

Cell Phone / Tower Radiation Hazards and Solutions

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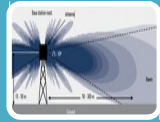
OUTLINE OF PRESENTATION



Cell Phone and Tower
Statistics



Microwave Heating Principle



Radiation Pattern of Antenna



EMF Exposure Safety Norms



Radiation Measurements



Review Biological Effects

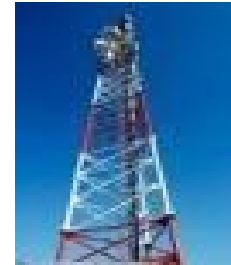


Solutions

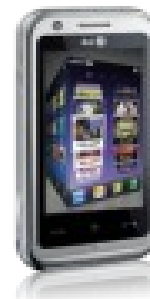
Cell Phone and Tower Statistics in India



India Population:
134+ crore



Cell Towers:
6+ lakh



Cell Phone
Subscribers:
100+ crore

Microwave Heating Principle

Microwave radiation causes vibration in the water molecules, which leads to friction and heating. The radiation effects are classified as:

- **Non-thermal**
- **Thermal**

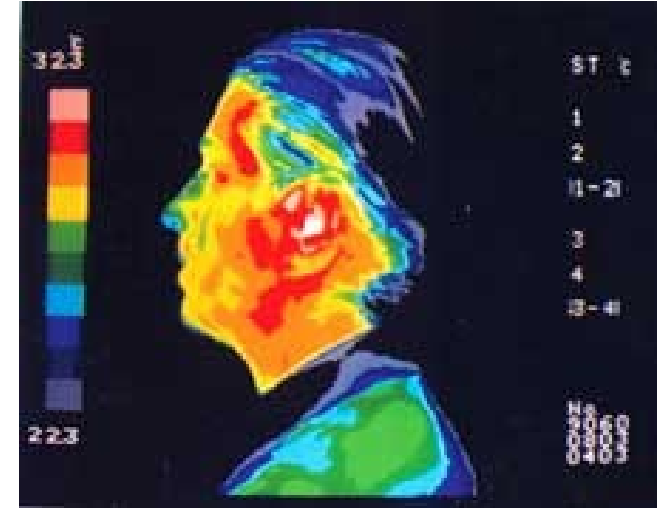
Current exposure safety standards are based on the thermal effects, which are inadequate.

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°C when cell phone is used for approx. 20 minutes.



Warm sensation → **pain** → **irreversible hearing loss and/or Ear Tumor**

SAR and Cell Phone Use Time Limit



6 minutes/day usage.

A cell phone transmits
1 to 2 watts of power

To check SAR value on
Smartphone: type *#07#

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.

iPhone 7 RF Exposure information

<http://www.apple.com/legal/rfexposure/iphone9,1/en/>

The highest SAR values of Models A1660, A1780 are:

1.6 W/kg (over 1 g) SAR Limit

Head: 1.19, Body: 1.20

To reduce exposure to RF energy, use a hands-free option, such as built-in speakerphone, the supplied headphones, or other similar accessories.

Carry iPhone at least 5mm away from your body to ensure exposure levels remain at or below the as-tested levels.

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.

Report in May 2010

Conclusion - no overall ↑ risk, but suggestions of ↑ glioma - heavy users & ipsilateral exposures

➤ Heavy users (**1/2 hour/day**) over 8 to 10 years:

Doubled - quadrupled brain tumor risk

➤ Children, young adults – excluded.

For children, new study - Mobi-kids

WHO: Cell Phones can Increase Cancer Risk

International Agency for Research on Cancer (IARC), a part of **WHO** designates cell phones as **“Possible Human Carcinogen” [Class 2B]**

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



World Health Organization

International Agency for Research on Cancer



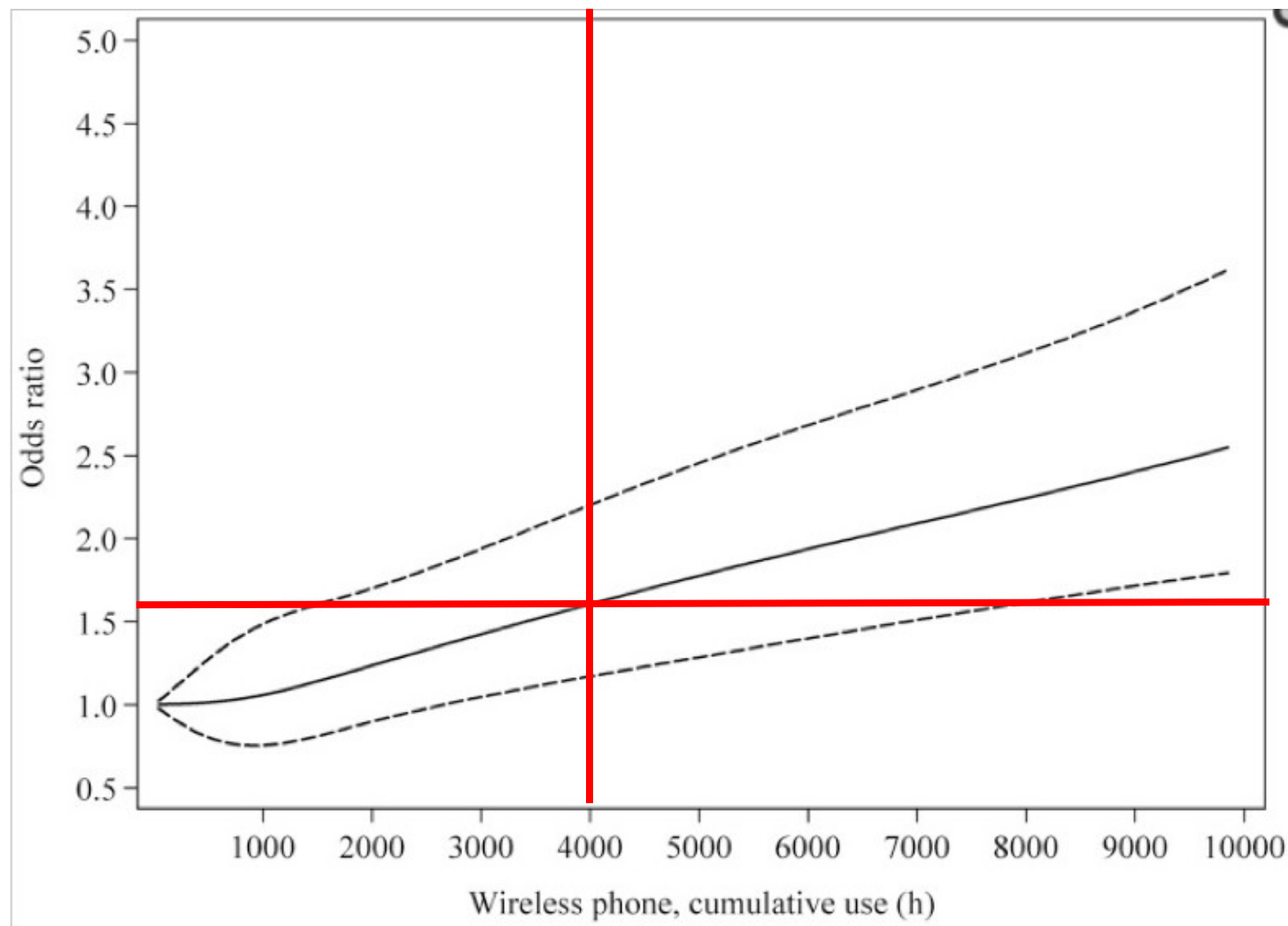
World Health
Organization

PRESS RELEASE
N° 208

31 May 2011

IARC CLASSIFIES RADIOFREQUENCY ELECTROMAGNETIC FIELDS AS
POSSIBLY CARCINOGENIC TO HUMANS

Malignant Brain Tumor vs. Cumulative Use



**4000 hours = approx.
1 hour use for 11
years**

**or
less than 6 months
of 24 hours exposure
to 100 mW/m²**

L. Hardell, M. Carlberg, Mobile phone and cordless phone use and the risk for glioma – Analysis of pooled case-control studies in Sweden, 1997–2003 and 2007–2009, Pathophysiology (Oct. 2014)

SUGGESTED SOLUTIONS

POPULAR
THE FUTURE NOW
SCIENCE

‘Are cell phones injurious to your health’ by
Prof. Girish Kumar
Sep. 2011



While the cell has become an additional appendage for most of us, all this, of course, does not mean that we have to stop using cell phones. Just ensure you take precautions:

- Limit your use
- Talk for short durations
- If possible, use SMS
- Use cell phone with lower SAR value
- Use the speakerphone or wired hands free or Bluetooth, but keep the cell phone at a distance of at least 12 inches from your body
- Use the land-line, when available
- Do not keep cell phones in your hand/pocket for long.
- At home/office, keep the phone away from you

Cell Tower Antenna 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)
- 2300 – 2400 MHz (4G)
- 2400 – 2500 MHz (Wi-Fi, Bluetooth)

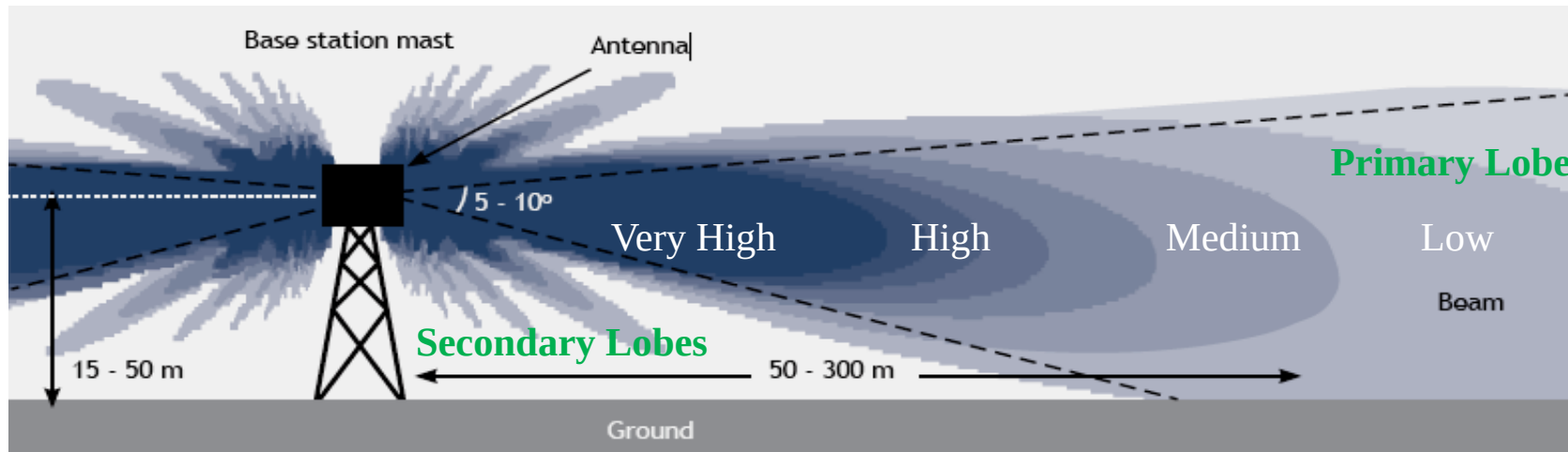
<http://www.wifiinschools.com/>

This website is dedicated to help the public realize that wireless internet, or WiFi, emits radiation that causes a myriad of serious **health effects, including damage to DNA, cancer, and infertility.**



Radiation Pattern of Cell Tower Antenna

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



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

People living at $< 50\text{m}$ are in extremely high radiation zone

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 (5th, 6th, 7th, 8th and 10th) directly facing and at similar height as the mobile phone towers of four telecom companies placed on the roof of opposite building.

EMF Radiation Standards for GSM900

Country	Milliwatt / m ²	Watt / m ²
INDIA (adopted ICNIRP)	4500	4.5 (f/200)
INDIA (Adopted 1/10th of ICNIRP on Sep. 1, 2012)	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
OET56:
Power
transmitted is
0.5 to 1 W
in the Urban Area**

Guidelines of Austrian Medical Association

Adopted on 3rd March 2012 in Vienna

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)

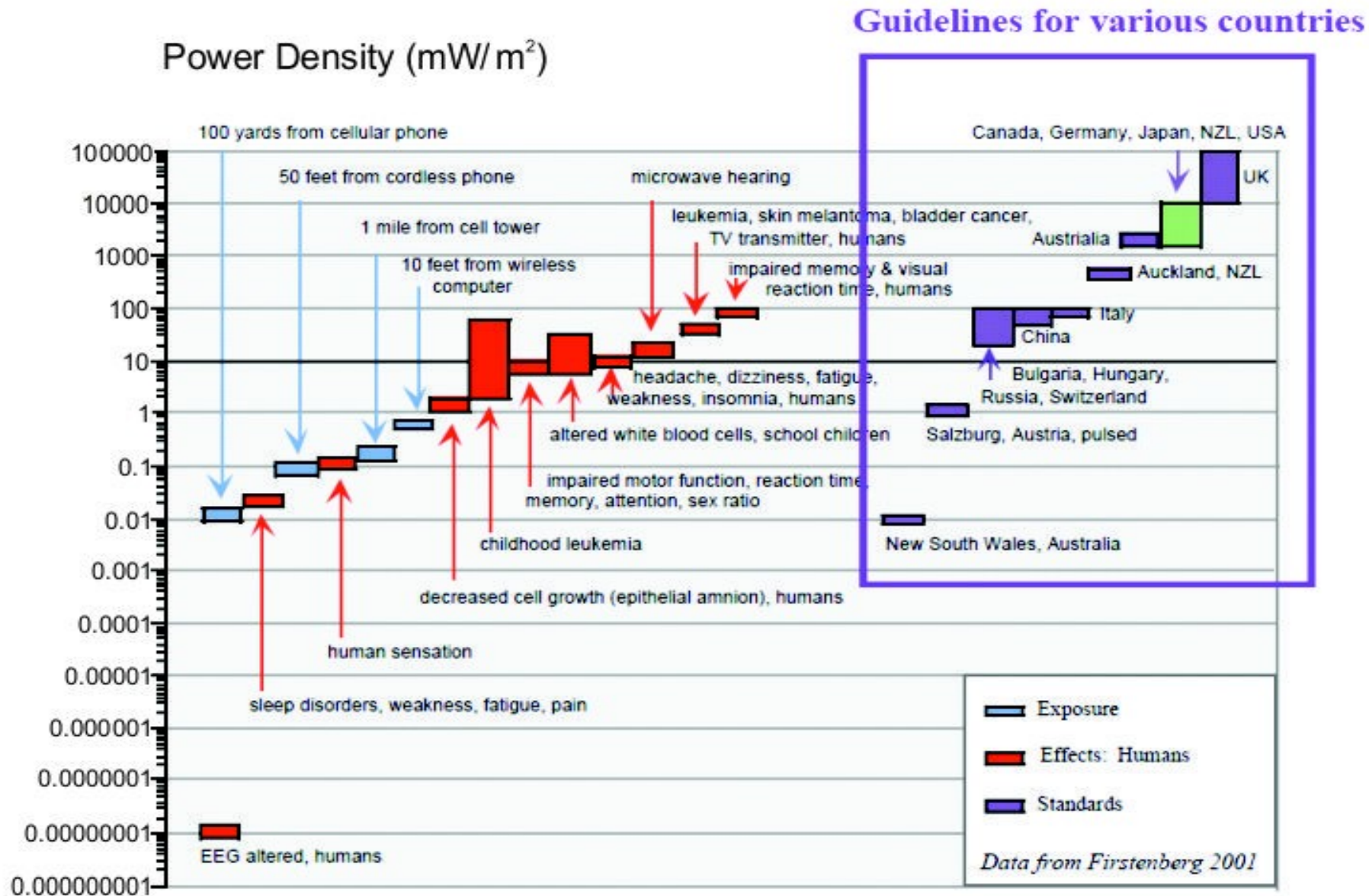
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|--|-----------------------|
| □ $\geq 1000 \mu\text{W}/\text{m}^2$ ($\geq 1 \text{ mW}/\text{m}^2$) | very far above normal |
| □ $10\text{-}1000 \mu\text{W}/\text{m}^2$ ($0.01\text{-}1 \text{ mW}/\text{m}^2$) | far above normal |
| □ $1\text{-}10 \mu\text{W}/\text{m}^2$ ($0.001\text{-}0.01 \text{ mW}/\text{m}^2$) | slightly above normal |
| □ $\leq 1 \mu\text{W}/\text{m}^2$ ($\leq 0.001 \text{ mW}/\text{m}^2$) | within normal limits |

Radiation Measurement at Various Locations

Cumulative Readings including CDMA, GSM 900 and GSM 1800

Location	Reading in dBm	Readings in W/m ²	Readings in milliW/m ²
Terrace, New Rajindra Nagar, Delhi	+09	0.561	561
Resident 1, Bedroom - Chowpatty	+06	0.281	281
Resident 2, Bedrooms - Opera House	+05	0.223	223
Resident 3, Bedroom – ML Dahanukar Marg	+05	0.223	223
Delhi-Gurgaon Highway - near Toll (3 towers)	0	0.0706	70
Vashi Bridge - after Railway Station	-4	0.0282	28
Resident 3, 4 th Fl: Sergeant House Lady w/cancer	-6	0.0177	17.7
Resident 4, Dadar East, Lady w/cancer	-6	0.0177	17.7
Resident 5, Opposite roof, Rane Society, Powai	-10	0.007	7
Ustav Chowk, Kharghar	-12	0.0045	4.5
Govandi- Residential towers - near Indian Oil	-14	0.0028	2.8
Lower Parel Employees-headaches, forgetfulness	-16	0.0018	1.8
Vashi Highway – near Turbhe	-18	0.0011	1.1
Nerul Bridge	-20	0.0007	0.7
Vivero pre School (opposite powai lake)	-22	0.0004	0.4
Rajeev Gandhi nagar	-26	0.00018	0.18
On road near Evita (Hiranandani Building)	-28	0.00011	0.11
D-Mart,Hiranandani, Powai	-34	0.000028	0.028
IIT Bombay School of Management - Entrance	-46	0.0000018	0.0018

Health Concerns with Current Safety Guidelines



Data from Firstenberg 2001. Diagram was prepared by Dr. Magda Havas, Trent University, Canada

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 (contd.)

Neurodegenerative Disorders –Alzheimer, Parkinson's

Immune System Degradation

Tinnitus and Ear Damage

Irreversible Infertility

Effect on Skin

DNA Damage

Increase in Cancer Risk



DNA Damage

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



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

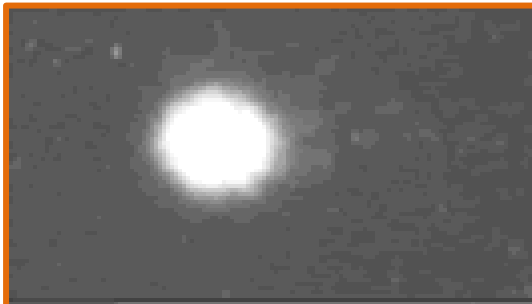


Fig.1 Unexposed control. Bundle of DNA (No-Tail)

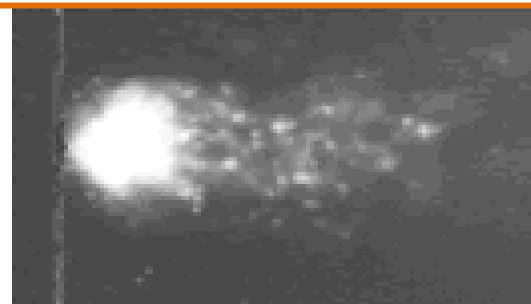


Fig.2 X-ray calibration 25.6 rads. DNA breaks are very obvious

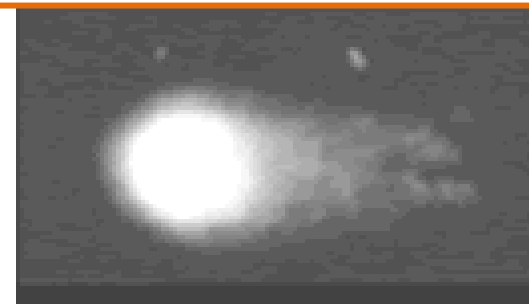


Fig.3 Cell Phone level microwave exposure 2hrs 2.45GHz reaching so called safe SAR levels
Comet Tail = DNA Damage

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

25,000 Brain Tumours Diagnosed in Andhra Pradesh and Telangana

Deccan Chronicle, Hyderabad – 9 June 2014

Over 25,000 primary brain tumours are diagnosed every year in Andhra Pradesh and Telangana. Of these, about 7 per 1 lakh population are found to be malignant tumors, while about 13 are non-malignant ones.

Dr B.S. Shiva Reddy, neurosurgeon at Medicity Hospital, said, “There are 120 types of brain and central nervous system tumours. The least aggressive type of tumours grow slowly while the malignant tumours, containing cancer cells, grow rapidly invading other body systems.”

Exposure to ionising radiation from therapeutic and diagnostic medical procedures, atmospheric testing of nuclear weapons, industrial accidents and heavy use of mobile phones also increases the risk of gliomas – a type of brain tumour.

Neurosurgeon Dr Rama Krishna said, “There is too much of a dispute on the claim that the use of mobile phones will cause tumours. But it is clear that excessive usage of mobile phones does lead to frequent headaches in a section of people. Children below 16 years must not be given phones for use as their body systems are still developing and it can cause early damage.”

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

In the nearby Farm House, output of most of fruit bearing trees drastically reduced from 100% to $< 5\%$ after 2.5 years of cell tower installation.

Scientists Recommend - RF Fields should be Classified as “Class 2A” or even “Class 1”

According to Dr. Anthony Miller, who was on the IARC committee, the accumulated evidence is now strong enough to suggest RF fields really should be classified **as Class 2A (probable carcinogen)**.

In Dec. 2013, Hardell group from Sweden showed that the evidence available suggests that RF-EMF exposure from mobile (and cordless) phones should be regarded **as Class 1 “known human carcinogen”**.

Alasdair Philips of [Powerwatch](#) (U.K.) says, “The criteria on strength, consistency, specificity, temporality, and biologic gradient for evidence of increased risk for glioma and acoustic neuroma were fulfilled.”

In April 2014, it was reported that "Health risk from Wi-Fi devices rising". It stated that “Epidemiological evidence shows that radio frequency should be classified as a **known human carcinogen**.”

SOLUTIONS TO REDUCE EMF HAZARD

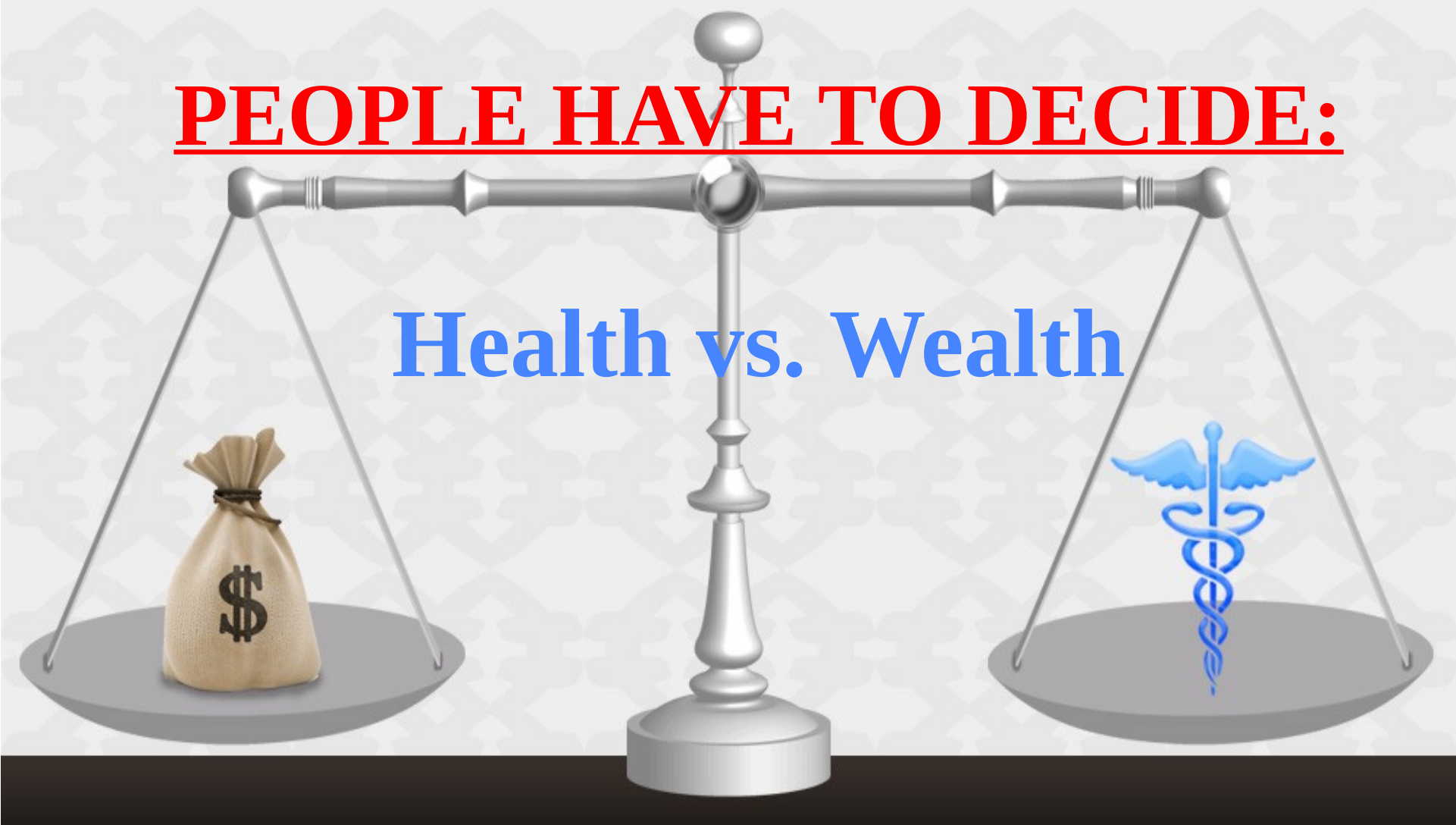
HOW TO IMPLEMENT?

Remove the power amplifier or reduce gain of amplifier.

DISADVANTAGES OF REDUCING POWER:

PEOPLE HAVE TO DECIDE:

Health vs. Wealth



Thank