

The Buster Report #49



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Cell Phones and Rats—Should You Worry?



Buster chatting with Snoopy and his pals about the new study of rats exposed to cell phone frequencies
Photo courtesy of John Boice

My dog Buster was a bit concerned about the preliminary report of an [animal experiment](#) by the National Toxicology Program (NTP) on rats and mice exposed to cell phone radiofrequency (RF) waves. While there is no love lost between dogs and rats, the dogs wonder whether this is relevant to species higher on the food chain (aka “man’s best friend”). I tried to explain that the experiment had too many limitations and uncertainties to conclude that cell phones cause cancer in humans. And that high-quality epidemiologic studies are providing increasing evidence that cell phones [do not cause brain tumors](#). Well, Buster did not find this germane to his species, so I “dug into the weeds” (using an expression any dog should understand).

The NTP animal experiment is exceptional, [but has serious limitations](#). Comprehensive peer reviews were included in the report. One, by a deputy director at the National Institutes of Health, concluded: “I am unable to accept the authors’ conclusions.” The chairman of the Department of Biostatistics and Applied Mathematics at the University of Texas M.D. Anderson Cancer Center (not a reviewer) said that [“the authors misused statistics”](#) and that “no result in the paper should be considered statistically significant.” Buster: *Pretty harsh. What are statistics?*

Consistency (or replication) of experimental or observational studies is key to interpreting findings. One study does not stand alone, e.g., even the study of [atomic bomb survivors](#) is confirmed by many cohort investigations. The NTP results were not internally consistent in that the significant excesses of selected brain tumor types (gliomas and hyperplasia) and selected heart tumor type (schwannoma) occurred only in male rats and not in the females. Further, it appears that no similar effects were seen in mice of either sex. The findings appear not to be replicated in studies conducted by the authors. Buster: *Okay, only in male rats, but what about dogs?*

Another peculiarity is that rats not exposed to cell phone RF did not live as long (28% survived to the end of the study) as male rats exposed to RF waves or as long as NTP control rats in other studies (47% survived to the end of the study). The tumors selected (gliomas, hyperplasias, and schwannomas) occur in later life and control rats did not live long enough to develop them. In fact, none of the control rats developed even one of these tumors! Buster: *Hey, I kind of get it, dogs who live longer than other dogs get more cancer so it’s not fair to compare old rats with young rats. But why didn’t the authors conclude that RF waves make you live longer? That would be cool.*

Results were only reported for certain brain tumors (gliomas and hyperplasia) and heart tumors (schwannomas). Schwannomas are tumors of tissues that cover the nerves, and the most common are [acoustic neuromas in the ear](#). Heart schwannomas have not been linked to cell phones in epidemiologic studies. To account for the possibility of false positive findings and reporting bias, all the other tumor results, in rats and mice, should be reported. For example, many schwannomas occur in other tissues (nerves in the ear, leg, arm, lower back), but there was no increased risk of schwannomas overall or for any other tissues. This raises concern about reporting bias of positive results where chance may have played a role, i.e., when you make many comparisons, by chance alone some might be significantly high and others significantly low. Buster: *Well, I know a lot about chance from “Dogs Playing Poker.”*

The study was severely underpowered. The number of rats studied was not large enough to detect even a high risk for the rare tumors presented, raising concern that the findings might reflect an increased likelihood of false positives. This concern could be alleviated by releasing all of the data, i.e., was there an equal number of significantly low findings? Tumors of interest not reported include meningiomas, salivary gland tumors, acoustic neuromas, and all other brain tumors and schwannomas. Buster: *Hey dude, you lost me on “underpowered,” but I’m against anything false.*

Generalizing this study to humans is problematic. The rats were exposed to 900 MHz of different modulating frequencies for nine hours a day, every day of their lives, starting as fetuses. The whole-body nature of the exposure differs from the exposure received when holding your phone to your ear, especially for heart exposures. Further, virtually all other animal studies taken together [“provide no evidence of health effects of RF field exposures.”](#) Thus the findings in only one species, in only one sex, and in only one study are difficult to interpret. Buster: *Yeah, I get it. One tree does not a forest make, and male rats cannot be that important (but I already knew that).*

Exposure limits are set based on thermal properties; the RF waves might jiggle molecules and thus increase heat—when your cell phone gets hot, however, it’s because of the battery, not the RF. Expert agencies in the [United States](#), [United Kingdom](#), and [European Community](#), as well as other [nonionizing radiation committees](#), conclude that the epidemiologic evidence taken together does not link RF waves to cancer in humans. Buster: *Not surprising, since “nonionizing radiation” doesn’t have enough energy to damage DNA. What’s the mechanism, dude? These RF waves aren’t dark energy you know.*

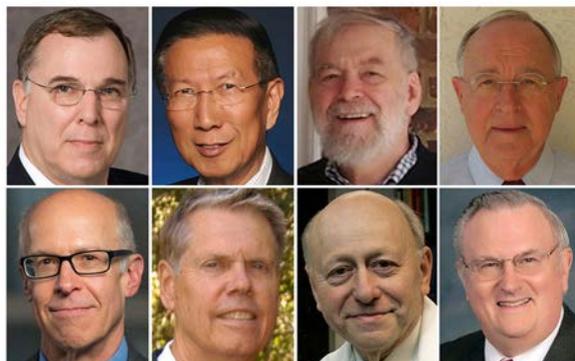
Good-quality, population-based studies take precedence over animal studies in setting guidance for the nation and the world. This is most notable for [ionizing radiation](#) where human cohort (prospective) studies have been used for over 40 years in setting guidance to protect the public and workers. Buster: *Good point. I myself would like a few more dog studies.*

High-quality human studies are uniformly negative, i.e., there is [little to no evidence](#) of [brain tumors](#) linked to cell phone use. Notable are the studies in [Denmark](#) of 400,000 cell phone subscribers and in the [United Kingdom of one million women](#). Studies in [children](#) are also negative, and there is no evidence that brain tumor rates have increased during the past 20 years in the [United States](#), the [United Kingdom](#), [Nordic](#) countries, [New Zealand](#), or most recently [Australia](#). Buster: *Good to hear. Some of my best pals are Australian Shepherds.*

Serious uncertainties exist that hinder interpreting the preliminary findings in the NTP report, determining their applicability to humans, and considering [recommendation](#) changes. We will stay tuned for the full NTP report! Buster: *Works for me.*

Coincidentally, the National Council on Radiation Protection and Measurements (NCRP) reconstituted its [Advisory Panel on Nonionizing Radiation](#) early this year. In 1981 [NCRP Report No. 67](#), you might recall, introduced the term “specific absorption rate” (SAR). Buster: *Remember? Are you kidding? I wasn’t even born then, and I can’t read!*

Advisory Panel on Nonionizing Radiation



Submitted photos

Top row, left to right: Jerry Bushberg (University of California Davis School of Medicine), Chung Kwang Chou (former Department of Radiation Research at City of Hope National Medical Center, Motorola, retired), Kenneth Foster (University of Pennsylvania), Joe Elder (former U.S. Environmental Protection Agency, Motorola, retired)

Bottom row, left to right: David Savitz (Brown University), Richard Tell (Richard Tell Associates), Marvin Ziskin (Temple University Medical School); John Boice (NCRP contact)