

# Probable Health Effects Associated with Base Stations in Communities: The Need for Health Surveys\*

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## Abstract

In 1995 a New Zealand Environment Court (as the Planning Tribunal) decided to set a public exposure limit of  $2\mu\text{W}/\text{cm}^2$  for from a BellSouth GSM cell site. This was based on evidence of biological effects, including calcium ion efflux, enhanced ODC activity and EEG change down to  $2.9\mu\text{W}/\text{cm}^2$ . There was also epidemiological evidence of childhood leukaemia at  $2.4\mu\text{W}/\text{cm}^2$ . The primary expert witness for BellSouth was WHO staff member Dr Michael Repacholi from Australia. He stated that there was no evidence of adverse effects below the international guideline of  $\text{SAR} = 0.08\text{W}/\text{kg}$  because the only effect of RF/MW was tissue heating. The Court's decision rejected this position and set the exposure level of 1% of the standard. The decision also stated that this should be revised with new evidence. Subsequently two Australian studies were carried out to assure the public that both cell phones and cell sites were safe. Both of these studies, Hocking et al. (1996) and Repacholi et al. (1997), showed that leukaemia/lymphoma was more than doubled for people and mice.

It is now clear that the results of both of these were quite predictable from earlier human and rodent studies. This includes studies that are claimed by ICNIRP, WHO and Dr Repacholi (both in reviews and in the Environment Court) to show that there were no adverse effects. To this day cell phone companies and some government bodies, such as the U.K independent expert committee, chaired by Sir William Stewart, that included Dr Repacholi, still claims that there is no evidence that cell phone radiation is harmful. There is a large and growing body of published scientific studies that show that this is not true. This includes Dr Repacholi's own research. Over forty cell phone radiation studies are cited here. They show that cell phone radiation mimics the biological and epidemiological studies for EMR over the past 4 decades. This includes DNA strand breakage, chromosome aberrations, increased oncogene activity in cells, reduced melatonin, altered brain activity, altered blood pressure and increased brain cancer.

Analogue cell phones use FM RF/MW signals and digital cell phones use pulsed microwaves that are very similar to radar signals. FM radio, TV signals and radar exposures cause significant and dose response increases in brain cancer, leukaemia and other cancers, and cardiac, neurological and reproductive health effects. Hence it is highly probable that cell sites and cell phones are causing many adverse health effects. Already cell phone radiation has been shown to significantly increase all these effects.

Public health surveys of people living in the vicinity of cell site base stations should be being carried out now, and continue progressively over the next two decades. This is because prompt effects such as miscarriage, cardiac disruption, sleep disturbance and chronic fatigue could well be early indicators of the adverse health effects. Symptoms of reduced immune system competence, cardiac problems, especially of the arrhythmic type and cancers, especially brain tumour and leukaemia are probable.

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\*) Original paper

However, since cell phone radiation has already been shown to reduce melatonin, damage DNA and chromosomes, surveys should look for a very wide range health effects and not be limited to a narrow set. In carrying out health surveys, the researchers must be mindful of the actual and realistic radiation patterns from cell sites and not to make the mistake of assuming a simple, uniform radial pattern.

### A Sample of the EMR Dose-Response Evidence for RF/MW, and Hence Probable Effects from Cell Phones and Cell Sites

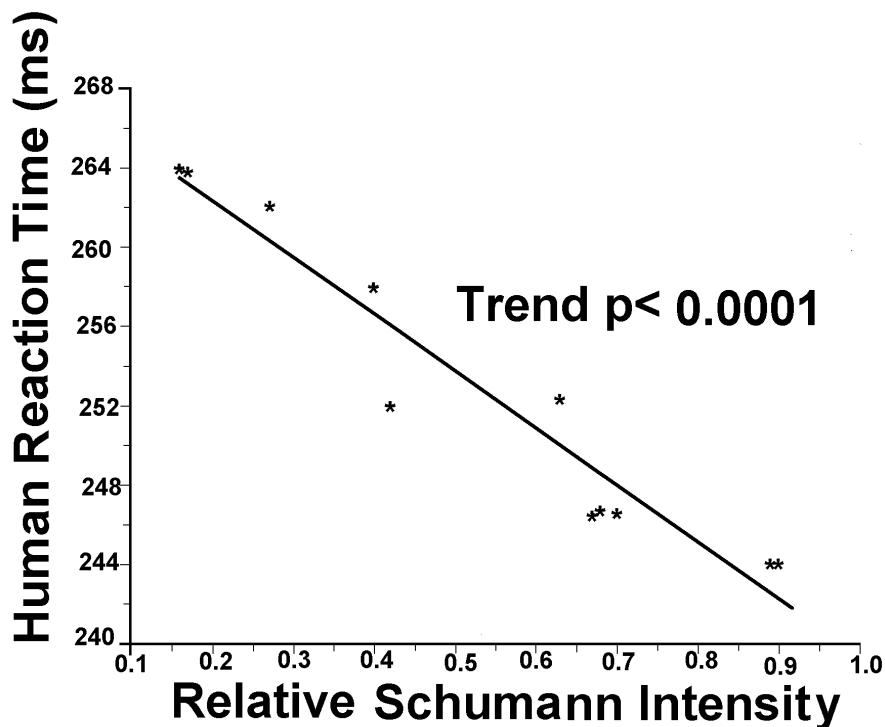
Brains, hearts and cells are very sensitive to interference with their natural EMR signally and to genetic damage because of the electrical nature of many cell regulation processes. A dose-response relationship is indicative of a causal effect, Hill (1965).

### Neurological Effects

#### Brain Interference Leading to Changed Reaction Times

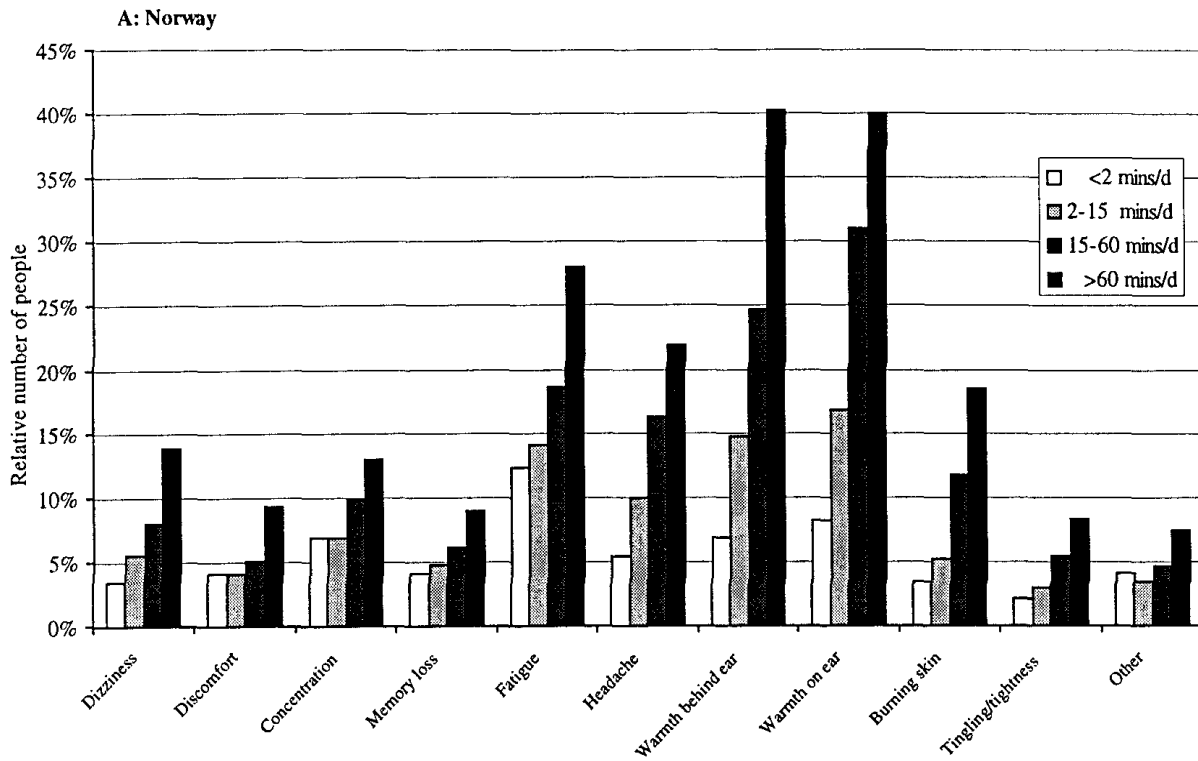
Human brains detect, use and react to naturally produces ELF signals, the Schumann Resonances at extremely low intensities:

**Figure 1** Human reaction times are causally correlated with natural variations in the Schumann Resonance Intensity, Konig (1974). The mean Schumann intensity (Relative Schumann Intensity =0.5) is 0.65mV/m or 0.1pW/cm<sup>2</sup>. The range is 0.2 to 1.2 mV/m (0.01 to 0.4pW/cm<sup>2</sup>).

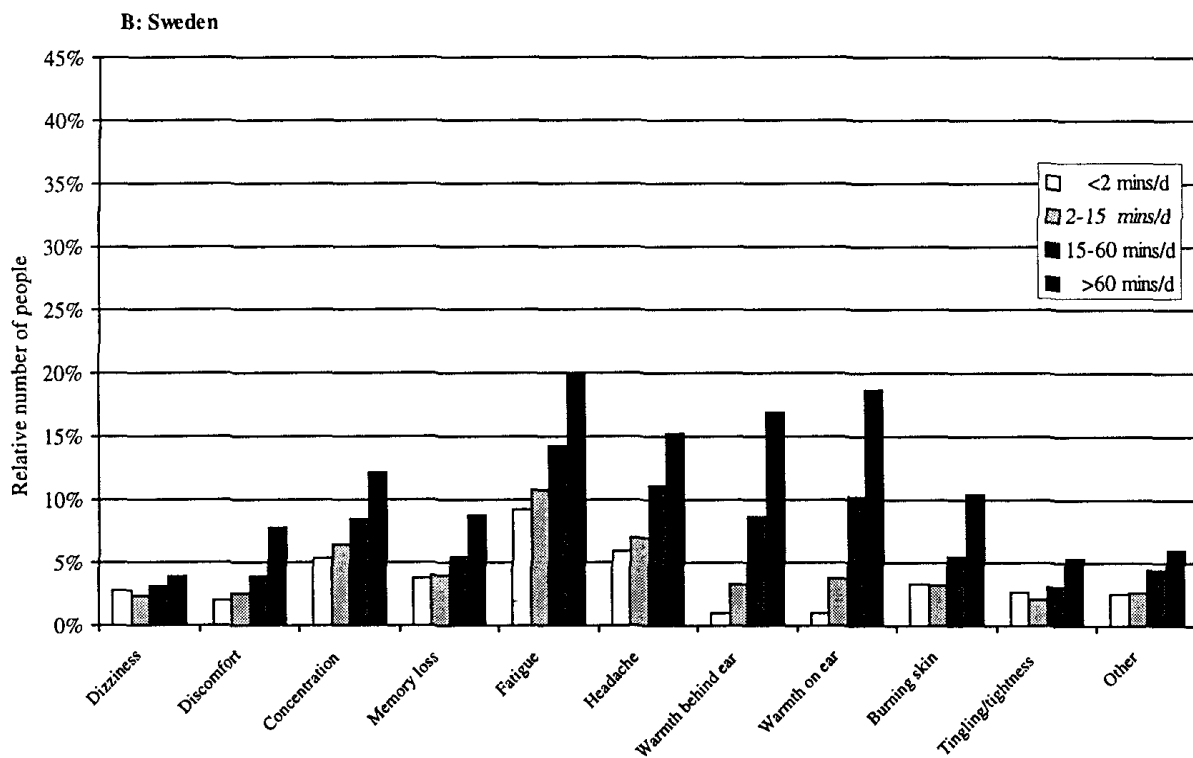


## Actual Neurological Effects of Cell Phones Have Been Observed

**Figure 2** Prevalence of symptoms for Norwegian mobile phone users, mainly analogue, with various categories of length of calling time per day, Mild et al. (1998).



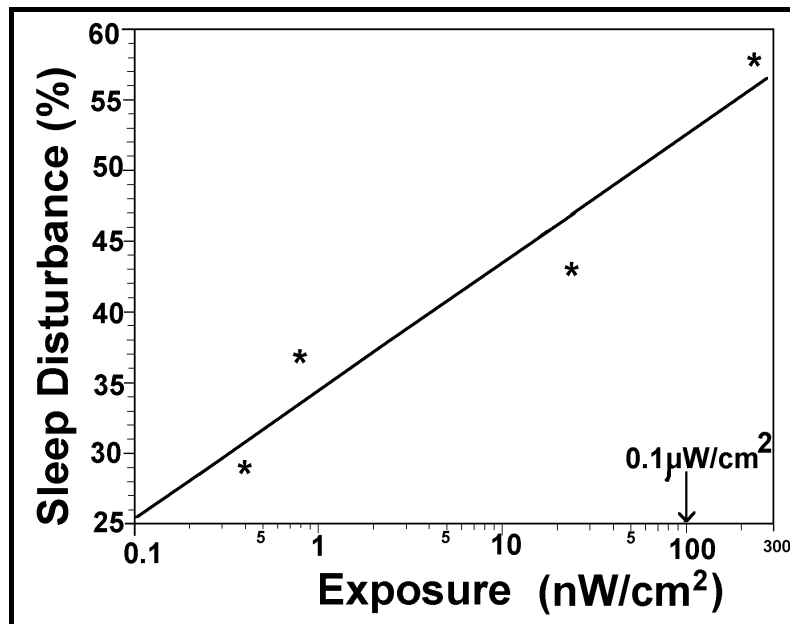
**Figure 3** Prevalence of symptoms for Swedish mobile phone users, mainly digital, with various categories of length of calling time per day, Mild et al. (1998).



### Sleep Disruption

Chronic and acute exposure to a Shortwave radio tower causes sleep disruption.

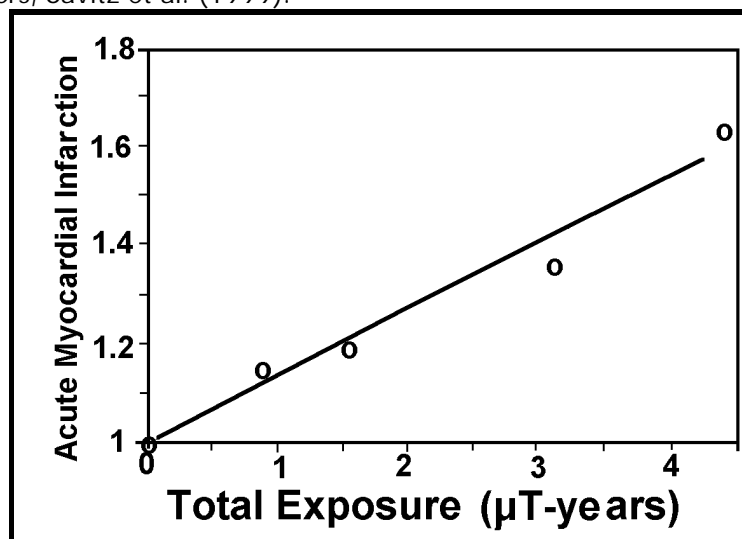
**Figure 4** Dose-response relationship for Sleep Disturbance at Schwarzenburg with exposure in nW/cm<sup>2</sup>. Note: 1nW/cm<sup>2</sup> = 0.001μW/cm<sup>2</sup>, Altpeter et al. (1995) and Abelin (1999).



### Cardiac Damage and Death

Hamburger, Logue and Silverman (1983) observed significant dose responses for heart disease for male physiotherapists as a function of treatments per month with microwaves, OR = 2.51 (1.09-5.78), Trend p<0.05; shortwave, OR = 3.40 (1.56-7.39), trend p=0.005; and Combined Microwave and Shortwave, OR = 2.88 (1.21-6.70), trend p=0.025.

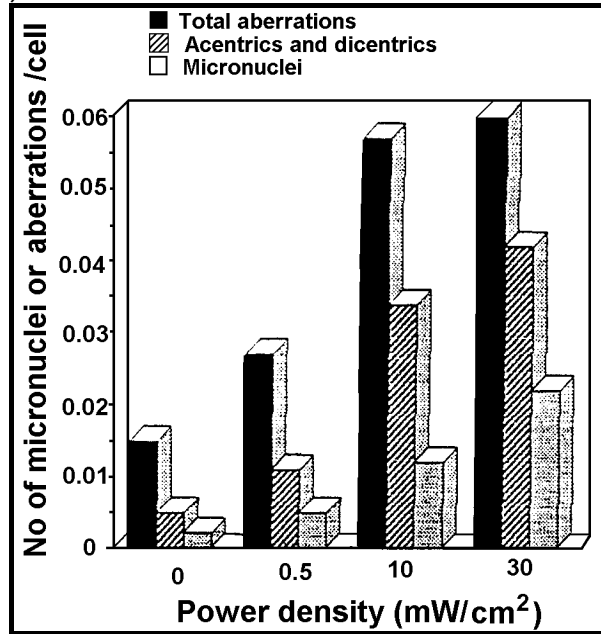
**Figure 5** Acute Myocardial Infarction as a function of cumulative exposure to 60 Hz fields in U.S. electricity utility workers, Savitz et al. (1999).



## Genotoxic Effects

### Chromosome Aberrations

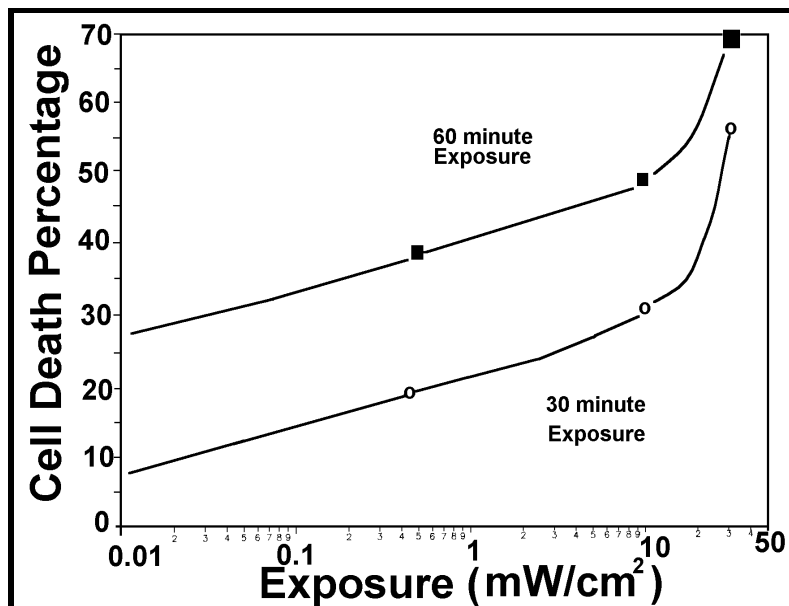
**Figure 6** The relation of total chromosome aberrations, micronuclei and specific chromosome aberrations for each cell in human lymphocyte cultures in the dose of microwave radiation in vitro, Garaj-Vrhovac et al. (1992).



Cell phones damage DNA down to very low exposure levels, Phillips et al. (1998).

### Cell Death

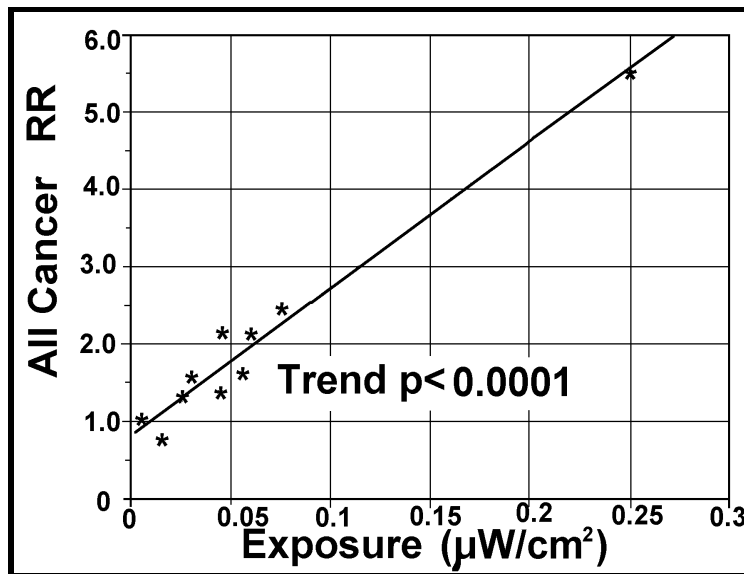
**Figure 7** Cell death percentage of Chinese hamster cells exposed to 7.7 GHz microwaves (CW) for 30 minutes and 60 minutes in an isothermal exposure system, Garaj-Vrhovac, Horvat and Koren (1991).



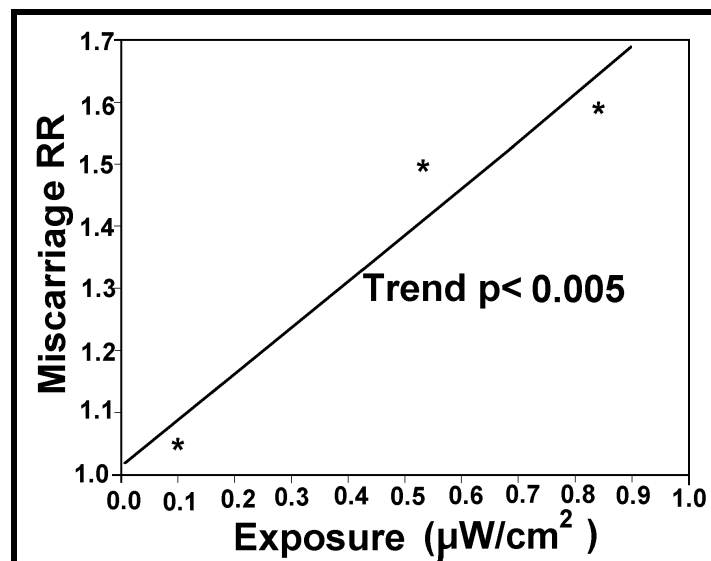
Cell phone radiation reduces the number and size of tumours in the brains of mice, Adey et al. (1999). This is a probable indication of accelerated cell death.

### Childhood Cancer

**Figure 8** All Cancer Risk Ratio as a function of estimated radial group mean personal exposure to RF/MW radiation from the Sutra Tower, San Francisco, using the spatial childhood cancer data presented in Selvin et al. (1992). The dose-response relationship is extremely significant ( $p < 0.0001$ ).



**Figure 9** Microwave exposure associated miscarriage for pregnant physiotherapists, Ouellet-Hellstrom and Stewart (1993).



Hence cell phones and cell sites are highly likely to cause serious neurological, carcinogenic, cardiac and reproductive health effects in exposed populations.

With a safe level of ZERO, an outdoor exposure of  $0.1 \mu\text{W}/\text{cm}^2$ , achieves a mean annual exposure of  $0.01 \mu\text{W}/\text{cm}^2$  ( $10 \text{ nW}/\text{cm}^2$ ).