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Collegium Ramazzini Statement

Carcinogenicity of Radiofrequency Electromagnetic Fields

The Collegium Ramazzini is an independent, international scientific academy comprised of 180 physicians and scientists from 45 countries. Its mission is to increase scientific knowledge of the environmental and occupational causes of disease and to transmit this knowledge to decision- makers, the media and the global public in order to prevent disease, promote good health and save lives. The Collegium Ramazzini is independent of commercial interests. It advances scientifically based solutions to global problems in occupational and environmental health.

The purpose of this statement is to call attention to emerging studies that have added significantly to appreciating and understanding the capacity of exposures to radio frequency electromagnetic fields (RF EMF) to cause or contribute to human cancers, and to call on the International Agency for Research on Cancer (IARC) to re-evaluate RF EMF, as recommended with high priority by recent Advisory Groups to Recommend Priorities for the IARC Monographs during 2020-2024 and 2025-2029 (IARC 2024).

In 2011 IARC convened a Working Group to evaluate the scientific evidence concerning the carcinogenic hazard of RF EMF to humans (IARC 2013). This portion of the

electromagnetic spectrum, ranging from 30 kHz to 300 GHz, is used in wireless telecommunication primarily but not exclusively in mobile phones. The epidemiologic evidence evaluated by the Working Group came from time-trend, cohort, and case-control studies of populations exposed in occupational settings, from sources in the general environment and from use of mobile and cordless phones, with the most informative studies (Interphone and studies from Sweden) focused on brain tumors associated with mobile phone use. The Working Group also evaluated experimental evidence from numerous animal cancer studies employing various frequencies, exposure modalities and durations, as well as studies of mechanistic end points potentially related to cancer including genotoxicity, immune function, cell signaling, oxidative stress and others.

The overall evaluation of the Working Group was that radiofrequency electromagnetic fields are possibly carcinogenic to humans (Group 2B) based on the findings from epidemiology studies, which were concluded to provide “limited evidence” for gliomas and acoustic neuromas. The data from experimental animal studies including standard 2-year rodent cancer bioassays, tumor-prone animal models, initiation-promotion, or co-carcinogenesis studies were considered “limited evidence” of carcinogenicity, and evidence of supporting mechanisms was weak (IARC 2013).

Subsequent to the IARC review, new findings from two comprehensive standard animal cancer bioassays, additional novel mechanistic findings and a recent World Health Organization (WHO)-sponsored systematic review of animal cancer findings have been published. In 2016 the US National Toxicology Program released initial findings (with final reports in 2018) from 2-year rodent cancer studies of GSM and CDMA modulated RFR in rats (900 MHz, 0,1,3 or 6 W/Kg) and mice (1900 MHz 0,2.5, 5, 10 W/Kg), reporting clear

evidence in male and female rats of malignant schwannomas of the heart, evidence of malignant gliomas of the brain, and some evidence of DNA damage in the hippocampus of male rats (Wyde et al. 2016; NTP 2018a, 2018b). Also in 2018, the Ramazzini Institute reported findings from their lifespan rodent cancer studies in which rats were exposed to 1,800 MHz GSM far field RF EMF at much lower power levels of 0, 5, 25 or 50 V/m (~ 0, 0.001, 0.03, 0.1 W/kg). Increased heart schwannomas were observed in male rats, and a non-significant increase in brain malignant glial cell tumors was observed in females (Falcioni et al., 2018). In both studies the cell types responding to RF EMF were morphologically similar to those observed in the human epidemiology studies cited above (brain malignant gliomas; heart schwannomas and acoustic neuromas). Lastly in a collaborative study between the NTP and Ramazzini Institute, gliomas and schwannomas from rats in the Ramazzini study were analyzed for single nucleotide variants and small insertions and deletions in genes analogous to genes recognized to be mutated in human glial tumors. Remarkably, not only were similar genetic alterations found in the rat tumors with human glial cell tumors as reported in the Catalogue of Somatic Mutations in Cancer (COSMIC) database, but also alterations in many of these same genes were observed in glial tissues from the Ramazzini RFR-exposed rats collected after only one year of exposure, and not in controls, well before when tumors developed in the exposed rats (Brooks et al, 2024).

In May of 2025 a systematic review of experimental animal cancer studies on RF EMF (Mevisen et al. 2025) was published as part of a larger series of systematic reviews to inform a health risk assessment of RF EMF sponsored by the WHO. Fifty-two studies were evaluated including 20 chronic cancer bioassays. The Mevisen et al. review

concluded that there was high confidence in the evidence linking RF EMF exposures with schwannomas of the heart and moderate to high confidence in the link with gliomas of the brain in rats. Moderate confidence was also concluded for increases in adrenal gland neoplasms in rats and lymphomas, lung and liver neoplasms in mice exposed to RF EMF. Surprisingly, the organizers and the editors of the WHO systematic review series criticized this systematic review... “one notable exception was the systematic review on the effects of RF EMF on cancer in experimental animals, which stood out due to its use of a different synthesis method” and “whether this method proves valid – and whether alternative synthesis approaches would yield the same conclusion – remains to be seen” (Verbeek 2025). On the contrary, the [International Commission on the Biological Effects of Electromagnetic Fields \(ICBE-EMF\)](#) pointed out a number of methodological flaws and weaknesses in the conduct of the other WHO systematic reviews, including concerns related to conflict of interests of many authors of the series, but “endorsed the methods and conclusions of the animal cancer SR,” (Melnick et al. 2025). Indeed, the controversy over the WHO systematic review for RF EMF health risk assessment highlights the essential role of the cancer hazard evaluations performed by the IARC Monographs, which are based on an up-to-date and fit-for purpose methodology for cancer hazard identification and are free from conflict of interests (IARC 2019). Indeed, a solid hazard assessment should be the first step and should be done prior to any attempt to perform risk estimates.

The Collegium Ramazzini therefore emphasizes, considering the new evidence, the urgent need to re-evaluate radiofrequency cancer hazard by IARC and that any risk assessment by WHO should be based on a cancer hazard evaluation by IARC.

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