# RESPONSE TO HHS REQUEST FOR COMMENT

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## INTRODUCTION

In recent years, the proliferation of microwave and RF radiating devices and systems has placed multiple RF and microwave sources on or near the human body. The ubiquitousness of mobile and cellular telecommunication devices and systems is raising concerns about the health impacts and safety of exposure to radio frequency (RF) electromagnetic fields and waves [Bahrani et al 2026, Belpomme et al 2018, Lin 2025, Miller et al 2019].

## DESCRIPTION

In 2011, the International Agency for Research on Cancer (IARC), a specialized expert agency of the World Health Organization, declared exposure to RF radiation as a possible carcinogen to humans [IARC 2013, Baan et al 2011]. At the same time, it identified limitations of the existing laboratory results from animal experiments.

Subsequently, the U.S. National Toxicology Program (NTP) reported clear evidence that lifelong exposure to low-level RF radiation at 900/1,900 MHz used by cellular mobile phones is the cause for two types of cancers: gliomas in the brain and schwannoma inside the heart of male laboratory rats [NTP 2018, Wyde 2018]. The temperature rises induced by RF exposure to the animal's body did not exceed 1 °C at the highest exposure [specific absorption rate (SAR) = 6 W/kg] in the project. The findings were made from a 12-year long, US$30 million major research program on cell phones using RF radiation exposure (near-field, whole-body SAR = 1.5, 3, or 6 W/Kg). This animal toxicology research was the largest animal health effect or cancer research undertaken at NTP in its history; the agents among them include chemicals and toxic environmental materials. It is the biggest carcinogenicity research done using cell-phone RF radiation as the independent ex perimental variable.

In the same year, a Ramazzini Institute study of carcinogenesis in rats exposed to 3 G, 1,800-MHz RF radiation was published from Italy [Falcioni 2018]. It involved a large number of rats for whole-body RF exposure, under plane-wave–equivalent conditions at 0.1

W/kg, either lifelong or from prenatal until death. A statistically significant increase was observed for cardiac schwannoma incidents in males. Moreover, both the NTP and Ramazzini RF exposure research showed findings of cardiac schwannomas and cerebral gliomas in two different exposure scenarios. Thus, two large comparatively well-conducted animal investigations using the same Sprague-Dawley (SD) strain of rats demonstrated consistent outcomes in significantly elevated cancer risks.

More recently the NTP and Ramazzini researchers cooperated to analyze the genes in RF-induced rat tumor samples through molecular characterization of cancer genes related to human gliomas [Brooks et al 2024]. A targeted next generation sequencing panel was assembled for rats but centered on human glioma-relevant genes. Single-nucleotide variants and small insertions and deletions were sorted in the rat gliomas and cardiac schwannomas. The outcomes revealed that rat gliomas induced by lifelong RF exposure histologically resemble low-grade human gliomas.

It is interesting to note that two recent papers reported results from rat experiments that were designed to mimic the NTP project [Imaida et ai 2026, Moon 2026]. The aims of these two studies were to assess the potential carcinogenicity of 900-MHz mobile phone RF signals at a single SAR of 4 W/kg and to verify the key findings from the NTP study at that SAR level. The experiments employed RF exposure systems that are similar in type to those used by the NTP project, but custom designed and locally fabricated 900-MHz reverberation chambers (RC). The RC's served to provide simultaneous exposure of 70 SD rats obtained from the same animal breeder/supplier. The RCs are scaled-down versions with reduced dimensions to accommodate smaller numbers of rats. Results from neither laboratory showed a statistically significant increase in cancer incidences of heart, brain, or adrenal glands. These studies do not qualify as replications. They are deficient in attempts to verify the key findings from the NTP study [Lin 2026, Melnick et al 2026]. They cannot challenge and do not have any impact on the outcome of the NTP results. The decision not to include a 6-W/kg-SAR group as a positive control in the Japan and Korea studies is a major blunder in experimental design. The NTP project involved three SAR levels of 1.5, 3, and 6 W/kg. It was NTP's male rats that showed clear evidence of a cancer risk at 6-W/kg. Furthermore, the Japan and Korea studies are confounded by anomalies and inconsistencies. A question arises on how more rigorous adherence to GLP and OECD guidelines might have helped to mitigate such inconsistencies and anomalies.

## DISCUSSION

The clear findings of increased cancer from long-term cell phone radiation exposure from the NTP carcinogenicity research should serve to mitigate IARC's earlier concerns of inadequacies in the existing investigations regarding laboratory results from animal

experiments. A systematic review commissioned by the World Health Organization (WHO) on the effects of RF exposure on cancer in laboratory animal studies [Mevissen et al 2025, 2026] concluded that an increase in glial cell-derived neoplasms was reported in two most recent large chronic (NTP and Ramazzini) bioassays in male rats. The increased risk in glioma was judged as high. Also, for neoplasms of the heart, the two most recent large bioassays showed statistically significant increases in malignant schwannomas in male rats. Thus, without a question, the NTP and Ramazzini results have provided the coveted animal data the IARC has been waiting for to embark on an update of its assessment of RF–cancer risks and to elevate its RF exposure cancer risk to (2A) probable carcinogenic or (1) carcinogenic classification. In short, science-based policy updates to reduce public exposure are urgently needed.

Cellphones and wireless mobile communication technologies have enriched human lives. It is difficult to imagine contemporary lives without them. The deployment of 5G and 6G mobile technology is well underway with it heralded mm-wave performances. It is not evident whether the health effects of 5G mm-wave radiations would be analogous or not to previous generations of cellphone and wireless communication technologies, given the paucity of research on health effects of 5G and 6G mm-wave radiation. Without dispute, cellphones have provided direct benefits to multiple arenas of human endeavor that includes helping to safeguard our personal security and safety. Nonetheless, the health and safety of billions of users who are subjected to repeated, unnecessary levels of RF radiation over lengthy intervals of time or even over their lifetimes should be recognized and accounted for.

## RECOMMENDATION

It is significant to note that cellphones have SAR ranging from 0.2 and 0.5 W/kg (compared to the current 1.6 and 2.0 W/kg heating limits for short-term, 6- to 30-min exposures. Clearly, cellphones can operate at a fraction of the SAR adopted by FCC, IEEE-ICES and ICNIRP. It is conceivable that forthcoming developments would enable cellphone functions including data transmission at much lower exposure levels. The ALARA — as low as reasonably achievable — practice and principle should be followed for RF health and safety when confronted with wireless RF radiation. In this regard, the apparent thresholds of carcinogenesis at 0.1 W/kg for far field and 3.0 W/kg for near field exposures should be seriously considered alongside appropriate risk reduction factors.

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