

Cell Phone Radiofrequency Radiation: A Review of the National Toxicology Program's Partial Findings

In May 2016, the US National Toxicology Program (NTP) reported initial findings of an animal study on the effects of long-term radiofrequency radiation (RFR) exposure under controlled settings¹. Over two years, the NTP exposed rats to cell phone radiofrequencies of 900 MHz using either GSM or CDMA modulation to achieve whole body specific absorption rates of 1.5, 3, or 6 W/kg. Total exposure time was 9 hours a day, 7 days per week, starting in utero and continuing until the animals were sacrificed and examined. The occurrence of gliomas (tumours of the brain) and cardiac schwannomas (heart tumours originating from Schwann cells of nerve tissues) in rats exposed to RFR was compared to the occurrence of tumors in unexposed control rats.

A preliminary report on this work identified that brain and heart tumours were found in the rats exposed to RFR but not the controls. The occurrence of brain tumors in exposed male rats ranged from 2.2-3.3% for GSM-modulated RFR and 0-3.3% for CDMA-modulated RFR. The occurrence of heart tumours in exposed male rats ranged from 1.1-5.5% for the GSM-modulated RFR and 2.2-6.6% for the CDMA-modulated RFR groups. In comparison of the proportional occurrence between exposed and control rats, the only statistically significant finding was for heart tumours in male rats at the highest CDMA modulated (6 W/kg) exposure level. In addition, a statistically significant positive trend in the occurrence of brain tumours was observed with increasing levels of CDMA-modulated RFR in the exposed male rats. Likewise, a significant positive trend in the occurrence of heart tumors was noted in male rats exposed to increasing RFR levels in both the GSM and CDMA groups. In female rats, the occurrence of brain and heart tumours ranged between 0-2.2%, yet none of the findings were statistically significant when compared to controls.

The type of brain tumors identified, gliomas, are consistent with those found in some population-based studies of cell phone users². Such studies have also demonstrated a possible link between cell phone use and tumors arising from Schwann cells of the ear (acoustic neuromas)². The occurrence of acoustic neuromas in individuals is not reported to be related to the coincident development of cardiac schwannomas, despite their common cell of origin.

Several limitations of this study have been identified. For example, the group of male rats that were not exposed to RFR had shorter life spans than the exposed male rats, with 28% of non-exposed rats surviving for 2 years compared to 47% of exposed rats. This makes interpretation of the data difficult because gliomas tend to arise in advanced age. Therefore, the occurrence of tumors could have been underestimated in the life-shortened control group. And while there were no brain or heart tumors found in any of the control rats, NTP studies typically demonstrate gliomas in approximately 2% in non-exposed male rats, making the observed level of 0-3.3% in the exposed groups only slightly higher than the historically expected background rate. It should also be noted that the whole body RFR exposure levels used, 1.5, 3, and 6 W/kg, are considerably higher than Health Canada's Safety Code 6 limit of 0.08W/kg for uncontrolled (public) whole body exposure. These limitations should be considered in the interpretation and application of study findings.

The NTP report from May 2016 presented data specific to the brain and heart of rats and does not represent the complete findings of the NTP study, which will also include studies on mice exposed to RFR frequencies of 1900 MHz. The NTP anticipates release of the full report in 2017.

References:

1. Wyde M, Cesta M, Blystone C, Elmore S, Foster P, Hooth M, Kissling G, Malarkey D, Sills R, Stout M, Walker N, Witt K, Wolfe M, Bucher J. Report of Partial findings from the National Toxicology Program Carcinogenesis Studies of Cell Phone Radiofrequency Radiation in Hsd: Sprague Dawley® SD rats (Whole Body Exposure). bioRxiv 055699. 2016 May. Available from: doi: <http://dx.doi.org/10.1101/055699>
2. International Agency for Research on Cancer. Non-ionizing radiation, part 2: radiofrequency electromagnetic fields. Vol 102. Lyon, France: World Health Organization; 2013. Available from: <http://monographs.iarc.fr/ENG/Monographs/vol102/>.