Cell phone radiation doesn't cause cellular stress, doesn't promote cancer

October 5 2005

Weighing in on the debate about whether cell phones have adverse health effects, researchers at Washington University School of Medicine in St. Louis have found that the electromagnetic radiation produced by cell phones does not activate the stress response in mouse, hamster or human cells growing in cultures.

The stress response is a cellular protection mechanism set into motion by various adverse stimuli, including heat shock, heavy metals, and inflammation. High levels of the stress response in cells are thought to result in changes associated with malignancy.

"We performed highly sensitive, extremely well-controlled tests on living cells irradiated with energy like that from mobile phones, but at

levels 5 to 10 times higher than those set for the devices by regulatory agencies," says Andrei Laszlo, Ph.D., associate professor of radiation oncology and a researcher at the Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine. "We see no indication that factors involved in the stress response increase their activity as a result of such exposures."

Prior research into the effect of cell phones on the stress response has been fraught with contradictory results, which in part may be due to less-than-ideal experimental conditions. For example, in the past it has been difficult to prevent temperature changes caused by microwave exposure.

Because heating of tissues has been shown unlikely to be a component of the effect of cell phone radiation on biological systems, Laszlo and his group sought to reduce as far as possible any heating of the cells in culture during the study. Using sensitive equipment that continuously monitored and adjusted temperature, they were able to keep temperature variations to plus or minus 0.3 degrees centigrade.

The researchers tuned their room-sized irradiator to emit cell phone frequency microwaves for both FDMA (frequency domain multiple access—used for cell phone analog signals) and CDMA (code domain multiple access—used for digital signals) modulation at power outputs standard for mobile phones. The large size of the irradiator enabled them to expose a large number of living cells so that sufficient material could be collected for highly accurate measurements.

"We were able to combine very good physics with very good biology as a consequence of the expertise of our research team," Laszlo says.

To test whether the cell's stress response was activated by irradiation, the group looked for activation of a protein called heat shock factor (HSF). The activation of HSF is a necessary first step in the cascade of events

that induce the stress response.

Under both short-term exposures (5-60 minutes) and long-term exposures (1-7 days), all tests on the cells in culture showed that HSF was not activated by microwave radiation of either type, indicating the stress response was not initiated.

"We've done extensive studies on the effect of cell phone radiation in our research group in the past as well," Laszlo says. "Dr. Joseph Roti Roti and his colleagues have examined the potential for DNA damage and cellular transformation, and the effect of microwave radiation on animals has been studied also. Now we've conducted this study of the molecular mechanisms of the stress response. In every case we've looked at, our group saw no biological effects of cell phone radiation that could cause cancer."

Source: Washington University School of Medicine