2nd Workshop on

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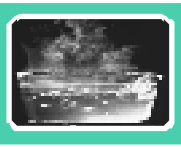
CELL PHONE/TOWER RADIATION HAZARDS & SOLUTIONS

Prof. Girish Kumar
IIT Bombay
Tel: (022) 2576 7436
gkumar@ee.iitb.ac.in

OUTLINE OF PRESENTATION

Cell Tower Statistics



Microwave Heating Principle

Radiation Pattern of Cell tower Antenna

EMF exposure Safety norms

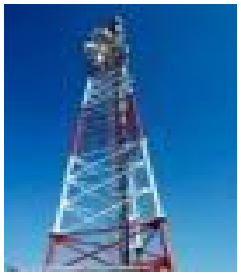
Radiation measurements near cell towers

Review Biological effects

Solutions

Cell Phone and Tower Statistics in India

India Population –
1.2 billion



Mobile Towers –
5 lakh

Mobile subscribers –
900+ Million

Microwave Radiation

Microwave radiation effects are classified as:

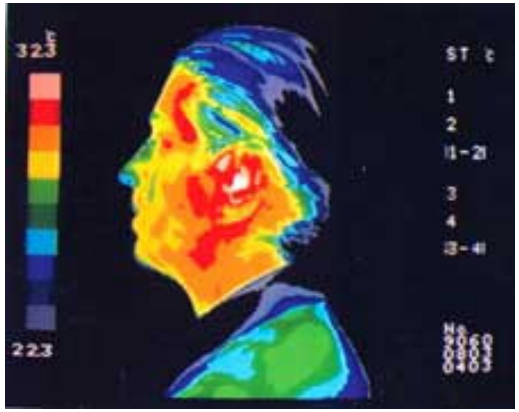
- Thermal
- **Non-thermal**

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.

Cell Phone - Ear Warming?

Have you ever noticed warm sensation in ear after using mobile phone for a long time?



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

Warm sensation/pain > tinnitus > irreversible hearing loss

All these effects lead to Ear Tumor

<u>Tinnitus or "Ringxiety"-</u> sensation of cell phone ring

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 watts per kg (W/kg).

In USA, max. SAR limit for cell phones is **1.6W/Kg** which is 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 given to people in India.

Warning from Blackberry

BlackBerry device keep the BlackBerry device at least 0.98 in. (25 mm) from your body when the BlackBerry device is transmitting. When using any data feature of the BlackBerry device, with or without a USB cable, hold the BlackBerry device at least 0.98 in. (25 mm) from your body. If you use a body-worn accessory not supplied by RIM when you carry the BlackBerry device, verify that the accessory does not contain metal and keep the BlackBerry device at least 0.98 in. (25 mm) from your body when the BlackBerry device is transmitting.

To reduce radio frequency (RF) exposure consider these safety guidelines:

- Use the BlackBerry device in areas where there is a strong wireless signal. The indicator that provides information about the strength of the wireless signal is located in the upper-right corner of the Home screen and displays five ascending bars. Three or more bars indicate a strong signal. A reduced signal display, which might occur in areas such as an underground parking structure or if you are traveling by train or car, might indicate increased power output from your BlackBerry device as it attempts to connect to a weak signal.
- Use hands-free operation if it is available and keep the BlackBerry device at least 0.98 in. (25 mm) from your body (including the abdomen of pregnant women and the lower abdomen of teenagers) when the BlackBerry device is turned on and connected to the wireless network. For more information about carrying your BlackBerry device, see the holster information in the "Additional safety guidelines" section of this document.
- Reduce the amount of time spent on calls.

Page 18 - Complete manual can be downloaded from -
http://docs.blackberry.com/en/smartphone_users/deliverables/11261/BlackBerry_Bold_9700_Smartphone-US.pdf

Results of Re-evaluation of Interphone Study

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

Re-evaluation - Risk underestimated by at least 25%

- For every 100 hours of use -26% ↑ risk of meningioma
- Initial 24% risk of glioma ↑to 55% over 10 years- regular users are taken as people who use it for **2hrs/month.**
- Doubled - quadrupled brain tumor risk - heavy users **(1/2 hour/day)** over 8 to 10 years.
- Children, young adults– excluded. New study - Mobi-kids

WHO: Cell phone use can increase cancer risk

International Agency for Research on Cancer (IARC), a part of **WHO designates cell phones as "possible human carcinogen" [Class 2B]**

World Health Organization

Found evidence of increase in glioma and acoustic neuroma brain cancer for mobile phone

International Agency for Research on Cancer

World Health Organization

PRESS RELEASE
N° 208

31 May 2011

IARC CLASSIFIES RADIOFREQUENCY ELECTROMAGNETIC FIELDS AS POSSIBLY CARCINOGENIC TO HUMANS

Cell Tower Radiation

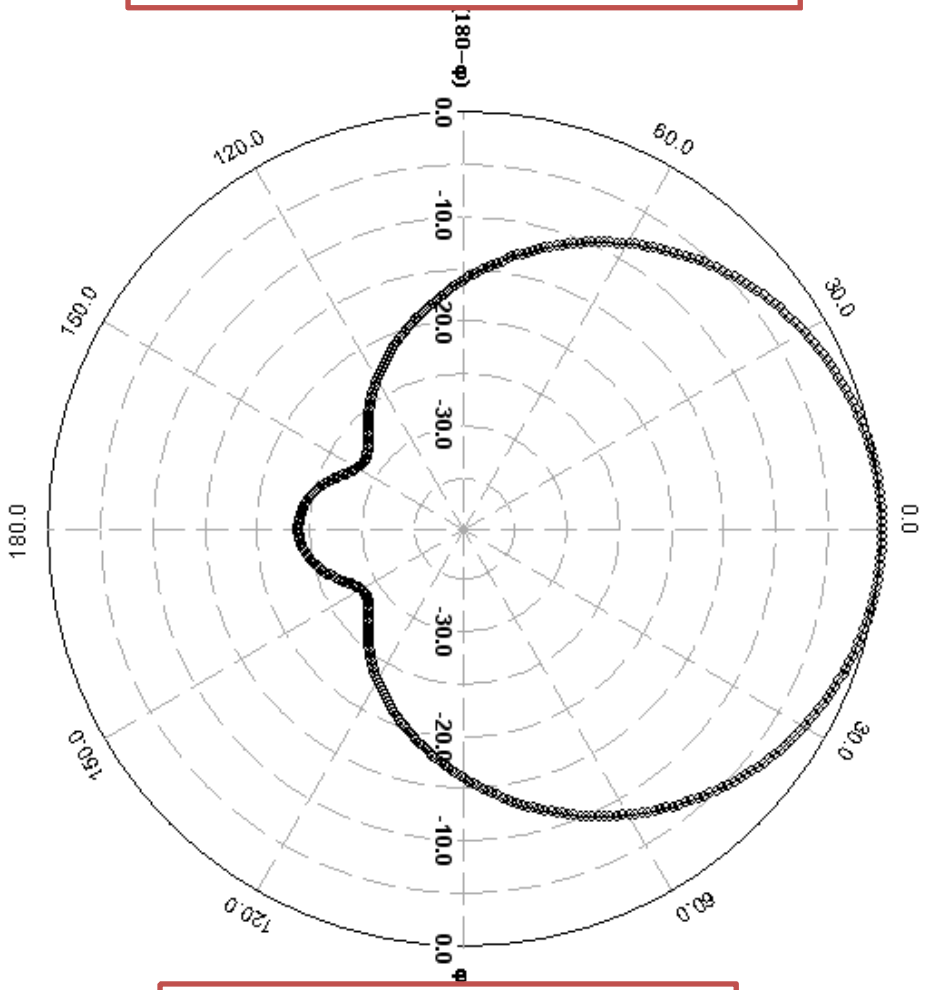
Antennas on Cell tower transmit in the frequency range of:

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

Cell Towers Installed in Mumbai

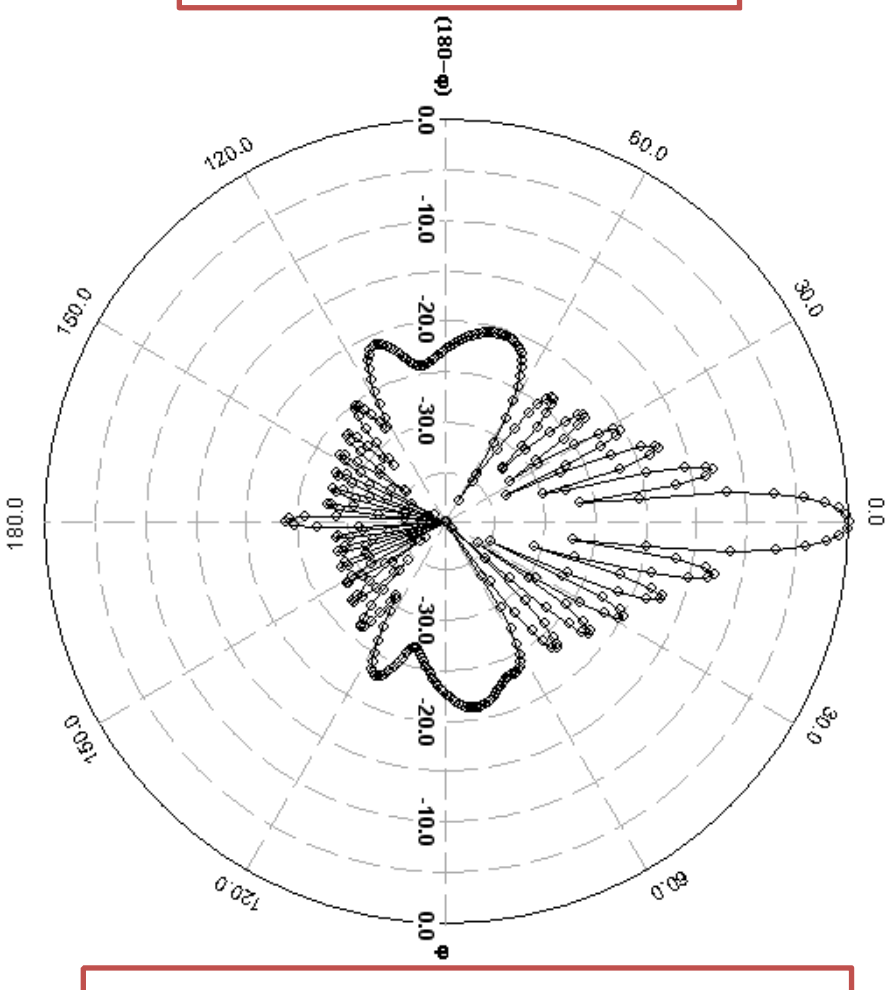
Radiation Pattern of Antenna

Horizontal plane



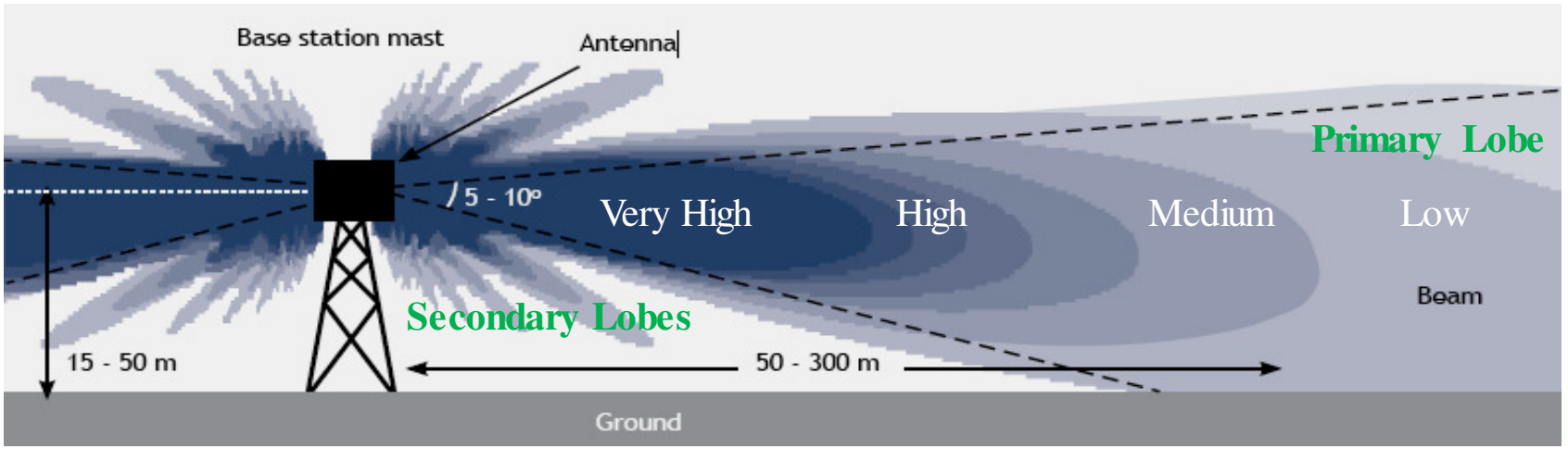
Beam is wide

Vertical plane



Main beam is narrow with secondary side lobes

Radiation Pattern of a Cell Tower Antenna

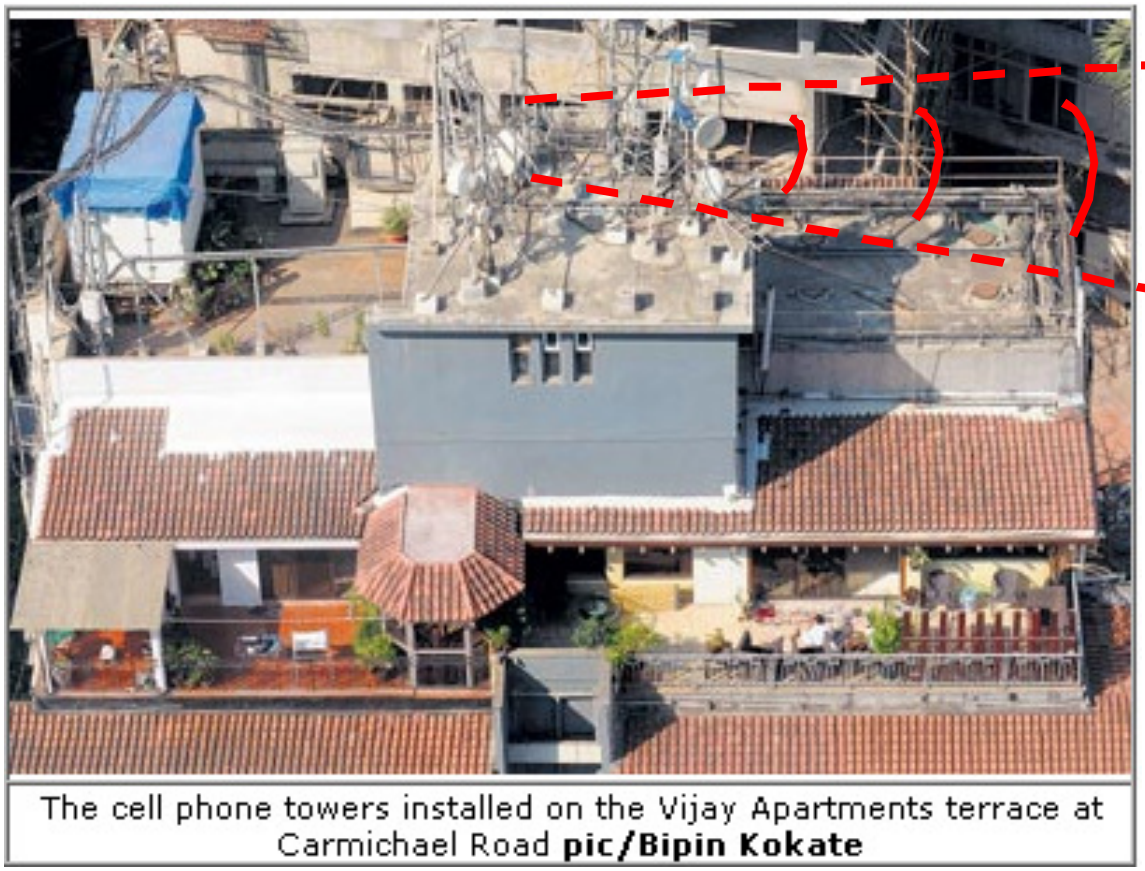


Propagation of "main beam" from antenna mounted on a tower or roof top

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

Power varies by $1/R^2$, where R = Distance from tower

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

Six cancer cases in consecutive floors (5^{th}, 6^{th}, 7^{th}, 8^{th} and 10^{th}) 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 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

Above values are for a **single carrier and a single operator**.

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, radiation level is extremely high.

ICNIRP Guidelines

India adopts ICNIRP guideline for Power density (P_d)
= Frequency /200, frequency is in MHz
(averaged over **6 min** exposure)

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 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

ICNIRP Guideline – Adopted by India

According to ICNIRP, for frequency (400-2,000 MHz) safe power density = f/200
So for GSM1840;
Safe power density according to ICNIRP is 1840/200 = **9.2W/m²** which is for 6 min as mentioned in point no. 3

Table 7. Reference levels for general public exposure to time-varying electric and magnetic fields (unperturbed rms values).[a]

Frequency range	E-field strength ($V\ m^{-1}$)	H-field strength ($A\ m^{-1}$)	B-field (μT)	Equivalent plane wave power density S_{eq} ($W\ m^{-2}$)
up to 1 Hz	—	3.2×10^4	4×10^4	—
1–8 Hz	10,000	$3.2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8–25 Hz	10,000	$4{,}000/f$	$5{,}000/f$	—
0.025–0.8 kHz	$250/f$	$4/f$	$5/f$	—
0.8–3 kHz	$250/f$	5	6.25	—
3–150 kHz	87	5	6.25	—
0.15–1 MHz	87	$0.73/f$	$0.92/f$	—
1–10 MHz	$87/f^{1/2}$	$0.73/f$	$0.92/f$	—
10–400 MHz	28	0.073	0.092	2
400–2,000 MHz	$1.375f^{1/2}$	$0.0037f^{1/2}$	$0.0046f^{1/2}$	$f/200$
2–300 GHz	61	0.16	0.20	10

[a] Note:
1. f as indicated in the frequency range column.
2. Provided that basic restrictions are met and adverse indirect effects can be excluded, field strength values can be exceeded.
3. For frequencies between 100 kHz and 10 GHz, S_{eq}, E^2, H^2, and B^2 are to averaged over any 6-min period.

Figure 1 Reference (ICNIRP, Pg 18 Table 7)

FCC limit for max. permissible exposure

Table 1. ***FCC Limits for Maximum Permissible Exposure (MPE)***

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz *Plane-wave equivalent power density

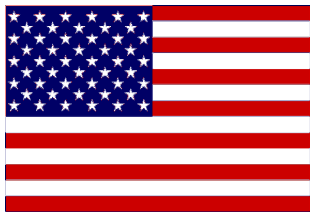
Table 1A – Safe Power density = f/300 averaged over 6 min exposure.

Table 1B – Safe power density = f/1500 averaged over 30 min exposure.

(From FCC 1999 - Pg 17 - Table 1)

Tower Installation : USA (FCC Guidelines) vs India

In USA



- Cellular cell site towers are typically 50-200 feet high.
- In urban areas, cell sites commonly emit an ERP of 10 watts per channel or less. An ERP of 10 watts corresponds to an actual radiated power of around 1 watt depending on the type of antenna used.

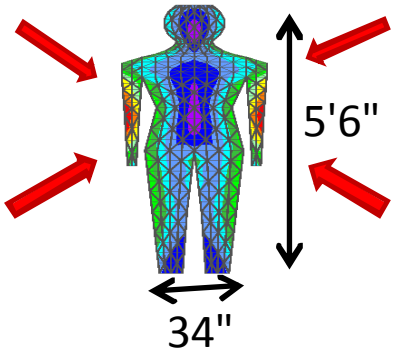
http://www.fcc.gov/guides/human-exposure-rf-fields-guidelines-cellular-and-pcs-sites

In India

- Cellular cell site towers are even 5-10 feet high; on sides of building and outside window.
- In INDIA, cell sites transmit 100's of Watts of power with antenna gain of more than 10, so ERP > 1000 Watts

Power Absorbed by Human Body

Microwave power absorbed by human body if exposed to 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 <u>500 W.</u>

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

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

EMF Radiation Standards (for GSM900)

Country	Milliwatt / m^2	Watts / m^2
INDIA (adopted ICNIRP)	**4500**	**4.5 (f/200)**
INDIA (Proposed 1/10th of ICNIRP)	450	0.45 (f/2000)
AUSTRALIA (New South Wales proposed)	0.01	0.00001
AUSTRIA (Salzburg city)	1	0.001
BELGIUM	45 to 1125	0.045 to 1.125
BELGIUM (Luxembourg)	24	0.024
BIO-INITIATIVE REPORT (Outdoor)	1	0.001
BIO-INITIATIVE REPORT (Indoor)	0.1	0.0001
CANADA (Toronto Board of Health - proposed)	100	0.1
CHINA	400	0.4
FRANCE (Paris)	100	0.1
GERMANY (ECOLOG 1998 - Precautionary Recommendation)	90	0.09
GERMANY (BUND 2007 - Precautionary Recommendation)	0.1	0.0001
ITALY	100	0.1
NEW ZELAND (Aukland)	500	0.5
POLAND	100	0.1
RUSSIA	100	0.1
SWITZERLAND (Apartments, Schools, Hospitals, Offices & Playgrounds)	42	0.042
USA (Implementation is strict)*	3000	3 (f/300)
Final Recommendations		
Indoor - include apartments, schools, hospitals, offices & playgrounds.	**0.1**	**0.0001**
Outdoor - where people spend few minutes a day.	**10**	**0.01**

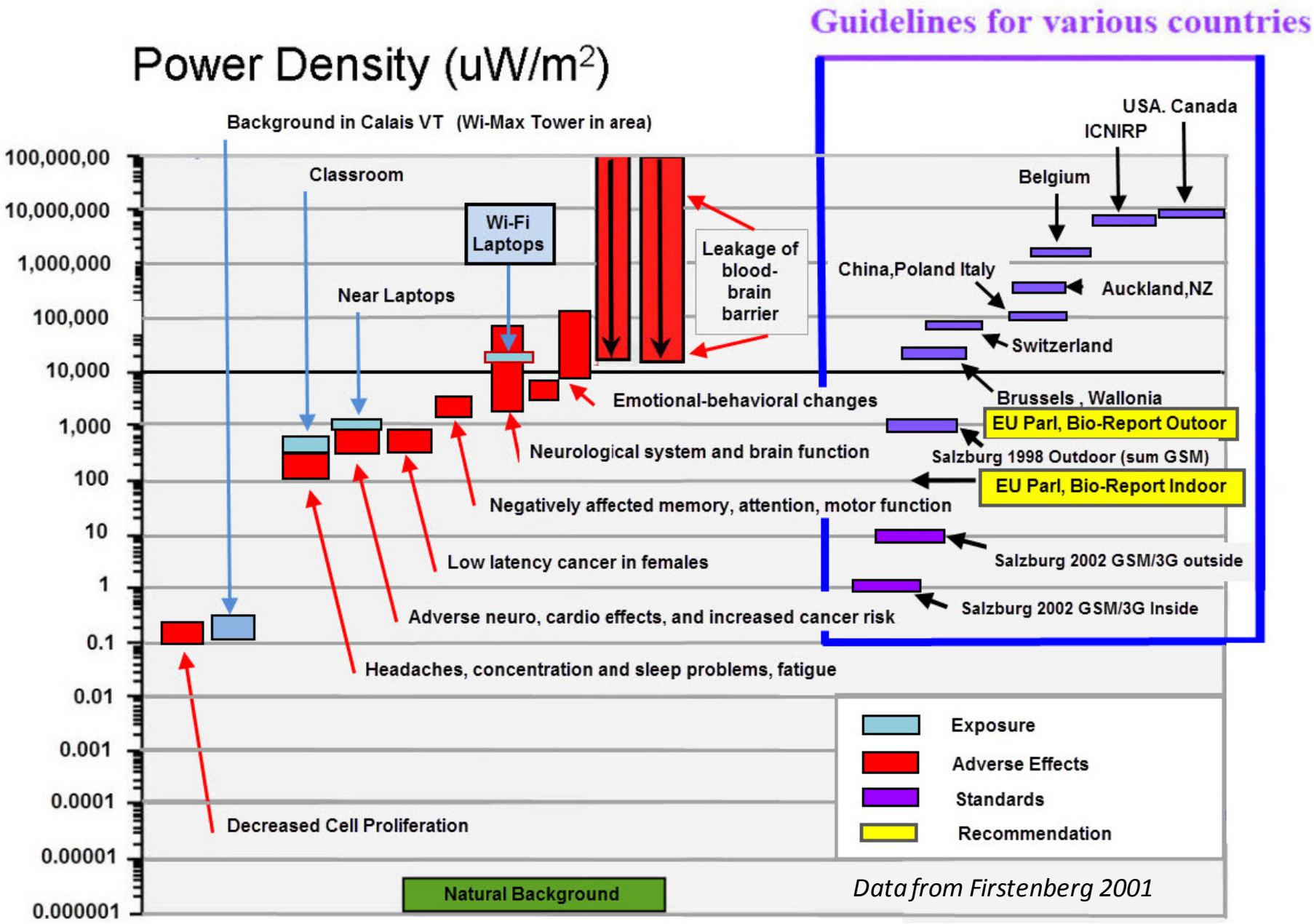
**USA - FCC Guidelines: f/300 if averaged over 6 minutes and f/1500 if averaged over 30 min*

Radiation Measurement at various locations

Cumulative Readings including CDMA, GSM 900, and GSM 1800

Location	Reading in dBm	Readings in W/m2	Readings in microW/m2
Terrace, New Rajindra Nagar, Delhi	+09	0.561	5,61,479
Resident 1, Bedroom - Chowpatty	+06	0.281	2,81,406
Resident 2, Bedrooms - Opera House	+05	0.223	2,23,529
Resident 3, Bedroom – ML Dahanukar Marg	+05	0.223	2,23,529
Delhi-Gurgaon Highway - near Toll (3 towers)	0	0.0706	70,686
Vashi Bridge - after Railway Station	-4	0.0282	28.274
Resident 3, 4th Fl: Sergean House Lady w/cancer	-6	0.0177	17,756
Resident 4, Dadar East, Lady w/cancer	-6	0.0177	17,756
Resident 5, Opposite roof, Rane Society, Powai	-10	0.00706	7,069
Ustav Chowk, Kharghar	-12	0.00446	4,460
Govandi- Residential towers - near Indian Oil	-14	0.002814	2,814
Lower Parel Employees-headaches, forgetfulness	-16	0.001776	1,776
Vashi Highway – near Turbhe	-18	0.001120	1,120
Nerul Bridge	-20	0.000707	707
Vivero pre School (opposite powai lake)	-22	0.000446	446
Rajeev Gandhi nagar	-26	0.000177	177
On road near Evita (Hiranandani Building)	-28	0.000112	112
D-Mart,Hiranandani, Powai	-34	0.0000280	28
IIT Bombay School of Management - Entrance	-46	0.00000178	1.78

Health concerns with current Safety Guidelines



BIOLOGICAL EFFECTS

Most common complaints:

- Sleep disruption
- Headache
- Concentration
- Forgetful memory
- Depression
- Fatigue
- Dizziness
- Palpitations of the heart
- Visual disorders
- Cardiovascular problems
- Buzzing in the head
- Altered reflexes

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

BIOLOGICAL EFFECTS

Neurodegenerative Disorders –Alzheimer, Parkinson's

Immune System Degradation

Tinnitus and Ear Damage

Irreversible infertility

Effect on Skin

DNA Damage

Increase in Cancer risk

Sleep Disorders

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

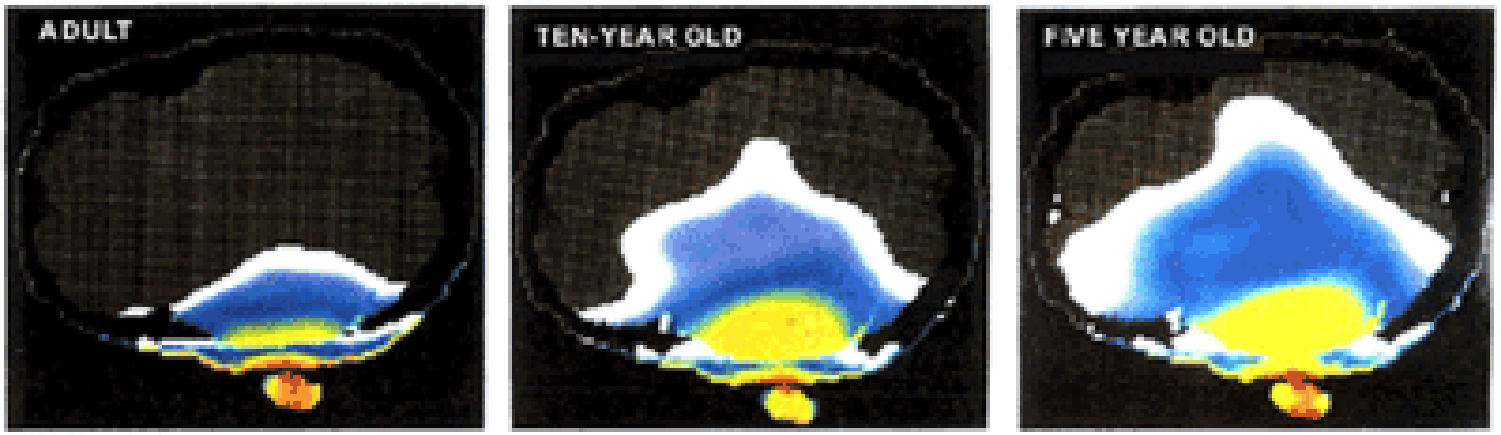
Keeping mobile phone next to head or below pillow while sleeping

NOT ADVISABLE

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
- Immune system not well developed -less effective against fighting cancer growth

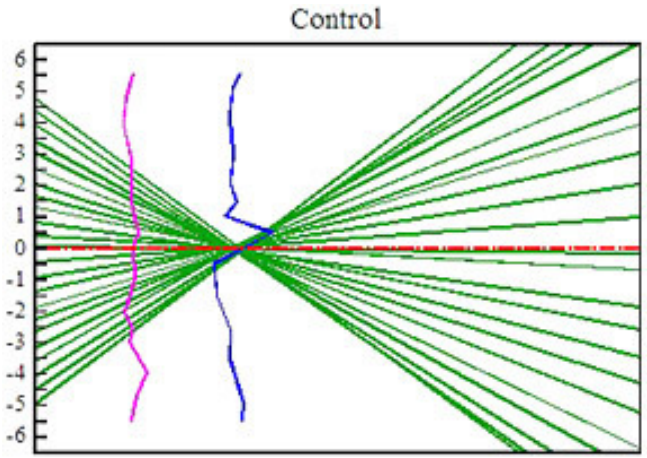


RF penetration in the skull of an adult (25%), 10 year (50%) and a 5 year old (75%).

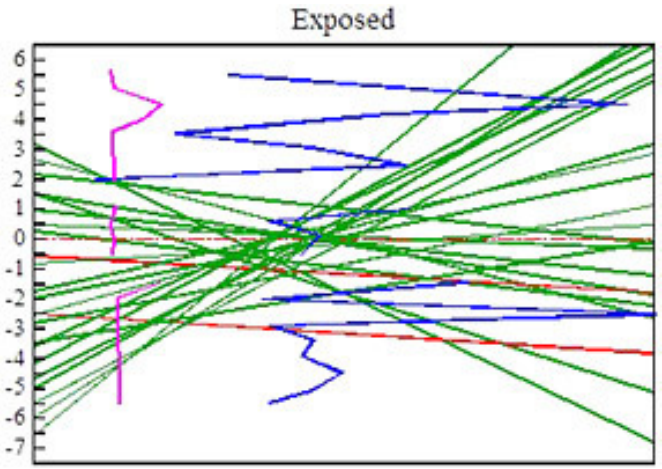
Risk to Pregnant Women

A pregnant woman and the fetus both are vulnerable as RF radiations can pass placental barrier & continuously react with the developing embryo and increasing cells.

Effect on Eye/ Uveal Melanoma



Good quality lens



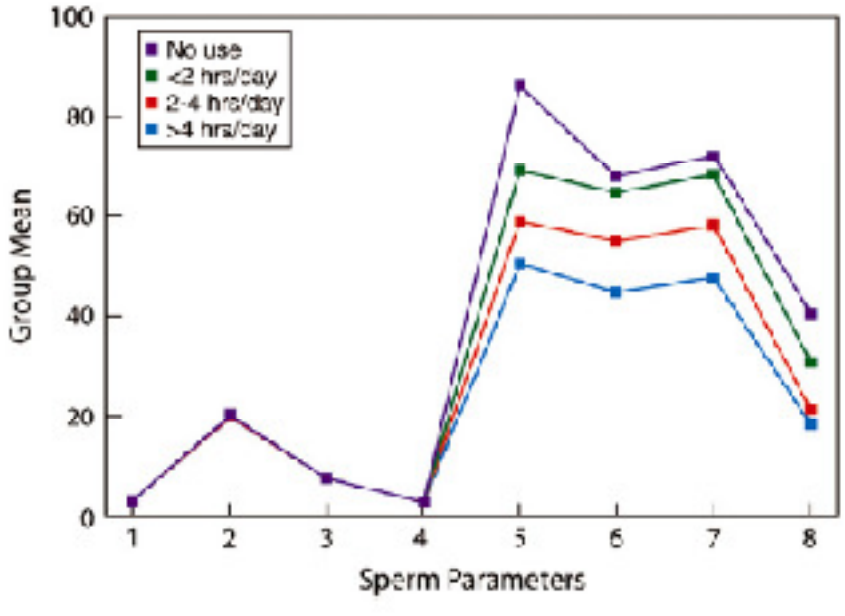
Ability to focus the laser beam at the various locations is altered.

Prolonged exposure to microwave radiation can lead to macroscopic and microscopic damage to the lens and part of this damage does not heal and accumulates with time.

Irreversible infertility

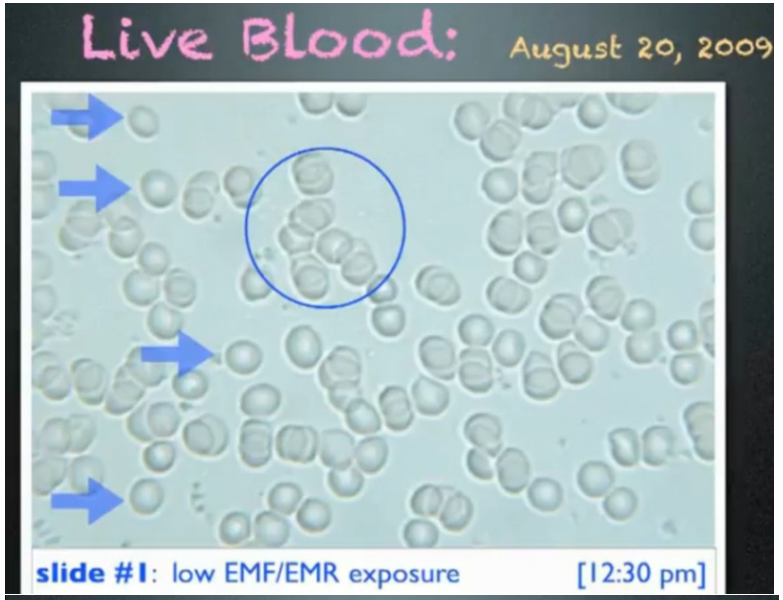
Continuous exposure ⟹ 30% sperm decrease in intensive mobile users, in addition to damage of sperms

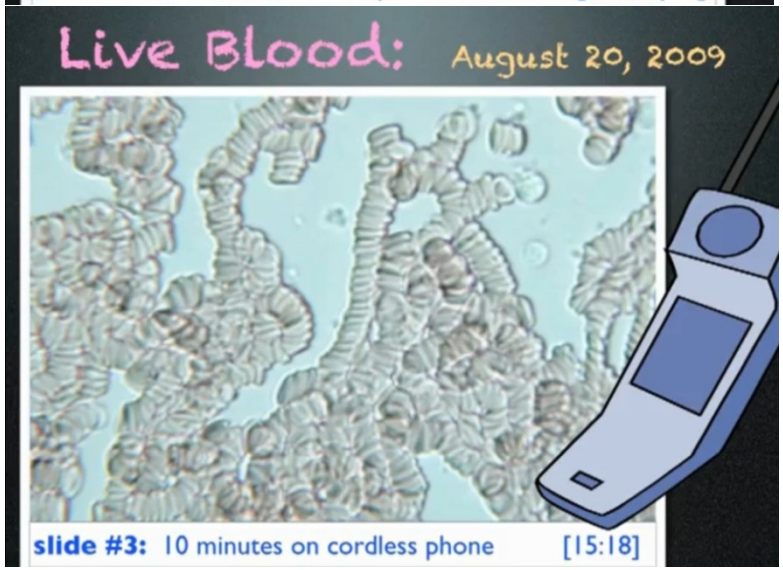
Sperm parameter profile for cell phone use groups. The x-axis lists eight sperm parameters: 1 = volume; 2 = liquefaction time; 3 = pH; 4 = viscosity; 5 = sperm count; 6 = motility; 7 = viability; and 8 = percent normal morphology. The y-axis depicts the mean value of the corresponding sperm parameters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



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

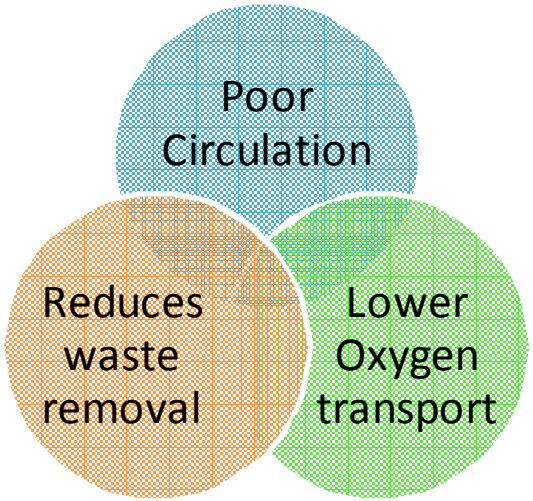
Live Blood Cells and Electrosmog



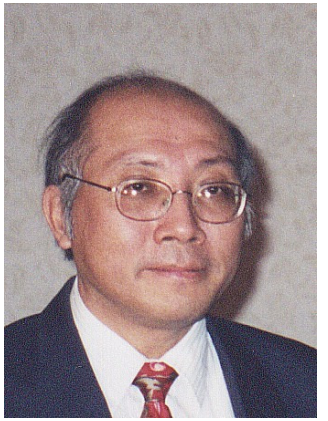


Dr. Magda Havas
Trent University, Canada

Consequences



DNA Damage



Prof. Henry Lai
University of Washington
1995, Diem *et al. 2005*

Single and double strand breaks observed in DNA from microwave exposure at levels below the current FCC exposure standard.

Fig.1 Unexposed control. Bundle of DNA (No-Tail)

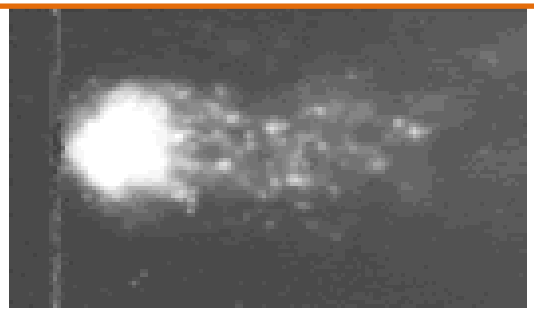


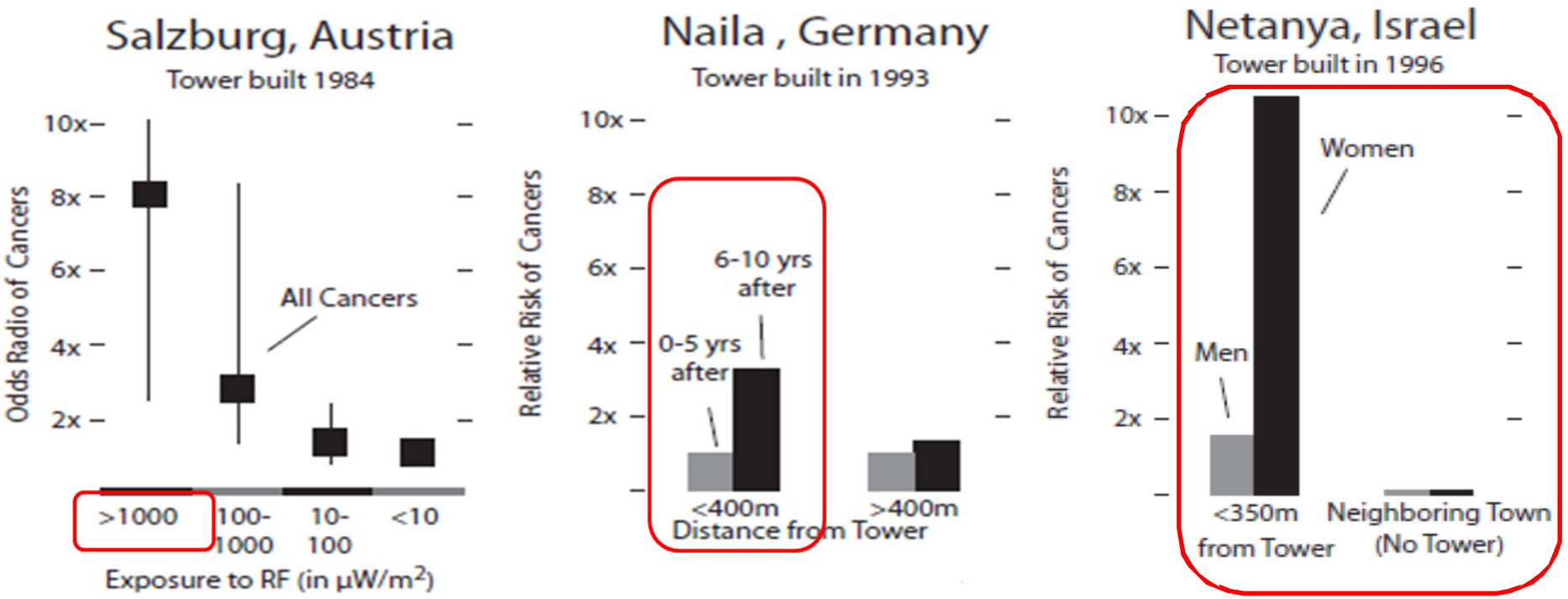
Fig.2 X-ray calibration 25.6 rads. DNA breaks are very obvious

Fig.3 Cell Phone level microwave exposure 2hrs 2.45GHz reaching so called Safe SAR levels

Comet Tail = DNA Damage

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

Effect of Cell Towers (some references)



❑ 8 times increased cancer risk for exposure **> 1000µW / m² =1 mW / m²**

❑ Risk is higher after 6-10 years of exposure

❑ Women living near towers had 10 times increased cancer risk

http://www.getmefacts.info/files/emfposter.pdf ***updated on 11Sep'11***

Effect on Birds and Animals

Have you ever seen any bird near cell towers?

May be not, because birds have more volume and less weight, so heating effect is very fast.

Birds and Bees

- Interfere with navigation and reproduction

Animals

- Dairy cows – Decreased milk production, reproductive and developmental problems and decline in overall health.
- Sheep, dogs, cats, rabbits living near base stations affected.

Effect on Plants

4 cell towers near Gurgaon-Delhi Toll Naka

Output of most of fruit bearing trees drastically reduced from 100% to < 5% after 2.5 years of cell tower installation.

Electromagnetic Radiation Research foundation of South Africa

Picture sent by Tracey-Lee , South Africa

EMF adversely affecting vegetation - Republic of South Africa

DOT Inter-Ministry Committee (IMC) accepts cell phone and tower radiation hazard

IMC Report ON EMF RADIATION was uploaded on DOT website in Jan. 2011.

Mentions several health hazards due to radiation on Human Health and Environment (pages 12-27).

Mentioned Bio-initiative report 2007 recommendation 1000 microW/m2 for outdoor cumulative RF exposure (Page 32).

Yet recommended RF exposure limits in India may be lowered to **only 1/10th** of the existing reference level, which will be 0.92W/m2 for GSM1800 (Page 33)

Expert Group reported impacts of communication towers on Wildlife including Birds and Bees *(2011)*

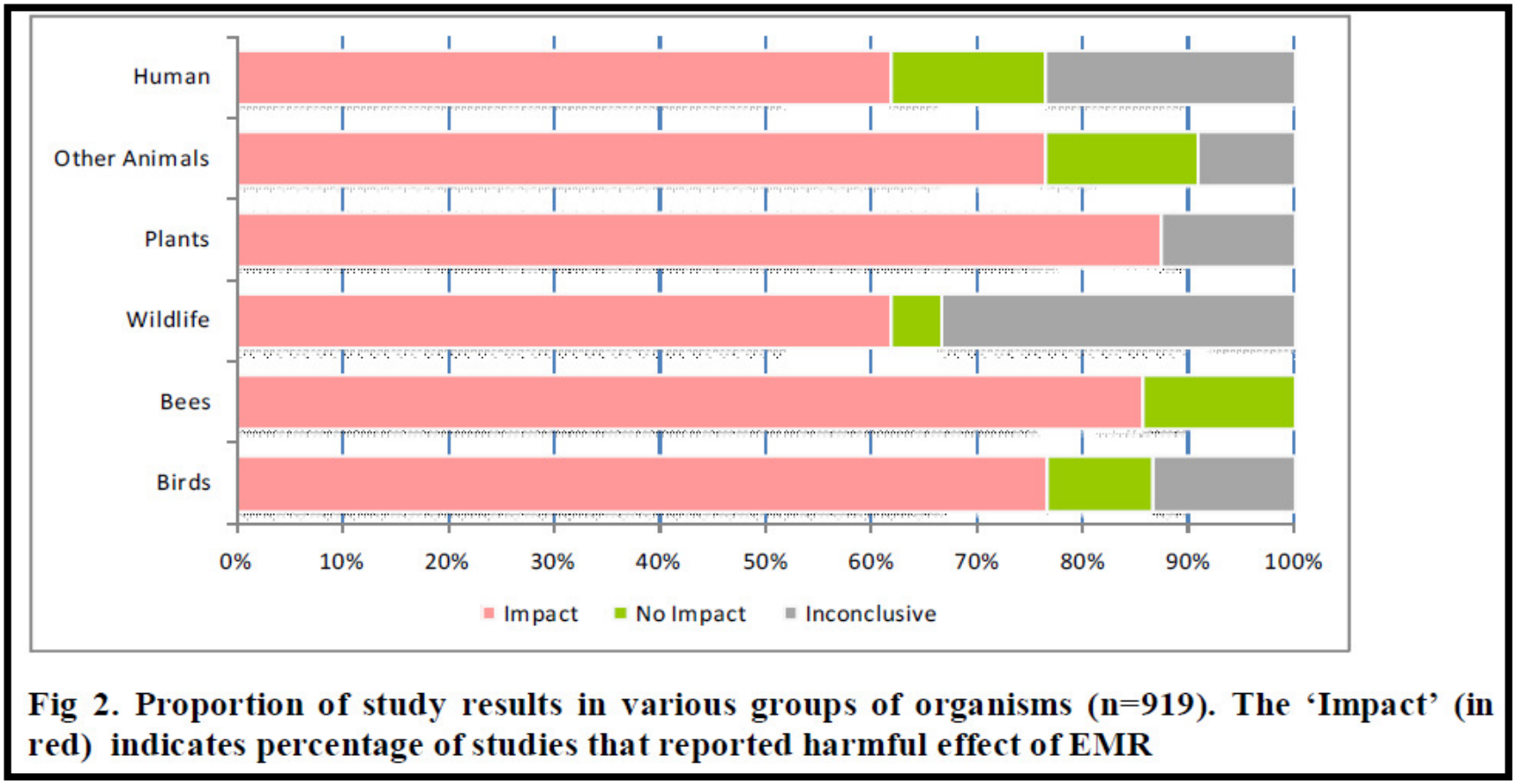


Fig 2. Proportion of study results in various groups of organisms (n=919). The 'Impact' (in red) indicates percentage of studies that reported harmful effect of EMR

Out of 919 research studies collected:

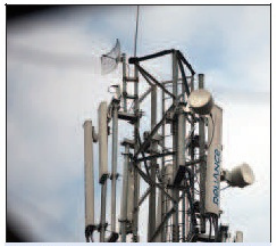
593 - report Impact; **130** - No Impact; **196** - Inconclusive

NEWS COVERAGE

7 June 2011, Pg 1

State to nix cell towers on schools, hospitals

Prafulla Marpakwar | TNN



Mobile towers in Mumbai **1,600**

On schools and hospitals **500**

Mumbai: Taking a cue from the widespread concern about mobile towers installed on school and hospital buildings, the Maharashtra government is all set to amend the Development Control (DC) Rules in this regard. Of the 1,600 mobile towers in Mumbai, nearly 500 (or 30%) are atop schools and hospitals. The remaining are on private or commercial buildings.

"Since fears have been e
about the radiation from mobil
we are readying to remove th
school and hospital buildings,"
official told TOI on Monday. "On

rules are amended, it will be mandatory for the operators to remove the towers within six months."

As per the proposed amendment, the operator will have to submit a certificate stating that the emission is within the permissible level and an undertaking that the existing tower will be removed within six months. "New Delhi has al-

Chandigarh - 8 June 2011, Pg 1

Inform public about health hazard of mobile towers: High Court to Govt

08.06.11
Ind. Exp.
Pg. 04
Pune Edn

RAGHAV OHRI
CHANDIGARH, JUNE 7

EXPRESSING concern over the effects of radiation from mobile towers installed in residential areas, the Punjab and Haryana High Court has held that it will be the duty of the government and mobile companies to inform

Making it clear that "there is no absolute right to carry on any business", the Bench ruled that "it (business) is always subject to reasonable restriction and regulation", and highlighted the damage being caused due to the radiation originating from the mobile towers. "It will be the duty of the local authorities to issue a public notice for information of all concerned where the permission for erection of a tower is being considered or granted to apprise the public as to what amount of radiation it will emit and the effect thereof on the health of the people living in the area," read the judgment.

The HC held that "the mobiles emit signals in the form of radio waves....It is also feared that the radio waves can cause changes to the cells in our brain. If the DNA in the brain cells get damaged, they may become cancerous and cause brain tumors... it is also feared that the radio waves can alter chemical and electrical reactions in our brain, changing, in effect, the way the brain cells communicate....Studies conducted revealed that sparrows have declined in most contaminated electromagnetic fields".

3 July 2011

'Actor's house vulnerable to radiation'

Sayli Udas Mankikar
sayli.mankikar@hindustantimes.com

Experts take a radiation reading at actor Juhi Chawla's residence at Malabar Hill on Saturday. HEMANT PADALKAR/HT PHOTO

If the change in tower direction led to lesser radiation levels at my house, then someone else is facing higher radiation as there are many buildings nearby.
JUHI CHAWLA, actor

MUMBAI: A day after Hindustan Times reported about Bollywood actor Juhi Chawla being worried about the mobile towers set up at Sahyadri state guesthouse located 40 meters across her house, a team from IIT Mumbai headed by professor Girish Kumar volunteered to check her claims, and found a major part of her house was 'vulnerable'.

"The range we found was between 10 to 25 milliwatts per sqm but at certain intervals it even shot up to 380. What's important is that the most occupied space in the house—the hall—has continuous exposure which is dangerous," Kumar said.

"Even 1mw of radiation is harmful and here there is exposure to about 25. And at a distance of 40 meters from a high radiation zone, one is prone to ill effects of electromagnetic radiation," Kumar said.

An independent agency reported radio frequency levels above 2000 mw per sqm at the actor's house in July 2010. The government then changed the direction of the towers and showed a lower range between 1.6 to 25.6 mw per sqm.

Chawla continues to be concerned and hopes that some concrete action is taken. "If the change in tower direction has led to lesser radiation levels at my house, it only means someone else is facing higher radiation since there are several buildings nearby," Juhi said.

News Coverage in Jaipur, Rajasthan

Dec 2011

11 May 2012

Milind Deora and A.K Mittal of TERM inspects radiation level of mobile towers at Haji Ali, Mumbai

22nd September'11

Measurement Location	Reading (in µW / m^2)
Haji Ali Juice Center	**85,000 µW / m^2**
Raj Niketan, **Opp. Sahyadri State Guest** House, Malabar Hill	Max: **42,260 µW/m^2** Min: ~178 µW/m^2

The TERM team says

"We were within WHO limits of 4,500,000 µW/ m^2".

ANALYSIS OF READINGS

Standard/ Location	Reading (in µW / m^2)	Comments
Indian Guideline - ICNIRP' 98	**4,700,000**	Equivalent to putting a person in microwave oven for 19 min/day.
IMC recommendation - Jan. 2011	4,70,000	However, the report mentions several health hazards at 1000 µW/m^2.
Haji Ali Juice Center	85,000	This level is very high but TERM says it is safe as it is within ICNIRP guideline
Opp. Sahyadri State Guest House	42,260	Cancer case in this house - "..same as above.."
Range at which health problems have been observed	>10,000 >100	**Several Cancer Cases** observed in India **Headaches, concentration problem, fatigue, miscarriage, joint pains etc** Disclaimer – Symptoms based on Individual sensitivity
Safe Radiation Density level	100	For long term continuous exposure (as per Bio-Initiative Report 2007)

Guideline of the Australian Medical Association

Irrespective of the ICNIRP recommendations for acute effects, the following benchmarks apply to regular exposure of more than four hours per day.

High-frequency electromagnetic radiation (as power flow density)

▫ ≥1000 µW/m² (≥1 mW/m²)	very far above normal
▫ 10-1000 µW/m² (0.01-1 mW/m²)	far above normal
▫ 1-10 µW/m² (0.001-0.01 mW/m²)	slightly above normal
▫ ≤1 µW/m² (≤0.001 mW/m²)	within normal limits

Ultimately, everything is related to Energy

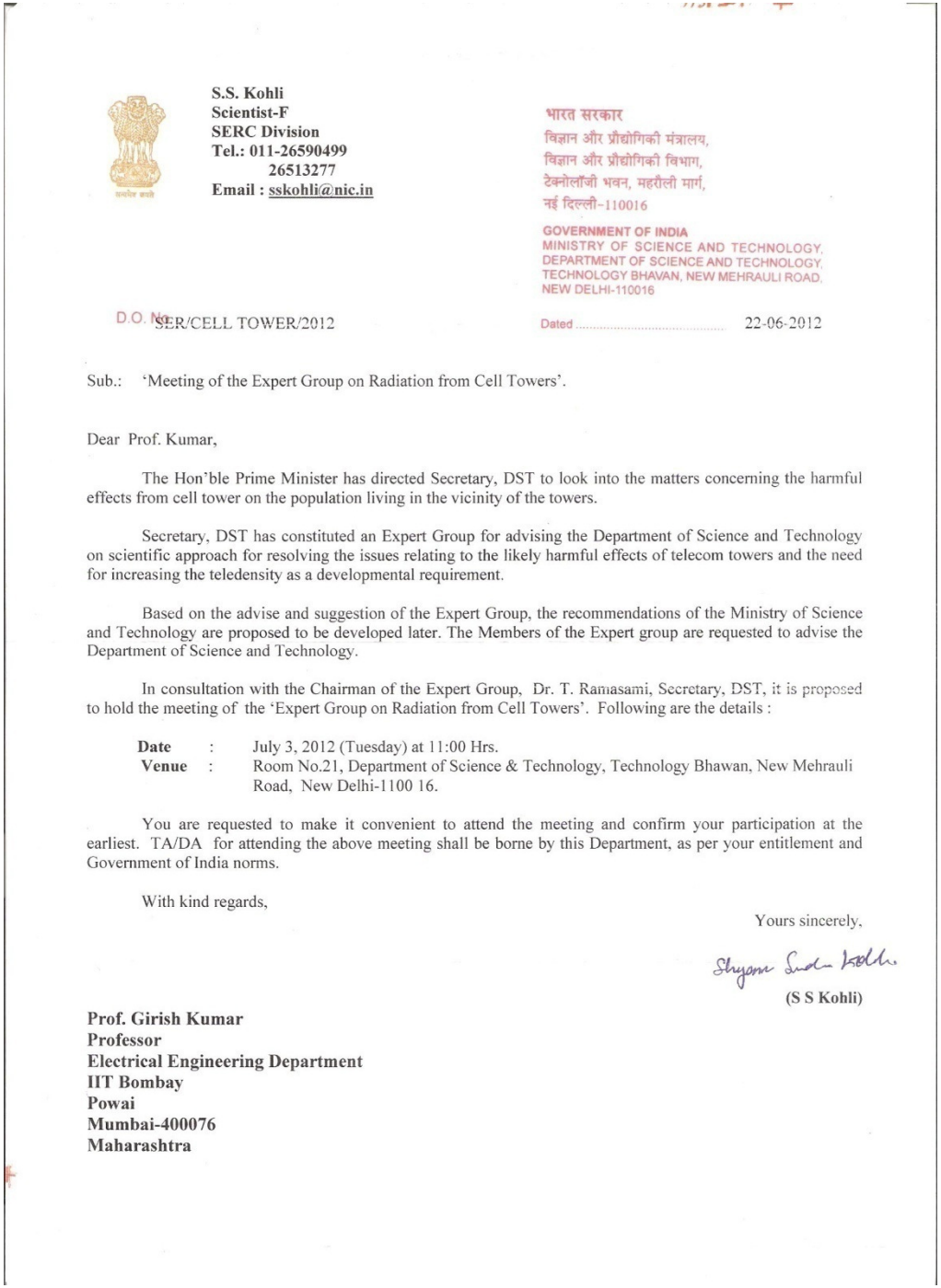
Energy = (Power x Time)

If we want to be safe for:

- 100 years, power density must be <100 $\mu W/m^2$
- 10 years, power density must be <1000 $\mu W/m^2$
- 1 year, power density must be <10,000 $\mu W/m^2$

Above values are for continuous exposure. If we are exposed for only a few hours per day, then we can afford to be exposed to higher radiation density.

LETTER FROM DST regarding EMF HAZARD



S.S. Kohli
Scientist-F
SERC Division
Tel.: 011-26590499
26513277
Email : sskohli@nic.in

भारत सरकार
विज्ञान और प्रौद्योगिकी मंत्रालय,
विज्ञान और प्रौद्योगिकी विभाग,
टेक्नोलॉजी भवन, महरौली मार्ग,
नई दिल्ली-110016

GOVERNMENT OF INDIA
MINISTRY OF SCIENCE AND TECHNOLOGY,
DEPARTMENT OF SCIENCE AND TECHNOLOGY,
TECHNOLOGY BHAVAN, NEW MEHRAULI ROAD,
NEW DELHI-110016

D.O. No. SER/CELL TOWER/2012 Dated 22-06-2012

Sub.: 'Meeting of the Expert Group on Radiation from Cell Towers'.

Dear Prof. Kumar,

The Hon'ble Prime Minister has directed Secretary, DST to look into the matters concerning the harmful effects from cell tower on the population living in the vicinity of the towers.

Secretary, DST has constituted an Expert Group for advising the Department of Science and Technology on scientific approach for resolving the issues relating to the likely harmful effects of telecom towers and the need for increasing the teledensity as a developmental requirement.

Based on the advise and suggestion of the Expert Group, the recommendations of the Ministry of Science and Technology are proposed to be developed later. The Members of the Expert group are requested to advise the Department of Science and Technology.

In consultation with the Chairman of the Expert Group, Dr. T. Ramasami, Secretary, DST, it is proposed to hold the meeting of the 'Expert Group on Radiation from Cell Towers'. Following are the details :

Date : July 3, 2012 (Tuesday) at 11:00 Hrs.
Venue : Room No.21, Department of Science & Technology, Technology Bhawan, New Mehrauli Road, New Delhi-1100 16.

You are requested to make it convenient to attend the meeting and confirm your participation at the earliest. TA/DA for attending the above meeting shall be borne by this Department, as per your entitlement and Government of India norms.

With kind regards,

Yours sincerely,

Shyam Sunder Kohli

(S S Kohli)

Prof. Girish Kumar
Professor
Electrical Engineering Department
IIT Bombay
Powai
Mumbai-400076
Maharashtra

The Hon'ble Prime Minister has directed Secretary, DST to look into the matters concerning the harmful effects from cell towers on the population living in the vicinity of the towers.

SUGGESTED SOLUTION TO REDUCE EMF HAZARD

Step 1

- **Convince operators to reduce transmitted power from 20W/carrier to max. 1 -2 W in dense urban area.**

HOW TO IMPLEMENT ?

Remove the power amplifier or reduce gain of amplifier.

ADDITIONAL BENEFITS:

Cooling of the amplifier will not be required then it may not require Air conditioner. → Power requirement will reduce, so Diesel Generator not required. Solar panel can meet this requirement → Operators can claim carbon credit and it truely leads to Green Telecom

You can see TRAI-Green-Telecom-Openhouse-GK Report

DISADVANTAGES OF REDUCING POWER:

Range will reduce. People living at larger distance may have signal problem initially. → Operators have to install more number of low power transmitter or they can provide low power repeaters → Which will cost them MORE MONEY!

SUGGESTED SOLUTION TO REDUCE EMF HAZARD

Step 2

- **Radiation measurements have to be done at residences, offices, schools, hospitals.**

HOW TO IMPLEMENT ?

If power density level is still high (i.e, more than 100-1,000microW/m^2 after reduction of the transmitted power, then either:

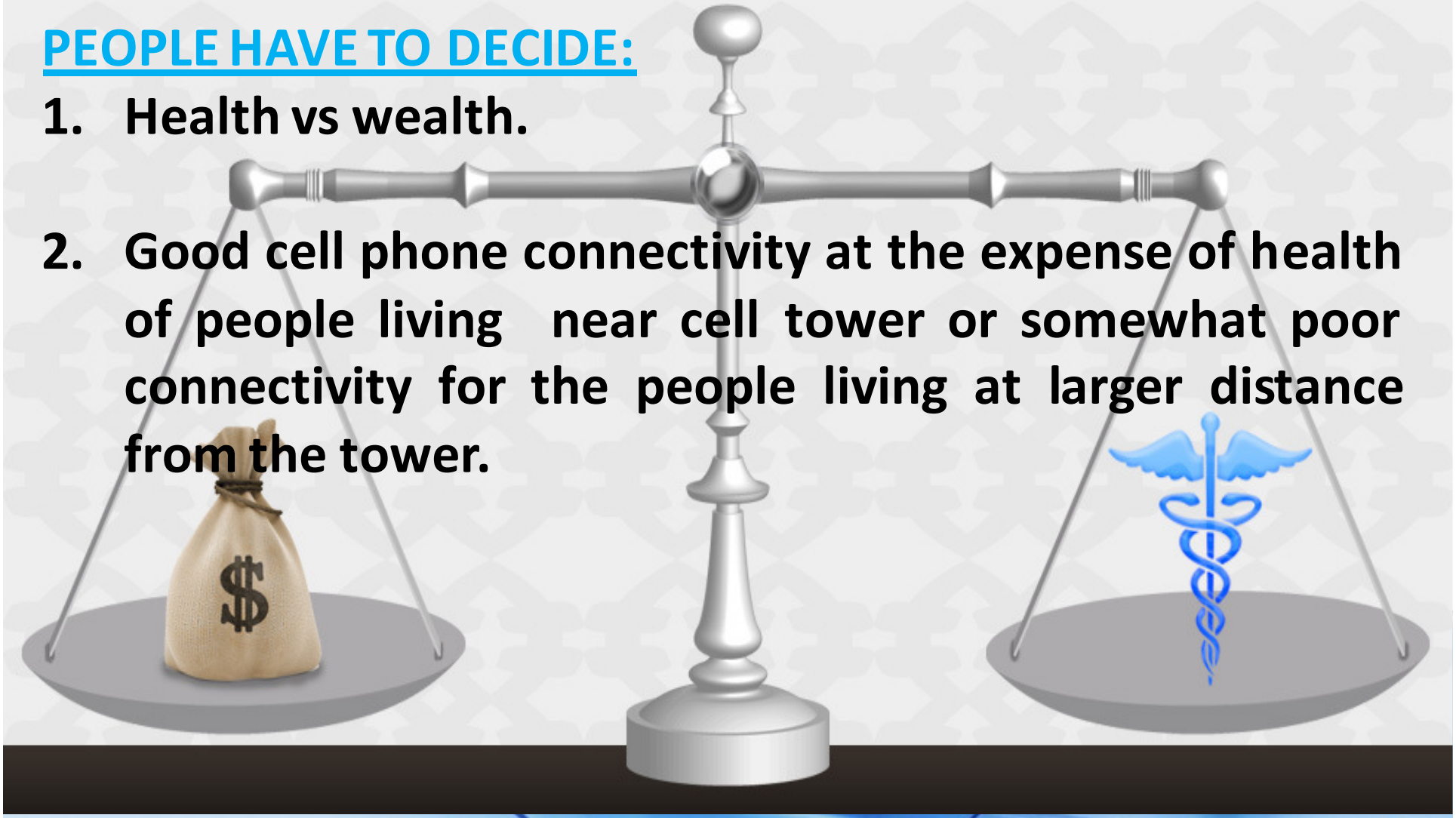
- Towers have to be relocated or
- Height of the towers has to be increased or
- Direction of the antenna has to be changed. *

*Again, any of these steps will require additional investment.

PEOPLE HAVE TO DECIDE:

1. **Health vs wealth.**

2. **Good cell phone connectivity at the expense of health of people living near cell tower or somewhat poor connectivity for the people living at larger distance from the tower.**



Thank you