Radiation Hazards from Cell Phones/Cell Towers

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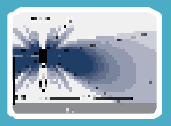
OUTLINE OF PRESENTATION

RF sources



Radiation Pattern of Cell tower Antenna

EMF exposure Safety norms

Radiation measurements near cell towers

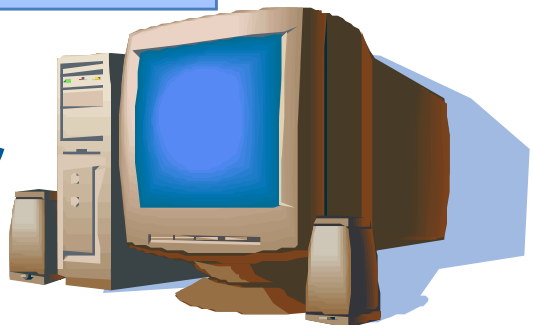
Review Biological effects

Case Studies

Electromagnetic Radiations

Radiation emitted from Cell Phones, Cell phone towers, Wi-Fi, TV and FM towers, microwave ovens, etc. are called Electromagnetic radiations (EMR).

EMR causes significant health hazards (biological effects) on human, animals, birds, plants and environment.



RF Sources

RF SOURCES IN INDIA

FM TOWER (88-108MHz)	PT=10KW		503 TOWERS
TV TOWER (180-220MHz)	PT=40KW		1044 TOWERS
AM TOWER (540-1600KHz)	PT=100 KW		197 TOWER
Wi-Fi (2.4 - 2.5 GHz)	PT=10-100mW		Wi-Fi HOT SPOTS
CELL TOWER (800,900,1800 MHz)	PT=20 W		4.3 LAKHS TOWERS
MOBILE PHONES	GSM-1800 - 1 W GSM-900 -2 W		600+ million

Microwave radiation effects are classified as:

- Thermal
- Non-thermal

The current exposure safety standards are mainly based on the thermal effects, which are inadequate.

Non-thermal effects are several times more harmful than thermal effects.

Microwave Heating Concept

4.2 KW (4200 W) of microwave power raises temperature of 1 Litre of water by 1^0C in 1 second.

In energy absorption term, 4.2 KW-sec microwave energy will increase the temperature of 1 Litre by 1^0C.

For example, in a microwave oven, temperature of one cup of water increases from 30^0C to 100^0C in approx. 70 seconds with 500W of microwave power. With 1W power (same as output power of cell phones), temp. will increase by 1^0C in 500 seconds.

Temp. of ear lobes increases by approx. 1^0C when cell phone is used for approx. 20 minutes.

Cell Phone and Tower Statistics in India

Worldwide:

4.6 billion mobile subscriptions

India:

Population - 1.15 billion

Mobile subscriber base - 65crores. Growing at 1.5 crore/month, highest in the world (TRAI, June 2010).

Mobile Towers - Nearly 4.5 lakhs to meet the communication demand.

SAR and Cell phone use time limit

A Cell phone transmits
1 to 2 Watts of power

6 minutes/day usage.

SAR (Specific absorption rate) - Rate at which radiation is absorbed by human body, measured in units of watts per kg (W/kg) of tissue.

In USA, SAR limit for cell phones is **1.6W/Kg** which is actually for **6 minutes.** It has a safety margin of 3 to 4, so a person should not use cell phone for more than **18 to 24 minutes per day.**

This information is not commonly known to people in India.

Cell phones and SAR values

Check SAR Values:

Search on Internet

SAR mobile phone

Manufacturer	Model	SAR Output (W/Kg)
Motorola	V195	1.6
Motorola	Rival	1.59
Sony Ericsson	Satio (Idou)	1.56
BlackBerry	Curve 8330	1.54
Nokia	E71x & X6	1.53
LG	Rumor	1.51
BlackBerry	Bold	1.51
Samsung	S3650 Corby	0.75
Samsung	SGH-G800	0.23
Samsung	Blue Earth	0.196
SAR is expressed in Watts per Kilogram Current UK Standard = 1.0W/Kg Current US Standard = 1.6W/Kg		

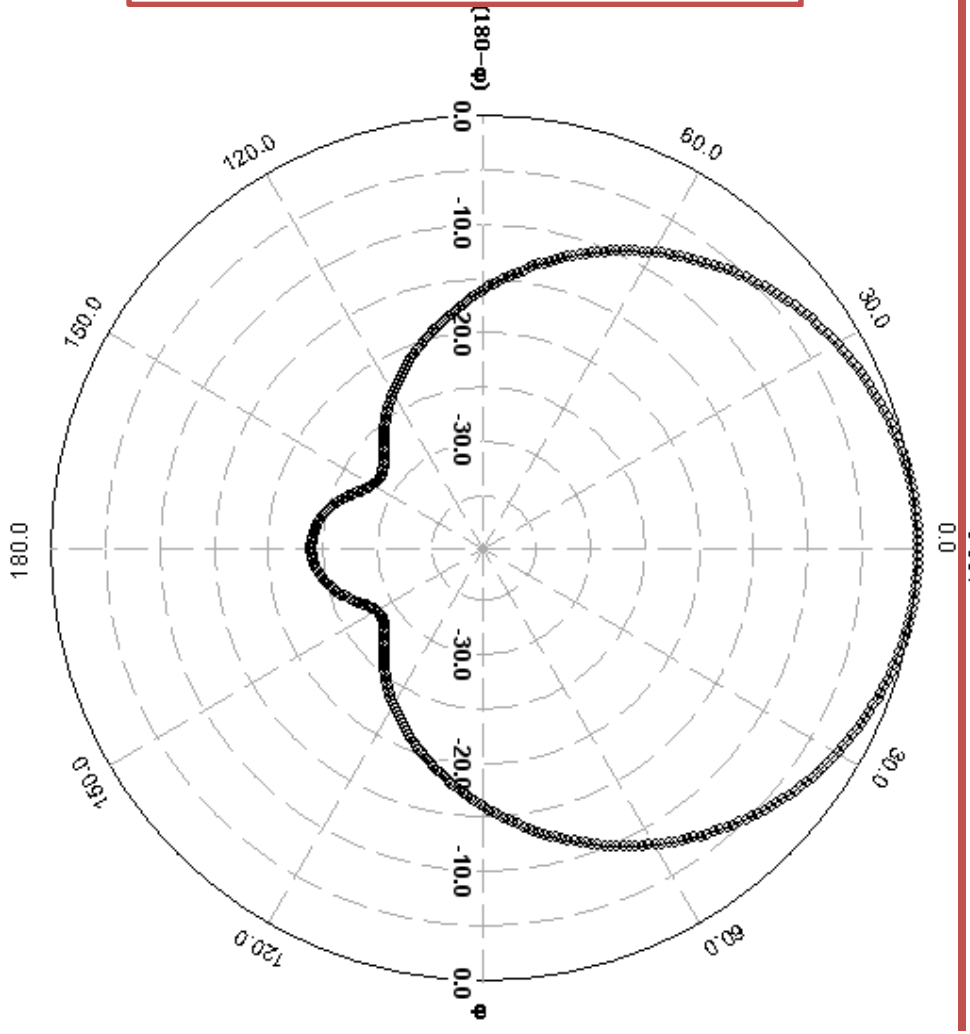
San Francisco Govt. has made it mandatory for the industry to display SAR value for each phone. (USA Today 14 July, 2010)

Antennas on Cell tower transmit in the frequency range of:

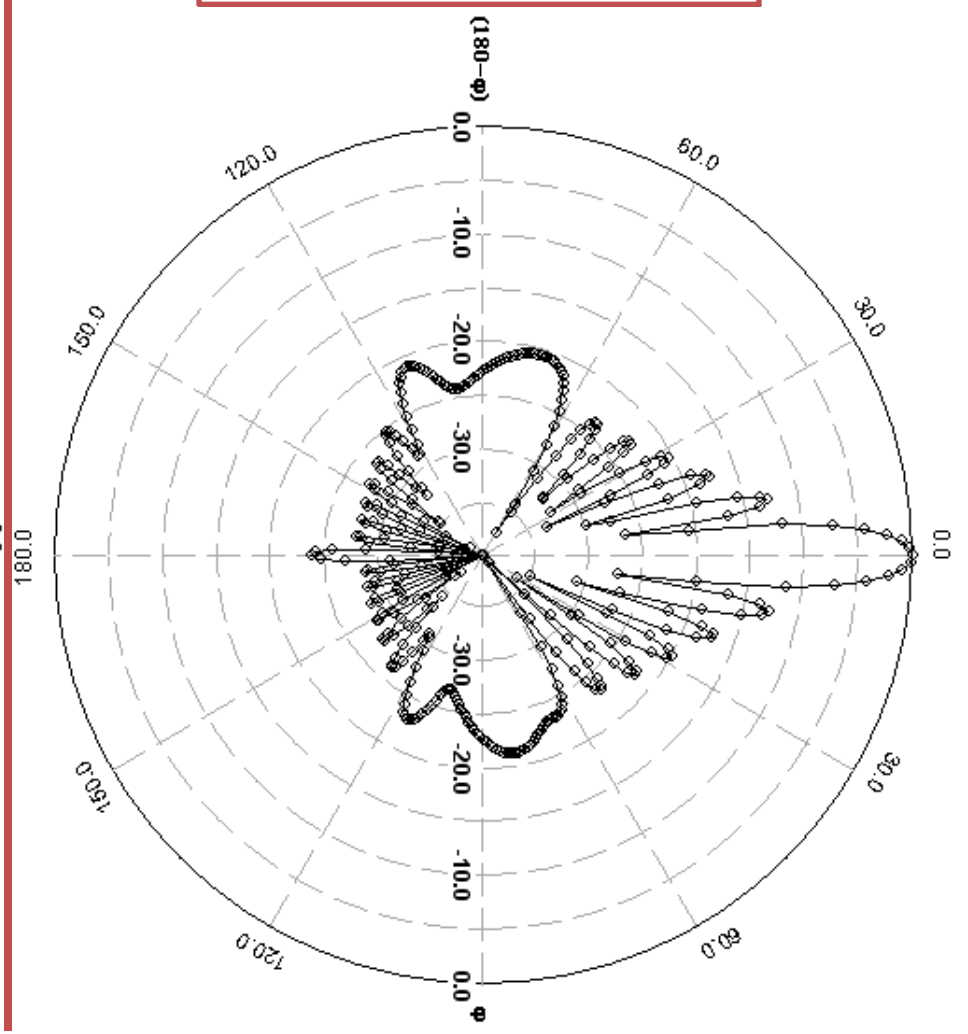
- 869 - 890 MHz (CDMA)
- 935 - 960 MHz (GSM900)
- 1805 – 1880 MHz (GSM1800)
- 2110 – 2170 MHz (3G)*

Radiation Pattern of Antenna

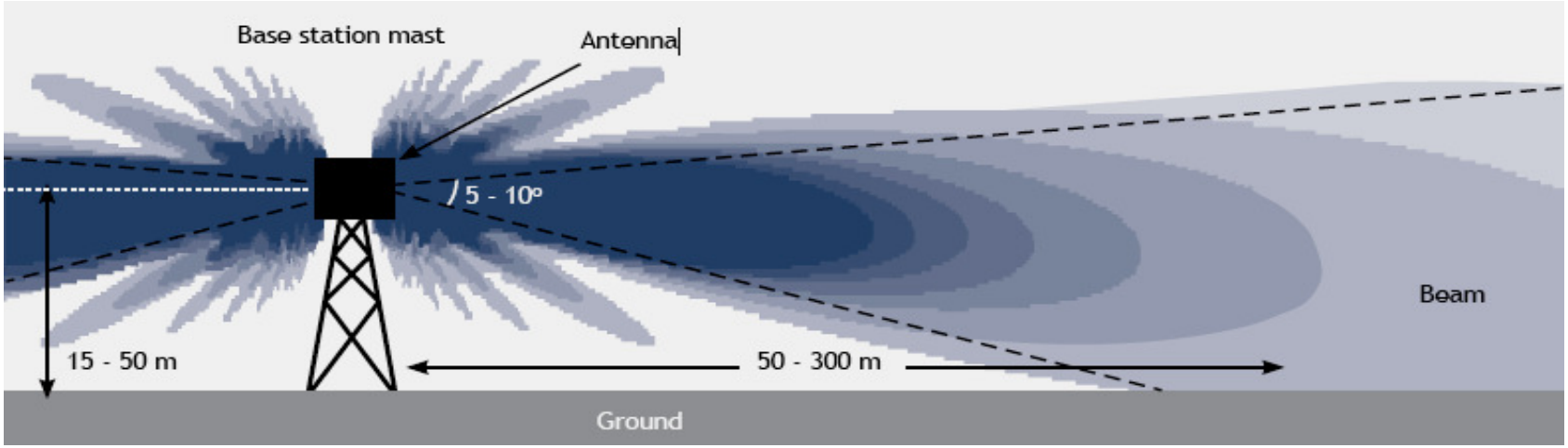
Horizontal plane



Vertical plane



Radiation Pattern of a Cell Tower Antenna

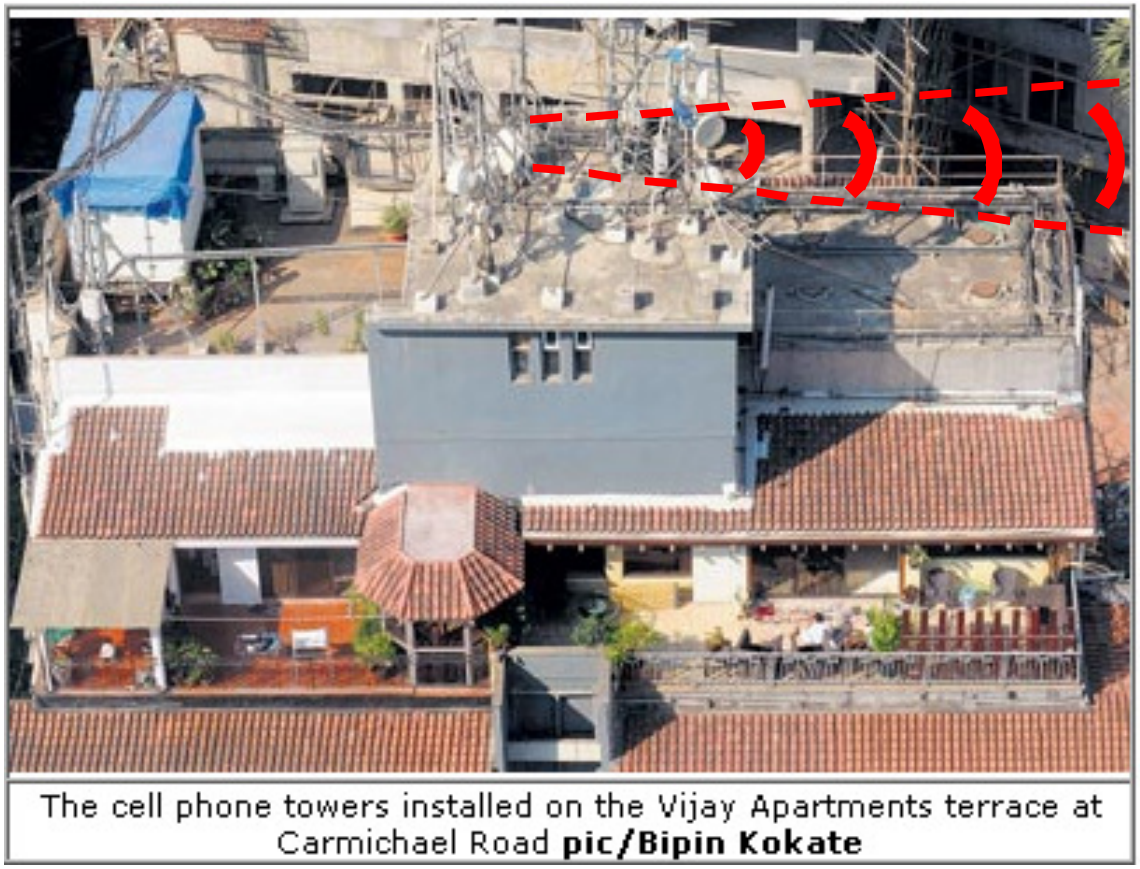


Propagation of "main beam“ from antenna mounted on a tower or roof top

People living within 50 to 300 meter radius are in the high radiation zone (dark blue) and are more prone to ill-effects of electromagnetic radiation

CASE STUDY

Usha Kiran Building, Worli, Mumbai



The cell phone towers installed on the Vijay Apartments terrace at Carmichael Road **pic/Bipin Kokate**

Usha Kiran Building

Four cancer cases in 3 consecutive floors (6th, 7th and 8th) directly facing and at similar height as the mobile phone towers of four telecom companies placed on the roof of opposite building.

Power Density Calculations

Power density P_d at a distance R is given by

$$P_d = \left(\frac{P_t \times G_t}{4\pi R^2} \right)$$ Watt/m^2

P_t = Transmitter power in Watts

G_t = Gain of transmitting antenna

R = Distance from the antenna in meters

Power Density at distance R from cell tower

For P_t = 20 W, G_t = 17 dB = 50

Distance R (m)	P_d (W/m^2)	P_d ($\mu W/m^2$)
1	79.6	79,600,000
3	8.84	8,840,000
5	3.18	3,180,000
10	0.796	796,000
50	0.0318	31,800
100	0.008	7,960
500	0.000318	318

The above values are for a **single carrier and a single operator**. For multiple carriers and **multiple operators** on the same roof top or tower, then the above values will **increase manifold**.

Power Density for multiple carriers and operators

For P_t = 20 W, G_t = 17 dB = 50

No. of carriers = 5, No. of operators = 3

Distance R (m)	P_d (W/m²)	P_d (μW/m²)
1	1194.0	1194,000,000
3	126.0	126,000,000
5	47.7	47,700,000
10	11.94	11,940,000
50	0.477	477,000
100	0.1194	119,400
500	0.00477	4,770

For **5 carriers** and **3 operators** on the same roof top or tower, the radiation level is extremely high.

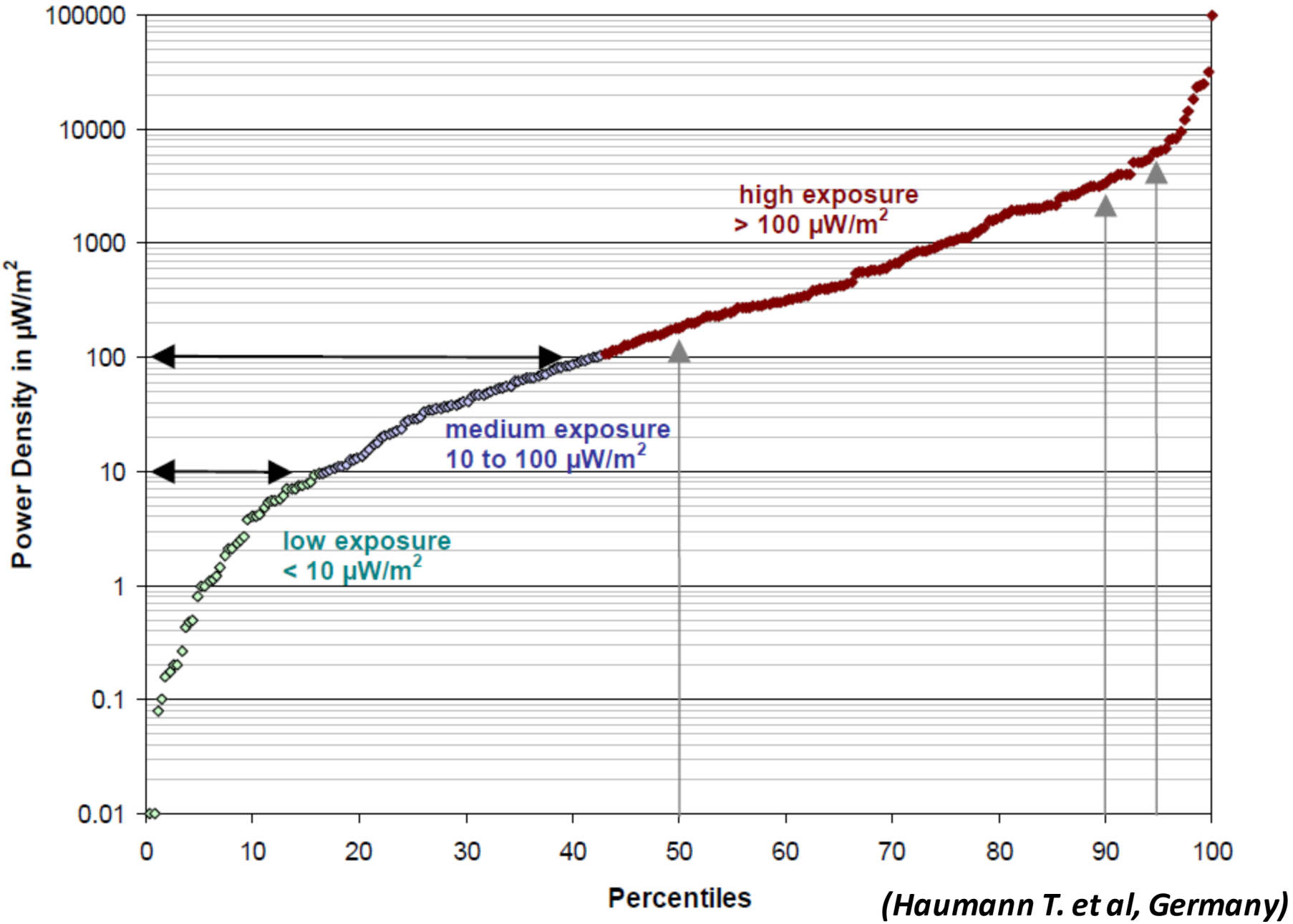
International Exposure Standards and Guidelines

International Exposure limits for RF fields (1800MHz)	
9.2 W/m²	**ICNIRP and EU recommandation 1998 – Adopted in India**
3 W/m²	Exposure limit in Canada (Safety Code 6, 1997)
2 W/m²	Exposure limit in Australia
1.2 W/m²	Belgium (ex Wallonia)
0.5 W/m²	Exposure Limit in Auckland, New Zealand
0.24 W/m²	Exposure limit in CSSR, Belgium, Luxembourg
0.1 W/m²	Exposure limit in Poland, China, Italy , Paris
0.095 W/m²	Exposure limit in Switzerl, Italy in areas with duration > 4hours
0.09 W/m²	ECOLOG 1998 (Germany) *Precaution recommendation only*
0.025 W/m²	Exposure limit in Italy in sensitive areas
0.02 W/m²	**Exposure limit in Russia (since 1970), Bulgaria, Hungary**
0.001 W/m²	"Precautionary limit" in Austria, Salzburg City only
0.0009 W/m²	*BUND 1997 (Germany) Precaution recommendation only*
0.00001W/m²	**New South Wales, Australia**

Table from Haumann Thomas, et al, Germany

Comparison of Standard Threshold Values and Recommendations (electromagnetic fields, non ionizing radiation)	**Total Power Density**
Standards, GSM1800/GSM1900/UMTS/DECT (e.g.)	
FCC/ANSI – USA	10,000,000 $\mu W/m^2$
Germany, England, Finland and Japan	10,000,000 $\mu W/m^2$
Belgium	1,200,000 $\mu W/m^2$
Switzerland and Italy	90,000 $\mu W/m^2$
Recommendations / References (e.g.)	
Ecolog Study, Germany (ECOLOG 2000)	10,000 $\mu W/m^2$
Cellular tower radiation – significant exposure level, 95th percentile (this study)	6,300 $\mu W/m^2$
Salzburg, Austria (RESOLUTION 2000)	1,000 $\mu W/m^2$
Cellular tower radiation – median level, 50th percentile (this study)	200 $\mu W/m^2$
High exposure, Oeko-Test (OEKOTEST 2001)	100 $\mu W/m^2$
EU Parliament (STOA 2001)	100 $\mu W/m^2$
Cellular tower radiation – background level, 20th percentile (this study)	10 $\mu W/m^2$
Low exposure, Oeko-Test (OEKO TEST 2001)	10 $\mu W/m^2$
Nighttime exposure, Baubiology Standard (SBM 2000)	0.1 $\mu W/m^2$
Successful communication with GSM mobile phone, system coverage requirements	0.001 $\mu W/m^2$
Natural cosmic microwave radiation (MAES 2000)	0.000001 $\mu W/m^2$

GSM cell tower power density levels – percentiles



(Haumann T. et al, Germany)

Other Standards and Guidelines

- BioInitiative Report 2007 - **1000 µW/m²** for outdoor, cumulative RF exposure

- Building Biology Institute, Germany, provided following guidelines for exposure:

  a. <0.1 µW/m² (0.00001 µW/cm²) - no concern
  b. 0.1 - 10 µW/m² (0.00001 to 0.001 µW/cm²) - slight concern
  c. 10 - 1000 µW/m² (0.001 to 0.1 µW/cm²) - severe concern
  d. > 1000 µW/m² (> 0.1 µW/cm²) - extreme concern

- We recommend safe power limit up to 50 µW/m² with upper limit as **100 µW/m².**

INDIA adopts ICNIRP Guidelines

India adopts ICNIRP guideline for Power density (P_d)
= Frequency / 200, frequency is in MHz.

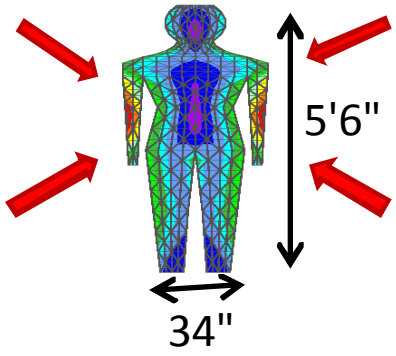
For GSM900 (935-960 MHz), $P_d = 4.7 W/m^2$ and
GSM1800 (1810-1880 MHz), $P_d = 9.2 W/m^2$.

ICNIRP has considered only thermal effects of radiation and has given following disclosure:

ICNIRP is only intended to protect the public against short term gross heating effects and NOT against 'biological' effects such as cancer and genetic damage from long term low level microwave exposure from mobile phones, masts and many other wireless devices.- http://ww.icnirp.de/documents/emfgdl.pdf

Power Absorbed by Human Body

How much microwave power will be absorbed by human body if exposed to the so called safe radiation level adopted in India, which is f/200, where f is in MHz?



Area = 1.43 m²

X

ICNIRP Guideline – At 940 MHz, Power density (P_d) is 4.7W/m²

Power received (P_r) by human body will be [$P_r = P_d$ x Area] = 6.75 Watts in one sec.

Microwave oven: 700 to 1000 W. With say 60% efficiency, microwave power output is say 500 W.

In one day, microwave energy absorbed will be [6.75 Watts x 60x60x24 sec] = 583.2 KW-sec.

This implies that human body can be safely kept in a microwave oven for 1166 secs = 19 minutes per day

Power Received by an Antenna

Power Received P_r by an antenna at a distance R is given by:

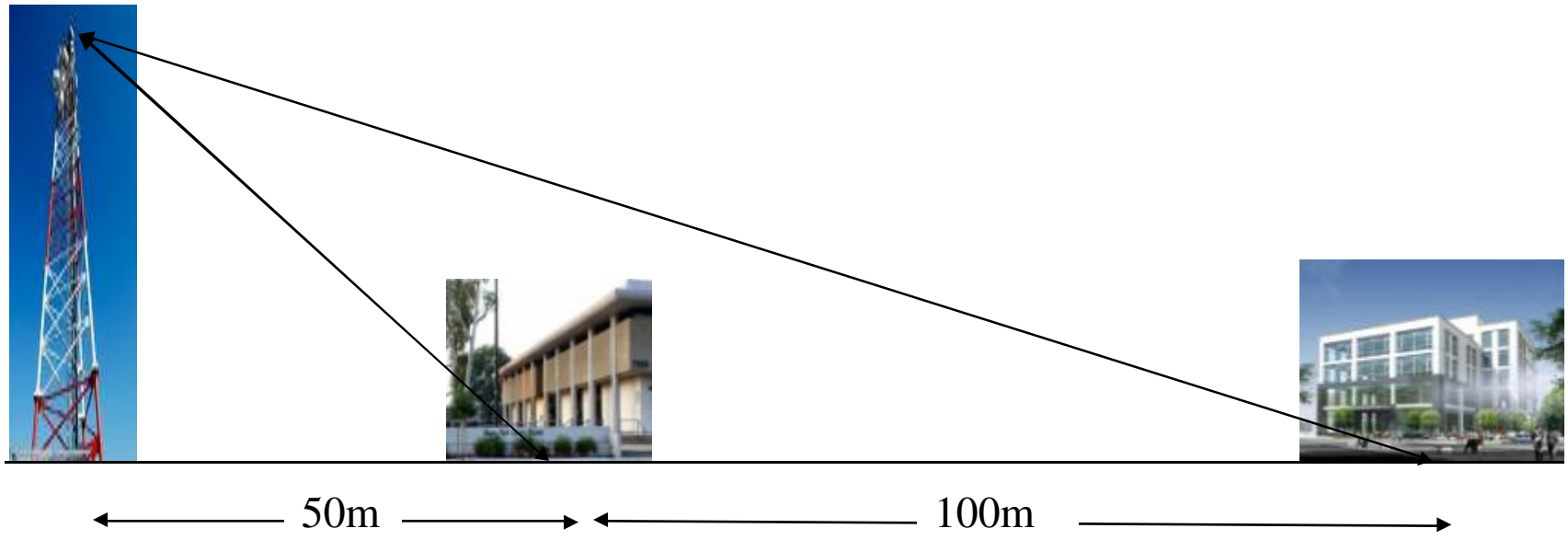
$$P_r = \frac{P_t \times G_t \times Area}{4\pi R^2} = P_t \times G_t \times G_r \times \left(\frac{\lambda}{4\pi R}\right)^2$$

- For a transmitter power, P_t = 20 W
- Transmitting antenna gain, G_t = 17.0 dB = 50
- Receiving monopole antenna gain, G_r = 2 dB =1.6
- Received power at R = 50 m is:
- At 940 MHz, P_r = 0.413 mW = -3.8 dBm
- At 1840 MHz, P_r = 0.108 mW = -9.7 dBm

Power density is equal to 31.8 mW/m^2 = 31,800 µW/m^2.

EXPERIMENT: Radiation level measurements near several Cell Tower sites

Broadband monopole antenna of gain = 2 dB was used to measure radiated power from cell towers (CDMA, GSM900 and GSM1800)



Measured Power (in dBm) For each frequency bands

-20 to -30 dBm

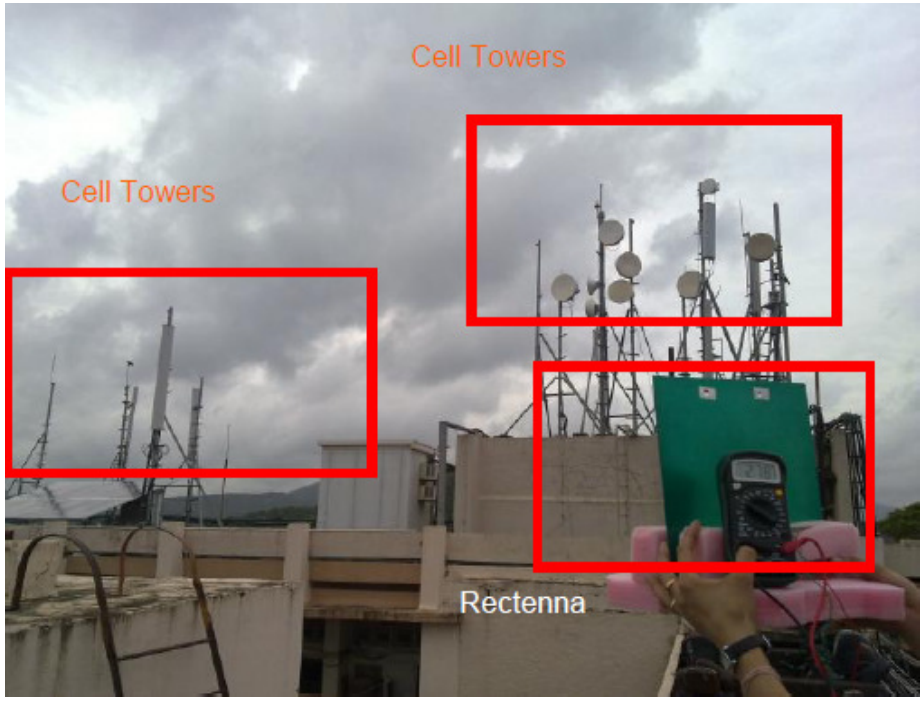
-30 to -50 dBm

- Measured power is less than theoretically calculated power as the concrete wall provides some attenuation and also these buildings were not directly in the direction of maximum radiation of transmitting antenna.

- A mobile phone requires -80 to -100 dBm power for its proper operation. Thus power level at 50m is 50 to 60 dBm (100,000 to 1,000,000 times) more than required by mobile phone.

Pictures of Measurement at IIT Bombay

50m from cell tower (IIT-B)



10m from cell tower (IIT-B)

Power level measured using a hand-held radiation monitor was : -6dBm and 5dBm (max. limit of instrument) at 50m and 10m, respectively.

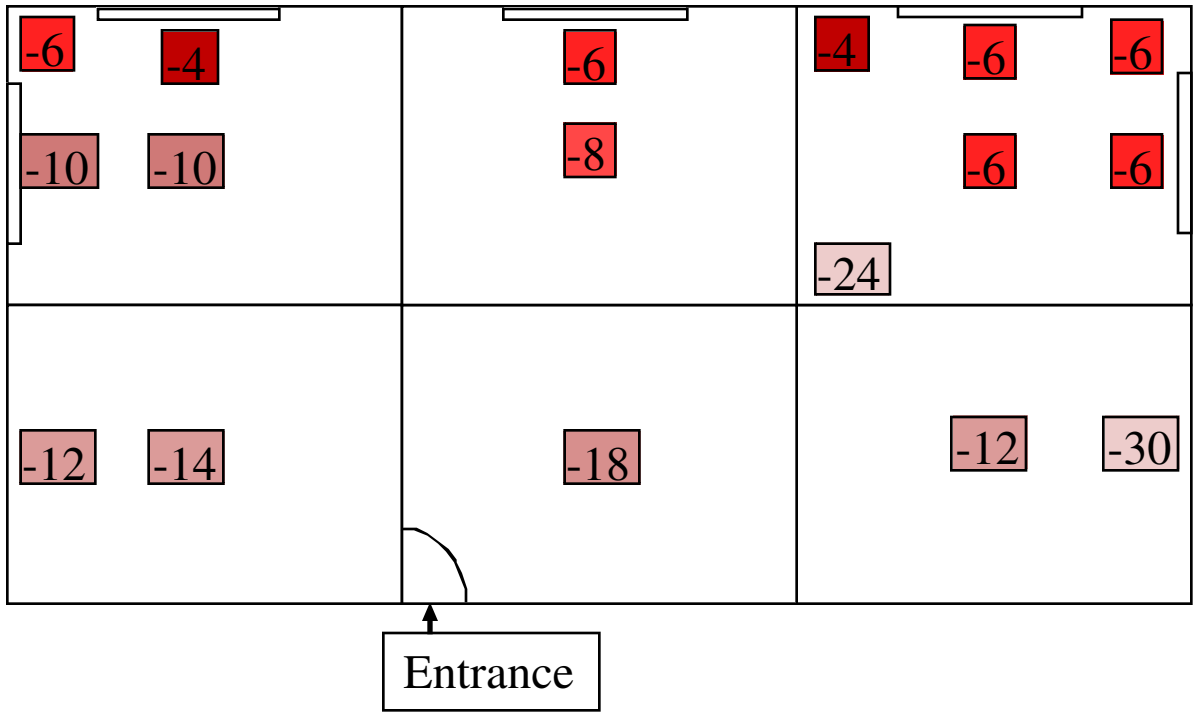
Radiation Measurement at various locations

Cumulative Readings including following:

CDMA ,GSM 900 ,GSM 1800 ,Bluetooth, Wireless LAN (0.8-4GHz)

Location	Reading in dBm	Readings in W/m2	Readings in microW/m2
Delhi-Gurgaon Highway - near Toll (3 towers)	0	0.121	121000
Vashi Bridge - after Railway Station	-4	0.0481	48100
Resident 1, 4th Fl: Sergean House Lady w/cancer	-6	0.0304	30400
Resident 2, Opposite roof, Rane Society, Powai	-10	0.012	12000
Near Hub mall, Goregaon	-10	0.012	12000
Gandhi Nagar Over railway bridge-near building	-12	0.00763	7630
Ustav Chowk, Kharghar	-12	0.00763	7630
Vikroli - before Godrej	-14	0.00481	4810
Govandi- Residential towers - near Indian Oil	-14	0.00481	4810
Belapur Flyover, near RBI- CIDCO	-16	0.00304	3040
Vashi Highway – near Turbhe	-18	0.00192	1920
Nerul Bridge	-20	0.00121	1210
Vivero pre School (opposite powai lake)	-22	0.000763	763
Powai police station	-22	0.000763	763
Rajeev Gandhi nagar	-26	0.000304	304
On road near Evita (Hiranandani Building)	-28	0.000192	192
D-Mart,Hiranandani, Powai	-34	0.0000481	48.1
IIT Bombay School of Management - Entrance	-46	0.00000304	3.04

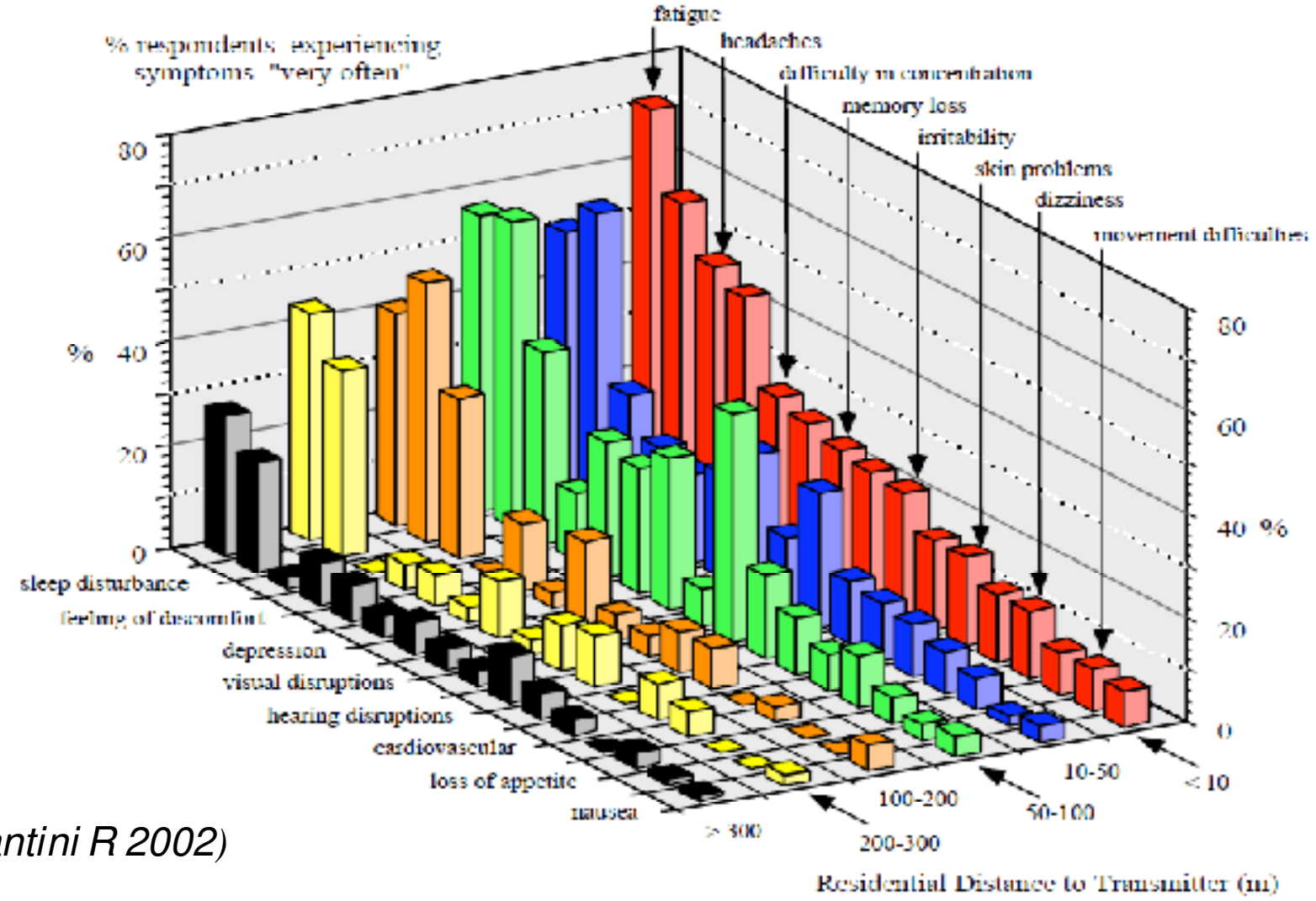
CASE STUDY:



SERGEANT HOUSE Residence (4th Floor) - Lady has been diagnosed with cancer - Cell phone towers few 10 meters away close to window in main beam. Measured Power levels using Radiation Monitor (in the room layout above) are given in dBm, which are very high.

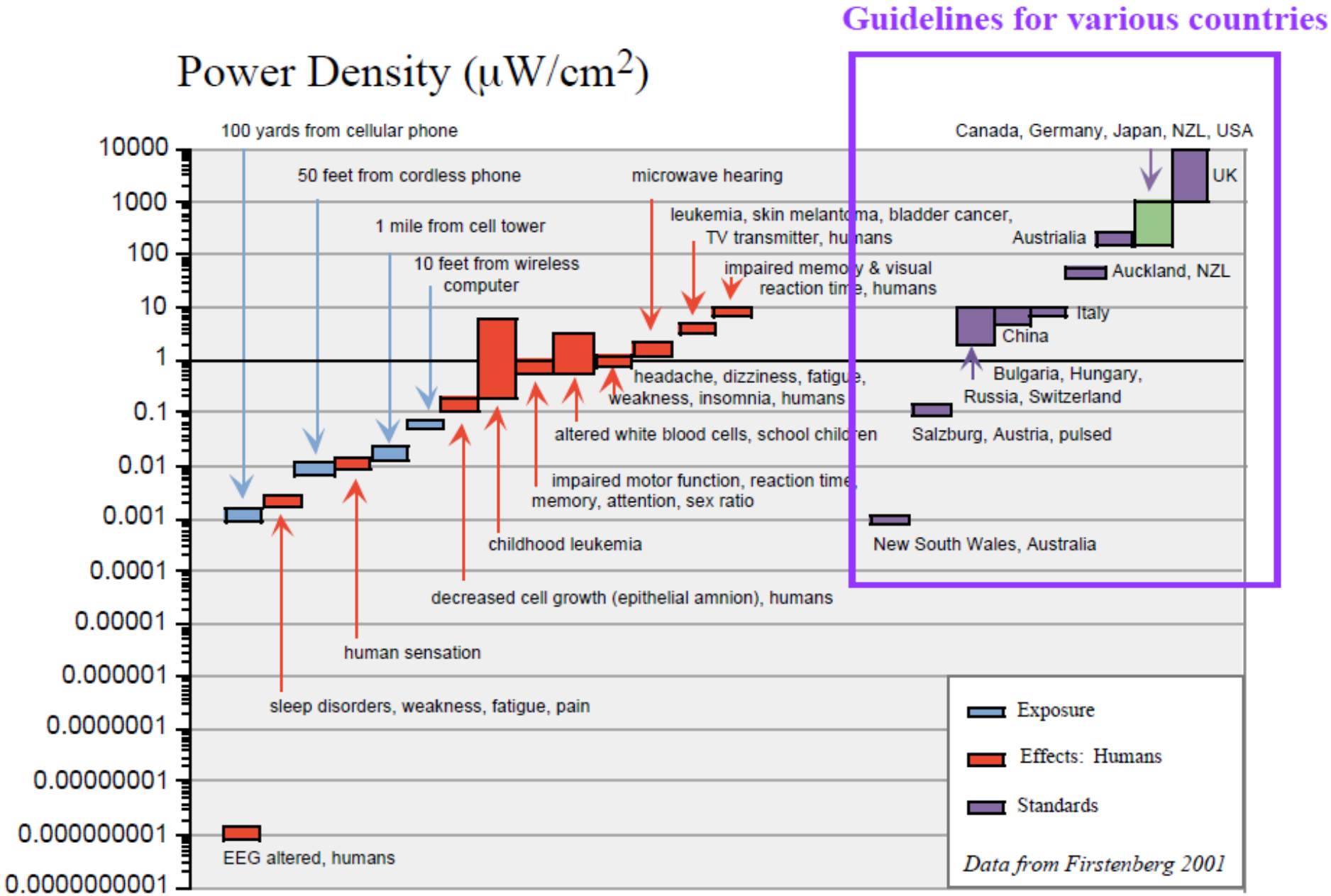
Epidemiological studies-Cell Phone Antennas: Human Exposure

Studies in Spain, the Netherlands, Israel, Germany, Egypt and Austria all document adverse health effects below the FCC guideline. Based on symptoms experiences: Cellular phone base stations should not be sited closer than 300 m to populations.

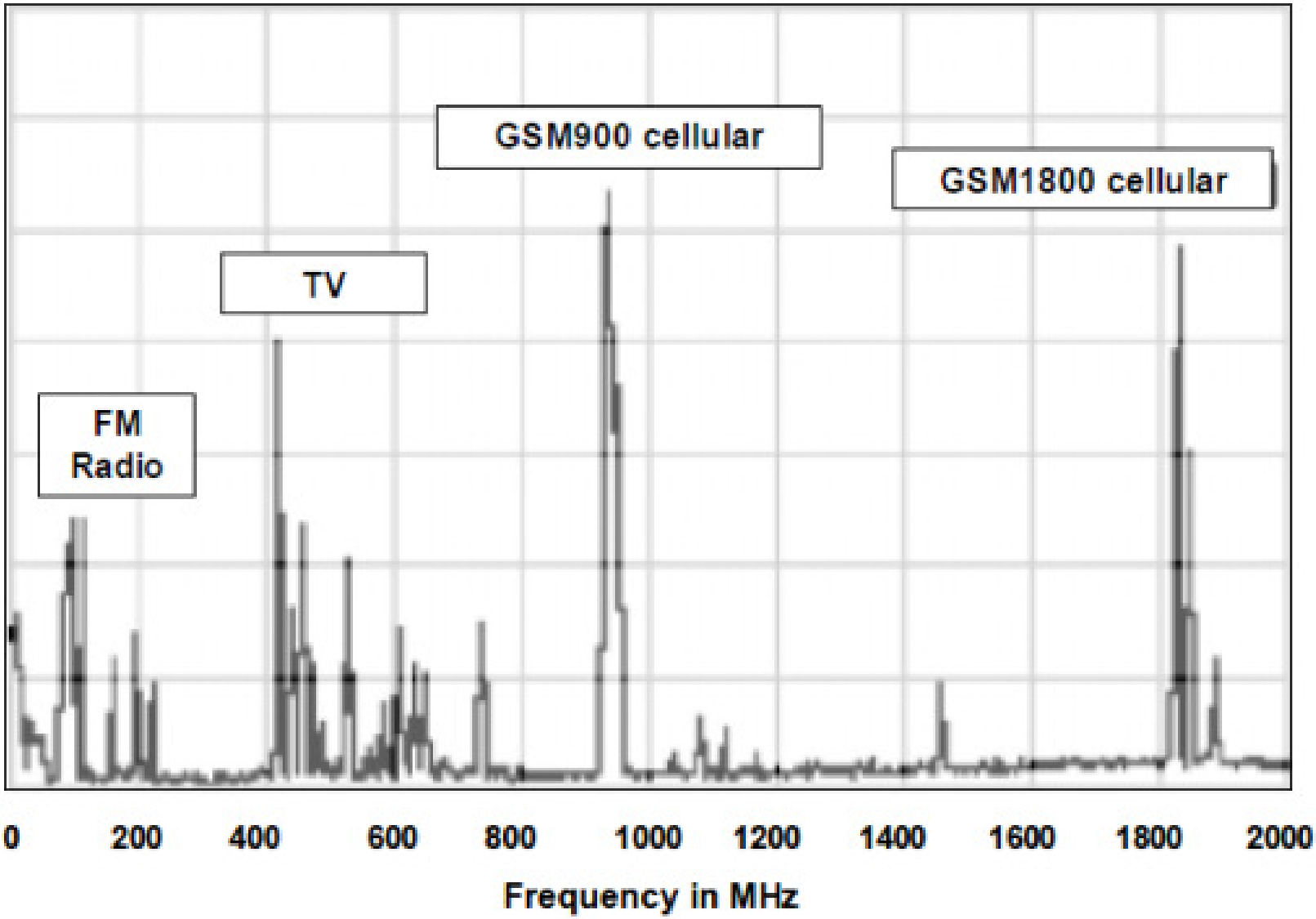


(Santini R 2002)

Serious health concerns regarding current Safety Guidelines



RF Spectrum near cell tower

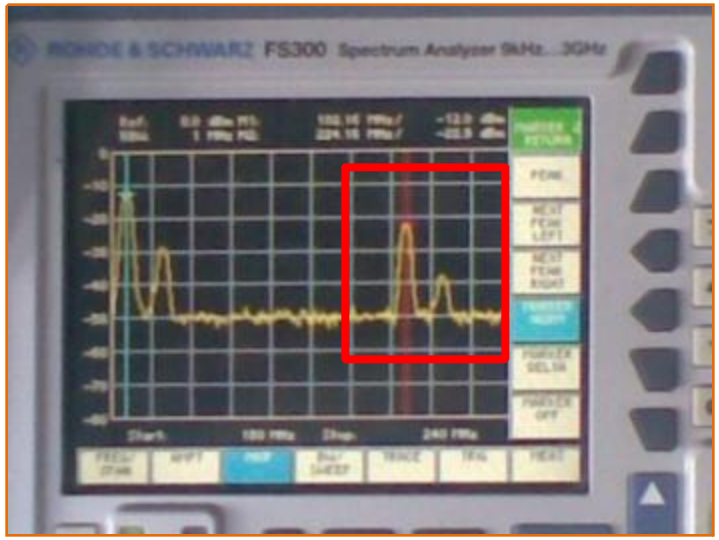


TV Tower Radiated Power Density at Different Height at a distance of 800 m

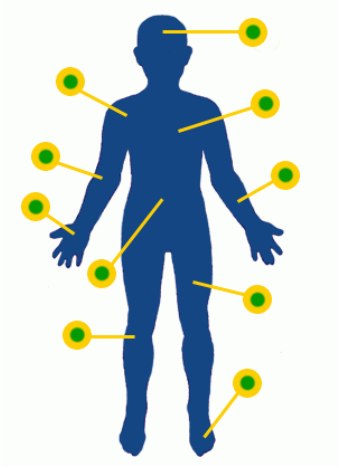
H(m)	R (m)	Power density (mW/cm^2)
230	803	0.00147
200	806	0.0014.5
150	814	0.00139
100	825	0.00132
50	838	0.00124
0	854	0.00115

TV Tower radiation measurement with shield

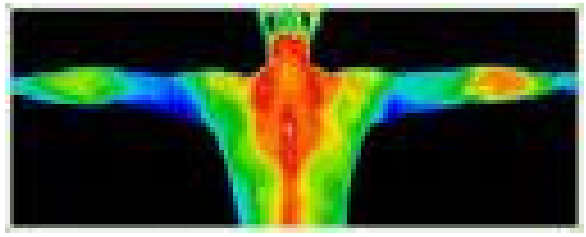
Without shield

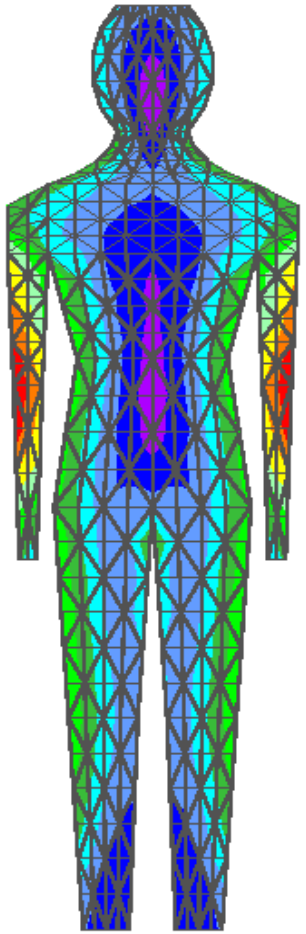


With shield

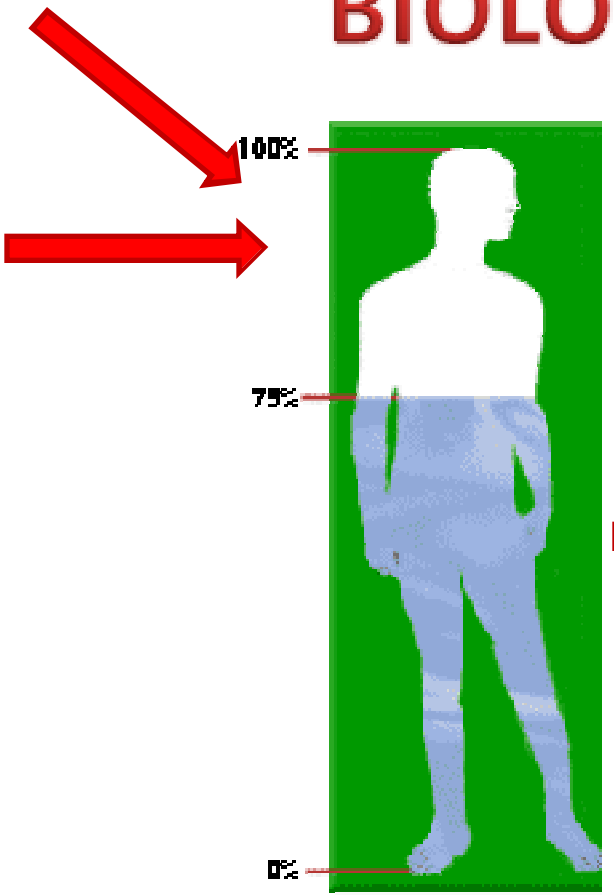


BIOLOGICAL EFFECTS





BIOLOGICAL EFFECTS



Multiple Resonances - localized heating - This results in boils, drying up the fluids around eyes, brain, joints, heart, abdomen, etc - leg/foot pain, muscle and joint pain.

Most common complaints:

Cognitive functions -Concentration, memory, behavior, etc

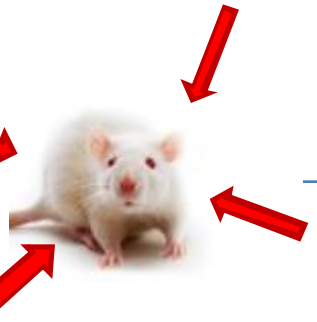
Epidemiological studies - Sleep disruption, Headache , Depression, discomfort, irritability, nausea, dizziness, appetite loss, muscle spasms, numbness, tingling, altered reflexes

Subjects reported buzzing in the head, palpitations of the heart, light-headedness, heat, visual disorders, cardiovascular problems, respiratory problems, nervousness, agitation. More severe reactions include seizures, paralysis, psychosis and stroke.

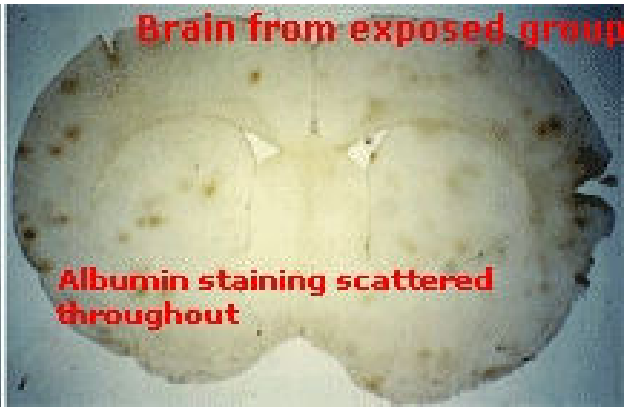
All these are related to changes in the electrical activity of the brain

Blood Brain Barrier -selectively lets nutrients pass through from the blood to the brain, but keeps toxic substances out.

Leif Salford *et al* 1988



Albumin - protein component of blood;does not normally cross BBB

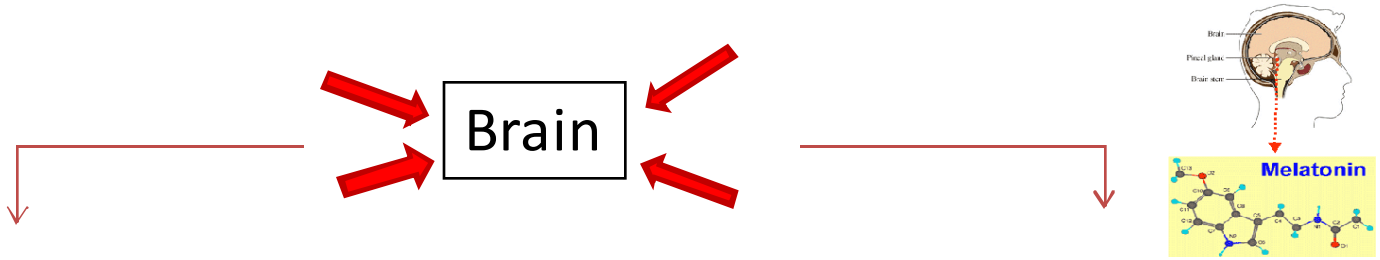


- Albumin in brain tissue - Damaged blood vessels & lost brain protection
- Neuron - Grouped & shrunken with loss of internal cell structures.

NOTE: BBB in is the same in a rat and a human being.

Alzheimer's , Motor neuron, Parkinson's disease

- 4 times incidence of Alzheimer's disease *(Hakansson et al 2003)*
- 3 times amyotrophic lateral sclerosis (ALS) *(Savitz et al1998)*



Cells concerning learning, memory, movement damaged

(Salford et al 2003)

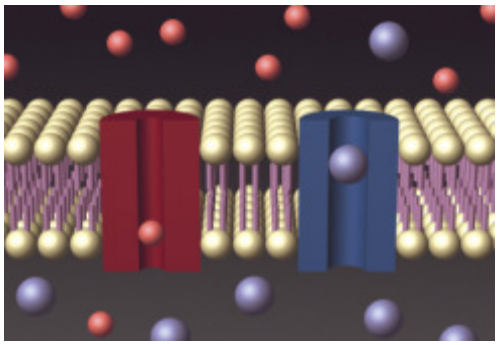
↓Melatonin production (Protects from brain damage)

(Burch 1999a ,Wood et al 1998)

Alzheimer's , Parkinson's disease

DNA Damage

1. Ca2+ release:



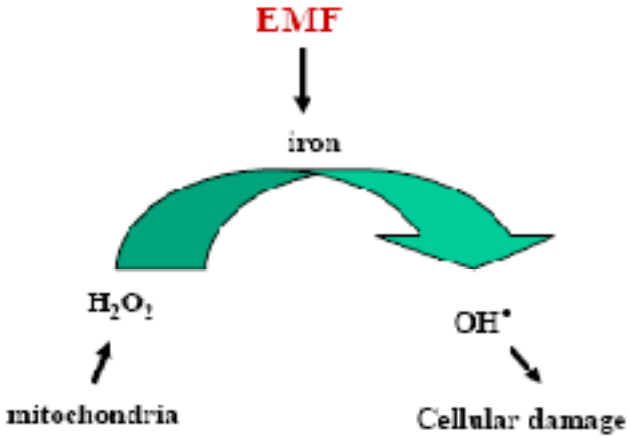
- ELF release Ca2+ bound to membranes
- Loss of Ca2+ causes leaks in the membranes of lysosomes releasing DNAase that causes DNA damage.

2.Interfere with natural processess:

- DNA replication & repair -altering molecular conformation
- This could result in chromosome aberrations, micronuclei formation & increased DNA fragmentation

3) Free radical formation inside cells:

- ↑ free radical activity in cells from EMF via Fenton rxn.
- Free radicals kill cells by damaging macromolecules, such as DNA, protein and membrane.



THE FENTON REACTION

When Damage to DNA > Rate of DNA repaired, there is the possibility of retaining mutations and initiating cancer

Effect on HSP

Normal Cell
(Human/ Animal)

Over-expression of (HSPs)
Inhibit natural programmed cell death (apoptosis)

cells that should have 'committed suicide' *continue to live.*

Normal Cell

Cancer Cell

Consistent with the 2-3-fold ↑in incidence of a rare forms of cancer

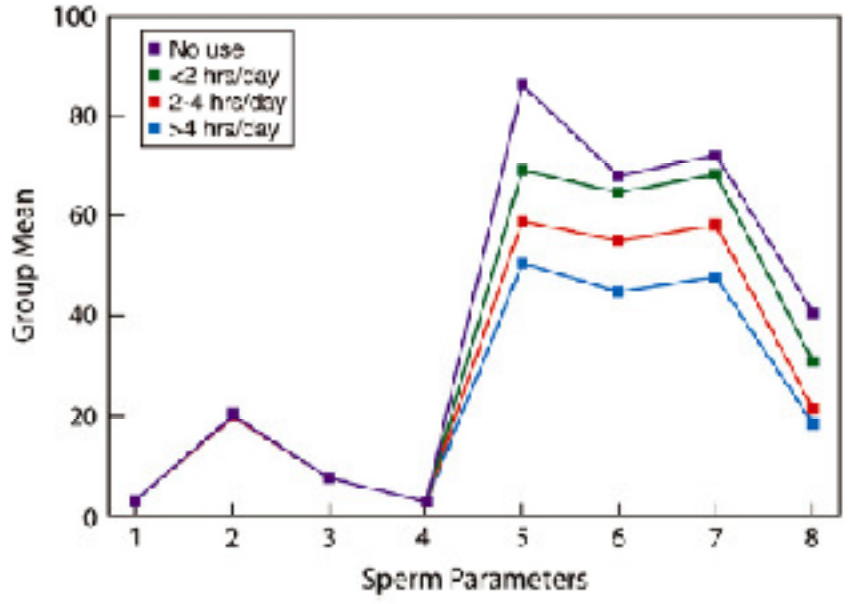
Sleep Disorders

Use of mobile phones before bed disturbs Stage 4 sleep, the stage important for full recuperation of brain and body.

Irreversible infertility

Continuous exposure ⟹ 30% sperm decrease in intensive mobile users, in addition to damage of sperms

Sperm parameter profile for cell phone use groups. The x-axis lists eight sperm parameters: 1 = volume; 2 = liquefaction time; 3 = pH; 4 = viscosity; 5 = sperm count; 6 = motility; 7 = viability; and 8 = percent normal morphology. The y-axis depicts the mean value of the corresponding sperm parameters for each cell phone use group.

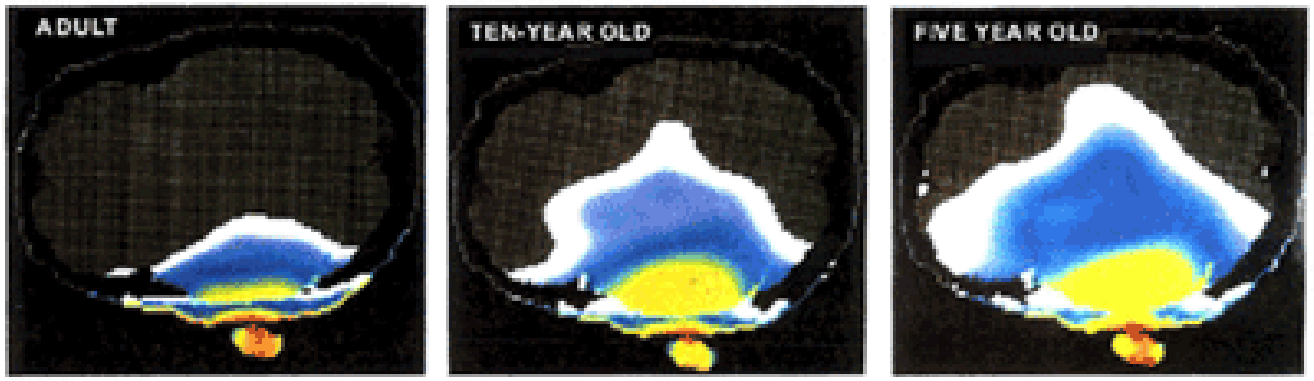


Agarwal. Cell phone usage and male infertility. Fertil Steril 2008.

Risk to Children

Children are more vulnerable as:

- Skulls are smaller & thinner - ↑'s radiation absorption
- ↑rate of Cell division - more susceptible to genetic damage
- Myelin sheath not developed - Electrical brain-wave activity



RF penetration in the skull of an adult (25%), 10 year (50%) and a 5 year old (75%).

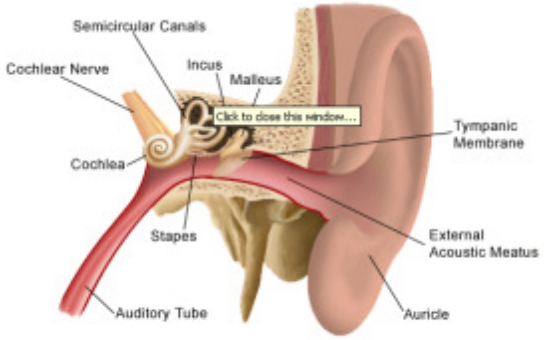
Fetus &Mother -RF can pass placental barrier & continuously react with the developing embryo and increasing cells

Effect on Skin

✓Rashes /sores – redness of skin
✓crawling, biting and stinging sensations
✓granules, threads or black speck-like materials on or beneath the skin.

❑Alters protein expression in endothelial cell lines and affect skin structure,(↑ed *transtyretin* protein conc.)
❑May enhance development of skin tumours.

Tinnitus and Ear Damage



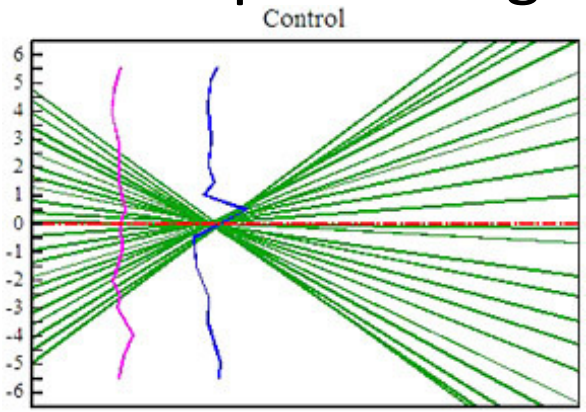
Tinnitus or "Ringxiety"- sensation of cell phone ring – in millions of cell phone users. People with severe tinnitus may have trouble hearing, working or even sleeping.

Warm sensation/pain > tinnitus > irreversible hearing loss

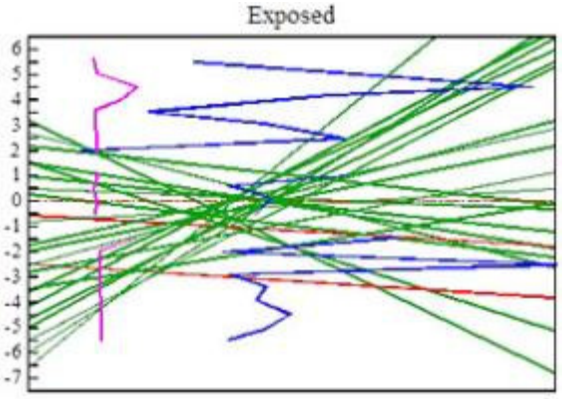
- Damage the delicate workings of the inner ear.
- Patients,18-25 yrs of age - damaged hair cells by RFR from phones. Hearing problems occur because these cells do not regenerate

Effect on Eye/ Uveal Melanoma

(A) Macroscopic Damage

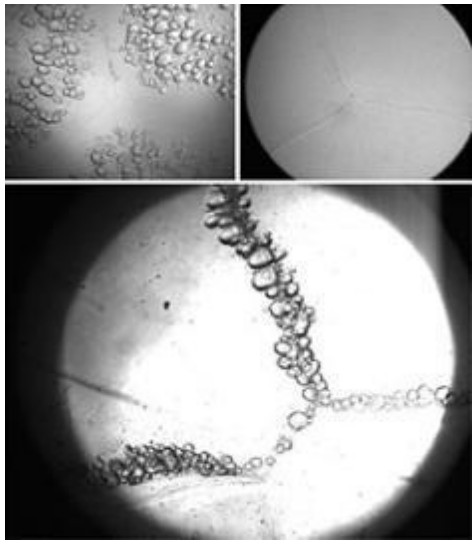


Good quality lens



Exposed lens-ability to focus the laser beam at the various locations is altered.

(B) Microscopic Damage



Tiny “bubbles "created due to microscopic friction between particular cells exposed to EMR. Contrary to macroscopic damage, the microscopic damage does not heal and accumulates with time.

Right frame - Control lens with no damage.
Bottom frame - demonstrates the effect of microwave radiation on bovine lens sutures .

Melatonin Reduction

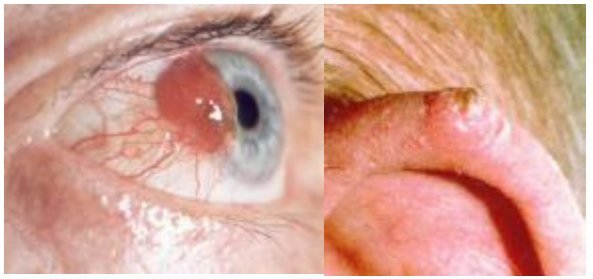
Powerful antioxidant, antidepressant and immune system enhancer that regulates circadian rhythm.

> 25 min/day – Prolonged use → **↓Melatonin production**

(Burch 1997, 2002, Graham C 2000)

- arthritis
- increased eye stress
- chronic fatigue, depression
- ↑cancer
- renal impairment
- ↑ childhood leukemia
- miscarriage
- ↑ DNA damage
- sleep disturbance
- cardiac, reproductive and neurological diseases

Increase in Cancer risk

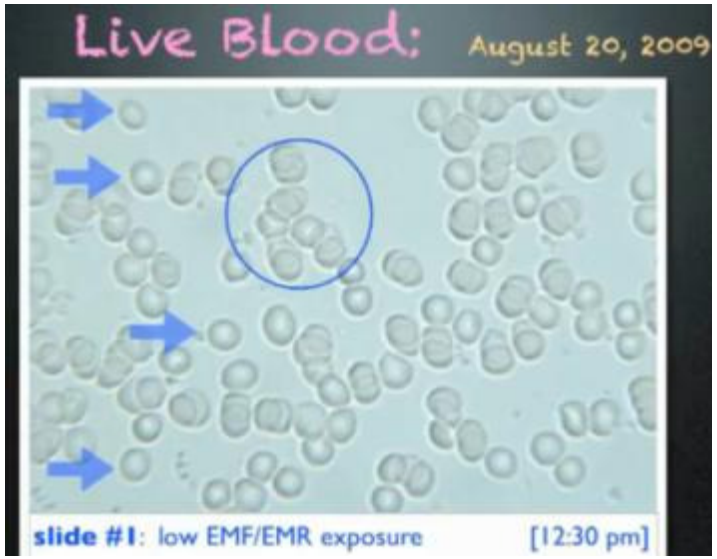


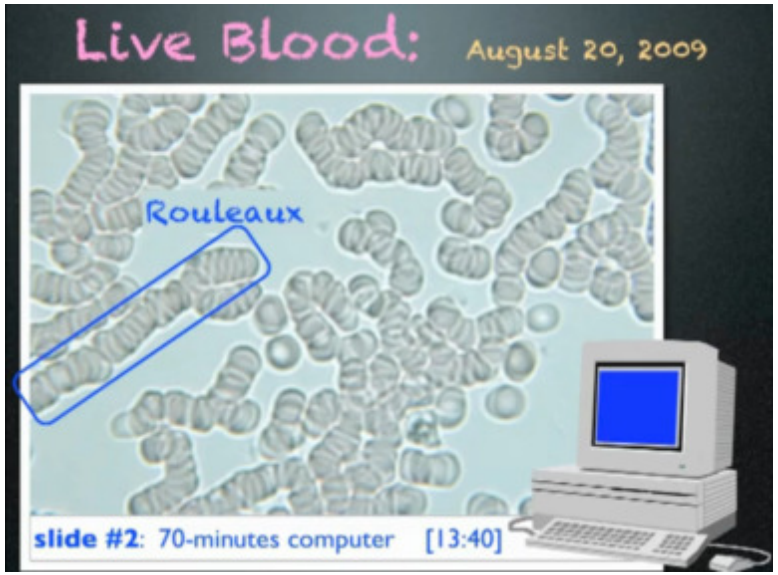
❑ Mobile phone use >10 years doubles risk of brain cancer. Risk is highest for ipsilateral (on the same side of the head where the instrument is held) exposure

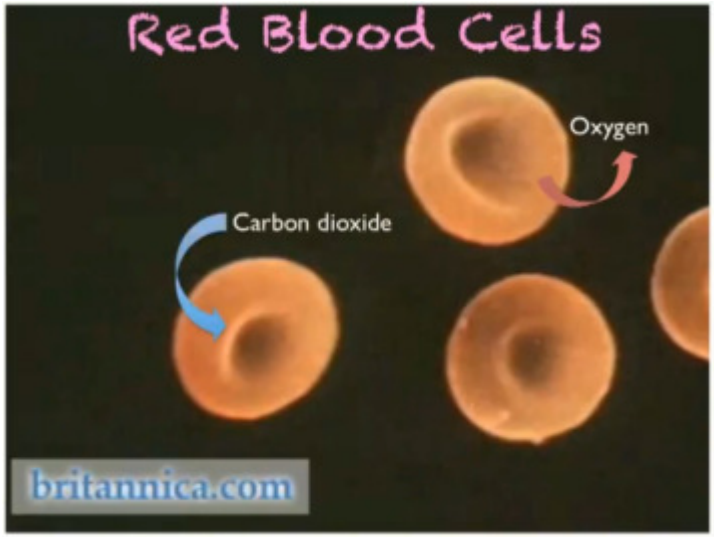
❑Cell phone use also increases risk of glioma, acoustic neuroma, salivary gland tumors , uveal melanoma, non-Hodgkin lymphoma, facial nerve tumors, skin, blood, testicular and breast cancer

❑**Children and teenagers**, before age of 20 - **Five times** more likely to get **brain cancer** if they use cell phones.

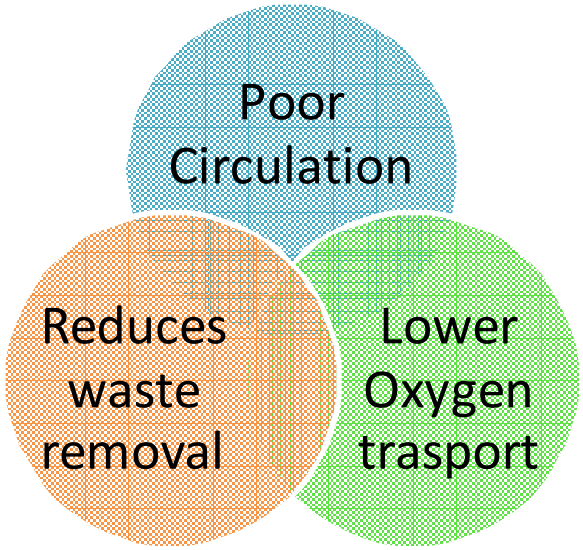
Live Blood Cells and Electrosmog







Consequences



Symptoms

- ✓Headache, fatigue
- ✓Difficulty concentrating
- ✓Numbness, tingling, cold extremeties
- ✓Heart and blood pressure problems

Effect on Environment

Farm animals -

•Dairy cows – Decreased milk production, spontaneous abortions, reproductive and developmental problems , and general declines in overall health.

•Sheep, dogs, cats, rabbits living near base stations affected.

Birds –

- Interfere with navigation, reproduction, thin shells.
- London - 75% fall sparrow population.
- **Sparrow - 'Red List'** of endangered avian species.
- Fall in Pigeons, swans, white stork, rock dove

❖Biological indicators to detect alterations in our ecosystem

Honey Bees -

Colony Collapse Disorder (CCD):

- Abrupt disappearance of bees.
- Cannot find their way back to hive due disruption in intercellular communication.

CCD has hit – US (up to 70 %), England (54% fall), Germany, Spain, Italy, Switzerland, Greece, Scotland, Wales, Kerala etc

Abrupt disappearance of bees in US

- $1/4^{th}$ (about 2.4 million colonies) lost to CCD.
- **Loss** projected to **$8-12 billion** on US agricultural economy.
- US now regularly imports bees from Australia and China.

❖ Bees are vital pollinators for agriculture. With vanishing of bees, a major food crisis could ensue .

Result of Re-evaluation of Interphone Study

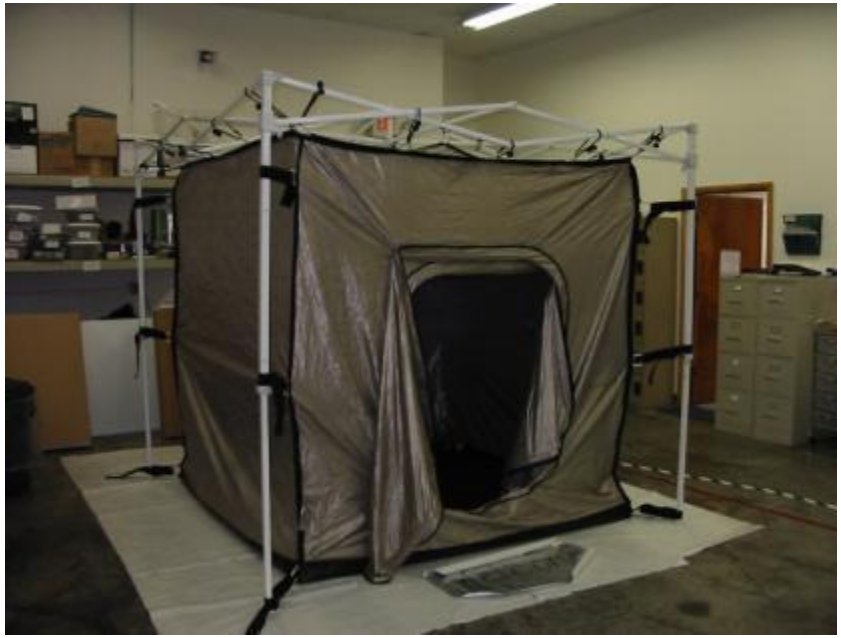
INTERPHONE – WHO -10 year,13 countries, largest (5,117 brain tumor cases), $25 million dollars to evaluate risk on brain tumours.
Conclusion - no overall ↑ risk, but suggestions of ↑ glioma -heavy users & ipsilateral exposures

Re-evalution - Risk underestimated by at least 25%

- ✓Flaws in the design
- ✓25% industry funded
- ✓Correction factor - significant results.
- ✓For every 100 hours of use -26% ↑ risk of meningioma
- ✓Initial 24% risk of glioma ↑ ed to 55% - regular users (2 hrs/month)?
- ✓Doubled - quadrupled brain tumor risk - heavy users (1/2 hour/day)
- ✓Children, young adults– excluded. New study - Mobi-kids

CASE STUDY

MY LIFE IN a FARADAY CAGE



Dr. Carlos Sosa, M.D., physician and surgeon living in Medellin, Colombia - Had to move five different apartments all over the city, resign his position at the hospital due to nearby masts and high radiation inside the Emergency Service. He now lives in a Faraday cage that prevents radiations from entering inside.

CASE STUDY

250,000 Swedes allergic to mobile phone radiation

- Around 230,000 - 290,000 Swedish men and women - Out of a population of 9,000,000 are now electro hypersensitive and report a variety of symptoms when being in contact with electromagnetic field.

- One of the first countries where mobile technology was introduced (approx. 15 years ago).

- Sweden has now recognized EHS (Electrohypersensitivity) as a physical degradiation and EHS sufferers are entitled to have metal shielding installed in their homes free of charge from the local government.

CASE STUDY

Increased cancer cases with proximity to Towers

Within 91 m from a mobile tower

Name of deceased	Year of death	Cause of death	Age at time of death
Radhabai Sathe	2005	Breast cancer	66
Deshpande	2006	Oesophagus cancer	48
Shubhangee Deshpande	2007	Rectum cancer	66
Pujaree	2008	Cancer	46
Gawai	2008	Breast cancer	52
Shah	2009	Cancer	48
Vidyadhar Dev	2009	Liver cancer	52
Ransube	2009	Throat cancer	73
Archana Malvadkar	2009	Spinal cord cancer	17

Source: L B Deshpande, who studied the deaths in his Solapur locality since two towers were installed four years ago

Cell Phones- Cigarettes of 21st Century

What do they have in common?

✓Produced by Multi-Billion $ Companies

✓Products linked to illness

✓Industries deny any health problem

Blackberry warns: "*. . . keep the device at least 0.98 inches (25 mm) from your body . . . and SHOULD NOT be worn or carried on the body.*"

✓Warnings on cigarette packages, cell phone manufacturers are beginning to put warnings on user manual –

CELLPHONE USER'S MANUAL:
warns customers to keep cellphones away from body.

- Until now, man has been absorbing the harmful, unseen EM radiations without even being aware of it, but now, with rapid advent in technology this RF Radiation pollution has started having ill effects on human health and health of animals.

- Hence, there is an urgent need to take precautionary steps.

- Example, when a glass is filled with water, it holds up to a certain level, but once it reaches the rim, it starts spilling. Similarly, our bodies can also absorb radiation up to a certain limit.

CONCLUSIONS

- In addition to continuous radiation from cell towers, there is radiation from cell phones, computers, laptops, TV &FM towers, microwave ovens, etc. -additive in nature.
- Stricter radiation norms must be enforced in India.
- This does not mean that we have to stop living near these towers. We all know that automobiles create air pollution... Hence came up with unleaded petrol, CNG driven vehicle, hybrid vehicles, etc. Similarly, the solution to avoid excess radiation is to use radiation shields.
- Mobile companies should not be in the denial mode and accept that radiation causes serious health problems. Only then people all over the world will carry out research to come out with solutions.

REFERENCES

1) Haumann Thomas, et al, " HF-Radiation levels of GSM cellular phone towers in residential areas"
2) Salford, Leif G et al., Nerve Cell Damage in Mammalian Brain After Exposure to Microwaves from GSM Mobile Phones, Environmental Health Perspectives 111, 7, 881–883, 2003
3) Gandhi et al., IEEE Transactions on Microwave Theory and Techniques, 1996.
4) Agarwal Aet al Relationship between cell phone use and human fertility: an observational study, Oasis, The Online Abstract Submission System, 2006
5) Wood, A.W., Armstrong, S.M., Sait, M.L., Devine, L. and Martin, M.J., Changes in human plasma melatonin profiles in response to 50 Hz magnetic field exposure, Journal of Pineal Research, 25, 116-127, 1998
6) Blackman CF, Benane SG, Kinney LS, House DE, Joines WT , Effects of ELF fields on calcium-ion efflux from brain tissue in vitro, Radiation Research, 92, 510-520, 1982
7) Lai, H, Singh, NP, Melatonin and a spin-trap compound block radiofrequency electromagnetic radiation-induced DNA strand breaks in rat brain cells, Bioelectromagnetics, 18, 446-454, 1997a
8) Altamura G, Toscano S, Gentilucci G, Ammirati F, Castro A, Pandozi C, Santini M,Influence of digital and analogue cellular telephones on implanted pacemakers,European Heart Journal, 18(10), 1632-4161, 1997
9) Blank M, Goodman R, Electromagnetic fields stress living cells, Pathophysiology 16 (2009) 71–78,
10) Anu Karinen, Sirpa Heinävaara, Reetta Nylund and Dariusz Leszczynski* Mobile phone radiation might alter protein expression in human Skin, *BMC Genomics,* Finland, 2008, **9:**77
11) Hutter HP et al, Tinnitus **and mobile phone use, Occup Environ Med. 2010**
12) Panda et al, Audiologic disturbances in long-term mobile phone users., J Otolaryngol Head Neck Surg., Chandigarh, 2010 Feb 1;39(1):5-11.

REFERENCES

13) Abdel-Rassoul G, et al, Neurobehavioral effects among inhabitants around mobile phone base stations, Neurotoxicology, 28(2), 434-40, 2006
14) Burch, J.Bet al "Cellular telephone use and excretion of a urinary melatonin metabolite". In: Annual review of Research in Biological Effects of electric and magnetic fields from the generation, delivery and use of electricity, San Diego, CA, Nov. 9-13, P-52.
15) Stang A, Anastassiou G, Ahrens W, Bromen K, Bornfeld N, Jöckel K-H: The possible role ofradio frequency radiation in the development of uveal melanoma. Epidemiology 2001 , 12(1):7-12
16) Hardell L, Carlberg M, So¨derqvist F, Hansson Mild K, Morgan LL. Long-term use of cellular phones and brain tumours: increased risk associated with use for >/_10 years. Occup Environ Med 2007;64: 626e32.
17) Santini R, Santini P, Danze JM, Le Ruz P, Seigne M, Study of the health of people living in the vicinity of mobile phone base stations: Incidence according to distance and sex, Pathology Biology, 50(6), 369-73, 2002 27
18) Eger H., Hagen K. U., Lucas B., Vogel P., Voit H., The Influence of Being Physically Near to a Cell Phone Transmission Mast on the Incidence of Cancer, Published in Umwelt·Medizin·Gesellschaft 17,4 2004
19) Balmori, A. (2002). Evidence of a connection between sparrow decline and the introduction of phone mast GSM
20) Lo¨scher W, Ka¨s G. Conspicuous behavioural abnormalities in a dairy cow herd near a TV and radio transmitting antenna. Practical Vet. Surgeon 1998;29:437–44.
21) Balmori A., Electromagnetic pollution from phone masts. Effects on wildlife, Pathophysiology 16 (2009) 191–199


THANK YOU