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With more than 82 million Americans using cell phones, there's been growing interest in further studies to try to determine, once and for all, if cell phones pose health risks. The Food & Drug Administration prepared this backgrounder to help explain what's known, and what's left to be researched.

Concerns

Why the concern?

Mobile phones emit low levels of radiofrequency energy (i.e., radiofrequency radiation) in the microwave range while being used. They also emit very low levels of radiofrequency energy (RF), considered non-significant, when in the standby mode.

It is well known that high levels of RF can produce biological damage through heating effects (this is how your microwave oven is able to cook food). However, it is not known whether, to what extent, or through what mechanism, lower levels of RF might cause adverse health effects as well.

Although some research has been done to address these questions, no clear picture of the biological effects of this type of radiation has emerged to date. Thus, the available science does not allow us to conclude that mobile phones are absolutely safe, or that they are unsafe. However, the available scientific evidence does not demonstrate any adverse health effects associated with the use of mobile phones.

Types of phones

What kinds of phones are in question?

Questions have been raised about hand-held mobile phones, the kind that have a built-in antenna that is positioned close to the user's head during normal telephone conversation.

These types of mobile phones are of concern because of the short distance between the phone's antenna -- the primary source of the RF -- and the person's head. The exposure to RF from mobile phones in which the antenna is located at greater distances from the user (on the outside of a car, for example) is drastically lower than that from handheld phones, because a person's RF exposure decreases rapidly with distance from the source.

The safety of so-called "cordless phones," which have a base unit connected to the telephone wiring in a house and which operate at far lower power levels and frequencies, has not been questioned.

Supporting evidence How much evidence is there that hand-held mobile

phones might be harmful?

There is not enough evidence to know for sure, either way. The existing scientific evidence is conflicting and many of the studies that have been done to date have suffered from flaws in their research methods.

Animal experiments investigating the effects of RF exposures characteristic of mobile phones have yielded conflicting results. A few animal studies, however, have suggested that low levels of RF could accelerate the development of cancer in laboratory animals.

In one study, mice genetically altered to be predisposed to developing one type of cancer developed more than twice as many such cancers when they were exposed to RF energy compared to controls.

There is much uncertainty among scientists about whether results obtained from animal studies apply to the use of mobile phones. First, it is uncertain how to apply the results obtained in rats and mice to humans. Second, many of the studies that showed increased tumor development used animals that had already been treated with cancercausing chemicals, and other studies exposed the animals to the RF virtually continuously--up to 22 hours per day.

The Cancer connection What is known about cases of human cancer that have been reported in cell phone users?

Some people who have used mobile phones have been diagnosed with brain cancer. But it is important to understand that this type of cancer also occurs among people who have not used mobile phones.

In fact, brain cancer occurs in the U.S. population at a rate of about 6 new cases per 100,000 people each year. At that rate, assuming 80 million users of mobile phones (a number increasing at a rate of about 1 million per month), about 4,800 cases of brain cancer would be expected each year among those 80 million people, whether or not they used their phones. Thus it is not possible to tell whether any individual's cancer arose because of the phone, or whether it would have happened anyway.

A key question is whether the risk of getting a particular form of cancer is greater among people who use mobile phones than among the rest of the population.

One way to answer that question is to compare the usage of mobile phones among people with brain cancer with the use of mobile phones among appropriately matched people without brain cancer. This is called a case-control study. The current case-control study of brain cancers by the National Cancer Institute, as well as the follow-up research to be sponsored by industry, will begin to generate this type of information.

What to do

In the absence of conclusive information, what can concerned individuals do?

If there is a risk from these products -- and at this point we do not know that there is -- it is probably very small. But if people are concerned about avoiding even potential risks, there are simple steps they can take to do so.

For example, time is a key factor in how much exposure a person receives. Those persons who spend long periods of

time on their hand-held mobile phones could consider holding lengthy conversations on conventional phones and reserving the hand-held models for shorter conversations or for situations when other types of phones are not available.

People who must conduct extended conversations in their cars every day could switch to a type of mobile phone that places more distance between their bodies and the source of the RF, since the exposure level drops off dramatically with distance. For example, they could switch to

- A mobile phone in which the antenna is located outside the vehicle.
- A hand-held phone with a built-in antenna connected to a different antenna mounted on the outside of the car or built into a separate package.
- A headset with a remote antenna to a mobile phone carried at the waist.