

STRAIGHT TALK

The trillion-dollar **cell phone** industry says the technology is safe, but some scientists are **not so sure**.

BY **BOONSRI DICKINSON**

Blame the brouhaha over cell phones and brain cancer on Larry King, who first brought the issue into the national spotlight. In 1993 Florida businessman David Reynard appeared on *Larry King Live* after suing the cell phone company NEC over his wife's death. Reynard claimed that his wife died in 1992 of a brain tumor caused by frequent use of her cell phone. An MRI had shown that the tumor started in the brain region directly next to the phone's antenna, Reynard contended.

Within a week of the broadcast, a congressional hearing was held, prompting both industry and government agencies to fund research on a possible link between cell phones and brain cancer. Congress asked the National Cancer Institute (NCI), among other agencies, to look into the issue. Accordingly, in 1994 Peter Inskip, a senior investigator at NCI who was already coordinating research on the causes of brain cancer, added cell phone usage to the study. Data collection for the NCI study ended in 1998, with researchers finding no evidence to support the hypothesis that using cell phones can cause brain tumors but cautioning that the data reflected only early use of the technology.

Around 1993, the Cellular Telecommunications Industry Association (CTIA) set up its own \$27 million research program led by epidemiologist and public health scientist George Carlo. This research did not find strong evidence of a link between cell phones and brain cancer, but Carlo suggested further investigation.

These studies could have closed the door on the question, but in the years since these findings, our cell phone habits have changed radically. We use our phones almost constantly—an average of 766 minutes a month, according to a recent survey. Children use the devices from a very young age. Scientists still don't know the potential consequences of being exposed to cell phone radiation every day for more than 10 years. While the vast majority of studies find no association between cell phones and brain cancer, many scientists are still calling for

further research because the full brunt of health effects could take decades more to appear. Meanwhile, we phone users are carrying out an experiment on a massive scale. Earlier this year, the alarm was raised again when a widely circulated memo from Ronald Herberman, a Pittsburgh cancer expert, counseled putting major limitations on cell phone use. "Although the evidence is still controversial, I am convinced that there are sufficient data to warrant issuing an advisory," he wrote.

THE CAUSE FOR CONCERN

Each time a cell phone user makes a call, low levels of radio-frequency (RF) energy are emitted as the phone's antenna generates radio waves that ultimately transmit people's voices from one phone to another. The amount of radiation depends on how long a person stays on the phone, how he holds the phone to his head, and whether he uses it in the city or the country.

By 1996 various committees of scientists and engineers had reviewed numerous epidemiological studies and research on lab animals exposed to RF radiation. Two of these committees independently formulated exposure recommendations for cell phones. Their findings were used by the Federal Communications Commission to develop a standard for exposure, set in 1996 and still in place today. The standard—1.6 watts per kilogram of tissue—is called a specific absorption rate.

Researchers know that cell phones don't cause cancer in the traditional way by directly damaging DNA. That's because cell phones emit nonionizing radiation. In animal studies, some researchers have found that nonionizing radiation can trigger biological changes that damage DNA, which could lead to cancer. However, most studies conclude that cell phone emissions do not have the energy to cause such harm.

So why does the controversy persist? Studies trying to link a behavior to an outcome are inherently difficult. Researchers typically ask people (who may have cognitive impairment as the result of brain cancer) to recall their cell phone habits

from years before. Brain tumor patients who know about the potential risk of cell phones may be more prone to what is known as recall bias, reporting using their cell phones at a higher rate than they actually did. And brain cancer itself is rare: According to the NCI, only 1 in 165 people are diagnosed during the course of a lifetime with cancer of the brain or nervous system. To put this into perspective, lung cancer is roughly 10 times as common.

In 2000 a multimillion-dollar epidemiological study called Interphone began exploring the potential connections between phone usage and disease, looking at the habits of 14,000 people, half of whom had cancers of the head and neck. Thirteen countries participated, including Australia, Canada, Sweden, and the United Kingdom. The United States did not participate, in part because NCI was still analyzing its own data, and also because the United States had a much shorter history of cell phone use than did the other countries.

Just a year after the Interphone study began, Carlo co-authored a book, *Cell Phones: Invisible Hazards in the Wireless Age*. In it he wrote that in running the CTIA study, he had been employed by an industry that practiced “science-veneered damage control...assuring one and all that cell phones are safe.” Carlo was an early critic of cell phones, but he was certainly not the last. In 2007 an international group of 14 scientists released a paper titled “BioInitiative Report: A Rationale for a Biologically Based Public Exposure Standard for Electromagnetic Fields,” concluding that existing standards do not protect public health.

“The physicists and engineers have the mistaken idea that unless an agent causes direct damage to DNA, it can’t cause cancer. That simply is wrong,” says David Carpenter, coeditor

of the report and director of the Institute for Health and Environment at the State University of New York at Albany. The implications of the European literature (including the Interphone study) are enormous, Carpenter says. There is no proven adverse effect in individuals who have used cell phones intensely for less than 10 years, but for those who have talked on them for a longer period of time, Carpenter believes there is a correlation between use and diseases such as brain cancer, tumors of the auditory nerve, and salivary gland tumors in the cheek. “We are concerned that we may be facing an epidemic of brain cancer as these kids grow up,” he says. “We should not wait until we have absolutely definite evidence to begin to issue warnings.”

But not everyone agrees with the report. An advisory panel in the Netherlands referred to it as an advocacy tool. Radiation biologist John Moulder at the Medical College of Wisconsin concurs. “People report things; other people try to confirm them and can’t,” Moulder says. “No one has found excess brain cancer in rodents exposed to radiation.”

While most of the research has explored cell phones and brain cancer, studies on eye disease, neurodegenerative disease, and cognitive function “may be equally justified,” reports the International Commission for Non-Ionizing Radiation Protection (ICNIRP) in Europe.

LONG-TERM EFFECTS AND NEW EVIDENCE

The current understanding of cell phones and brain cancer is a mess. But the question of safety is becoming ever more relevant today as cell phones become essential to everyday life. (Some 84 percent of Americans own cell phones, according to the CTIA.) Many are turning to the Interphone research (a collection of many studies), but firm conclusions are difficult to find.



“I DON’T SEE MY RESULTS AS CONCLUSIVE BUT AS A RED LIGHT TO BE CAREFUL.”

Almost 50 international researchers are still arguing about how to present the results from Interphone, some of it suggesting an association between cell phones and brain cancer. Two Interphone studies were headed up by the same man, Lennart Hardell, of the department of oncology at the Orebro Medical Center in Sweden. In 2006 Hardell reported that using cell phones for at least 10 years correlated with an increased risk of two types of brain tumor. He also showed a relationship between the side of the head against which the cell phone was placed and the side of the head where the tumor grew.

Siegal Sadetzki, a physician and epidemiologist at Sheba Medical Center and Tel Aviv University in Israel, published her results ahead of the final report of the Interphone study. Like Hardell, Sadetzki found a side-of-the-head correlation, with heavy phone users facing a 50 percent higher risk for developing a salivary gland tumor on the side where the phone was placed. “I don’t see my results as conclusive but as a red light to be careful,” Sadetzki says. “It’s premature to make conclusions; it takes 20 to 40 years for cancer to develop.”

“We don’t know the long-term risk of heating up your brain in those areas over 20 to 30 years,” says Keith Black, neurosurgery department chairman at Cedars-Sinai Medical Center in Los Angeles. “All these studies have flaws.”

The industry stands by the safety of its products. “The significant weight of the evidence demonstrates that RF energy in mobile phone products poses no credible health risk,” says Motorola spokeswoman Paula Thornton Greear. Says Joseph Farren, assistant vice president of public affairs for CTIA: “Our position is pretty clear. There is a consensus among the scientific experts around the world—the FDA, the National Cancer Institute, the American Cancer Society, the World Health Organization—all of the organizations have reviewed the available data and have concluded there is no link between adverse health effects and wireless use.”

NEW FEARS—AND CONTINUED DEBATE

On May 27, 2008, Larry King brought Vini Khurana, a neurosurgeon at Australian National University, to his show to discuss the current state of cell phone research. In March Khurana had posted his own assessment of current literature on his Web site—69 pages, none of it peer reviewed. Khurana warned that the devices may be contributing to health problems in ways we have not yet identified. He suggested that cell phones could have far broader health ramifications than smoking cigarettes, due in part to the fact that nearly three billion people talk on cell phones and only one billion smoke.

On July 21, 2008, Ronald Herberman sent a memo to 3,000 faculty and staff at the University of Pittsburgh, warning that cell phone use might be dangerous. Herberman, an internationally known tumor immunologist at the University of Pittsburgh Cancer Institute, declined an interview for this article, but his position is well spelled out on the Institute’s Web site, where he

wrote, “Recently I have become aware of the growing body of literature linking long-term cell phone use to possible adverse health effects, including cancer.” His memo included 10 tips, such as: “Do not allow children to use a cell phone, except for emergencies. The developing organs of a fetus or child are the most likely to be sensitive to any possible effects of exposure to electromagnetic fields.”

Certain members of the scientific community took exception to Herberman’s advice. “It’s important to not confuse exposure with risk,” the NCI’s Peter Inskip says. Nonetheless, thousands of people called the American Cancer Society’s toll-free number to ask if cell phones were safe. Otis Brawley, chief medical officer at the society, says, “The University of Pittsburgh exaggerated the risks. They were unnecessarily scaring people. Most of the scientific community was wondering what Herberman, with no expertise, was doing.”

Larry King brought two oncologists and a neurosurgeon back to his show in July to address the subject. One of them, Keith Black, later said in a phone interview that “even if cell phones don’t cause cancer, microwave energy heats up the tissue.”

Increased concerns following Herberman’s memo and Larry King’s latest show led Representative Dennis Kucinich (D-Ohio) to address the issue in the fall of 2008. “My hope is that we can improve the public’s and Congress’s understanding about the gray area in this scientific debate,” Kucinich said in a congressional hearing. “The question before us, then, is whether that evidence is sufficient to merit action by regulators and legislators to protect public health.” Herberman testified that the most thorough studies showed an association for those using cell phones for more than 10 years. Most of the literature on cell phones is of little use, he said, because the people studied had used the devices for only a few years.

The NCI’s data show that overall, brain tumor rates have been steady: From 1987 to 2005, the rate of brain cancer has not increased despite the increase in cell phone users, from 110 million in 2000 to 208 million in 2005. While there is an increase in diagnoses of brain cancer in the elderly, this may be attributed to better brain imaging techniques resulting in earlier detection of tumors. In November, neurologist Ron Pawl of Lake Forest Hospital in Illinois wrote an editorial in which he argued that gliomas (which account for the majority of malignant brain tumors) have become more common, warranting action.

Unfortunately, no one is even close to answering the question that was asked 15 years ago: Are cell phones safe? The debate isn’t going away anytime soon. “Part of the problem is with neurosurgeons going on *Larry King Live*, who change the facts on the fly and are flat-out wrong,” Brawley says. The studies showing an association make the headlines, but there are thousands of other studies that don’t. Meanwhile, Brawley points out: “We know cell phones kill people by distracting them while driving. Let’s focus on the real problem.” Ω