular use of a cellphone for longer than 10 years increases your risk of some types of brain tumors.

And that's just the bad news for adults.

A former cellphone-industry researcher from the University of Utah, Om Gandhi, Sc.D., has discovered that children's brains absorb far more RF radiation than adult brains do. Having routinely subjected adult-sized dummy heads to RF waves, in 1996 Gandhi created models of the smaller, thinner skulls of children ages 5 and 10. In what would mark the beginning of the end of his financial relationship with the cellphone industry (its decision, not his) Gandhi reported in the journal *IEEE Transactions on Microwave Theory and Techniques* that the cellphone radiation that hits an adult brain with 72 mW/kg (milliwatts per kilogram of brain tissue) of wireless radiation, for instance, zaps a 10-year-old's brain with 160 mW/kg. Worse, it invades a 5-year-old brain with nearly 240 mW/kg.

Gandhi's research was replicated by the French cellphone industry, and France has

joined several other nations in issuing advisories limiting the use of cellphones by children. "We have children running around with these cellphones up to their ears and sleeping with them under their pillows," says Andrea Boland, a lawmaker from Maine who introduced the first piece of legislation in this country to require warning labels on cellphones.

Lest readers over the age of 10 take comfort, the window of increased vulnerability to cellphone radiation may not be limited to kids' *Dora the Explorer* years. According to Ronald Herberman, M.D., former head of UPCI, it takes decades for the brain to lay down the electrical insulation (known as myelin) that presumably shields the nerves, for the most part, from radio waves. Dr. Herberman thinks our increased vulnerability to RF radiation could extend well into our 20s.

All of which might explain the latest bad news out of Sweden. According to data published by Dr. Hardell in the *International Journal of Oncology* in July 2009, brain-tumor patients who went wireless as teenagers had four to five times the risk of developing an astrocytoma, a type of brain tumor. If this data is correct, you can forget about having a leisurely decade to wean yourself off your

developing a brain tumor," Morgan says, "or the studies have major design flaws."

If RF radiation does cause brain tumors, we'll see a precipitous rise in cancer by the mid-2030s. If rates stay where they are, on the other hand, gadflies like Morgan will have undermined the case for environmental causes of cancer. Morgan believes it's a risk worth taking. "I worry, and I pray that I'm wrong," he says.

**WHEN HE BROKE RANKS IN 2008 TO TESTIFY** before Congress about his concerns, the UPCI's Ronald Herberman, M.D., became the most prominent member of the American cancer research community to describe long-term use of cellphones as a potential carcinogen. In September, Dr. Herberman appeared before a sparsely attended subcommittee meeting—it was the week the banking crisis came to a head—to argue that while more research was needed, enough data was available for him to warn his staff to begin using earbuds and speakerphones and to keep their cellphones away from their children. He based his recommendation on the work of Gandhi and Dr. Hardell.

Continued on page 158

After studying 1,400 brain-tumor patients and an equal number of healthy people, Dr. Hardell found not only a doubling of brain-tumor risk after 10 years of heavy wirelessness, but also a specific risk on the side of the head patients remembered using their phones on. (Critics say that recollections by brain-tumor patients would be colored by where the tumor grew.) In 2003, Dr. Hardell looked at the same data and found the risk from using cellphones rose with a patient's total hours of use. Two years later he sorted the people in his study by address and discovered that rural cellphone users—whose phones must emit much more power to reach towers than urban phones do—faced a higher risk of tumors.

For Dr. Herberman, it was the idea of RF radiation saturating the heads of children that most troubled him. "Of all the studies I had read linking an increased risk with cellphone use," he says, "none had been done with kids."

Now retired from the UPCI, Dr. Herberman remains in the minority on the issue. "A number of my colleagues in the cancer community wonder whether I did the right thing," he says, "whether there was enough evidence to sound an alarm. But most of them didn't take the trouble to assess the published results. Whenever they ask me why I spoke up, I ask them if they've read the research, and what I usually get is, 'No, I hadn't seen much about that.'"

Dr. Herberman and Davis are now waiting for the publication of the troubling findings presented by Davis last summer in Davos, Switzerland. After parsing the NIH database of brain-tumor incidence in the United States, Davis discovered an "increasing incidence of brain tumors in the United States in people under age 30," she wrote in an e-mail. "The reasons for this trend could include changing patterns of use of cellphones, diagnostic radiation, or even aspartame." Davis, who moved on from Pitt's cancer institute to found the Environmental Health Trust, thinks it's lousy that her findings remain mired in review while the authors of a recent article in the *Journal of the National Cancer Institute* made headlines for suggesting that there had been no increase in brain tumors in Scandinavia between 1998 and 2003, a period still early in the use of cellphones.

**WHEN YOU COME DOWN TO IT, THOUGH, WE** might simply be arguing about earbuds. That's right: Whatever the outcome of these clashes between RF wonks, no one has proposed a ban on cellphones. "In general," says Dr. Carpenter, "merely pulling the phone 6 inches away will dramatically reduce your exposure."

This entire seemingly apocalyptic argument, in other words, is over whether the cellphone industry should warn us to wear our earbuds, keep the things away from our kids, and use the speaker feature. That seems like an easy enough suggestion. But it's like suggesting to an NRA member that he put a lock on his gun. Not over my dead cellphone battery, the industry shouts back. ■

2  
U  
S  
C  
sr  
dr  
a f  
se  
sli  
mi  
a r  
bro  
the  
oil  
are  
bee  
pea  
ega  
nee

29  
Ch  
Boil  
rins  
sau  
1 ta  
flak  
into  
until  
a bit  
add  
ach,  
spr  
sauc  
throu

30  
Cell  
Eda  
Soak  
shelle  
Puree  
of veg  
a fres  
and pe  
Toss t  
tro "pe