



Electromagnetic Radiation and Health

C4ST – Citizens for Safe Technology

C4ST

On May 31st, 2011, the World Health Organization classified **radio frequency electromagnetic fields** as a possibly carcinogenic to humans (Class 2B)





Wi-Fi uses **microwave radiation** (also referred to as radio frequency radiation) at two different frequencies **2.4 and 5.8 GHz**. The 2.4 GHz is similar to that used in a **microwave oven**.

WHAT IS ELECTROMAGNETIC RADIATION

- Electromagnetic Radiation (EMR) is emitted by multiple everyday wireless technology sources.
 - EMR generated and emitted by wireless technologies is an invisible and insensible environmental pollutant.
 - Many studies exist that challenge the aged theory that EMR¹ is only harmful at certain levels.
 - A significant and growing percentage of our population suffer ill health effects caused by emissions from everyday wireless devices and infrastructure.
- ¹ Various terminology exists for EMR: non-ionizing radiation, microwave radiation, electromagnetic fields (EMF), radiofrequency energy, and others

SOURCES OF ELECTROMAGNETIC RADIATION

Electromagnetic Radiation (EMR) is emitted by multiple sources:

- Cell phones, Smart phones
- Cell towers, antennae
- Wireless internet (Wi-Fi)
- iPad, iTouch, tablets
- Cordless phones
- PDAs – Blackberry, Treo, iPhone
- Baby monitors
- Smart Meters
- Wireless: laptops, printers, mice, keyboards, speakers
- Wireless routers, desktop computers, wireless appliances
- Microwave ovens



OUTDATED GOVERNMENT POSITIONS

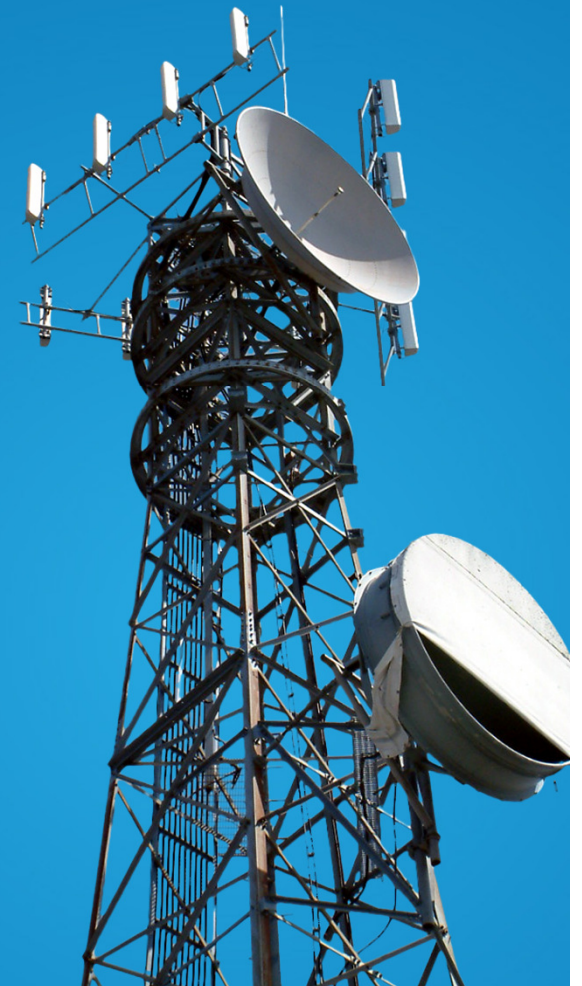
The Radio Telecommunications Act regulates cell towers and antennae through Industry Canada (IC) which does not require public notification or consultation when:

- **New towers/antennas are less than 15 metres in height.**
- **The antenna is added to an existing structure (e.g., pole, building, church, hospital, school).**

When IC allows public involvement, comments are restricted to impacts from infrastructure appearance, security and construction

When IC depends on Safety Code 6 there is no protection for the health of the public.

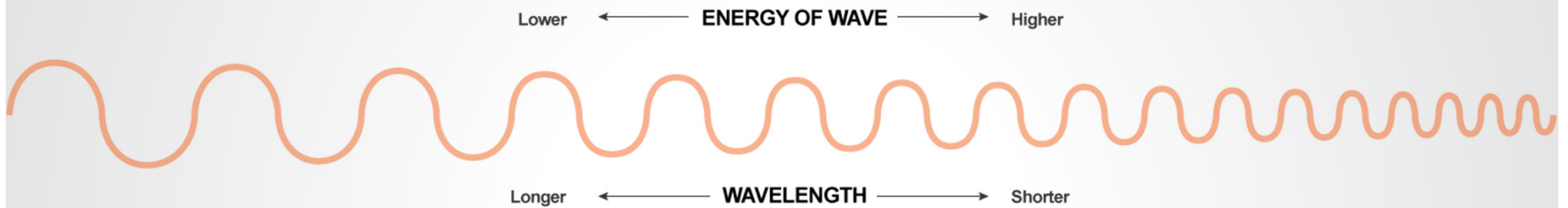
Provincial medical health officers state “there is no convincing evidence that exposure to levels of radiation below those allowed by SC6 is harmful.” Yet there is much credible research to the contrary.



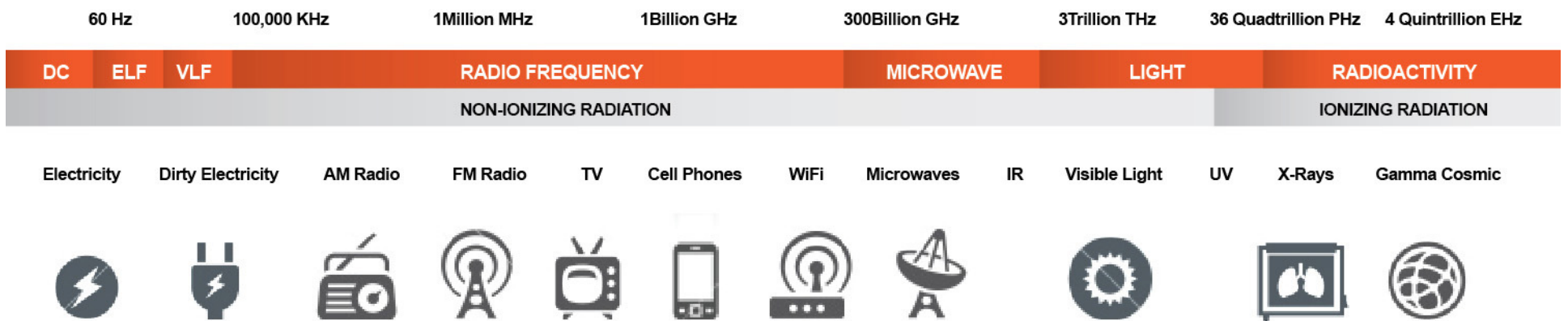
DEFINITIONS AND TERMS

- The Electromagnetic Spectrum (see next slide) is measured in Hertz. Historically, we believed that low frequency (Non-ionizing radiation) was safe. Studies now show, that over long periods of time, there are harmful effects from non-ionizing radiation.
- The term used to describe the absorption of EMR in the body is specific absorption rate (SAR), which is the rate of energy that is actually absorbed by a unit of tissue.
- Actual measurement of SARs is very difficult in real life so measurements of electric and magnetic fields are used as surrogates because they are easier to assess.
- As a result, the intensity of EMR is generally measured and noted in scientific literature in microwatts per centimetre squared $\mu\text{W}/\text{cm}^2$.

ELECTROMAGNETIC SPECTRUM



FREQUENCY IN HERTZ



CANADA STANDARD COMPARISON

Exposure limits for RF fields	Country or Area
0.1 $\mu\text{W}/\text{cm}^2$	Precautionary limit in Salzburg
10.0 $\mu\text{W}/\text{cm}^2$	Precautionary limit in Paris
10.0 $\mu\text{W}/\text{cm}^2$	Exposure limit in Russia
10.0 $\mu\text{W}/\text{cm}^2$	Exposure limit in China
10.0 $\mu\text{W}/\text{cm}^2$	Exposure limit in Switzerland
10.0 $\mu\text{W}/\text{cm}^2$	Exposure limit in Italy
10.0 $\mu\text{W}/\text{cm}^2$	Precautionary limit set by Toronto Board of Health
 1000.0 $\mu\text{W}/\text{cm}^2$	Health Canada Safety Code 6

CANADIAN HEALTH AT RISK

- May 31, 2011 – World Health Organization Decision - Radiofrequency electromagnetic fields reclassified as a Class 2B possible human cancer risk.
 - Same category as lead, dioxane, chloroform, DDT, ethylbenzene.
- Exposure to EMR is generally uncontrolled, like 2nd hand smoke...except that conventional walls do not block EMR
- Thousands of studies have found harmful health effects from exposure to the radiation emitted by mobile phones, cell towers and antennas, WiFi and smart meters.
- Health Canada SC6 guidelines are obsolete and not protective.

1999 HEALTH CANADA REPORT

“...growing body of scientific evidence which suggests that exposures to RF fields at intensities far less than levels required to produce heating can cause effects on cells and tissues...”

Over 40 individual calls for research

A Review of the
Potential Health Risks of Radiofrequency Fields
from Wireless Telecommunication Devices

An Expert Panel Report prepared at the request of
the Royal Society of Canada
for Health Canada



• The Royal Society of Canada/
La Société royale du Canada

March 1999

ISBN 920064-68-X

HEALTH CANADA WARNING

- In October, 2011, Health Canada issued a cell phone use warning for children under 18
- “encourages parents to reduce children's RF (radiofrequency radiation) exposure from cell phones since children are typically more sensitive to a variety of environmental agents”
- “there is currently a lack of scientific information regarding the potential health impacts of cell phones on children”.





ENTIRE POPULATION EXPOSURE

Unlike other public health and environmental issues (such as asbestos, lead, tobacco and other chemical exposures), hazards of acute and chronic exposure to electromagnetic radiation is of extreme concern as the entire population is exposed and at risk almost everywhere.

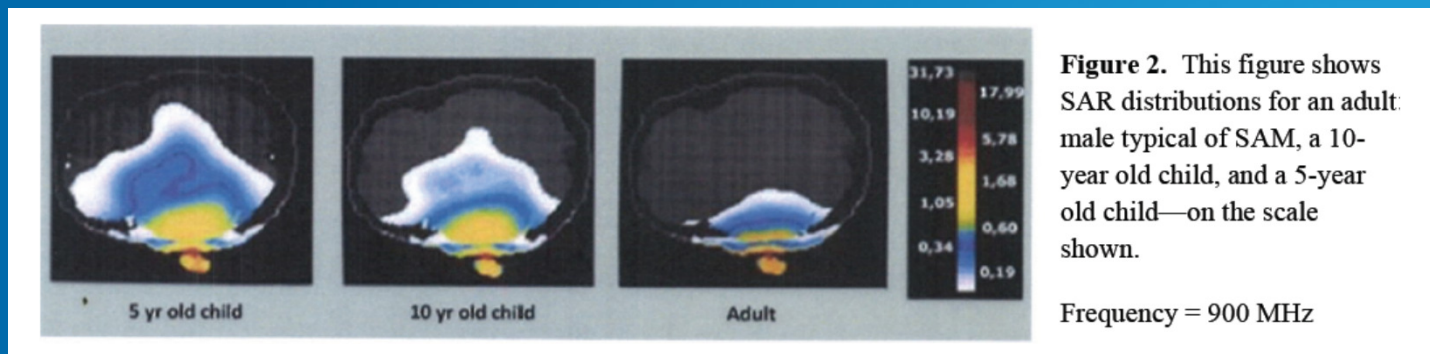
CHILDREN ARE NOT “LITTLE ADULTS”

Radiation from cell phones and other sources penetrates deeper into the head of children¹

Certain tissues of a child's head, e.g., the bone marrow and the eye, absorb significantly more energy than those in an adult head²

Starting to use cell phone before the age of 20 results in a 5 fold increase in glioma and acoustic neuroma³

Many of today's children start getting exposed from birth



1. Wiart, J., Hadjem, A., Wong, M.F., and Bloch, I. 2008. Analysis of RF exposures in the head tissues of children and adults. *Phys. Med. Biol.*
2. Christ, A., Gosselin, M.C., Christopoulou, M., Kuhn, S., and Kuster N. 2010. Age-dependent tissue-specific exposure of cell phone users. *Phys. Med. Biol.*
3. Dr. Lennart Hardell, MD, PhD and Professor at University Hospital in Orebro, Sweden
4. Gandhi, O.P. et al., Exposure Limits: The Underestimation of Absorbed Cell Phone Radiation, Especially in Children, *Electromagnetic Biology and Medicine*, Early Online, 1-18 (2011).

PROGRESS TO DATE INTERNATIONALLY

May 2012	India to Cut Cellphone Tower Radiation by 90%
October 2011	Health Canada encourages children under 18 to limit the time they spend talking on cell phones
May 2011	International Agency for Research on Cancer (IARC) and World Health Organization (WHO) reclassified radio frequency electromagnetic fields as a Class 2B carcinogen; other qualifiers: lead, DDT
May 2011	The Parliamentary Assembly Council of Europe (PACE) released Resolution 1815 on the <i>Potential Dangers of Electromagnetic Fields and their effect on the Environment</i>
April 2011	Russian National Committee on Non-Ionizing Radiation Protection (RNCNIRP) released their Resolution entitled " <i>Electromagnetic fields from Mobile Phones: Health Effect on Children and Teenagers</i> "
2010	Seletun Statement, Norway: The International Electromagnetic Field Alliance (IEMFA)
2009	Porto Alegre Resolution, Brazil
2007	BioInitiative Report, USA.
2002	Freiburg Appeal, Germany. Physicians request tougher guidelines for radio frequency exposure



C4ST: MISSION STATEMENT

The increasing presence of technology in our environment is generating new concern about exposure to electromagnetic radiation for Canadians, especially today's and tomorrow's children whose 21st-century exposures are unprecedented.

C4ST: MISSION STATEMENT

Citizens for Safe Technology is a not-for-profit, volunteer-based coalition of **parents, citizens and experts** whose mission is to educate and inform Canadians and their policy makers about the dangers of the exposures to unsafe levels of **electromagnetic radiation from technology** and to work with all levels of government to create healthier communities for children and families from coast to coast.

1

It is critical that all levels of Government

- **Acknowledge** that current assumptions about the safety of electromagnetic radiation (EMR) are **outdated** and must be **revised**.
- Offer **protection** and **choice** for **electrosensitive** individuals and **children** who are exposed to EMR in their homes and schools.

2 Health Canada must **overhaul** its **process** for updating Safety Code 6.

- Implement the recommendations of the House of **Commons, Standing Committee** on Health 2010 Report.
- Provide **full disclosure** for all information regarding all studies and documents reviewed, included and excluded; funding of all participants
- **Update** all analysis/guidelines to keep pace with the rapid acceleration of technology.

3 Industry Canada must **update CPC-2-0-03 Radiocommunication and Broadcasting Antenna Systems.**

- **Eliminate exemption** guidelines and **notify residents** of all new cell towers or antennae planned in their community.
- Consultation must **include all issues** of concern to the public
- Some real authority needs to rest with **local** land use **authorities**

C4ST STRATEGY

Educate Canadians to gain support for reduced limits on EMR emissions, prioritizing the protection of Canadian families and their rights to safe living spaces

Advocate for change through a proactive government relations strategy and extensive educational and media campaigns

Promote credible alternatives based on the precautionary principle in respect to everyday exposures; more stringent requirements may be required to protect those more vulnerable, including children, elderly, immune compromised and electrosensitive.

Provide education, awareness and recommendations for safer use and reduce or eliminate radiation from consumer products where possible.

Leverage other organizations to assist in reinforcing and sharing the message that Health Canada's SC6 is not protective of Canadians in the 21st century and now is the time for change.



C4ST ORGANIZATION

We have National Teams in the following Focus Areas:

- **WiFi in Schools**
- **Smart Meters**
- **Cell Towers and Antennae**
- **Electrosensitivity**
- **Radiation from Consumer Products**
- **Environment (Fauna and Flora)**
- **Legislation**
- **Legal**

HOW CAN YOU HELP?

Continue to educate yourself: www.c4st.org

Share this message with your friends, families and co-workers

Please volunteer, send us an email (info@c4st.org)

Appendix

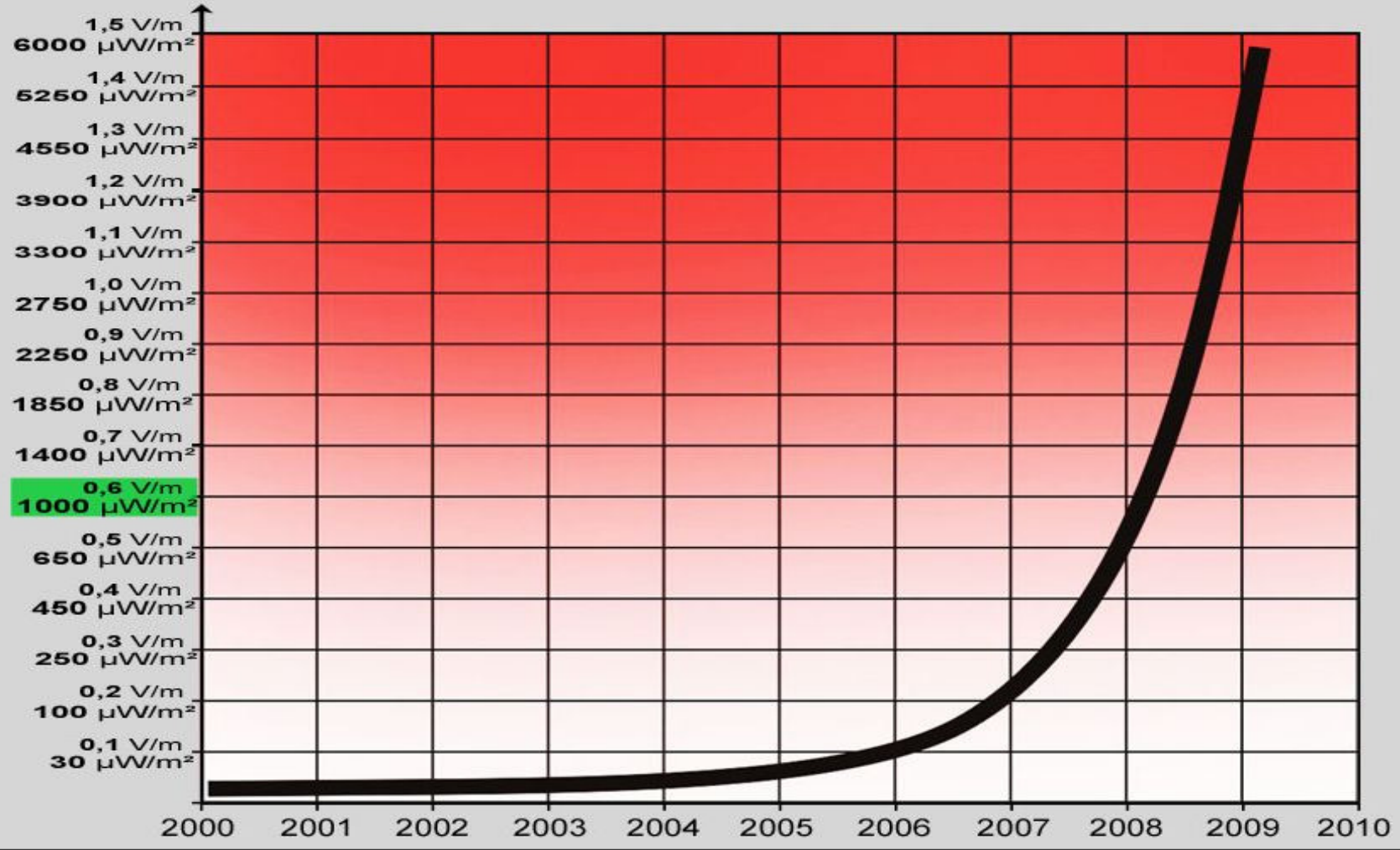
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C4ST SUPPORTS ENACTMENT OF THE PRECAUTIONARY PRINCIPLE

The **Precautionary Principle** is enacted when there are plausible, serious and irreversible hazards, where there are many uncertainties and much scientific ignorance. Electromagnetic radiation is characterized by such circumstances.

 Average increase observed in urban area of artificial HF microwave radiation from 900 MHz - 2.5 GHz

 Valeur moyenne constatée en milieu urbain de l'irradiation artificielle HF micro-onde de 900 MHz - 2,5 GHz



COMPARISON OF RF EXPOSURE LIMITS

International Radio Frequency "RF" Exposure Limits for 1800 MHz Range

(Cell Phone, WiFi, Smart Meters, etc)

Location	Reference	Exposure time	Limit Based On	Lower by	$\mu\text{W}/\text{m}^2$	V/m
Canada	Safety Code 6, Table 5	6 minutes	Thermal / Heating	-	10,000,000	61.4
USA	(FCC) IEEE C95.1-1999 and ICNIRP	30 minutes	Thermal / Heating	-	10,000,000	61.4
Most of Western Europe	IEEE C95.1-1999 and ICNIRP	30 minutes	Thermal / Heating	-	10,000,000	61.4
Russia	Sanitary Norms and Regulations 2.2.4/2.1.8.055-96	3 hours +	Biological Effects	100 x	100,000	61.4
China	UDC 614.898.5 GB 9175-88	3 hours +	Biological Effects	100 x	100,000	61.4
Italy	Sanitary Norms and Regulations 2.2.4/2.1.8.055-96	3 hours +	Biological Effects	100 x	100,000	61.4
Most of Eastern Europe	Sanitary Norms and Regulations 2.2.4/2.1.8.055-96	3 hours +	Biological Effects	100 x	100,000	61.4
Switzerland	Ordinance on Protection from Non-ionising Radiation (NISV)	Long Term	Precautionary	100 x	100,000	61.4
Toronto Board of Health, Canada	Proposed 1999	Long Term	Precautionary	100 x	100,000	61.4
Bio-Initiative Report recommendation	Bio-Initiative Report 2007	Long Term	Biological / Precautionary	10,000 x	1,000	0.614
Salzburg Resolution on Mobile Telecommunication	Preventive public health protection, Salzburg, June 7-8, 2000	Long Term	Precautionary	10,000 x	1,000	0.614
European Parliament	Resolution 1815, Strasbourg, May 27, 2011	Long Term	Precautionary	10,000 x	106	0.2
Building Biology Guidelines Germany (Sleeping Areas)	SBM2008 - Level of No Biological Concern	Long Term	Precautionary	100,000,000 x	0.1	0.006,14
Cell Phone Operational Requirements				10,000,000,000 x	0.001	0.000,061,4
Natural Cosmic Radiation	MAES 2000	Long Term	Natural Exposure	10,000,000,000,000 x	0.000,001	0.000,000,061,4
Average Indoor Urban Exposure Toronto, Canada	Safe Living Technologies Inc. 2011	Long Term			200 - 5000	0.3 - 1.4

* Electromagnetic Radiation from Cell Towers and Antennas

UNDERESTIMATION OF RISK FOR TEENS AND CHILDREN

Dr. Lennart Hardell

- Starting to use cell phone before age of 20 = 5 fold increase in glioma and acoustic neuroma

Dr. Devra Davis

- Deeper penetration of absorbed radiation
- Exposure of brains 2 times more than adults
- Exposure of bone marrow 10 times more than adults
- Eyes and Thyroid overexposed



ELECTROSENSITIVITY COMMON SYMPTOMS

Headaches, Migraines

Insomnia, Difficult Sleep

Heart Palpitations

Agitation, Anxiety

Tinnitus, Ringing in ears

Dizziness, Vertigo

Skin Rashes

Nausea, Digestive problems

Poor Blood Sugar Regulation

Memory Loss

Inability to Concentrate

Extreme Fatigue

Pain in Joints, Muscles

Depression, Mood Changes

Visual disruptions

Shortness of Breath, Asthma-like symptoms

Fibromyalgia/Chronic Fatigue symptoms

SUMMARY:

There are **No Safety Standards** for
Non-Thermal Exposures in **Canada**

NEED: Safety Guidelines to protect against Non-Thermal Biological Effects which occur at exposure levels thousands of times below our safety standards – Safety Code 6

WHY: present Safety Guidelines are for thermal effects only and based on a 6-minute exposure for a full grown man (200 lb, 6 feet) – tested on dummy head filled with electrolyte solution – not tested for children – human body being naturally electrical was not taken into account – only tested for increase in heat

WIRELESS TECHNOLOGY CONCERNS

Andrew Michrowski,
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Environmental wireless
emissions geography,
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