Consequences of Chronic Microwave RF Exposure

Fig. 2. Geographical location of BS Site BH 20 at 1373 Rua do Ouro Street, in the Serra neighborhood, Belo Horizonte municipality


Amateur Radio Operators

Analysis of leukemia deaths in male members of the American Radio Relay League resident in Washington and California, 1971-1983


Polish military personnel with occupational exposure to radio and microwave frequency radiation.

Odds ratio of cancer incidence (1971-1985)

CML = chronic myelocytic leukemia
AML = acute myeloblastic leukemia
NHL = non–Hodgkin lymphoma


In the original paper, Robinette et al evaluated job exposure hazard levels of 6 categories of navy personnel and grouped them into two groups, low exposure and high exposure. The electronic technicians (ET) had a significantly lower hazard rating and lower levels of pathology than the other two job categories in the high risk group, so this classification diluted out the high exposure risk pool.

Dr. Cherry took Robinette et al’s published data and divided the workers into three exposure levels. The above chart is the result of Dr. Cherry’s analysis of the data set.


Comments on Notice of Inquiry, ET Docket No. 13-84

Y axis: Odds ratio for brain tumor

X axis: Exposure intensity score x months exposed


Multiple powerful transmitters on site.

10 km radius around towers contains a population of >49,650 (1990 census).

 exponential fitted trend line, $R^2=0.9756$, $p = 0.002$


New cell phone tower set up in city of Netanya, Israel, in July, 1996.
1500 watt, 850 MHz.
Power density in the whole exposed area was far below 0.53 $\mu$W/cm².
This is 1000 times less than the FCC Guidelines of 600 $\mu$W/cm² for 850 MHz exposure.

Comparison of cancer rates during the second year of exposure, in 677 long-term residents near the tower, compared to 1,222 matched controls living in another area of the city.


Netanya, Israel - Relative Cancer Risk

Relative risk of cancer in residents near a new cell phone tower in Netanya, Israel, during the second year of exposure.
Overall risk of cancer in Area A was 4.15 times higher than in the town as a whole.
For men in area A, the cancer rate was 1.4 times higher.
For women in area A, the cancer rate was 10.5 times higher (p < 0.0001)

[the probability of this being a random finding is one hundredth of 1%]

Naila, Germany (1999-2004)

Town of ~ 1100 residents.
Cell tower installed in 1993.
Medical of 1000 residents reviewed for the years 1994-2004.
Comparison of cancer incidents in residents living within 400 meters of the cell phone tower,
compared to residents living farther away,
and compared to the death rates for the province as a whole.


Fig. 3: Number of new cancer cases 1999 to 2004, adjusted for age and gender, calculated for the 5,000 patient years
Y axis: Cancer incidence 1994 – 2004 (new cases per 5000 patient years).
* Saarland = predicted rate based on the cancer registry for the federal state of Saarland.
** Naila = incidence for the town as a whole.
Inner area = residence within 400 meters of the tower.
Outer area = remainder of community.
In the inner area, the risk of cancer incidence was three times as high after five or more years of exposure.
In addition, the patients that live within 400 metres tend to develop the cancers at a younger age.
Hausmannstätten & Vasoldsberg, Austria (1984-1997)

Case/control study of cancer patients living within 1200 meter radius of the tower.


Odds ratio of cancer incidence — stratified by exposure levels (exterior to dwelling) in μW/m².

Note: FCC thermal safety guidelines ~ 6,000,000 μW/m².

In the highest exposure category:

- Breast cancer risk was 23 times higher.
- Brain cancer risk was 121 times higher.

Belo Horizonte, Brazil (2011)

Belo Horizonte is the capital of Minas Gerais state in Brazil, population 2,258,096 in 2010. Rated by the U.N. in 2007 as having the best quality of life in Latin America. By 2006, 856 cell phone towers had been installed in the city.


Environmental monitoring of RF power densities in the city was performed. In 2003, the highest recorded power density in the city was 3.06 μW/cm². In 2008, the largest recorded power density was 40.78 μW/cm², 13 times higher than in 2003. 40 μW/cm² is 15 times less than the FCC Exposure Guidelines.

determined by dividing the total number of deaths during the period \( n = 7191 \) by the total population living in the municipality \( 2,238,332 \), showed that there was a risk of dying of 32.12 per 10,000 inhabitants, as seen in Fig. 15. In this study, this figure represents the null hypothesis, i.e., the total number of deaths occurring in the period divided by the population, independent of the proximity to the BSs.

Fig. 16 shows the distribution of the number of deaths by neoplasia versus duration of exposure since the date of operation of the first antenna in each analyzed CT.

3.6. Environmental monitoring of the electromagnetic field

The EMF results provided essential information for the assessment of risks to the health of the exposed persons in the community. A total of 400 points were measured in the Central-Southern region in 2008, where a major concentration of cellular telephony antennas was found. The mean intensity of the measured electric field was 7.32 V/m, varying from 0.4 to 12.4 V/m. It was common to find a stronger electric field at locations above the ground. The BS frequency bands ranged from approximately 800 MHz to 1800 MHz. In 2003, the power density varied from \( 0.898 \mu \text{W/cm}^2 \) to \( 3.066 \mu \text{W/cm}^2 \).

4. Discussion

Electric and EMFs interact with biological systems because they penetrate into organs and tissues, and the biological systems are ruled by delicate bioelectrochemical reactions that sustain the vital processes and receive the influence from those fields. As demonstrated in the literature, installed BSs in the Belo Horizonte municipality until 2006. Total amount = 856.

The authors used the Telecommunications National Agency database to map the locations of the 856 cell phone towers that existed in the city as of December 2006.


They then cross-referenced health department records of death by neoplasia with census and demographic city population data to locate the residence of all individuals who had died of cancer in the city between 1996 and 2006.

This allowed them to calculate the distance between the deceased individuals’ residences and the closest cell phone tower, in meters.


Analysis of this data showed that the cancer death rate was significantly elevated at proximities closer than 500 meters to cell phone towers.

Fig. 15. Rate of mortality by neoplasia, according to the distance from the BS in Belo Horizonte municipality, from 1996 to 2006, and the null hypothesis (blue line).

Death rates peaked during the second year of exposure.

Fig. 16. Distribution of the number of deaths by neoplasia versus duration of exposure since the date that the first antenna in each analyzed CT came into operation.


**Effects of Microwave RF Exposure on Fertility**