

Radiofrequency Radiation: Ways to the Risk Assessment

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This letter attempts to analyze the applicability of the LNT model for the risk assessment from radiofrequency radiation (RFR) by analogy with ionizing radiation.¹⁻³ Taking into account fluctuations of the solar activity and atmospheric electricity, there must be an adaptation to a certain range of RFR exposure and, accordingly, a threshold. In the electromagnetic spectrum, damage per unit of absorbed energy tends to increase with the energy carried by a photon. This is evident not only for ionizing and ultraviolet radiation but also for infrared and visible light causing thermal damage at absorbed energies that would be harmless for RFR heating tissues more evenly. DNA derangements after heat exposures have been reported; references are in.³ Considering low photon energies, there are no theoretic reasons to expect more DNA damage per unit of absorbed energy from RFR than from infrared rays or heating by conduction.

The NTP Report⁴ is currently under discussion.⁵ Exposures to GSM- or CDMA-modulated RFR were associated with an incidence increase of brain gliomas and heart schwannomas in male rats. The strongest evidence was found for schwannoma at maximal SAR = 6 W/kg.⁴ A positive result of the DNA damage test was observed in hippocampus of male rats exposed to the CDMA modulation (SAR = 6 W/kg).⁴ Importantly, the overall survival tended to be lower in the controls than in exposed male rats: 28% survival until the study termination in controls vs. 50-68% and 48-62% in the exposed groups for GSM and CDMA respectively.⁵ For the animals exposed to GSM-modulated RFR at the end of 2 years, the survival of all exposed male groups was significantly longer than in the control group. For CDMA-modulated RFR the difference was statistically significant only in the 1.5 and 3 W/kg SAR groups.⁴ The survival of exposed female rats tended to be longer than in controls after prolonged exposures (513-724 days); there was a small but statistically significant survival increase in a 6 W/kg CDMA female group.⁴ The net harm or benefit reflected in the life span seems to be more important than incidence of rare age-related tumors. The above considerations pertain also to experiments at the Ramazzini Institute, where rats were exposed to GSM-modulated signals 19 h/d, SAR 0.001-0.1

W/kg, from prenatal life to natural death.^{6,7} No significant survival differences between the treated and control groups were observed. However, scrutinizing the graphs,⁷ it can be seen that survival of exposed rats of both genders tended to be slightly longer than that of controls. Several epidemiological studies reported associations of RFR exposures with tumors. Other research did not found such associations or reported a reduced cancer risk; details and references are in.¹ Epidemiological research is known to be associated with bias. A moderate incidence increase of certain tumors in some regions has been out of proportion to the tremendous expansion of mobile phones, being potentially explainable by improvements in the diagnostic imaging and access to care.¹ Supposed risks in humans, discussed above, are from RFR of subthermal intensity. However, ultra high frequency (UHF) diathermy has been widely used in Russia for the treatment of inflammatory otorhinolaryngological conditions in children and adults since the 1960s. No associations with cancer have been reported. In conclusion, reliable evidence can be obtained by large-scale animal experiments.

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References

1. Calabrese EJ. Model uncertainty via the integration of hormesis and LNT as the default in cancer risk assessment. *Dose Response*. 2015;13(4):1559325815621764.
2. Calabrese EJ. The Muller-Neel dispute and the fate of cancer risk assessment. *Environ Res*. 2020;190:109961.

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3. Jargin SV. Radiofrequency radiation: carcinogenic and other potential risks. *J Radiat Oncol*. 2020;9(1):81-91.
4. NTP. NTP Toxicology and carcinogenesis studies of acetaminophen (CAS No. 103-90-2) in F344 rats and B6C3F1 mice (Feed Studies). *Natl Toxicol Program Tech Rep Ser*. 2018; 595:1-380.
5. ICNIRP note on recent animal carcinogenesis studies. Published 2018. Updated September 04, 2018. Accessed September 04, 2020. <https://www.icnirp.org/cms/upload/publications/ICNIRPnote2018.pdf>
6. Soffritti M, Giuliani L. The carcinogenic potential of non-ionizing radiations: the cases of S-50 Hz MF and 1.8 GHz GSM radiofrequency radiation. *Basic Clin Pharmacol Toxicol*. 2019;125(suppl 3):58-69.
7. Falcioni L, Bua L, Tibaldi E, et al. Report of final results regarding brain and heart tumors in Sprague-Dawley rats exposed from pre-natal life until natural death to mobile phone radiofrequency field representative of a 1.8 GHz GSM base station environmental emission. *Environ Res*. 2018;165:496-503.