Comments on the National Toxicology Program Study on Cell Phone Radiation and Cancer

Toxicology Comments on Peer Review of NTP/RF Bioassay

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Overview of Presentation on Toxicology (Day 2, Devra Davis, NTP Comments, 2018

- Rationale for using the NTP study's controls and not historical controls due to appropriate housing
- Dinse et al NTP tumor results from cardiac Schwannoma and glioma in Sprague Dawley rats shows very low levels
- Need to re-examine data on reproductive endpoints and birth weight impacts
- DNA damage multi-site & multi-site increased cancers suggest RF is a pluripotent carcinogen
- Cardiomyopathy (Schwann cell hyperplasia) & cardiac malignancies (Schwannoma) should be combined, as should glial hyperplasia and glioma
- Need for realistic exposure scenarios that take into account chemical and physical synergies, Tillman et al, 2010, Soffritti et al, 2012 and Lerchl et al, 2015
- Recent increasing trends in GBM and pituitary cancers in U.K, Sweden and U.S. are problematic

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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 GSM base station environmental emission

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ABSTRACT

Background: In 2011, IARC classified radiofrequency radiation (RFR) as possible human carcinogen (Group 2B). According to IARC, animals studies, as well as epidemiological ones, showed limited evidence of carcinogenicity. In 2016, the NTP published the first results of its long-term bioassays on near field RFR, reporting increased incidence of malignant glial tumors of the brain and heart Schwannoma in rats exposed to GSM – and CDMA – modulated cell phone RFR. The tumors observed in the NTP study are of the type similar to the ones observed in some epidemiological studies of cell phone users.

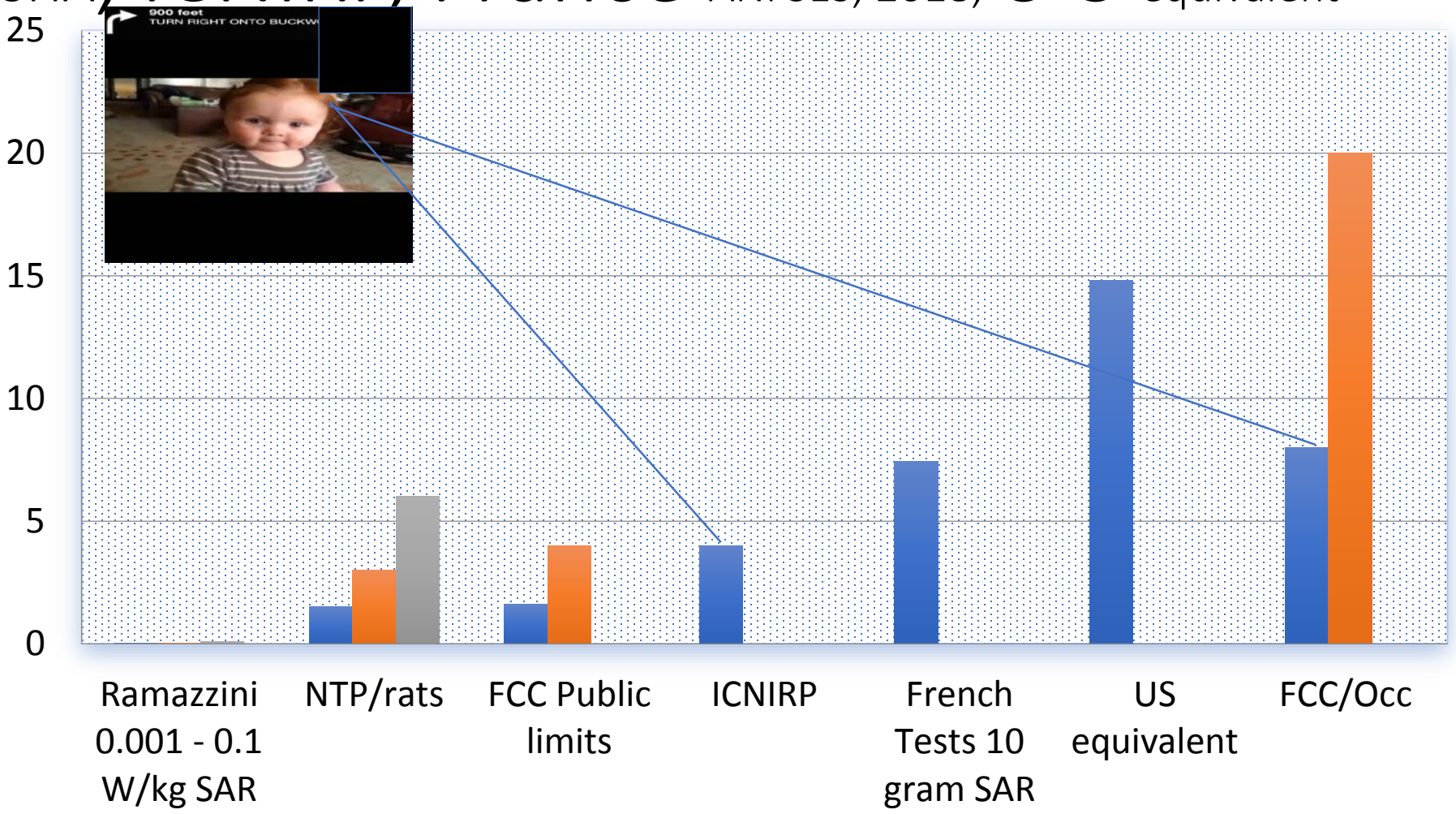
Objectives: The Ramazzini Institute (RI) performed a life-span carcinogenic study on Sprague-Dawley rats to evaluate the carcinogenic effects of RFR in the situation of far field, reproducing the environmental exposure to RFR generated by 1.8 GHz GSM antenna of the radio base stations of mobile phone. This is the largest long-term study ever performed in rats on the health effects of RFR, including 2448 animals. In this article, we reported the final results regarding brain and heart tumors.

Methods: Male and female Sprague-Dawley rats were exposed from prenatal life until natural death to a 1.8 GHz GSM far field of 0, 5, 25, 50 V/m with a whole-body exposure for 19 h/day.

Results: A statistically significant increase in the incidence of heart Schwannomas was observed in treated male rats at the highest dose (50 V/m). Furthermore, an increase in the incidence of heart Schwann cells hyperplasia was observed in treated male and female rats at the highest dose (50 V/m), although this was not statistically significant. An increase in the incidence of malignant glial tumors was observed in treated female rats at the highest dose (50 V/m), although not statistically significant.

Conclusions: The RI findings on far field exposure to RFR are consistent with and reinforce the results of the NTP study on near field exposure, as both reported an increase in the incidence of tumors of the brain and heart in RFR-exposed Sprague-Dawley rats. These tumors are of the same histotype of those observed in some epidemiological studies on cell phone users. These experimental studies provide sufficient evidence to call for the re-evaluation of IARC conclusions regarding the carcinogenic potential of RFR in humans.

SAR Levels from Ramazzini, 2018, U.S. NTP 1996 FCC, U.S. OSHA, ICNIRP, France ANFSES, 2018, U S equivalent



European 2.0 W/Kgm for 10 gram volume
U.S./Canada 1.6 W/Kgm for 1 gram volume
4.0 W/Kgm for 10 gram volume for ear & extremities

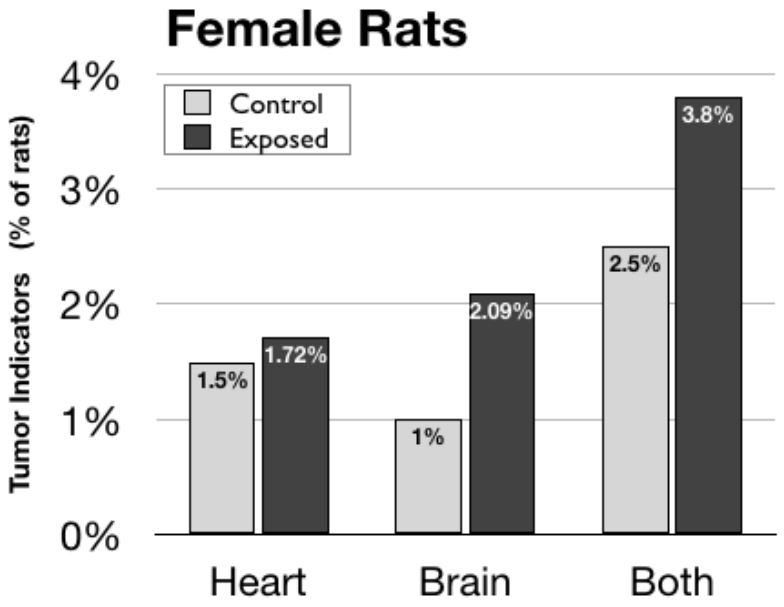
From Falcioni et al, Environmental Research, online, 2018

Table 2
Long-term bioassay on 1.8 GHz base station RFR, administered at various doses to male (M) and female (F) Sprague-Dawley rats (Experiment BT 1CEMRF): results on pre-neoplastic and neoplastic lesions of the heart.

Group	Dose	Animals		Hyperplasia		Endocardial		Intramural		Total	
No.	GSM-RFR			Schwann cells		Schwannoma		Schwannoma		Schwannoma	
	1.8 GHz (V/m)	Sex	No.	No.	%	No.	%	No.	%	No.	%
I	0	M	412	3	0.7	0	0.0	0	0.0	0	0.0
	(control)	F	405	2	0.5	0	0.0	4	1.0	4	1.0
		M + F	817	5	0.6	0	0.0	4	0.5	4	0.5
II	5	M	401	2	0.5	2	0.5	1	0.2	3	0.7
		F	410	0	0.0	2	0.5	7	1.7	9	2.2
		M + F	811	2	0.2	4	0.5	8	1.0	12	1.5
III	25	M	209	1	0.5	1	0.5	0	0.0	1	0.5
		F	202	0	0.0	0	0.0	1	0.5	1	0.5
		M + F	411	1	0.2	1	0.2	1	0.2	2	0.5
IV	50	M	207	5	2.4	2	1.0	1	0.5	3	1.4*
		F	202	2	1.0	1	0.5	1	0.5	2	1.0
		M + F	409	7	1.7	3	0.7	2	0.5	5	1.2

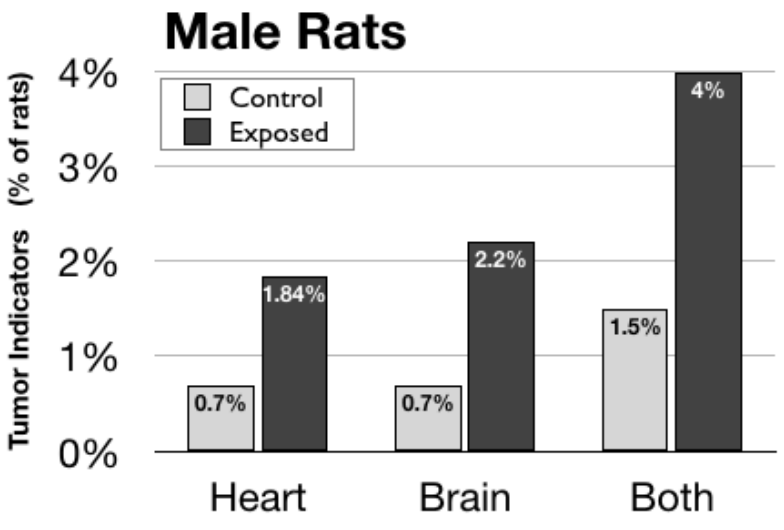
* Statistically significant $p \leq .05$ using Fisher exact test.

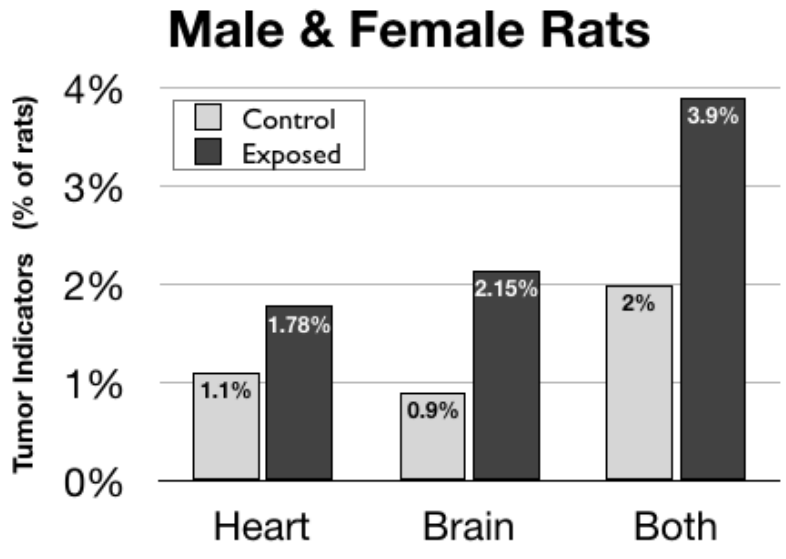
2018 NTP Multiple elevated tumors in male and female rats



Falcioni et al. 2018. Report of final results regarding brain and heart tumors in Sprague-Dawley rats exposed from prenatal life until natural death to mobile phone radio-frequency field representative of a 1.8 GHz GSM base station environmental emission. Environmental Research, in press.

[Data re-graphed by Dr. Magda Havas]





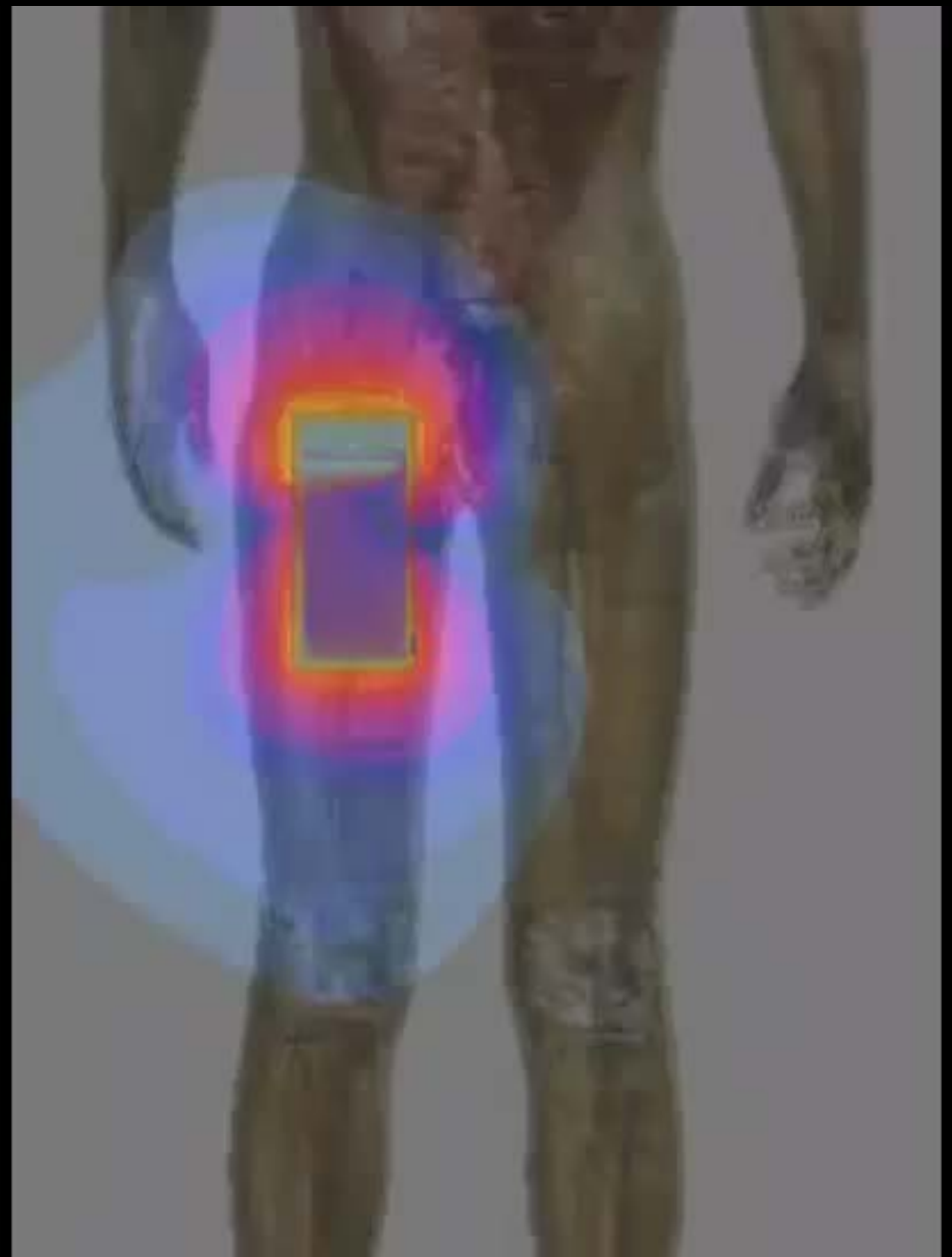
Falcioni et al, 2018 Dose-dependent increase in glial tumors in female rats

- However, a non-statistically significant dose dependent increase an increase in the incidence of malignant glial tumors was observed in treated female rats : 2/405 (0,5%), 3/410 (0,7%), 2/202 (1,0%), 3/202 (1,5%). No malignant glial tumors were observed in male controls (0/412) and only 2 malignant glial tumors were observed in female controls (2/405, incidence 0,5 %).
- In a period of over 20 years (1984-2004), the data on historical control rats of the RI show that only 15 cases of malignant glial tumors have been reported out of 3,165 untreated females (incidence 0,5%) (and 41 cases of malignant glial tumors have been reported out of 3,160 untreated males, incidence 1,3%).
- Therefore, the incidence of malignant glial tumors observed in treated female rats is slightly increased, in particular at the highest dose

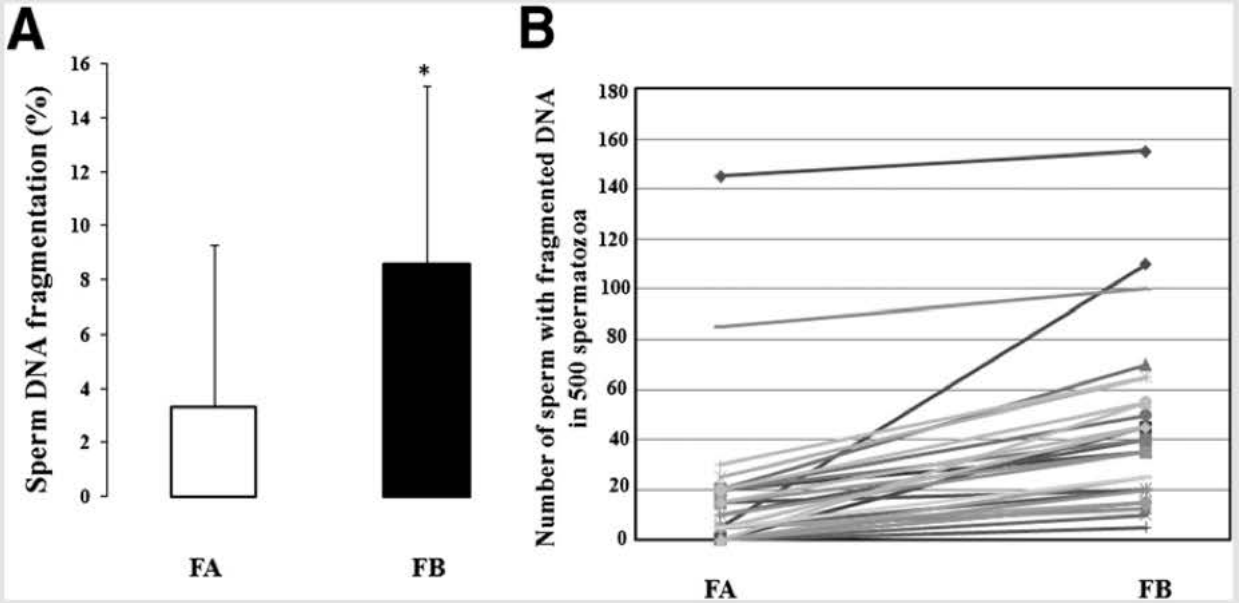
Falcioni et al., 2018 Conclusions

- The RI findings on far field exposure to RFR are consistent with the results of the NTP study on near field exposure to RFR (Wyde et al., 2016), as both reported an increase in the incidence of tumors of the brain and heart in RFR-exposed Sprague-Dawley rats
- The tumors of the brain and heart observed at increased incidence in rats exposed to RFR generated by an 1.8 GHz GSM antenna in our study are of the same cytological origin of those observed in some epidemiological studies of cell phone users.
- Therefore, these experimental studies provide sufficient evidence to call for the re-evaluation of IARC conclusions regarding the carcinogenic potential of RFR in humans.

Mobile Phone in Pocket
Exposes Reproductive Organs and Bone Marrow



Fernandez et al, 2016



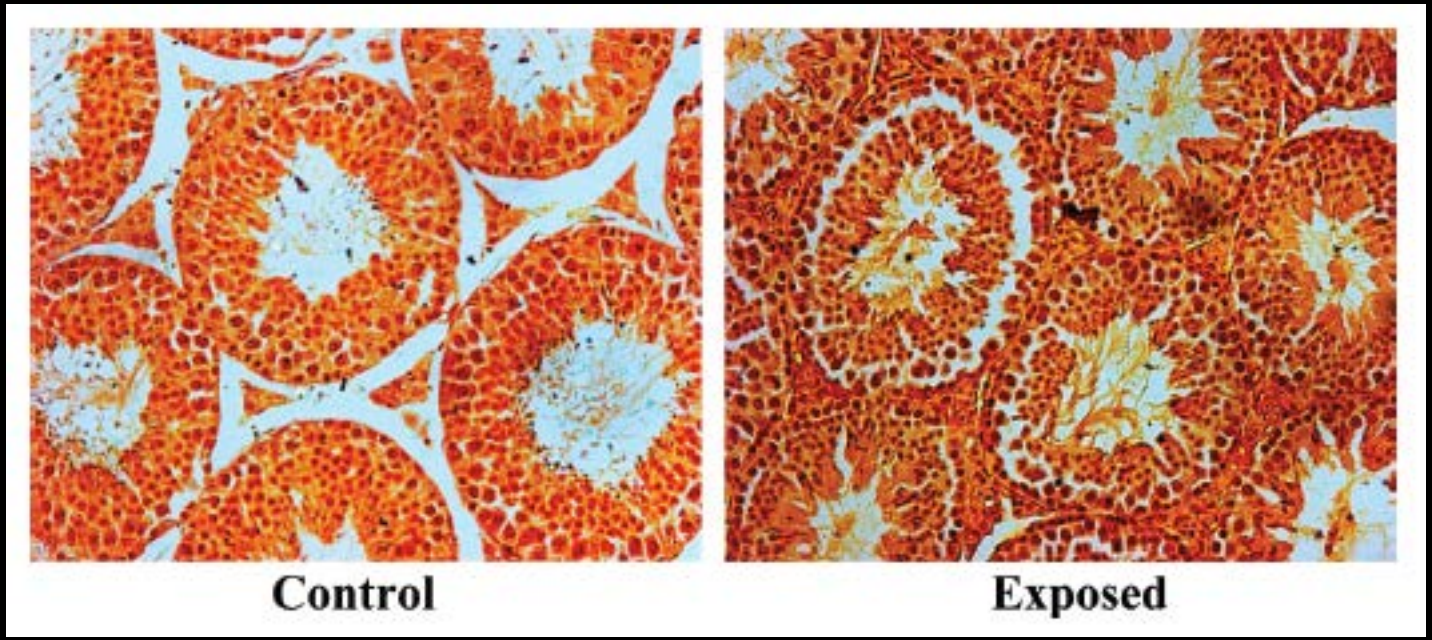
Laptop exposure and human sperm DNA fragmentation. Sperm suspensions were incubated under a laptop computer connected to the internet by Wi-Fi (FB) during 4 hours at 25°C. Aliquots of the same samples were placed outside of the reach of other computers or electronic devices, in a separate room (FA). (A) Sperm DNA fragmentation was increased after 4 hours of laptop exposure. In the test group, 8.6% ± 6.6% of the cells were fragmented, whereas only 3.3% ± 6.0% of the controls showed DNA fragmentation (*P<.01). (B) Plot of individual responses of sperm DNA fragmentation to laptop exposure. The number of sperm with fragmented DNA was evaluated in two aliquots of the same sample (500 cells/aliquot).

4 Hours of exposure

Decreased motility and induced DNA fragmentation by a non-thermal effect.

Avendano et al. 2012

Testis: Increased i-NOS immunostaining in the spermatogonial cells of seminiferous tubules



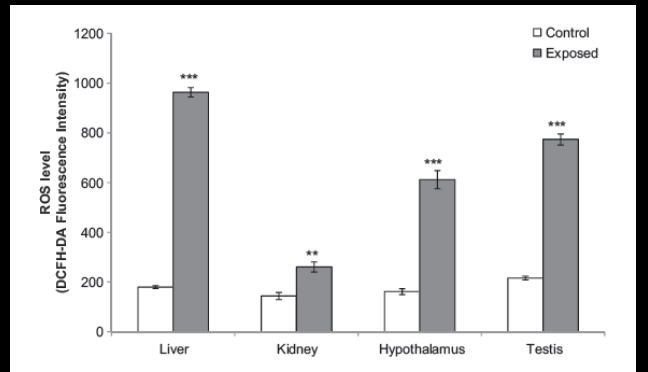
Mice exposed to nonthermal 2.45-GHz 2h/d x 30 d

↑ ROS in liver, kidney, hypothalamus, and testis

↑ RNS, lipid peroxidation

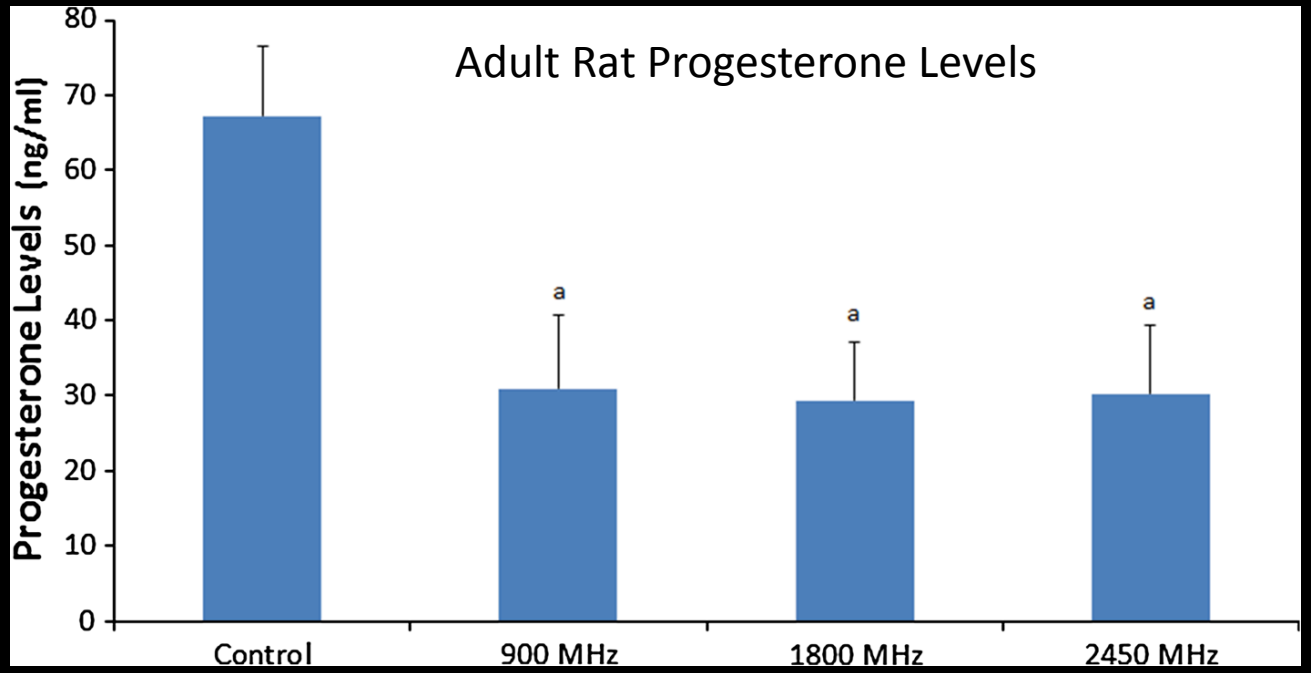
↓ Antioxidant capacity, % viable sperm

Increased DCFH-DA fluorescence (measure of ROS)



Shahin et al. 2014

Abnormal endocrine functions and uterine oxidative stress in 4 generations rats.



Exposures:
Control, 900 or 1800, 2450 MHz
During pregnancy and growth

60 min/day/5 times a week x 52 weeks (4 pregnancies)

Decreased prolactin, progesterone, estrogen
Increased oxidative stress in the uteri of maternal rats during the development of offspring.

Yüksel et al. 2015

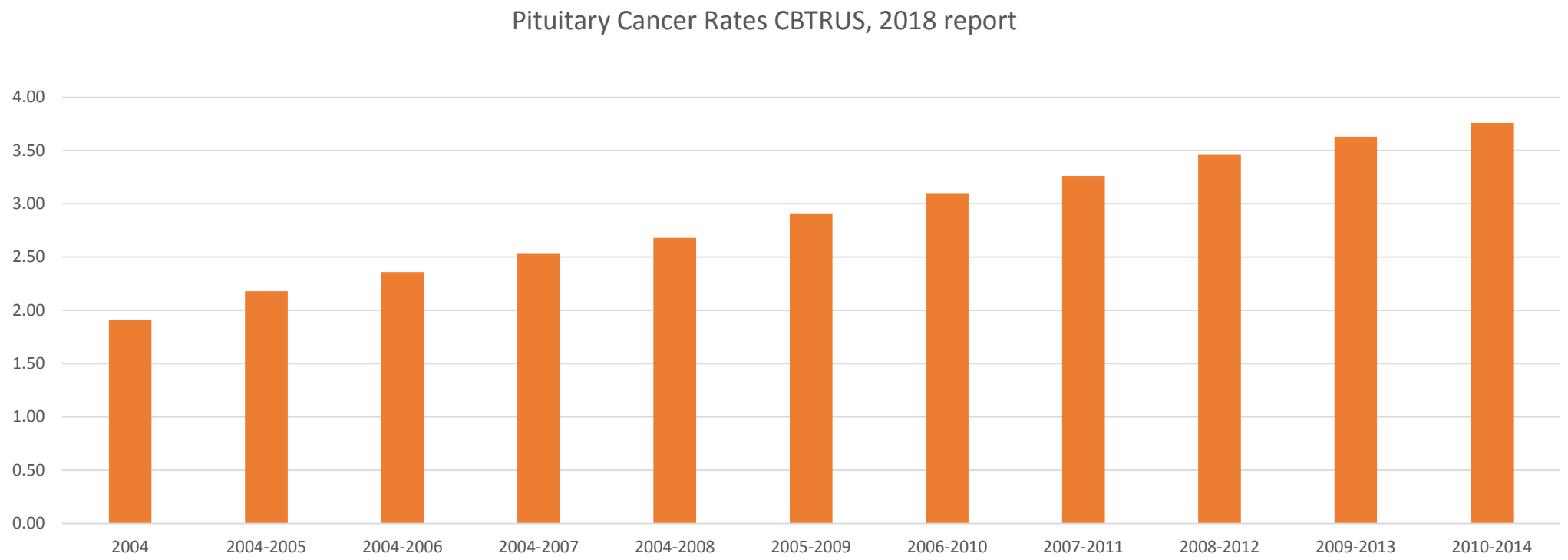
Non-monotonic reductions in spermatid and spermatozoa, Davis, NTP 2018

TABLE H2
Summary of Reproductive Tissue Evaluations for Male Rats Exposed to CDMA-Modulated Cell Phone RFR for 14 Weeks[a]

	Sham Control	1.5 W/kg	3 W/kg	6 W/kg
n	10	10	10	10
Weights (g)				
Necropsy body wt	444 ± 9▲▲	440 ± 8	435 ± 4	411 ± 8**
L. Cauda epididymis	0.266 ± 0.011	0.284 ± 0.008	0.274 ± 0.009	0.249 ± 0.017
L. Epididymis	0.640 ± 0.021	0.667 ± 0.014	0.649 ± 0.015	0.587 ± 0.043
L. Testis	2.083 ± 0.059	2.116 ± 0.055	2.102 ± 0.036	1.836 ± 0.160
Spermatid measurements				
Spermatid heads (10^6/testis)	305.1 ± 11.2	281.0 ± 12.5	280.7 ± 10.1	253.7 ± 30.1
Spermatid heads (10^6/g testis)	147.3 ± 6.0	133.9 ± 7.6	133.6 ± 4.5	129.5 ± 12.9
Epididymal spermatozoal measurements				
Sperm motility (%)	91.5 ± 1.4	90.9 ± 1.0	88.7 ± 4.0	81.9 ± 9.2
Sperm (10^6/cauda epididymis)	247.7 ± 68.9	206.0 ± 36.4	243.9 ± 36.4	201.8 ± 29.7
Sperm (10^6/g cauda epididymis)	909.3 ± 243.5	742.9 ± 140.7	906.2 ± 144.4	775.8 ± 106.6

▲▲ Significant trend (P≤0.01) by Jonckheere's test
** Significantly different (P≤0.01) from the sham control group by Williams' test
[a] Data are presented as mean ± standard error. Pairwise differences from the sham control group are tested for significance by Williams' or Dunnett's test (tissue weights) or by Shirley's or Dunn's test (spermatid and epididymal spermatozoal measurements).

Central Brain Tumor Registry of U.S. rates per 100,000



Prepared by L.Lloyd. Morgan, EHT, 2018 from CBTRUS, 2018

Department of Defense Non-Lethal Weapons Rely on 5G millimeter wave technology

https://www.youtube.com/watch?v=hpCqsN5zbwk

https://www.youtube.com/watch?v=dmuyLIrSjxI