

Report on National Toxicology Program's Cell Phone Study

If you take the National Toxicology Program reports on cell phone radiation ([rat study](#) and [mouse study](#)) at face value, you have to believe that cell phone radiation causes cancer in rats but not mice, and in male rats but not female rats. You have to believe that cell phone radiation is such a weak carcinogen that it only causes cancer in two to three percent of male animals and only in one species. You have to believe that after two years of continuous exposure to thermal levels of radiation the vast majority of both rats and mice were essentially normal in appearance and behavior and had completely normal blood work.

The reality is quite different and a lot messier. I have now spent days poring over the actual data on individual animals. The rats in particular were all in terrible shape at the end of the two years—all the rats, in every exposure group. Many had breathing problems, diarrhea, uncoordination, eye abnormalities, tremors, and paralysis. They developed enormous numbers of tumors, both benign and malignant. The “unexposed” groups of rats were in worse shape than the “exposed” animals and developed just as many tumors.

The “unexposed” control animals were housed adjacent to the irradiated animals in the same facility. The rooms were connected to each other by coaxial cables and “other interconnections,” including common wiring that powered all the mechanical equipment, sensors and lights. The microwave transmitters were connected to the same wiring. There were common heating and air conditioning systems, and there was a common exhaust duct system connecting all the rooms that was made of metal. The microwave radiation levels were monitored but lower frequencies were not. In a reverberation chamber the radiation from the “dirty electricity” would have been amplified tremendously.

Only about 78% of the mice, and 50% of the rats survived until the end of the two years. The “unexposed” group of male rats fared the worst. Only 25 of the 90 “unexposed” male rats survived the two years. They died early of kidney failure, heart failure, and a large variety of benign and malignant tumors. Here is a sample of the causes of death in the “unexposed” group:

Animal No: Cause of death

501	“Benign” pituitary tumor (day 642)
502	(lived to end of study)
503	Kidney failure (day 590)
504	Died of unknown cause on day 294
506	Died of unknown cause on day 655
509	Kidney failure (day 681)
510	Pancreatic cancer (day 691)
511	Kidney failure (day 580)
512	“Benign” mammary gland tumor (day 440)
513	“Benign” pituitary tumor (day 527)
514	“Benign” pituitary tumor (day 541)
515	“Benign” kidney tumor (day 654)
516	(lived to end of study)

517	Pancreatic cancer (day 677)
518	(lived to end of study)
519	Kidney failure (day 498)
520	Kidney failure (day 563)
521	Kidney failure (day 562)
522	Skin cancer (day 719)
523	(lived to end of study)

25 of 90 “unexposed” male rats lived to the end of the study.
 43 of 90 male rats exposed to 1.5 W/kg lived to the end of the study.
 55 of 90 male rats exposed to 3 W/kg lived to the end of the study.
 43 of 90 male rats exposed to 6 W/kg lived to the end of the study.

For female rats, and for all the mice, there was essentially no difference in survival rates between the different groups of rats, regardless of their exposure levels.

All the rats and all the mice developed enormous numbers of tumors. My numbers do not agree with the numbers in the NTP report, which underreported the numbers of tumors and malignancies. Since the numbers of tumors are essentially the same for all levels of exposure, including “unexposed,” I combined all the animals together and analyzed each group of 360 animals as a unit.

Male rats exposed to GSM

360 animals
 more than 821 tumors
 more than 334 malignancies
 278 animals with tumors (77% incidence rate)
 128 animals with malignancies (36% incidence rate)

Female rats exposed to GSM

360 animals
 more than 1139 tumors
 more than 401 malignancies
 344 animals with tumors (96% incidence rate)
 123 animals with malignancies (34% incidence rate)

Male rats exposed to CDMA

360 animals
 more than 836 tumors
 more than 370 malignancies
 271 animals with tumors (75% incidence rate)
 123 animals with malignancies (34% incidence rate)

Female rats exposed to CDMA

360 animals
 more than 1100 tumors

more than 373 malignancies
345 animals with tumors (96% incidence rate)
112 animals with malignancies (31% incidence rate)

Male mice exposed to GSM

360 animals
more than 939 tumors
more than 440 malignancies
320 animals with tumors (89% incidence rate)
191 animals with malignancies (53% incidence rate)

Female mice exposed to GSM

360 animals
more than 758 tumors
more than 565 malignancies
215 animals with tumors (60% incidence rate)
118 animals with malignancies (33% incidence rate)

Male mice exposed to CDMA

360 animals
more than 925 tumors
more than 450 malignancies
335 animals with tumors (93% incidence rate)
197 animals with malignancies (55% incidence rate)

Female mice exposed to CDMA

360 animals
more than 713 tumors
more than 472 malignancies
233 animals with tumors (65% incidence rate)
126 animals with malignancies (35% incidence rate)

“More than” means I counted each instance of “multiple” tumors as a minimum of 2 tumors. These are extraordinarily large numbers of tumors. For comparison, I looked at a couple of older studies of spontaneous tumor rates in Sprague-Dawley rats, the same type of rats used in the NTP study.

In an 18-month study, the overall tumor incidence in male rats was 34%, in female rats 58%, and in mice 26%. (J. D. Prejean et al., “Spontaneous Tumors in Sprague-Dawley Rats and Swiss Mice. *Cancer Research* 33: 2768-73 (1973)).

In a 25-month study on microwave irradiation of male rats, the incidence of benign tumors in the unexposed group was 38% and the incidence of malignant tumors was only 5%. The total number of tumors among the 100 rats was 76. (C. K. Chou, et al., “Long-Term, Low-Level Microwave Irradiation of Rats,” *Bioelectromagnetics* 13: 470-496 (1992)).

The NTP tables of individual clinical observations are intriguing and suggestive, at least in rats, of an inverse dose response. In other words, the lower the dose, the worse the effect:

Male rats exposed to GSM

	<u>"unexposed"</u>	<u>1.5 W/kg</u>	<u>3 W/kg</u>	<u>6 W/kg</u>
diarrhea	16	5	3	2
abnormal breathing	30	18	11	5
lethargic	34	16	12	9
thin	42	27	18	17
nasal/eye discharge	36	32	38	22
ataxia (unsteadiness)	22	3	1	1
paralysis	4	1	0	0
hindlimb splay	1	6	4	1
ulcer/abscess	10	19	22	17
ruffled fur	47	38	31	21
eye abnormality	36	28	35	28
clonic seizures	1	0	0	0
tremors	2	2	0	0

This is reminiscent of another series of tables, published long ago, when the U.S. Embassy in Moscow was being irradiated by microwaves and embassy employees were getting cancer and complaining of unwellness. Johns Hopkins epidemiologist Abraham Lilienfeld prepared a lengthy report for the State Department titled "Evaluation of Health Status of Foreign Service and Other Employees from Selected Eastern European Posts" (July 31, 1978). His findings of an *inverse* relationship between exposure levels and symptoms were so counterintuitive that he didn't believe his own results and concluded that embassy personnel "suffered no ill effects" from the radiation. The numbers below are from Table 6.32 of Lilienfeld's report, for male embassy employees:

	Exposure Status in Moscow	
	<u>Unexposed</u>	<u>Exposed</u>
	Rate per 1000 person-years	Rate per 1000 person-years
Fainting	1.9	2.2
Depression	8.8	3.5
Migraine	5.6	3.5
Sleepiness	2.8	3.5
Lassitude	7.4	5.3
Irritability	7.9	4.4
Nervous disorders	1.4	0.88
Anxiety	6.5	2.2
Vibrations	11.1	9.3
Intraocular pain	0.46	0.0
Sensations	2.3	1.8
Loss of Appetite	2.3	1.3
Difficulty concentrating	6.5	3.5
Memory loss	5.6	1.3
Dizziness	6.0	5.3
Finger tremor	3.7	1.8
Hallucinations	0.93	0.0
Insomnia	7.0	4.4
Neurosis	0.46	0.0
Other symptoms	3.7	3.1

The “unexposed” embassy workers had a higher incidence in 18 of the 20 symptom categories. Equally spectacular results were obtained for female embassy employees (Table 6.34). The study population was 1,827 people who had worked at the Moscow Embassy over the 24-year period of irradiation. Lilienfeld classified radiation levels below $1 \mu\text{W}/\text{cm}^2$ as “unexposed.”

Considering the fact that half the rats in the NTP study died of things like kidney failure before the end of the study and that so many of them were in poor physical shape, it is hard to believe that all their blood work was normal. Since the averaging of data always loses the details and hides the truth, I reserve judgment until I can look at the hematology data for the individual animals. That data has not yet been released by the NIH.

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