



Cell Phone Radiofrequency Radiation Studies

Personal (cellular) telecommunications is a rapidly evolving technology that uses radiofrequency energy or radiation for mobile communication.

Cell phones are now being used by 91 percent of American adults, according to a [2013 survey](#). Given this large number of users, if adverse health effects are shown to be associated with cell phone use, this could potentially be a widespread public health concern.

The nomination for the National Toxicology Program (NTP) to study cell phone radiofrequency radiation was made by the U.S. Food and Drug Administration (FDA) because of the following:

- Widespread human exposure.
- Current exposure guidelines are based largely on protection from acute injury from thermal effects.
- Little is known about potential health effects of long-term exposure to radiofrequency radiation.
- Data from human studies are inconsistent. Additional studies are being conducted.

Many people are concerned that cell phone radiation will cause cancer or other serious health effects. While current scientific evidence has not conclusively linked cell phones with any health problems, NTP and other scientific organizations recognize that additional data are needed.

Therefore, NTP is conducting studies to help clarify any potential health hazards, including cancer risk, from exposure to cell phone radiation, and to pave the way to better protection for public health.



Overview of NTP studies

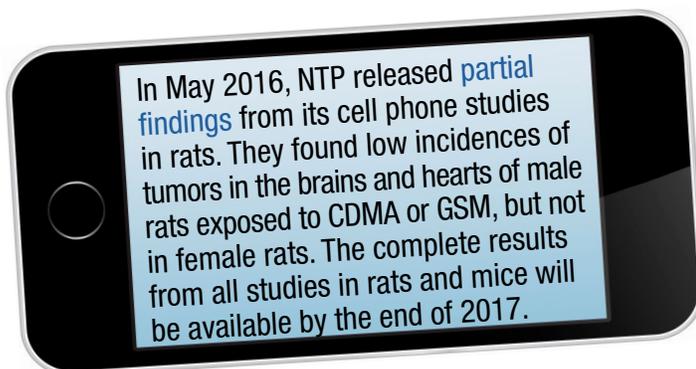
Toxicology and carcinogenicity studies were carried out in laboratory animals that are designed to simulate the exposures of cell phone users in the U.S.

Rats and mice were exposed to radiofrequency radiation from the code division multiple access (CDMA) and Global System for Mobile (GSM) Communications technologies, at frequencies of 900 and 1900 megahertz — those currently used in the U.S. Cell phone radiation exposures in the animal studies were for approximately nine hours spread over the course of the day. NTP anticipates that all study findings will be available for peer review and public comment by the end of 2017.

Creating cell phone radiation exposure

Because of the technical complexity of studying cell phone radiation, NTP staff worked closely with radiofrequency radiation experts from the National Institute of Standards and Technology (NIST).

Through an interagency agreement, NIST scientists worked to help develop an exposure system that would provide rodents with uniform exposures to radiofrequency radiation in the frequency bands of mobile communications. Suitability tests were conducted on various radiofrequency radiation exposure systems.





This system consists of 21 separate reverberation chambers that are essentially shielded rooms with a transmitting antenna radiating radiofrequency fields and rotating stirrers to generate a statistically uniform field.

These efforts demonstrated the feasibility of using specially designed reverberation chambers. The design allows for exposure for approximately nine hours over the course of a day.

A three-phased study design

NTP conducted studies on radiofrequency radiation emitted by cell phones in three phases:

1. A series of pilot studies to establish field strengths that do not excessively raise body temperature.
2. Subchronic toxicology studies where the rodents are exposed to various low-level field strengths for up to two months.
3. Chronic toxicology and carcinogenicity studies where the rodents will be exposed for the majority of their lifetime, up to 24 months.

Phase one studies evaluated various power levels of cell phone radiofrequency radiation to determine levels of exposure in both sexes of young and old rats and mice, and in pregnant female rats that did not cause thermal effects. Data from these studies helped identify maximal power levels for the phase two studies.

The second phase investigated the subchronic toxicity of cell phone radiofrequency radiation, and helped determine the appropriate power levels for each strain and species for the third phase of the studies. Exposure to radiofrequency radiation was started during gestation in rats and during adolescence in mice, and continued through young adulthood (subchronic).

If you are concerned about potential risks to cell phone radiofrequency radiation, the FDA suggests you:

- Reduce the amount of time spent using your cell phone.
- Use speaker mode or a headset to place more distance between your head and the cell phone.



The third and final phase, which included chronic exposure studies, was designed to determine the potential for cell phone radiation to be hazardous or carcinogenic to humans. These chronic studies were started *in utero* and continued for two years through adulthood.

Collectively, these NTP studies will provide critical information regarding the safety of exposure to radiofrequency radiation, and strengthen the science base for determining any potential health effects in humans.

These data could contribute to information used by the federal government, including the FDA, in making decisions with respect to radiofrequency radiation health issues consistent with the protection of public health and safety.

The studies may also be used by the Federal Communications Commission, who regulates interstate and international communications by radio, television, wire, satellite, and cable.

Where can I go for more information?

For more information on what federal agencies are doing to determine whether radiofrequency radiation from cell phones affects human health, visit the following websites:

National Toxicology Program

<http://ntp.niehs.nih.gov/go/cellphone>

National Cancer Institute

<http://www.cancer.gov/cancertopics/factsheet/Risk/cellphones>

U.S. Food and Drug Administration

<http://go.usa.gov/B5tx>

Centers for Disease Control and Prevention

http://www.cdc.gov/nceh/radiation/cell_phones_FAQ.html

Federal Communications Commission

<http://www.fcc.gov/encyclopedia/radio-frequency-safety>



National Toxicology Program

U.S. Department of Health and Human Services

The National Toxicology Program is an interagency program headquartered at the **National Institute of Environmental Health Sciences** that tests and evaluates chemicals in our environment.

For more information on NTP, go to <http://ntp.niehs.nih.gov>.