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Cell Phones and Cancer: No Clear Connection

by Tamar Nordenberg

Of the 100 million American cellular phone subscribers, some use their wireless phone only in a crisis--to call a friend or 911. They put their rap sessions on hold until arriving home, where phoning a friend costs no cents per minute.

For other wireless phone owners, it could be the fear of brain cancer, not an unwieldy wireless bill, that keeps them from using their cell phones for leisure chats.

Convinced that a nine-year cell phone habit led to his brain cancer, neurologist Chris Newman, M.D., has filed an $800 million lawsuit in Baltimore against his cell phone's maker and several other telecommunications companies. His suit comes five years after the dismissal, for lack of evidence, of a lawsuit filed in Florida by David Reynard, who alleged that a cell phone was responsible for his wife's fatal brain cancer.

In Newman's case, his lawyer has said, "it's really not a question at all" whether the cancer is cell phone-related. The evidence, she says: Newman's own doctors made the connection between his long-time cell phone use and his tumor, which is positioned in "the exact anatomical location where the radiation from the cell phone emitted into his skull."

Newman has been front and center in a renewed public focus over the last few months on whether the fear of brain cancer from wireless phones is well-founded or folly. For his part, epidemiologist Sam Milham, M.D., recently expressed a breakaway scientific viewpoint when he told the television audience of CNN's Larry King Live show that there is "plenty of reason for concern" about cell phones causing brain cancer.

Hold the phone. Is there really cause for concern? Do steps need to be taken, as Milham told Larry King, to avoid a brain cancer epidemic among the millions of cell phone users in this country and around the world?

No, current scientific evidence does not show any negative health effects from the low levels of electromagnetic energy emitted by mobile phones, says the Food and Drug Administration. But some recent studies suggest a possible link between mobile phones and cancer and warrant follow-up, the agency says, to determine with more certainty whether cell phones are safe.

"We don't see a risk looking at currently available data," says David Feigal, M.D., director of FDA's Center for Devices and Radiological Health. "But we need more definite answers about the biological effects of cell phone radiation, and about the more complicated question of whether mobile phones might cause even a small increase in the risk of developing cancer."

Radiation Without Risk?

Like televisions, alarm systems, computers, and all other electrical devices, mobile phones emit electromagnetic radiation. FDA can regulate these devices to ensure that the radiation doesn't pose a health hazard to users, but only once the existence of a public health hazard has been established. (See "It's Not a Food or Medical Product, So Why FDA?")

In the United States, mobile phones operate in a frequency ranging from about 850 to 1900 megahertz (MHz). In

that range, the radiation produced is in the form of non-ionizing radiofrequency (RF) energy. This RF energy is different than the ionizing radiation like that from a medical x-ray, which can present a health risk at certain doses.

At high enough levels, RF energy, too, can be harmful, because of its ability to heat living tissue to the point of causing biological damage. In a microwave oven, it's RF energy that cooks the food, but the heat generated by cell phones is small in comparison.

A mobile phone's main source of RF energy is its antenna, so the closer the antenna is to a phone user's head, the greater the person's expected exposure to RF energy.

Because RF energy from a cell phone falls off quickly as distance increases between a person and the radiation source, the safety of mobile phones with an antenna mounted away from the user--like on the outside of a car--has not been called into question. Also not in doubt is the safety of those so-called cordless phones that have a base unit attached to a home's telephone wiring and operate at much lower power levels than cell phones.

Many experts say that no matter how near the cell phone's antenna--even if it's right up against the skull--the six-tenths of a watt of power emitted couldn't possibly affect human health. They're probably right, says John E. Moulder, Ph.D., a cancer researcher and professor of radiation oncology at the Medical College of Wisconsin. It's true, he says, that from the physics standpoint, biological effects from mobile phones are "somewhere between impossible and implausible."

At the same time, Moulder supports further studies into the science of cell phone radiation. "Some people think the power emitted by the phones is so low, it's a silly thing to research. But I think it remains a legitimate area of study."

Studies in Perspective

Some mobile phone users have been diagnosed with brain cancer, and many others who have not used mobile phones have gotten the disease, too. Each year in the United States, brain cancer occurs at a rate of about six new cases per 100,000 people. Among the 100 million Americans who own mobile phones, then, about 6,000 cases of brain cancer would be expected among them in a year, even if they had not used mobile phones.

Scientific studies have focused on the question of whether the statistical risk of getting brain cancer is increased in those who use mobile phones compared to non-users, leaving to the courts the judgment of whether Chris Newman or other individuals would have gotten the disease had they not used a cell phone.

Two types of studies are generally used to investigate suspected cancer causes: epidemiological studies, which look at the incidence of a disease in certain groups of people, and animal studies.

Epidemiological studies are sometimes difficult to carry out in a way that can determine whether a cause-and-effect relationship exists between a single variable in a person's life (in this case, cell phone use) and the person's disease (brain cancer). Some factors that complicate research into the asserted link between cell phones and brain cancer: Brain cancer can take years or even decades to develop, making possible long-term effects of mobile phone use difficult to study; mobile phone technology is ever-evolving; and so many lifestyle factors--even down to the precise position in which a person holds the phone, as well as his or her own anatomy--can affect the extent of radiation exposure.

Studies in animals are easier to control, but entail complications of their own. For example, how should results obtained in rats and mice be interpreted in terms of human health risks? And how can scientists account for the fact that these studies sometimes expose animals to RF almost continuously--up to 22 hours a day--and to whole-body radiation, unlike people's head-only exposure?

While studies generally have shown no link between cell phones and brain cancer, there is some conflicting scientific evidence that may be worth additional study, according to FDA. (See "Studies So Far.")

Based on the evidence so far and possible limitations in some studies' research methods, FDA is closely following ongoing research into whether there might be any association between cell phones and cancer, according to the agency's Feigal.

A long-term study by the government's National Cancer Institute is already under way to examine possible risk factors for brain cancer. It compares past usage of mobile phones (as well as other environmental, lifestyle, and genetic factors) by 800 people with brain tumors compared with 800 others who don't have tumors.

The study, the first part of which is expected to be published early next year, will provide a "snapshot" of what the risks from cell phones could be, says Peter Inskip, Sc.D., one of the study's principal investigators. But this research, he cautions, has its own limitations. For one thing, the study was started in 1994 and it considers radiation exposures from cell phones that occurred between the mid-1980s and 1998. That time frame in large part predates the explosion in the popularity of cell phones, as well as the introduction of digital phones that work on a fraction of the energy compared with older analog varieties.

Recently, FDA announced that it will collaborate with the Cellular Telecommunications Industry Association (CTIA) on additional laboratory and human studies of mobile phone safety. A "Cooperative Research and Development Agreement" signed in June provides for research to be conducted by third parties, with industry funding and FDA oversight to help ensure the studies' quality.

Specifically, FDA will identify the scientific questions that merit attention, propose research to address those questions, review study proposals from those interested in doing the research, make recommendations on the selection of researchers, and oversee the development of study design. Once research is begun, FDA will review the progress of ongoing studies, review the results of completed studies, and issue a report to the CTIA.

Beyond this planned research, according to the industry association, there are hundreds of scientific studies completed or in progress around the world to investigate RF's possible health effects, with half of them specifically addressing the frequencies used by wireless phones. FDA is a leading participant in the World Health Organization's International EMF (electric and magnetic fields) project to coordinate research and the harmonization of international radiation standards.

Fear Factor

The new studies may bolster current scientific knowledge, but they will never be able to prove cell phones to be absolutely safe. Proving that cell phones don't cause cancer presents the insurmountable scientific obstacle of trying to prove a negative, Moulder explains. "The closest thing to proving that something is safe--that it doesn't cause cancer--is to try to prove that it does, and fail, and fail enough times and in enough different ways."

Even when scientists are convinced of the safety of a technology--be it the technology of cell phones or of televisions, radios, computers, or microwave ovens--it doesn't necessarily follow that public fears will be put to rest. Lay people interpret scientific evidence differently from scientists, according to risk experts, and the general public may be more likely to be frightened when preliminary research shows a mere possibility of harm.

Scientist Moulder is already confident that cell phone use doesn't increase a person's chance of getting brain cancer--so confident, in fact, that he sees nothing wrong with using a cell phone for even hours each day. "Go right ahead," the cancer researcher says, "but please-please-please don't use it while driving. That's dangerous."

Tamar Nordenberg is a former staff writer for FDA Consumer and now writes for FDA's Food Safety Initiative Program.

Earlier this year, the British government recommended that children's use of cell phones be limited to essential calls. The recommendation was not based on any scientific evidence that cell phones pose a special risk to children. Rather, it was a precautionary recommendation, the government explained, to protect a vulnerable population with still-developing nervous systems.

FDA has suggested some simple steps that American cell phone users can take if they remain concerned about potential health risks but don't want to give up their mobile phones.

First, people can of course consider reserving the use of mobile phones for shorter conversations or when a conventional phone is not available. Also, they can switch to a type of mobile phone with a headset to place more distance between the antenna and their bodies. And for the car, people can switch to a mobile phone with the antenna mounted outside the vehicle.

With the recent media spotlight on cell phones, cancer researcher John Moulder, Ph.D., warns that some marketers are preying on people's fear of radiation, selling fraudulent devices with claims that they are protective. Moulder has seen a variety of creative but useless items, mostly on the Internet, from pendants worn around the neck to so-called RF-proof lingerie. As to products sold as shields for the phone to cut your RF exposure while not interfering with the communication signal, Moulder says, "I have yet to see one that can do both of those things."

---*T.N.*

Studies So Far

Epidemiological and animal studies undertaken by the U.S. cell phone industry and others have yielded mixed results.

- In a study published in 1999, investigators at the Orebro Medical Centre in Sweden compared the past mobile phone use of 209 Swedish brain tumor patients and 425 healthy people. Conclusion: The study found no mobile phone/brain cancer link "in virtually all respects," cancer researcher John E. Moulder, Ph.D., says in the August 2000 issue of IEEE Spectrum, the official magazine of the Institute of Electrical and Electronics Engineers. Investigators did find that mobile phone users who got certain types of brain tumors tended to report using the phone on the side of the head where they developed the tumor. The study's limitations, according to Moulder, include a weak association between cell phone use and tumor development, as well as a possibility that the cancer patients' recollections were biased by already knowing on which side of their head the brain cancer developed.
- In a yet-unpublished study presented at a 1999 scientific meeting, researcher Joshua Muscat looked for an association between mobile phone use and a type of brain cancer called glioma. Muscat did not find evidence that cell phone use increased people's risk of this type of brain cancer generally. He did, however, observe an increase in one rare kind of glioma, which FDA scientists say might have occurred by chance. Interestingly, with increased hours of mobile phone use, the risk tended to decrease rather than increase as might be expected.
- A few animal studies have suggested that low levels of RF exposure could speed up development of cancer in laboratory animals. In one recent Australian study, for example, mice genetically altered to be predisposed to developing lymphoma got more than twice as many of these cancers when exposed to RF energy compared to mice not exposed to the radiation.
- A large number of laboratory tests have been conducted to assess RF's effects on genetic material, looking

for mutations, chromosomal changes, DNA strand breaks, and structural changes in blood cells' genetic material. One kind of test, called a micronucleus assay, showed structural changes in genetic material after exposure to simulated cell phone radiation. The changes occurred only after 24 hours of continuous exposure, which experts say raises questions about this test's sensitivity to heating effects and whether that sensitivity could be solely responsible for the results.

In one study of brain function and RF exposure, two groups of 18 people were given cognitive function tests while being exposed to simulated mobile phone signals. No changes were seen in the ability to recall words, numbers, or pictures, or in spatial memory, but among the 20 variables compared, there was one standout observation: The participants were actually able to make choices more quickly in one visual test when they were exposed to the signals.

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Reach Out and Get More Information

Federal Communications Commission RF Safety Program
www.fcc.gov/oet/rfsafety

World Health Organization International Commission on Non-Ionizing Radiation Protection
www.who.int/emf

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