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THIS WAY IN

How Safe Is Your Cell Phone?

BY GINA SHAW

ell phones may cause cancer!" shouted hundreds of international headlines at the end of May 2011, after a World Health Organization (WHO) review of the available evidence classified cell phone radiation as a "possible carcinogen." (A carcinogen is anything that causes cancer.) It was enough to make iPhone addicts yearn for the days of rotary phones.

But wait. Less than six weeks later, a new study was released, this one by a panel of independent experts from the International Commission on Non-Ionizing Radiation Protection. They looked at cancer instances between 1970 and 2008 and found that they remained mostly static compared to the time periods before and after cell phones became common.

"Although there remains some uncertainty, the trend in the accumulating evidence is increasingly against the hypothesis that mobile phone use can cause brain tumors in adults," said their report, published in the *Environmental Health Perspectives Journal*.

So who's right? And how do you decide whether or not you should limit use of your cell phone, hold it away from your head, buy a headset, or lock it in a lead-lined box three feet away from your body?

Both reports are right. The WHO review did *not* say that cell phones were a major cause of cancer. Its International Agency for Research on Cancer (IARC), which has evaluated the cancer-causing potential of more than 900 possible carcinogens over the past 30 years, uses the following scale:

- ► GROUP 1: Carcinogenic to humans
- ► GROUP 2A: Probably carcinogenic to humans
- GROUP 2B: Possibly carcinogenic to humans
- GROUP 3: Unclassifiable as to carcinogenicity in humans
- GROUP 4: Probably not carcinogenic to humans

The May report from the IARC moved cell phones from Group 4—probably not carcinogenic—to Group 2B, or possibly carcinogenic. Also in that group: coffee, pickled vegetables, engine exhaust, and working as a carpenter or a dry cleaner.

HOW WOULD CELL PHONES CAUSE CANCER?

The theory as to why cell phones might cause brain tumors has to do with the type of radiation they emit. They send out radiofrequency waves to find the nearest cell tower. It's not the same kind of radiation given off by X-ray machines, which is a known carcinogen (that's why you wear a lead apron to get dental X-rays). The radiation given off by cell phones is *nonionizing* radiation, a type which has not been associated with

increased cancer risk.

Some scientists argue no plausible biological mechanism exists by which cell phone radiation could cause cancer.

"It's impossible for cell phones to cause cancer because the electromagnetic fields they generate cannot break chemical bonds between molecules," says Gary Arendash, Ph.D., a research professor at the Florida Alzheimer's Disease Research Center. That process, he explains, is thought to be key to increasing cancer risk. "UV light from the sun causes skin cancer, for example. But cell phones provide radiation that is thousands of times

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-ANTHONY SWERDLOW, M.D., PH.D

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weaker than UV rays and X-rays—it's similar to that generated by a one-watt flashlight. This is too weak to cause cancer."

However, just because the signal is weak doesn't mean the brain can't pick it up. Earlier this year, scientists at the National Institutes of Health (NIH) and the Brookhaven National Laboratory reported that the human brain is sensitive to the electromagnetic radiation emitted from cell phones. Using positron emission tomography (PET) scanning, the researchers found that the brain's metabolism was increased during cell phone use, specifically in the areas nearest where the phone's antenna meets the head.

Another device that emits similar-frequency waves to cell phones is the cordless phone. "They've been extensively utilized since the early 1980s, and there is no body of scientific evidence that I am aware of that says cordless phones cause brain cancer," Dr. Arendash says.

Henry Lai, Ph.D., a research professor at the University of Washington, was one of the first to draw attention to concerns about the carcinogenic potential of cell phones. He notes that the new study from the International Commission—the one that says cell phones are unlikely to cause cancer—received at least some of its funding from the Mobile Manufacturers' Forum and the GSM Association, both of which represent the cell phone industry.

Dr. Lai is particularly concerned about the risk of long-term cell phone use among younger people. "The radiation penetrates deeper into a child's head, so a bigger portion of the brain could be exposed to the radiation," he says. "And parts of a child's head—such as the eyeballs and the skull's bone marrow—absorb more energy than an adult's."

"Children's brains are still developing and may be more vulnerable to effects than an adult brain would be," says Nora Volkow, M.D., director of the National Institute on Drug Abuse, who was a lead investigator on the NIH-Brookhaven National Lab study. "Also, since they are starting their lives with cell phones—whereas most of us started our lives without them by the time they are middle-aged, they will have had many more years of exposure to cell phones than we do."

WHAT'S THE EVIDENCE?

The two types of cancer that researchers have been most concerned about are gliomas and acoustic neuromas. Both kinds of brain cancer are relatively rare. Gliomas are usually malignant and often deadly (the late Massachusetts Senator Edward Kennedy died of a malignant glioma), while acoustic neuromas are slow-growing and generally benign.

Perhaps the largest study of cell phone use and possible links to cancer is the multi-country Interphone study, which is conducted by the IARC. It involves approximately 14,000 study subjects in more than a dozen nations, including Japan,





rtist Chuck Close paints huge portraits that invite you to ponder visual details. Find where each detail below appears in the photograph of Chuck Close above. All details are right side up and three times as big as in the original photo. This puzzle was adapted from *The Playful Brain*, by Richard Restak, M.D., and Scott Kim, Ph.D. (Riverhead Books). *— Scott Kim*

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Canada, Australia, and many European countries.

The study, published last year in the *International Journal of Epidemiology*, categorizes people according to how often they talk on their phones and how long they've been using them. For most people, cell phone use didn't appear associated with an increased risk of cancer.

However, for people who talked on their phones for at least 30 minutes a day, and had done so for at least 10 years, the study found an elevated risk of developing gliomas—about a 40 percent increase. That one finding was the primary reason that the World Health Organization decided to put cell phones into its "possible carcinogen" category.

But this study has significant flaws, says Lynne Taylor, M.D., Fellow of the American Academy of Neurology and director of neuro-oncology at Virginia Mason Medical Center in Seattle, WA.

"They got their information by asking people who were recently diagnosed about their cell phone use over time," she says. "One of the primary symptoms of a brain tumor is memory loss, and the period right after diagnosis is emotionally charged. So if you interview someone at that time and ask them how often they've used a cell phone, for how long, and over how many years—that's going to yield highly questionable results."

Even the authors of the study acknowledge that, Dr. Taylor notes. "There's a subset of the patients who used cell phones the most and were found to be at highest risk. They reported using their cell phones five hours a day without a headset," she says. "But who does that? They may not be remembering accurately."

HOW SUBSTANTIAL IS THE RISK?

Let's say for the sake of argument that no controversy exits that we know frequent cell phone use increases the risk of developing brain cancer by 40 percent. What does that mean?

"Every year, about six people out of every 100,000 will develop a glioma," says Dr. Lai. "With a 40 percent increased risk, that means among heavy cell phone users, about two more people—for a total of eight out of 100,000—will develop one. But there are millions of people using cell phones around the world, so it could be a significant overall increase in cancers."

But we're not seeing such an increase, according to the IARC. Evidence from many Western countries, where mobile phone use has exploded over the past 20 years, shows "no indication of increases in brain tumor incidence," says Anthony Swerdlow, M.D., Ph.D., professor of epidemiology at the UK's Institute for Cancer Research, a lead author of the Interphone study.

Dr. Arendash believes the "40 percent increase" that's been so heavily reported could be caused by flaws in the study's design. "For heavy cell phone users, there was no increased risk when their use was indexed by *number* of calls," he points out. "Only when their risk was calculated by *duration* of calls did they find increased risk. But if that risk was real, the next group down in duration of call time should have had at least a slightly above normal risk of brain cancers." To the contrary, that group's risk of brain cancer appeared to be lower than normal.

Still, not all the data are in. Dr. Swerdlow and his colleagues admit the possibility of a longer-term effect—that is, increases in cancer rates showing up after more than 10-15 years of substantial exposure—can't be ruled out.

WHAT SHOULD YOU DO?

"It's not that hard to get a headset or ear buds, so why not do it?" says Dr. Lai. "It may be easier to just hold the phone to your head, but even the pamphlet that you get when you buy a cell phone tells you to hold it at least a half an inch away. If you're at all worried about getting cancer, use a headset."

Dr. Taylor isn't even saying that to her patients. "I think the World Health Organization ranked cell phone use as a 'possible carcinogen' because they wanted to keep it open for further study," she says. "So I reassure my patients that there is no link that we know of between cell phones and brain tumors. Should you use a headset so you don't crash your car? Sure. But I don't think you need to use one to protect against brain tumors."

