Comments on the National Toxicology Program Bioassay on RF GSM- and CDMA-Modulated Cell Phone RFR, NTP TR 595, March 12, 2018, submitted on behalf of Environmental Health Trust

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The fragmentation of subgroups in the analysis of the data in this study tends to obscure its most striking finding, which is the extent to which we observe lesions (either neoplastic or hyperplastic) in the glial cells and cardiac Schwann cells of almost every subgrouping. This is best seen by collapsing some of the exposure and outcome categories.

It is reasonable to combine hyperplastic and neoplastic lesions as they are generally recognized as stages in a common disease pathway. Given the evidence suggesting that RF may operate through voltage gated calcium channels, it is also conceivable that the RF could operate in a binary fashion once a sufficient power level is reached. If so, it is reasonable to combine categories of exposure.

Note that a threshold effect at low RF power levels could also explain the striking (and controversial) fact that there were no lesions in the control group. Unlike any previous control group from any other NTP study, these control rats were shielded from RF. If the effect observed in this study reflects a causal relationship, then it may well be that some of the cases observed historically are due to unshielded RF in previous laboratory studies.

These counts are shown in Table 1, which combines all exposure levels into an exposed group. The p values associated with a chi-squared test (or Fisher's Exact test if more appropriate) are given in Table 1.

When we combine groups, we see elevations in risk for all rats in all categories of exposure. For male rats, these risks are significant at $p<0.05$ for all exposure categories and outcomes except CDMA and glial cell lesions, which had a p value of 0.08. For female rats the rates are lower (as we would expect based on historical controls) and, although elevated in all groups, they do not achieve significance at $p<0.05$.

The most striking feature about these findings is the apparent coherence between these results and the epidemiological studies suggesting a risk of glioma and Schwannoma. That consistency is a key part of any inference concerning causality. In that context, even a non-significant elevation in risk must be taken seriously. Significant elevations of risk provide critical evidence for any assertion of causality and can never be dismissed lightly in making an assertion of safety.

		Male	p	Female	p
Glial Cells	GSM	11	0.02	3	0.35
	CDMA	10	0.08	4	0.13
	Combined	21	0.04	7	0.21
Schwann Cells	GSM	19	0.03	6	0.35
	CDMA	5	0.02	3	0.08
	Combined	24	0.03	9	0.15

Table 1.) Cases of combined neoplastic and hyperplastic lesions among all exposed rats in the NTP RF study. P values are based on comparisons with the control groups which had no neoplastic lesions a chi-squared test or Fischer's exact test as appropriate.