

**STUDIES ON RADIOFREQUENCY RADIATION
EMITTED BY CELLULAR PHONES**

Year 2005

Personal (cellular) telecommunications is a rapidly evolving technology that uses microwave radiation to communicate between a fixed base station and a mobile user. Until recently, most systems employed analog technology where low frequency speech signals are directly modulated onto a high frequency carrier in a manner similar to a frequency-modulated (FM) radio. These second-generation systems, widely used in Europe, USA and Japan, employ digital technology where the low frequency speech is digitally coded prior to modulation. Most systems employ hand-held cellular telephones where the radiating antenna is close to the head of the user.

Over 100 million Americans currently use wireless communication devices with over 50 thousand new users daily. This translates into a potentially significant public health problem should the use of these devices even slightly increase the risk of adverse health effects. Cellular phones and other wireless communication devices are required to meet the *radiofrequency radiation* (RFR) exposure guidelines of the Federal Communications Commission (FCC, August 1996)¹. The existing exposure guidelines are based on protection from acute injury from thermal effects of RFR exposure. Current data are insufficient to draw definitive conclusions concerning the adequacy of these guidelines to be protective against any non-thermal effects of chronic exposures.

Studies in laboratory animals are considered crucial for understanding whether exposure to RFR is adverse to human health because meaningful data from epidemiological studies (human population studies) of cellular phone use will not be available for many years. This is due to the long latency period between exposure to a carcinogenic agent and the diagnosis of a tumor. Most scientific organizations that have reviewed the results from laboratory studies conducted to-date, however, have concluded that they are not sufficient to estimate potential human cancer risks from low-level RFR exposures and long-term, multi-dose, animal studies are needed.

Currently there is an international effort underway to develop and conduct long-term toxicology studies on the potential health effects associated with cellular phone RFR emissions. This effort includes studies by a consortium of European investigators and cellular phone manufacturers under the auspices of the European Union (PERFORM-A), and by investigators at the Cancer Research Center of the European Ramazzini Foundation of Oncology and Environmental Sciences Commission in Bologna, Italy.

What is the NTP Doing?

The **F**ood and **D**rug **A**dministration (FDA) nominated RFR emissions of wireless communication devices to the **N**ational **T**oxicology **P**rogram (NTP) for toxicology and carcinogenicity testing. The NTP has carefully evaluated the efforts already underway and concluded that while they have an excellent probability of producing high quality research results, additional studies may be warranted to more clearly define any potential health hazard to the U.S. population.

¹ FCC, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, 61FR41006 available at <http://www.fcc.gov/oet/dockets/et93-62/>

Because of the technical complexity of such studies, NTP staff is working with RFR experts from the National Institute of Standards and Technology (NIST). With support from the National Institute of Environmental Health Sciences of the National Institutes of Health, scientists at NIST have been testing the suitability of various RFR exposure systems for use in these studies. The studies at NIST have demonstrated the feasibility of using specially designed reverberation chambers as the exposure system to evaluate potential long-term health effects, including carcinogenicity, of cellular phone RFR in unrestrained laboratory animals. Based on the findings from NIST, the NTP designed studies to evaluate the potential toxicity and carcinogenicity of cell phone RFR in rats and mice exposed in reverberation chambers at the two frequencies (~900 and 1900 MHz) that are at the centers of the primary cellular bands used in the United States. In addition, these exposures will include the most common coding strategies for carrying information by cellular telephone communication technology in the United States: the Global System for Mobile Communications (GSM) and Code Division Multiple Access (CDMA) signal modulations. These studies will be conducted at multiple power levels and will include special emphasis on potential adverse effects in the brain. In addition to histopathological evaluations for toxic or neoplastic lesions, special studies will examine effects on the blood brain barrier, neonatal cell migration patterns in the brain, and DNA strand breaks in brain cells.

For further information, contact:

Dr. Ron Melnick, NIEHS, P.O. Box 12233, MD B3-08, Research Triangle Park, NC 27709

Phone: 919/541-4142; E-mail: melnickr@niehs.nih.gov

Printed on recycled paper