

Comparing NTP and RI Studies of Sprague-Dawley Rats Exposure to Radiofrequency Radiation (RFR)

	National Toxicology Program (NTP)	Ramazzini Institute (RI)
Documents	NTP Draft Technical Report of Cell Phone Radiofrequency Radiation (Rats) 2/2018 Telephone Press Conference (Audio): NTP Draft Conclusions, Transcript, YouTube of Audio 2/1/2018 NIEHS Press Release DNA Damage Genotoxicity Findings	“Report of final results regarding brain and heart tumors in Sprague-Dawley rats exposed from prenatal life until natural death to mobile phone radiofrequency field representative of a 1.8 GHz base station environmental emission”
Summary of Design	A two-year study to evaluate the carcinogenic effects of chronic exposure to CDMA and GSM RFR at 900 MHz at three exposure levels 1.5 W/Kg, 3 W/Kg and 6 W/Kg SAR to mimic localized exposure from cell phones near body.	A life-span study on Sprague-Dawley rats to evaluate the carcinogenic effects of chronic exposure to 1.8 GHz GSM at three exposure levels 5 V/m, 25/Vm and 50 V/m to mimic “environmental” exposure to RFR generated by antennas of the radio base stations (cell towers) used for mobile phones.
Summary of Findings on Heart and Brain Tissue. Note: The RI pathological lesions of the heart were screened for second-opinion diagnosis in blind by NTP pathologists.	Heart: A statistically significant increase in heart schwannoma in male rats. Significantly increased incidences of right ventricular cardiomyopathy in several treatment groups. Brain: Increased incidences (did not reach statistical significance) of malignant glioma in all groups of GSM male rats, and some CDMA groups. Litter Weights: A decrease in litter weights in the RFR-exposed groups. DNA Damage: Significantly increased in the frontal cortex of male mice (both modulations), peripheral leukocytes of female mice (CDMA only), and hippocampus of male rats (CDMA only)	Heart: A statistically significant increase in heart schwannoma in male rats treated at the highest dose. An increase in the incidence of Schwann cells hyperplasia in male and female rats treated at the highest dose. An increase in effects in Schwann cells of the heart of male rats when one looks at hyperplasia of Schwann cells combined with all schwannomas of the heart. Brain: An increase in the incidence of malignant glial tumors was observed in female rats treated at the highest dose but did not reach statistical significance. Litter Weights: A decrease in litter weights in the RFR-exposed groups.
Intent of Exposure Design	To test the underlying basis for US regulatory limits on RFR—the hypothesis that non-thermal exposures had no adverse biological effects	To mimic “environmental” RFR exposures from the emissions of cellular base stations (cell towers). All exposures were below FCC and ICNIRP limits.
Frequency	900 MHz RFR at two different modulations: GSM and CDMA	1.8 GHz RFR at GSM
Exposure Levels/SAR	Three Exposure Groups + Control 1.5 W/Kg SAR 3 W/Kg SAR 6 W/Kg SAR	Three Exposure Groups + Control 5 V/m, 0.001 SAR estimated 25 V/m, 0.03 SAR estimated 50 V/m, 0.1 SAR estimated
Exposure Groups	14 Total exposure groups Controls (male and female) plus three levels of time-averaged whole-body SARs of 1.5, 3, and 6 W/kg 900 MHz at GSM and at CDMA RFR (male and female).	8 Total exposure groups Controls (male and female) plus three power levels of whole-body GSM modulation 0, 5, 25, 50 V/m at 1800 GHz (male and female).
Size of Study Groups	90 animals in each group received 2 years (104 weeks) of exposure. The groups started larger, with 105 male and 105 females. After 14 weeks of exposure, 10 rats per group were randomly selected for interim evaluation.	Control: 412 Males and 405 Females = 817 Total 5V/m: 401 Males and 410 Females = 811 Total 25V/m: 209 Males and 202 Females = 411 Total 50V/m: 207 Males and 202 Females = 409 Total
Exposure Began	5th day of gestation	12th day of gestation
Animal Sacrificed	104 weeks:~two-thirds of the rat life-span	At natural death of the animal
Daily Exposure Duration	Total: 9 hours and 10 minutes per day, 7 days/week. The daily exposure alternated 10 minutes on and 10 minutes off during an 18-hour and 20-minute period/day.	Total: 19 hours per day continuous exposure, 7 days/ week.