



# Health Concerns Associated with Cell Phone Antennas as they relate to Simcoe, Ontario.

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# Scientific Expertise?


- **International:** science advisors International Joint Commission (Canada/US)
- **National:** science advisor CBC
- **Provincial:** Environmental Appeal Board, Ontario; Ground Current Pollution Bill
- **Municipal:** Mayor's Committee on Sustainable Development
- **Trent University:** Board of Governors, President's Environmental Advisory Committee, teach & research EMFs (15 years)
- **Legal:** expert witness (Canada & US)
- **NGOs:** Canada, US, UK, Netherlands,

Ms. Cathy Balcomb requested the following:

*“I would also remind you and the deputations that any information being presented must be **new** information from what has previously been discussed.”*

**What I presented in 2006 was the following:**

1. **Peer-reviewed scientific studies** that showed that people who live near cell phone antennas have an increased risk of developing **cancer (3 studies)** and have symptoms of **electrohypersensitivity (4 studies)**. These illness occur within **400 meters of antennas**.
2. Thirty-four (**34**) studies showing adverse biological effects as summarized by Firstenberg (2001) at levels well below **Safety Code 6**.
3. **Industry Canada** exposure calculations (Lai 2006) showed the **Curry Residence** (at the base of the water tower) and **Elgin Avenue Public School** fall within the dark green (**400 to 1000 times below SC6 limit**) and blue (**1000 to 10,000 times below SC 6 limit**). Note that adverse biological effects have been documented at those levels in scientific studies I cited in my presentation.
4. Recognition by the **World Health Organization** that electromagnetic hypersensitivity (**EHS**) is a real and a debilitating problem that occurs at levels below international guidelines.
5. **EHS** is recognized as a **disability in Sweden** and about **3% of the population** is severely affected.
6. **Physicians and Scientists** have written **appeals** to governments to reject existing guidelines and to adopt new safety standards for radio frequency radiation.
7. **Toronto Public Health** (2000) requested that exposure to radio frequency be **100 times lower** than **Safety Code 6** for applicants installing new, replacement or modified antennas.
8. The **International Association of Fire Fighters** (2004) passed a resolution restricting use of fire halls for cell phone antennas until they are proven safe.
9. **Royal Society of Canada** (1999) report stated that non-thermal biological effects have been documented below SC6 and these might have adverse health effects.
10. I recommended that a **precautionary principle** be used for the siting of cell phone antennas.

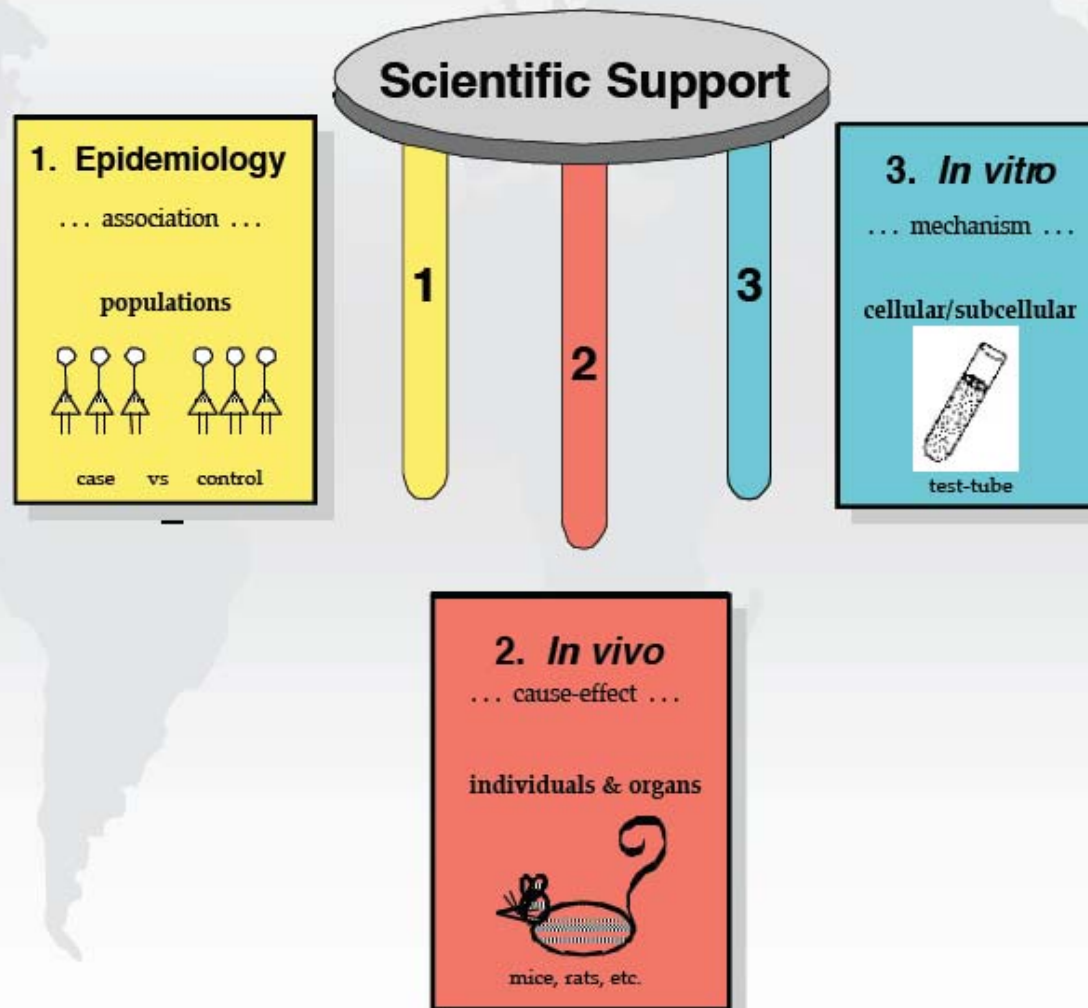
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Q. Are radio frequencies at levels below  
Safety Code 6 harmful to health?

**YES!**

Scientific Evidence?

# Scientific Evidence





## Dr. Henry Lai, University of Washington

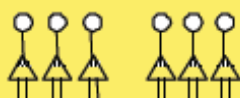
- reviewed literature (1988-2004).
- 40 studies (excluding his own) that demonstration adverse biological or health effects of RFR at low intensities.



## 1. Epidemiology

... association ...

populations



case vs control

## 12 studies

leukemia=5 studies

genetic damage

neuromuscular

sperm count

immune response

EHS

stress hormones

### Distance:

300 m - cell antenna

3.5-6 km radio broadcast

# Scientific Evidence

E 1989 Chiang et al. (1989)- people lived and worked near radio antennae and radar installations showed deficits in psychological and short-term memory tests.

E 1996 Balode (1996)- blood cells from cows from a farm close and in front of radar showed significantly higher level of severe genetic damage.

cattle  
genetic damage

E 1996 Hocking et al. (1996)- an association was found between increased childhood leukemia incidence and mortality and proximity to TV towers.

E 1996 Kolodynski and Kolodynska (1996)- school Children lived in front of a radio station had less developed memory and attention, their reaction time was slower, and their neuromuscular apparatus endurance was decreased.

E 1997 Dolk et al. (1997)- a significant increase in adult leukemias was found in residence who lived near the Sutton Coldfield television (TV) and frequency modulation (FM) radio transmitter in England.

E 1997 Hjollund et al. (1997)- sperm counts of Danish military personnel, who operated mobile ground-to-air missile units that use several RFR emitting radar systems (maximal mean exposure **10 microW/cm<sup>2</sup>**), were significantly low compared to references.

E 1998 Michelozzi et al. (1998)- leukemia mortality within **3.5 km** (5,863 inhabitants) near a high power radio-transmitter in a peripheral area of Rome was higher than expected.

E 2001 Boscoli et al. (2001)- RFR from radio transmission stations (**5 microW/cm<sup>2</sup>**) affects immunological system in women.

E 2002 Michelozzi et al. (2002)- childhood leukemia higher at a distance up to **6 km** from a radio station.

E 2002 Santini et al. (2002)- increase in complaint frequencies for tiredness, headache, sleep disturbance, discomfort, irritability, depression, loss of memory, dizziness, libido decrease, in people who lived within **300 m** of mobile phone base stations.

E 2002 Vangelova et al. (2002)- operators of satellite station exposed to low dose (0.1127 J/kg) of RFR over a 24-hr shift showed an increased excretion of stress hormones.

E 2004 Park et al. (2004) higher mortality rates for all cancers and leukemia in some age groups in the area near the AM radio broadcasting towers.

**Power Density:**  
5-10 units  
[< 1% SC6]  
SC6=1000 units

units = microW/cm<sup>2</sup>

## 2. In vivo

... cause-effect ...

individuals & organs



mice, rats, etc.

## 15 studies

tumours  
immune system  
testosterone  
sterility  
insulin  
calcium  
blood-brain barrier  
cortisol  
stress  
brain waves  
nerve damage

# Scientific Evidence

L 1991 Veyret et al. (1991)- low intensity RFR at SAR of **0.015 W/kg** affects functions of the immune system.

L 1994 Navakatikian and Tomashevskaya (1994)- RFR at low intensities (**10-100 microW/cm<sup>2</sup>**; **0.0027- 0.027 W/kg**) induced behavioral and endocrine changes in rats. Decreases in blood concentrations of testosterone and insulin were reported.

L 1996 Wolke et al. (1996)- RFR at **0.001W/kg** affects calcium concentration in heart muscle cells of guinea pigs.

L 1997 Persson et al. (1997) reported an increase in the permeability of the blood-brain barrier in mice exposed to RFR at **0.0004 - 0.006 W/kg**. The blood-brain barrier envelops the brain and protects it from toxic substances.

L 1997 Stark et al. (1997)- a two- to seven-fold increase of salivary melatonin concentration was observed in dairy cattle exposed to RFR from a radio transmitter antenna.

L 1998 Mann et al. (1998)- a transient increase in blood cortisol was observed in **human** subjects exposed to cellular phone RFR at **20 microW/cm<sup>2</sup>**. Cortisol is a hormone involved in stress reaction.

L 1999 Fesenko et al. (1999) reported a change in immunological functions in mice after exposure to RFR at a power density of **1 microW/cm<sup>2</sup>**.

L 1999 Magras and Xenos (1999) reported a decrease in reproductive function in mice exposed to RFR at power densities of **0.168 - 1.053 microW/cm<sup>2</sup>**.

L 2000 Lebedeva et al. (2000)- brain wave activation was observed in **human** exposed to cellular phone RFR at **60 microW/cm<sup>2</sup>**.

L 2000, 2002 de Pomerai et al. (2000, 2002) reported an increase in a molecular stress response in cells after exposure to a RFR at a SARs of **0.001 W/kg**. This stress response is a basic biological process that is present in almost all animals - including humans.

L 2002 Polonga-Moraru et al. (2002) change in membrane of cells in the retina (eye) after exposure to RFR at **15 microW/cm<sup>2</sup>**.

L 2003 Salford et al. (2003)- nerve cell damage in brain of rats exposed for 2 hrs to GSM signal at **0.02 W/kg**.

L 2004 Novoselova et al. (2004)- chronic exposure to RFR (**1 microW/cm<sup>2</sup>**) decreased tumor growth rate and enhanced survival in mice

L 2004 Pyrpasopoulou et al. (2004) exposure to cell phone radiation during early gestation at SAR of **0.0005 W/kg** (**5 microW/cm<sup>2</sup>**) affected kidney development in rats.

humans

**Power Density:**  
1-100 units  
[0.1%-10% SC6]  
SC6=1000 units

units =  
microW/cm<sup>2</sup>



### 3. In vitro

... mechanism ...

cellular/subcellular



test-tube

## 13 studies

cell division  
(tumours)  
genetic changes  
calcium-heart  
immune system  
stress proteins  
brain function  
(memory)

# Scientific Evidence

C 1988 D'Inzeo et al. (1988)- very low intensity RFR (**2-4 microW/cm<sup>2</sup>**) affects the operation of acetylcholine-related ion-channels in cells. These channels play important roles in physiological and behavioral functions.

C 1989 Dutta et al. (1989) reported an increase in calcium efflux in cells after exposure to RFR at **0.005 W/kg**. Calcium is an important component of normal cellular functions.

C 1990 Schwartz et al. (1990)- calcium movement in the heart affected by RFR at SAR of **0.00015 W/kg**. Calcium is important in muscle contraction. Changes in calcium can affect heart functions.

C 1991 Somosy et al. (1991)- RFR at **0.024 W/kg** caused molecular and structural changes in cells of mouse embryos.

C 1997 Stagg et al. (1997)- glioma cells exposed to cellular phone RFR at **0.0059 W/kg** showed significant increases in thymidine incorporation, which may be an indication of an increase in cell division.

C 1999 Ivaschuk et al. (1999)- short-term exposure to cellular phone RFR of very low SAR (**0.026 W/kg**) affected a gene related to cancer.

C 1999 Novoselova et al. (1999)-low intensity RFR (**1 microW/cm<sup>2</sup>**) affects functions of the immune system.

C 1999 Velizarov et al. (1999) showed a decrease in cell proliferation (division) after exposure to RFR of **0.000021 - 0.0021 W/kg**.

C 2001 Kwee et al. (2001)- 20 minutes of cell phone RFR exposure at **0.0021 W/kg** increased stress protein in human cells.

C 2001 Tattersall et al. (2001)- low-intensity RFR (**0.0016 - 0.0044 W/kg**) can modulate the function of a part of the brain called the hippocampus, in the absence of gross thermal effects. The changes in excitability may be consistent with reported behavioral effects of RFR, since the hippocampus is involved in learning and memory.

C 2003 de Pomerai et al. (2003) RFR damages proteins at **0.015-0.020 W/kg**.

C 2004 Marinelli et al. (2004)- exposure to 900-MHz RFR at **0.0035 W/kg** affected cell's self defense responses.

C 2004 Sarimov et al. (2004)- GSM microwaves affect human lymphocyte chromatin similar to stress response at **0.0054 W/kg**.

**Power Density:**  
1-4 units  
[<0.4% SC6]  
SC6=1000 units

units =  
microW/cm<sup>2</sup>

**2000**  
**Germany**

# Mobile Telecommunications and Health

Review of the current scientific research in view of precautionary health protection

**Commissioned by**

T-Mobile

De TelMobil Deutsche Telekom MobiNet GmbH

**Authors:**

Dr. Kerstin Hennies

Dr. H-Peter Neitzke

Dr. Hartmut Voigt

April 2000, ECOLO-Institut, Hanover Germany.

Table 6.1

Overview over the results of epidemiological studies with regards to the health risks of high frequency electromagnetic exposures (see also Appendix D, Table D.1)

Illness	Number of studies (results)	Studies (results) with RR>1	Statistically significant results
All illnesses	2	0	0
Cancer, unspecified	6 (7)	5 (6)	3
Brain tumours unspecified and tumours of the nervous system unspecified	14 (21)	10 (15)	6 (7)
Cancer (eyes)	1	1	1
Cancer of the respiratory organs, lung cancer	5	2	1
Chest cancer, men	2	2	0
Breast Cancer, women	3	3	2
Cancer of the lymphatic and blood forming system unspecified	4	4	1
Leukaemia unspecified	12 (16)	9 (13)	5 (7)
Acute leukaemia unspecified	4	4	0
Lymphatic leukaemia unspecified	4 (7)	2 (5)	1 (4)
Acute lymphatic leukaemia	2	2	0
Chronic lymphatic leukaemia	4	4	1
Leukaemia, non lymph. non-myelo	1 (4)	1 (4)	1 (2)
Lymphoma, Hodgkin-Syndrome	5 (7)	3 (4)	1
Testicular cancer	3 (5)	3 (5)	3 (4)
Uterine cancer	1	1	1
Skin cancer	4	3	1
Cardio-vascular diseases	4 (5)	3 (4)	1
Infertility, reduced fertility, men	4 (7)	4 (7)	2 (4)
Infertility, reduced fertility, women	1	1	0
Miscarriages, stillbirths, malformations and other birth defects	2 (3)	2 (3)	2
Cancer, offspring (parental exposure)	2	2	1
Neurodegenerative diseases, Alzheimer's	1	1	0
Disruptions of motor and psychological functions and well-being	2 (9)	2 (9)	1 (7)

Hennies et al. 2000. Mobile Telecommunications and Health. ECOLO-Institut, Hanover Germany.

### CANCERS

Brain

Eye

Breast

**Leukemia**

Testicular

Uterine

Skin

93 Epidemiological Studies  
74 increased risk  
35 statistically significant

### REPRODUCTION

Hennies et al. 2000. Mobile Telecommunications and Health. ECOLO-Institut, Hanover Germany.

**Safety Code 6**  
**1000 microW/cm<sup>2</sup>**

**Conclusion: CANCER**

The results of the studies for all stages of cancer development from the damage of the genetic material via the uninhibited proliferation of cells and debilitation of the immune system up to the manifestation of the illness prove effects at power flux densities of less than **100 microW/cm<sup>2</sup>**. For some stages of cancer development, intensities of **10 microW/cm<sup>2</sup>** or even less may suffice to trigger effects.

**Conclusion: IMMUNE SYSTEM**

Experiments on animals prove harmful effects on the immune system from circa **100 microW/cm<sup>2</sup>**; at power flux densities of **20 microW/cm<sup>2</sup>** higher secretions of stress hormones in humans have been demonstrated.

**Conclusion: CENTRAL NERVOUS SYSTEM & COGNITIVE FUNCTION**

Effects of high frequency electromagnetic fields on the central nervous system are proven for intensities well below the current guidelines. Measurable physiological changes have been demonstrated for intensities from **50 microW/cm<sup>2</sup>**. Impairments of cognitive functions are proven for animals from **200 microW/cm<sup>2</sup>**.

**Conclusion: ELECTROSENSITIVITY**

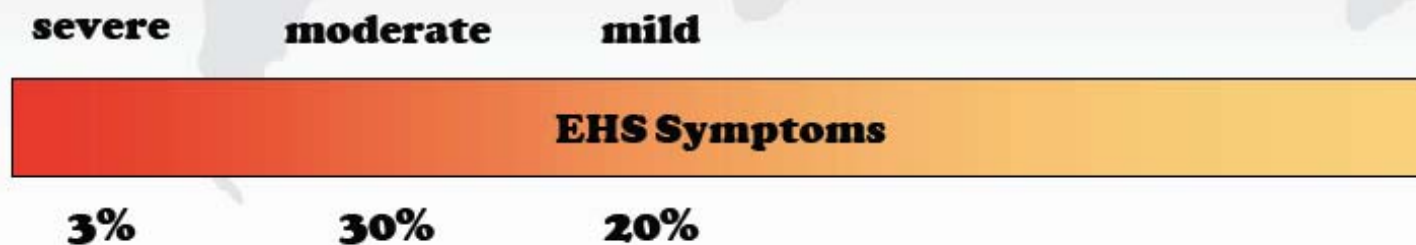
On the basis of current knowledge it is impossible to estimate the risk of electrosensitive reactions or to make recommendations for guidelines designed to avoid such a risk for the general population, which is composed of sensitive and non-sensitive persons.



# Electrohypersensitivity (EHS)

If **3%** of the population has severe symptoms of EHS (electrohypersensitivity) in Norfolk County, with a population of **62,563** approximately **1880** people are likely to become severely affected if they are exposed to radio frequency radiation.

As more antennas are placed in residential areas, near schools and hospitals, more people will become sick.





Q. Is EHS psychosomatic?

?

Q. Is there scientific evidence that EHS is physiological NOT psychology?

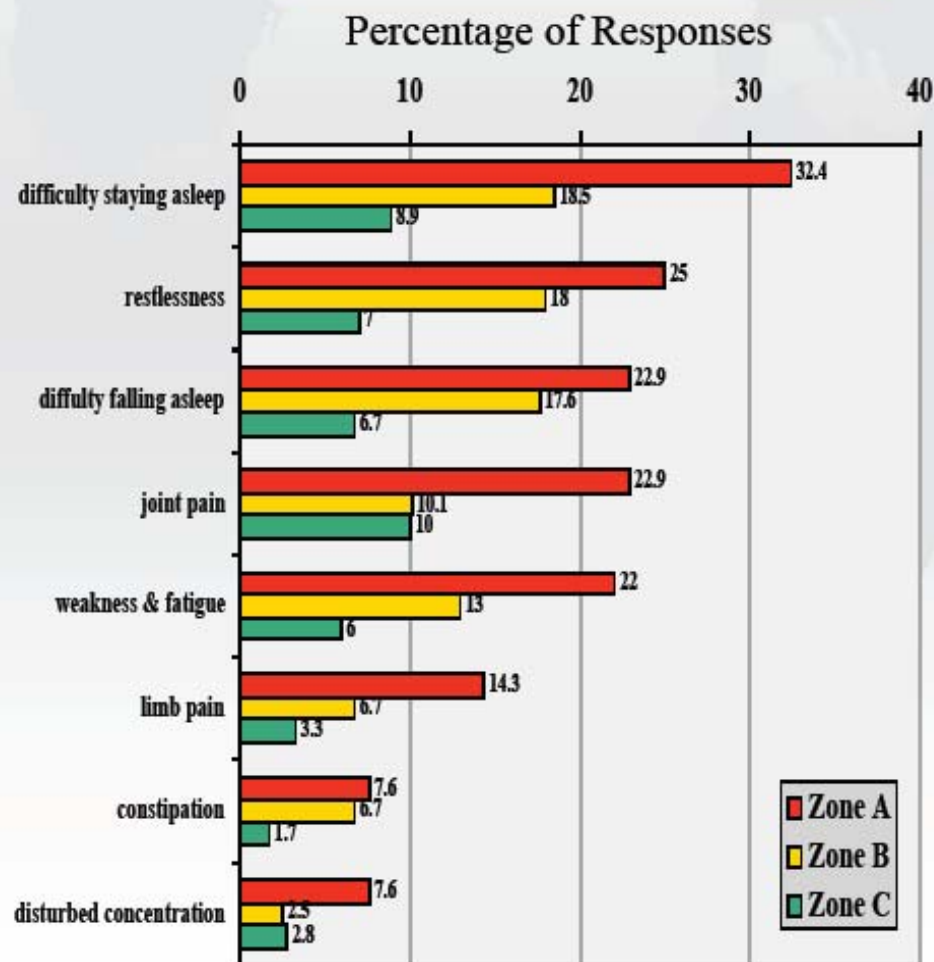
yes

**1995**  
**Switzerland**

## Study of Health Effects of the Shortwave Transmitter Station of Schwarzenburg, Berne, Switzerland.

[Altpeter et al. 1995. Federal Office of Energy, BEW Publication Series, Study No. 55]

### Health Questionnaire



### Health Diary

#### Transmitter shut down for 3 days

- Sleep improved 1 day after shut down
- Results: **statistically significant** improvement of sleep quality
- Reaction **biological** not psychological

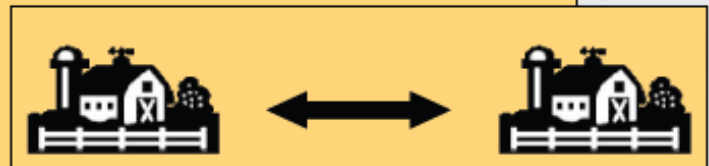
# 1998 Germany Cows

W. Löscher and G. Käs. 1998. Conspicuous behavioural abnormalities in a dairy cow herd near a TV and Radio transmitting antenna. Prakt. Tierarzt [Practical Veterinary Surgeon] 79: 5, 437-444 (1998)



**Examination:** ruled out feed, chemical & biological agents

1. **Analyzed Feed:** high quality and sufficient quantity
2. **Autopsied dead dairy cow:**
  - Death from **acute heart & circulatory collapse** with bleeding from several organs.
  - No indication of causal biological or chemical agents.
3. **Examined aborted foetal material:**
  - **no pathogenic causes** for aborting the foetus based on the microscopic and cultural examination and on the serological tests.
4. **Switched stables:**
  - cow moved 20 kilometres away from the original location.
  - behavioural abnormalities **disappeared** after 5 days at new stable.
  - behavioural abnormalities **returned** within a few days after relocation at original stable.
5. **Electromagnetic radiation:**
  - maximum value in stable was **80  $\mu\text{W}/\text{cm}^2$  (200-1000 Canada)**.



# 2005

## Spain

### Birds

Possible Effects of electromagnetic fields from phone masts on a population of White Stork (*Ciconia ciconia*).

[Balmori, A. 2005. Electromagnetic Biology and Medicine, 24:109-119]

#### Near Antennas:

- more fighting among breeding pair
- nests
- chicks/nest:
- nests with no chicks:
- chick survival

#### within 200 m

more aggressive  
built fewer nests  
0.86  
40%  
more deaths

#### beyond 300 m

1.6  
3.3%



# FREIBURGER APPEAL

Germany October 2002

More than 3000 physicians have signed the **Freiburger Appeal**. These doctors have observed among their patients an increased incidence of disorders including:

- headaches,
- chronic exhaustion,
- agitation,
- sleeplessness,
- tinnitus,
- susceptibility to infection,
- nervous and connective tissue pains

that they associate with increased exposure to high frequency microwave radiation from mobile phone base stations and mobile phones (both cell phones and cordless phones).



# FREIBURGER APPEAL 2002

Quotes from this document . . .

*Our therapeutic efforts to restore health are becoming increasingly less effective: the unimpeded and continuous penetration of radiation into living and working areas, particularly bedrooms, an essential place for relaxation, regeneration and healing, causes uninterrupted stress and prevents the patient's thorough recovery.*

*In the face of this disquieting development, we feel obliged to inform the public of our observations . . .*

*What we experience in the daily reality of our medical practice is anything but hypothetical! We see the rising number of chronically sick patients also as the result of an irresponsible "safety limits policy", which fails to take the protection of the public from the short- and long-term effects of mobile telephone radiation as its criterium for action. Instead, it submits to the dictates of a technology already long recognized as dangerous. For us, this is the beginning of a very serious development through which the health of many people is being threatened.*

*We will no longer be made to wait upon further unreal research results - which in our experience are often influenced by the communications industry, while evidential studies go on being ignored. We find it to be of urgent necessity that we act now!*

*Above all, we are, as doctors, the advocates for our patients. In the interest of all those concerned, whose basic right to life and freedom from bodily harm is currently being put at stake, we appeal to those in the spheres of politics and public health.*



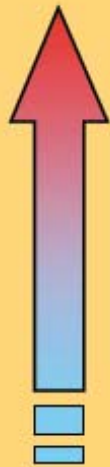
## Germany warns citizens to avoid using Wi-Fi

Environment Ministry's verdict on the health risks from wireless technology puts the British government to shame. By Geoffrey Lean, Published: 09 September 2007, The Independent on Sunday (UK)

**Wi-Fi = Wireless Fidelity (wireless computing)**

### RF EXPOSURE near ANTENNAS (ranked)

HIGHEST:



Radar



Broadcast



Cell Phone



LOWEST:

Wi-Fi



## Germany warns citizens to avoid using Wi-Fi

Environment Ministry's verdict on the health risks from wireless technology puts the British government to shame. By Geoffrey Lean, Published: 09 September 2007, The Independent on Sunday (UK)

**People should avoid using Wi-Fi wherever possible because of the risks it may pose to health, the German government has said.**

Its surprise ruling – the most damning made by any government on the fast-growing technology – will shake the industry and British ministers, and vindicates the questions that The Independent on Sunday has been raising over the past four months.

And Germany's official radiation protection body also advises its citizens to use landlines instead of mobile phones, and warns of "electrosmog" from a wide range of other everyday products, from baby monitors to electric blankets.

The German government's ruling – which contrasts sharply with the unquestioning promotion of the technology by British officials – was made in response to a series of questions by Green members of the Bundestag, Germany's parliament.

The Environment Ministry recommended that people should keep their exposure to radiation from Wi-Fi "as low as possible" by choosing "conventional wired connections". It added that it is "actively informing people about possibilities for reducing personal exposure".

Its actions will provide vital support for Sir William Stewart, Britain's official health protection watchdog, who has produced two reports calling for caution in using mobile phones and who has also called for a review of the use of Wi-Fi in schools. His warnings have so far been ignored by ministers and even played down by the Health Protection Agency, which he chairs.

By contrast the agency's German equivalent – the Federal Office for Radiation Protection – is leading the calls for caution.

**Florian Emrich, for the office, says Wi-Fi should be avoided "because people receive exposures from many sources and because it is a new technology and all the research into its health effects has not yet been carried out".**

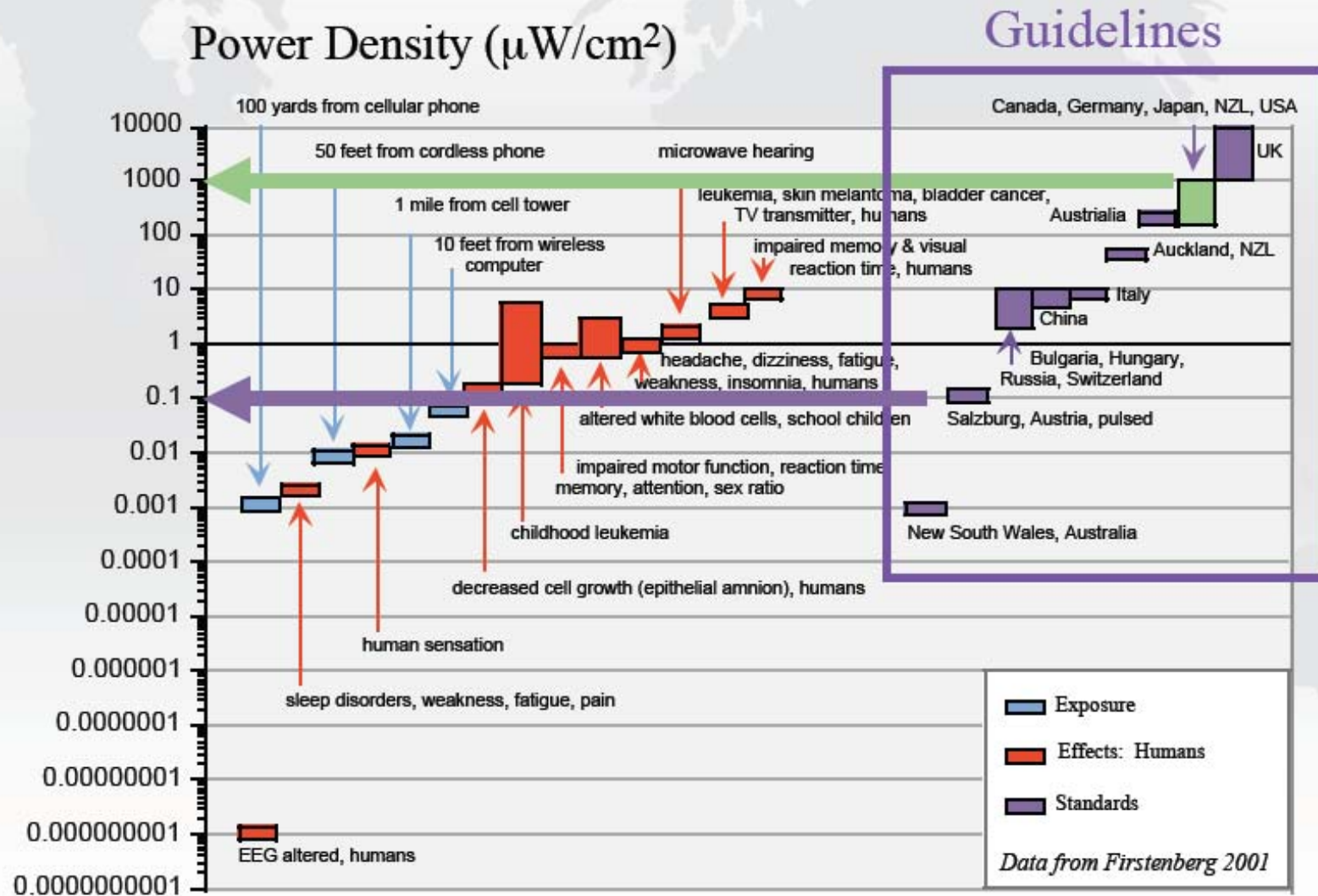
Q. What levels of RFR are safe?





# HUMANS:

## Radio Frequency Guidelines, Exposures, & Effects





# Health Canada Safety Code 6

**SC6: heating** effect averaged over **6 minutes**  
**1000 units** (microW/cm<sup>2</sup>) for cell phone frequencies

## Problems:

- **6-minute average**: organisms respond **extremes** (tomato/frost)
- **6-minute** = short term, 8 hr? 1 month? 1 years? 10 years?
- **heating** = physical effect NOT biological effect.
- adverse effects below **1000 units**.
- Guidelines vary from **0.1 to 10,000** in different countries!

**Canada does NOT have guidelines for long-term biological effects of RFR!**

# Q. Clearly this is a Federal issue.

What is the responsibility of local authorities?

## Examples of local initiatives:

1. **Smoking**: carcinogenic . . . smoke-free buildings.

2. **Pesticides**: toxic . . . pesticide-free communities.

3. **Peanut** allergies: nut-free schools

4. **RFR**:

- **IAFF**: no antennas on firehalls
- **Lakehead University**: minimize wireless
- **Guelph University**: antennas moved
- **Vancouver School Board**: no antennas within 1000 feet of school property
- **Surrey School Board**: Contract cancelled 2003
- **Coquitlam, Vancouver, Surrey, Langley, White Rock, Victoria, Saanich, Summerland, West Vancouver, North Vancouver, Burnaby, Abbotsford, Salt Spring Island, Brandon Manitoba, Point Roberts Washington, Charlottetown PEI**: denied permits or ordered towers at more distance locations.
- **Calgary**: Towers removed 1998 (Milt Bowling, BC)



# *Precautionary Principle*

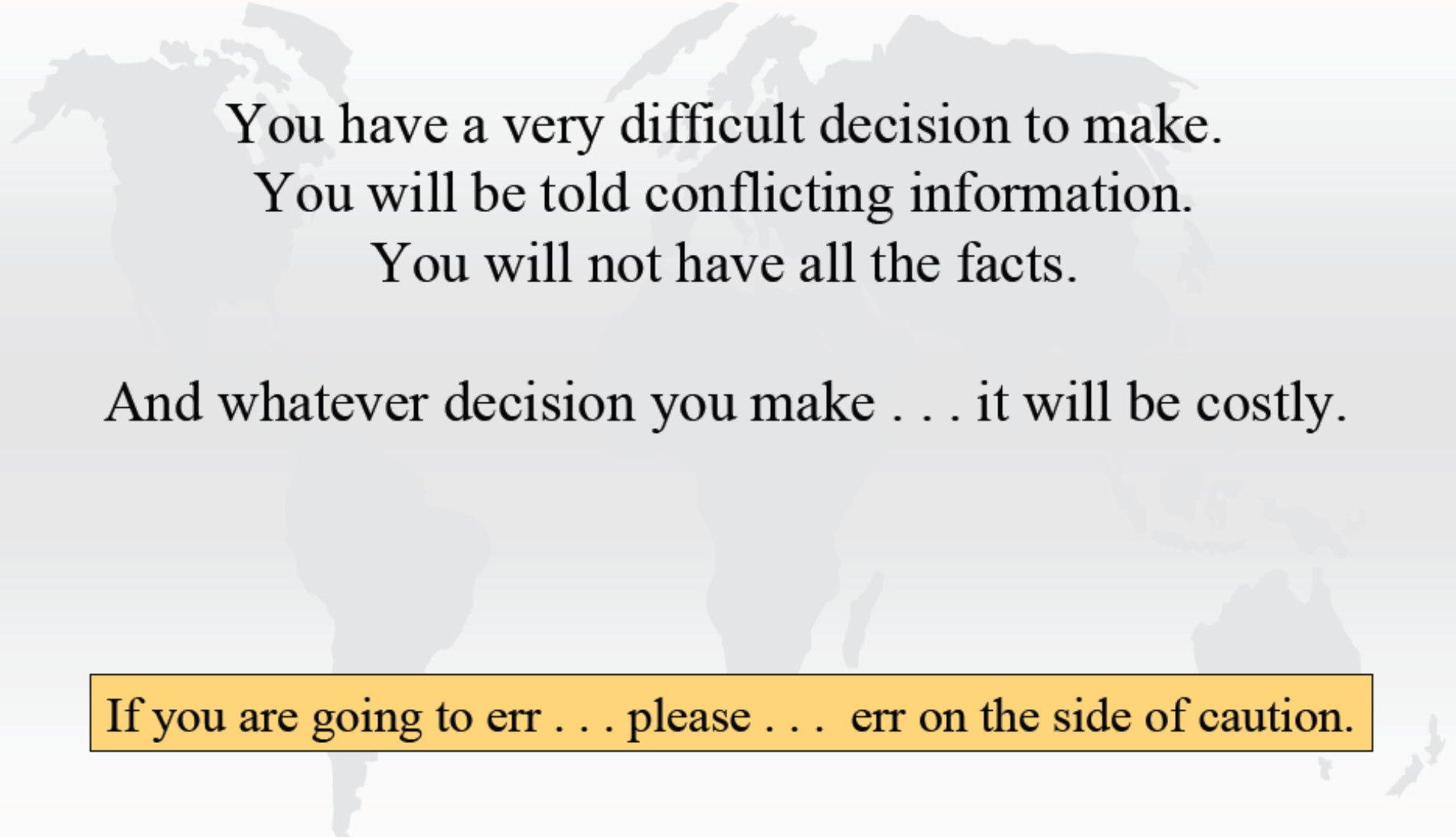
## Canadian Environmental Protection Act

Caccia 2001. *The Politics of Sustainable Development*, Hammond Lecture, Guelph University.

*“where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”*

# Health Canada/Industry Canada

1. Scientific evidence is “inconsistent”
2. Scientific evidence is “inconclusive . . . unconvincing”
3. ICNIRP, WHO, FCC . . . Trust Us!
4. EHS is Psychological
5. Fear Mongers

A faint, light gray world map is visible in the background of the slide, centered behind the text.

You have a very difficult decision to make.  
You will be told conflicting information.  
You will not have all the facts.

And whatever decision you make . . . it will be costly.

If you are going to err . . . please . . . err on the side of caution.