Why is there concern that cell phones may cause cancer or other health problems?

There are three main reasons why people are concerned that cell phones (also known as “mobile” or “wireless” telephones) might have the potential to cause certain types of cancer or other health problems:

Cell phones emit radiofrequency radiation (radio waves), a form of non-ionizing radiation, from their antennas. Parts of the body nearest to the antenna can absorb this energy.

The number of cell phone users has increased rapidly. There were over 400 million cell phone subscribers in the United States in 2017, according to the Cellular Telecommunications and Internet Association Exit Disclaimer. Globally, there are more than 5 billion cell phone users Exit Disclaimer.

Over time, the number of cell phone calls per day, the length of each call, and the amount of time people use cell phones have increased. Because of changes in cell phone technology and increases in the number of base stations for transmitting wireless signals, the exposure from cell phone use—power output—has changed, mostly lowered, in many regions of the United States.

What is radiofrequency radiation and how does it affect the human body?

Radiofrequency radiation is a form of electromagnetic radiation. Electromagnetic radiation can be categorized into two types: ionizing (e.g., x-rays, radon, and cosmic rays) and non-ionizing (e.g., radiofrequency and extremely low frequency, or power frequency). Electromagnetic radiation is defined according to its wavelength and frequency, which is the number of cycles of a wave that pass a reference point per second. Electromagnetic frequencies are described in units called hertz (Hz).

The energy of electromagnetic radiation is determined by its frequency; ionizing radiation is high frequency, and therefore high energy, whereas non-ionizing radiation is low frequency, and therefore low energy. The NCI fact sheet Electromagnetic Fields and Cancer lists sources of radiofrequency radiation. More information about ionizing radiation can be found on the Radiation page.

The frequency of radiofrequency electromagnetic radiation ranges from 30 kilohertz (30 kHz, or 30,000 Hz) to 300 gigahertz (300 GHz, or 300 billion Hz). Electromagnetic fields in the radiofrequency range are used for telecommunications applications, including cell phones, televisions, and radio transmissions. The human body absorbs energy from devices that emit radiofrequency electromagnetic radiation. The dose of the absorbed energy is estimated using a measure called the specific absorption rate (SAR), which is expressed in watts per kilogram of body weight.

Exposure to ionizing radiation, such as from x-rays, is known to increase the risk of cancer. However, although many studies have examined the potential health effects of non-ionizing radiation from radar, microwave ovens, cell phones, and other sources, there is currently no consistent evidence that non-ionizing radiation increases cancer risk in humans.

The only consistently recognized biological effect of radiofrequency radiation in humans is heating. The ability of microwave ovens to heat food is one example of this
Researchers have carried out several types of epidemiologic studies in humans to investigate the possibility of a relationship between cell phone use and the risk of malignant brain tumors, such as gliomas, as well as benign tumors, such as acoustic neuroma, meningiomas (usually benign tumors, such as acoustic neuroma, meningiomas), and parotid gland tumors (tumors in the salivary glands).3

In one case–control study, cell phone use is compared between people with these types of tumors and people without them. In another type of study, called a cohort study, a large group of people who do not have cancer at study entry is followed over time and the rate of these tumors among the exposed is compared. Cancer incidence over time and the rate of these tumors is compared. Cancer incidence among people who are concerned should wear an earpiece and limit cell phone use, particularly among children.

In 2015, the European Commission Scientific Committee on Emerging and Newly Identified Health Risks concluded that, overall, the epidemiologic studies on cell phone radiofrequency electromagnetic radiation exposure do not show an increased risk of brain tumors or of other cancers of the head and neck region.2,4

You may be interested in the following fact sheets from Oncology Nurse Advisor: