REPLY TO

ASSOCHAM
INDIA

Comments on Prof Girish Kumar's presentation at the ASSOCHAM EMF Workshop 7th Feb 2012, New Delhi

BY

Prof. Girish Kumar

IIT Bombay

gkumar@ee.iitb.ac.in

(022) 2576 7436

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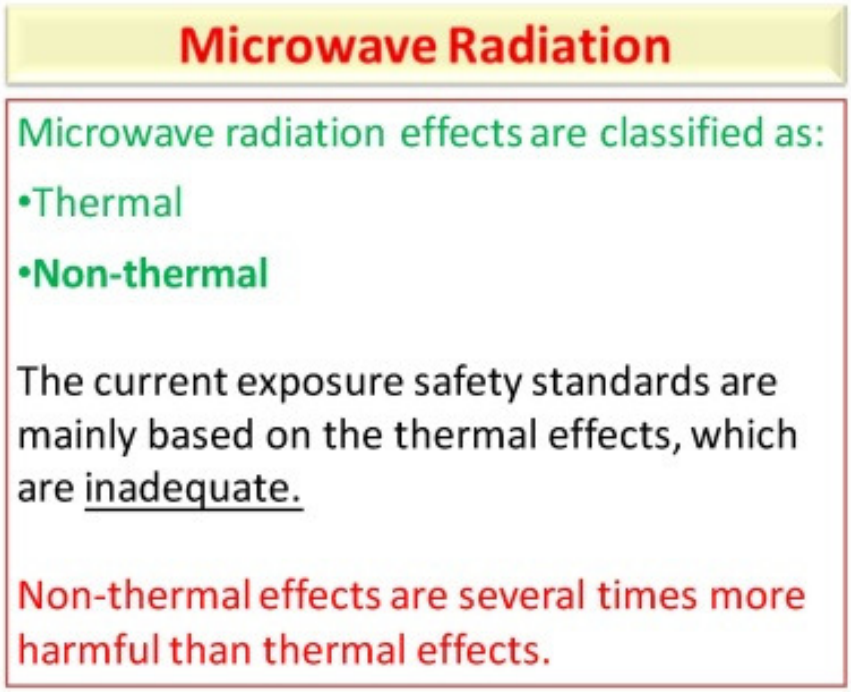
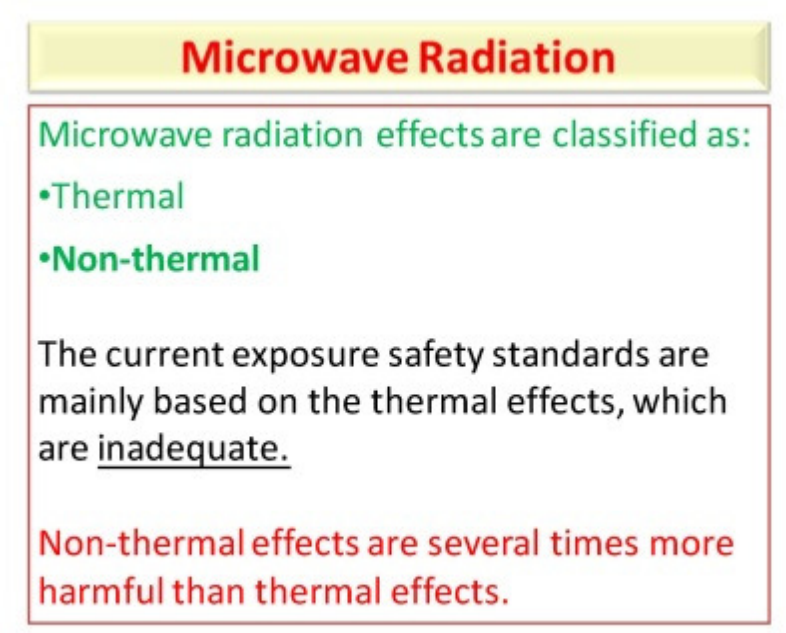
Comments on Prof Girish Kumar's presentation at the Assocham EMF Workshop 7th Feb 2012

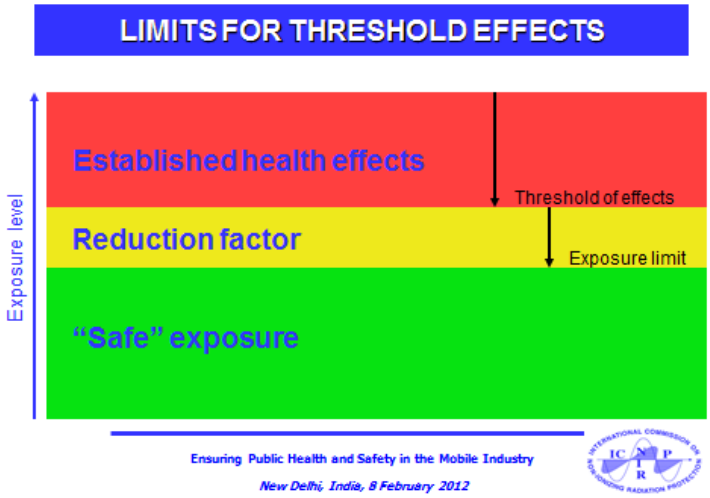
My reply is given after ASSOCHAM's comments at the end of each slide in red

Slide		Rebuttal information
1		
	No response needed.	
2		
	No response needed.	
3		
3	Mobile Towers 5.0 lakh (Feb '12) with about 3,000 BTSs added monthly Mobile Subscribers almost 900 million with subscribers base expected to reach 1,159 million by 2013	**Several millions of people living near these towers (at least 2 Lakhs out of 5 Lakhs of towers are in the dense population area), who will be exposed to high radiation, thereby leading to severe health problems. Also, birds, animals, fruit yield of the trees, environment are affected due to high transmitted RF power.**

Slide	Rebuttal information
	People who are living in the main beam are exposed to higher radiation levels and have complained to us of headaches, sleep disturbance, memory related disorders, fatigue, buzzing in the head, joint pain, miscarriage, cancer, etc. It is important to look at those families, who live in the relatively higher radiation level than the families living in the entire building or society, which are exposed to lower radiation levels.
4	
4	**For the ICNIRP guidelines, only thermal effects are regarded as established and used to set the limits. Non-thermal biological effects have not been shown to be a health hazard** The **World Health Organization** has said: *"The exposure limits for EMF fields developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) - a non-governmental organization formally recognised by WHO, were developed following reviews of all the peer- reviewed scientific literature, including thermal and non-thermal effects. The standards are based on evaluations of biological effects that have been established to have health consequences."* Source: http://www.who.int/peh-emf/standards/en/ *"With more and more research data available, it has become increasingly unlikely that exposure to electromagnetic fields constitutes a serious health hazard, nevertheless, some uncertainty remains."* Source: http://www.who.int/peh-emf/about/WhatisEMF/en/index5.html *"Strict adherence to existing national or international safety standards: such standards, based on current knowledge, are developed to protect everyone in the population with a large safety factor."* Source: http://www.who.int/peh-emf/about/WhatisEMF/en/index5.html Cancer and genetic damage has not been established as due to low-level RF exposures. **On May 31, 2011, WHO reported, "The electromagnetic fields produced by mobile phones are classified**

Slide	Rebuttal information
	by the International Agency for Research on Cancer as possibly carcinogenic to humans." http://www.who.int/mediacentre/factsheets/fs193/en/index.html Thus, there is no point in mentioning WHO's older reports. **WHO/International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group 2B), based on an increased risk for glioma, a malignant type of brain cancer, associated with wireless phone use.** **Telecom Industries argue that it has been classified as a class 2B carcinogen, which also has pickles, coffee, etc. in the list. If we eat pickle entire day or drink coffee entire day, it will lead to severe health problems. Radiation from cell phone towers is 24x7, so people living in the near vicinity absorb this radiation continuously. Also, excessive use of cell phones lead to severe health problems as described in the later slides.**
4	
4	**Additional information…** IEEE uses the term low-level effects instead of non-thermal effects, because even some low-level effects are still thermally related. IEEE reviews all papers in the IEEE ICES database, both thermal level and low-level effects. IEEE position on the low-level effects is: *"Despite more than 50 years of RF research, low-level biological effects have not been established. No theoretical mechanism has been established that supports the existence of any effect characterized by trivial heating other than microwave hearing. Moreover, the relevance of reported low-level effects to health remains speculative and such effects are not useful for standard setting."* There is no basis for the statement of "Non-thermal effects are several times more harmful than thermal effects." How is the "many times more harmful" quantified? Where is the supporting reference? The International Commission on Non-Ionizing Radiation Protection (ICNIRP) published a review, addressing epidemiological evidence related to mobile phones and reviewing evidence for the full radio-frequency (RF)

Slide	Rebuttal information



spectrum.

Slides presented by ICNIRP chairman, Paolo Vecchia at International Health Conference, Delhi, 8 February 2012, demonstrate safety factor included in ICNIRP limits

On the basis of experimental evidence the report concludes:

- *the '...the plausibility of various non-thermal mechanisms that have been proposed is very low.'*
- *'...recent in vitro and animal genotoxicity and carcinogenicity studies are rather consistent overall and indicate that such effects are unlikely at SAR levels up to 4 W kg-1.'*
- *subjective symptoms '...are not causally related to EMF exposure.'*
- *'The experimental data do not suggest so far that children are more susceptible than adults to RF radiation, but few relevant studies have been conducted.'*

In relation to epidemiology: *'Results of epidemiological studies to date give no consistent or convincing evidence of a causal relation between RF exposure and any adverse health effect. On the other hand, these studies have too many deficiencies to rule out an association.'*

ICNIRP Epidemiology Review

In my report submitted to DOT in Dec. 20, 2010, (http://www.scribd.com/Neha@Scribd/d/44736879-Cell-Tower-Radiation-Report-sent-to-DOT-Department-of-Telecommunications), I had given nearly 200 technical/scientific references. Several non-thermal effects have been mentioned with separately titled references. Even the above comments mention that it is very low but it is not zero or non-existent. Also, many of the studies are conducted for much shorter duration and the effects are noticed over a longer period of around 10 years. Avearge Human life expectancy is 70 years, so we must make guidelines to live safely for atleast 70 years.

5

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.

5

The Physics

The following is correct **only** assuming we can temporarily suspend some fundamental laws of physics and control energy the way we want:

- All energy transfers are perfect i.e. all energy output = energy input,
- There are no energy losses during heating,
- Energy is only absorbed by the intended target i.e. the water,
- All radiated energy from a phone can be directed into a single point,

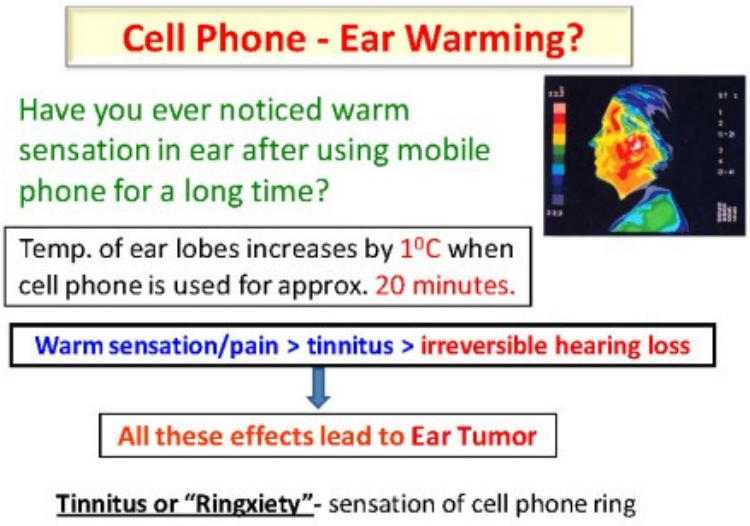
We will also assume here that the theoretical phone operates at the theoretical maximum power at all times and there is no network power control involved.

Thus as 1 cup = 200ml water, therefore specific heat capacity for this 200ml of water is 4,200/5 = 840j/cup/°C. For 500W of power applied for 70s, this produces 35,000j of energy, so 35,000/840 = 41.7°C temperature rise. So a cup of water would be heated from 30°C to 70.7°C, to reach 100°C would take 117.6s (in this specific, perfect microwave oven).

If again we suspend the laws of physics particularly relating to heat/energy loss from a body then the following applies. A 1W phone using GSM 1800MHz in fact operates at an average of 0.125W continuous output (1/8 time periods for voice calls), thus in 500s will deliver 62.5j which will cause 62.5/840 = 0.07°C temp increase in cup of water.

In India, cup sizes are much smaller, they hold less than 150 mL water, so their calculations agree with my calculations. Energy is given by power x time, so if power transmitted is reduced by 500 times, then time taken will increase by 500 times.

6



6

U.S. National Library of Medicine
National Institutes of Health

MedlinePlus
Trusted Health Information for You

Tinnitus

Tinnitus is the medical term for "hearing" noises in your ears when there is no outside source of the sounds. The noises you hear can be soft or loud. They may sound like ringing, blowing, roaring, buzzing, hissing, humming, whistling, or sizzling. You may even think you are hearing air escaping, water running, the inside of a seashell, or musical notes. Tinnitus is common. Almost everyone experiences a mild form of tinnitus once in a while that only lasts a few minutes…

It is not known exactly what causes a person to "hear" sounds with no outside source of the noise. However, tinnitus can be a symptom of almost any ear problem, including:

- Ear infections
- Foreign objects or wax in the ear
- Injury from loud noises
- Meniere's disease…

Alcohol, caffeine, antibiotics, aspirin, or other drugs can also cause ear noises.

Tinnitus may occur with hearing loss. Occasionally, it is a sign of high blood pressure, an allergy, or anemia. **Rarely, tinnitus is a sign of a serious problem like a tumor or aneurysm.**

Ringxiety

"the annoying feeling of mistakenly thinking that you can hear your mobile phone ringing"

'This audio illusion – called phantom phone rings or, more whimsically, ringxiety or fauxcellarm – has emerged recently as an Internet discussion topic and has become a new reason for people to either bemoan the techno-saturation of modern life or question their sanity.'

The New York Times 4th May 2006

Thermal heating of the ear

Ear warming is not due to RF absorption. The main reason that the ear and cheek get warm is because of the reduced air circulation when holding a phone against the ear and cheek. The conduction heat from the phone due to battery warming also contribute to the heating of the ear. Holding a wired phone for 20 minute will make a caller's ear turn red. Sleeping on the pillow also makes one's ear red when wakes up in the morning.

All these additional scenarios can be demonstrated by the use of Thermal Imaging cameras.

An interesting experiment with a thermal Imaging camera would be to see if you can identify which of three test subjects has one of the following next to their ear for 20 minutes:

- A mobile phone switched on
- A mobile Phone switched off
- An ear muff (or woollen hat)

The answers would not surprise a physicist.

In my report submitted to DOT in Dec. 20, 2010, I had given nearly 200 technical/scientific references. It includes following references regarding Tinnitus/Hearing complaints caused by overuse of cell phones.

Meo SA, Al-Drees AM, Mobile phone related-hazards and subjective hearing and vision symptoms in the Saudi population, Int J Occup Med Environ Health. 18(1):53-7, 2005 - http://www.ncbi.nlm.nih.gov/pubmed/16052891

Hutter HP, Moshammer H, Wallner P, Cartellieri M, Denk-Linnert DM, Katzinger M, Ehrenberger K, Kundi M, Tinnitus and mobile phone use, Occup Environ Med. 2010 - http://oem.bmj.com/content/early/2010/06/23/oem.2009.048116.abstract

Tyazhelov, V.V., R.E. Tigranian, E.P. Khizhnian & I.G. Akoev, 1979, Some pecularities of auditory sensations evoked by pulsed microwave fields, Radio Science 14(supp 6):259-263. - http://europa.agu.org/?view=article&uri=/journals/rs/RS014i06Sp00259.xml

Lin JC, Wang Z, Hearing of microwave pulses by humans and animals: effects, mechanism, and thresholds, Health Phys. ,92(6):621-8, 2007 - http://www.ncbi.nlm.nih.gov/pubmed/17495664

Lin J.C , Health Aspects of Wireless Communication: Auditory Perception of Microwaves –Hearing Microwaves – 2002, 6 (2), 9-12, - http://www.notafreemason.com/images/JamesCLin-HealthAspects.pdf

Lin, J.C., 1977a, On microwave-induced hearing sensation, IEEE Trans. Microwave Theory Tech., 25:605-613- http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=01129167

Lin, J.C., 1977b, Further studies on the microwave auditory effect, IEEE Trans. Microwave Theory Tech., 25:936-941 - http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1129245

Panda NK, Jain R, Bakshi J, Munjal S., Audiologic disturbances in long-term mobile phone users., J Otolaryngol Head Neck Surg., Chandigarh, 2010 Feb 1;39(1):5-11.- http://www.ncbi.nlm.nih.gov/pubmed/20122338

Doctors from KEM Hospital, JJ Hospital, KG Nair Hospitals have reported that overuse of cell phones cause loss in hearing and also ear tumor especially in teenagers.

7

SAR and Cell phone use time limit

6 minutes/day usage.

A Cell phone transmits
1 to 2 Watts of power

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.

7

The FCC regulations are based on earlier rationale and scientific analysis. The ICNIRP handset guidance is based on more recent understanding of the science.
(see letter International Committee on Electromagnetic Safety, 15.3.12)

The FCC peak spatial-average SAR limit for localized exposure of the general public (1.6 W/kg averaged over 1 g of tissue) is based on the C95.1-1991 (and NCRP Report 86) SAR values and is different from the 2 W/kg averaged over 10 g of tissue value found in the 1998 ICNIRP guidelines. The ICNIRP limits, which are based on more recent data and an updated scientific rationale, are recommended by the World Health Organization (WHO) and have been adopted by more than 40 countries, including the European Union countries.

"**6 minutes/day usage**" is a mistake.
FCC in OET Bulletin 65 specifically stated that there is no applicable averaging time for mobile phones.
The below quotation is from FCC OET65 Supplement C page 33, this is Note 2 immediately below the SAR regulation Table.

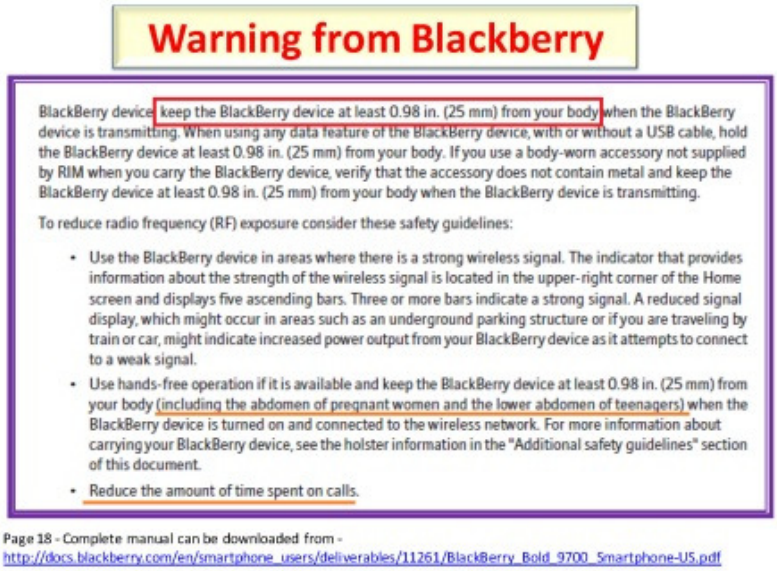
7

"NOTE 2: *The averaging time for General Population/Uncontrolled exposure to fixed transmitters is not applicable for mobile and portable transmitters. See 47 CFR §§2.1091 and 2.1093 on source-based time-averaging requirements for mobile and portable transmitters.*"
See http://www.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65a.pdf

A cell phone transmits 1 to 2 W of power is not accurate. 1 to 2 W is only peak power for GSM phones. Average power is 0.128 or 0.25 W as other non GSM phones. Also due to adaptive power control, during actual use, the emitted power is a small fraction of the maximum power (1% of the 0.125 or 0.25 W average power). A recent paper showed WCDMA phones emit mostly about 1 mW.

"In USA, max. SAR limit for cell phones is 1.6 W/Kg which is for 6 minutes" is a false statement, as stated above.
"It has a safety margin of 3 to 4…" there is no reference to this anywhere in the FCC guidelines, it has never been seen before.
This is false information and should not be presented to anyone.

A limit of 18 to 24 minutes after safety margin agrees well with Interphone study, where they have reported that 1/2 hour use of cell phones increases the probability of brain tumour by 200% to 400% over a period of 8 to 10 years. This report came in May 2010 and it was part of WHO. However, on May

	31, 2011, WHO reported, "The electromagnetic fields produced by mobile phones are classified by the International Agency for Research on Cancer as possibly carcinogenic to humans." Question arises, "why WHO took one year to accept Interphone study"?
8	
8	"keep the BlackBerry device at least 0.98 in. (25 mm) from your body" This instruction when read in context is clearly related to body worn usage during data transmission when the antenna may be closer to the body then during a voice call held to the head when the antenna is typically further away from the head. The use of "body" here means torso and does not mean head. Some readers misinterpret the instruction for keeping phone away from body as to hold the phone at a distance from head. Phone testing includes both holding phone in direct contact with ear and cheek, as well as near body at a distance from the trunk (body) such as in a holster. "(including the abdomen of pregnant women and the lower abdomen of teenagers)" The language used here by RIM is an adaption of the **requirements on manufacturers outlined in the French Ministerial Order of 8th October 2003**. Other companies include similar wording in their French user manuals sold in France, although the MMF recommendation is to also include a statement to the effect that while they are obliged to provide the information it does not necessarily reflect the views of the company. "Reduce the amount of time spent on calls" This and other recommendations issued by the WHO, for people who wish to reduce their exposure are provided to the user. **A mobile manufacturing company writing the above implies overuse of cell phones is harmful, so there is nothing to debate. Interphone study also mentioned that 1/2 hour use of cell phones increases the probability of brain tumour by 200% to 400% over a period of 8 to 10 years.**

9	
9	This is a misleading slide. **There has been no "re-evaluation of Interphone" by any of the scientists involved. The slide refers to mathematical assessment based on assumptions that cannot be tested**. INTERPHONE was a retrospective, case-control, population-based study. 13 participating countries (Australia, Canada, Denmark, Finland, France, Germany, Israel, Italy, Japan, New Zealand, Norway, Sweden, the UK. There were 5117 cases (people with glioma or meningioma) and 5634 controls (people without those brain tumours) Case control study is based on memory of the subjects. The longer the time, the less reliable of the data. Recall bias is a basic problem for case control studies especially for patients with brain tumors. Self-reported exposure also exaggerate mobile phone use in cancer patients. Selection bias is another problem because: Concerned persons more likely to participate, more likely to have located the nearest base station, and probably more likely to report symptoms or lower well-being. Regarding the increase seen for glioma, the INTERPHONE study authors explain that this is inconclusive: *"For glioma, an increased odds ratio of 1.40 was seen in analyses in the highest decile of cumulative call time (more than 1640 hours), including tumours in the temporal lobe and subjects who reported having used the mobile phone mainly on the same side as where the tumour occurred.* ***Still, the evidence for an increased risk of glioma among the highest users was inconclusive****, as the increase could be due to one or more of the possible sources of error,"* **The experts say:** The World Health Organisation summarises the current understanding: "*A large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established as being caused by mobile phone use."* Regarding INTERPHONE results, the WHO Fact Sheet 193 states (June 2011): *"The international pooled analysis of data gathered from 13 participating countries found no increased risk of glioma or meningioma with mobile phone use of more than 10 years. There are some indications of an increased risk of glioma for those who reported the highest 10% of cumulative hours of cell phone use, although there was no consistent trend of increasing risk with greater duration of use. Researchers concluded that biases and errors limit the strength of these conclusions and prevent a causal interpretation."*

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

17 May 2010, The conclusions of the 13-country INTERPHONE study were:
"Overall, no increase in risk of glioma or meningioma was observed with use of mobile phones. There were suggestions of an increased risk of glioma at the highest exposure levels, but biases and error prevent a causal interpretation. The possible effects of long-term heavy use of mobile phones require further investigation." (17 May 2010)

9

May 31, 2011, International Agency for Research on Cancer (IARC) classified RF exposure (not just mobile phones) as a possible carcinogen 2B, and not definite carcinogen 1, or probable carcinogen 2A, because of the limited evidence.

25 Jan 2011: Elisabeth Cardis of the Centre for Research in Environmental Epidemiology (CREAL), Barcelona, Spain, and Siegal Sadetzki of the Gertner Institute in Israel conclude, "indications of an increased risk in high- and long-term users from Interphone and other studies are of concern."

July 1, 2011, ICNIRP in a paper: "Mobile Phones, Brain Tumours and the Interphone Study: Where Are We Now? "*In summary, Interphone and the literature overall have methodological deficiencies but do not demonstrate greater risk of either glioma or meningioma with longer or greater use of mobile phones, although the longest period since first use examined is <15 years*.", and "*Although there remains some uncertainty, the trend in the accumulating evidence is increasingly against the hypothesis that mobile phone use can cause brain tumours in adults*."

IARC- Interphone study reports on mobile phone use and brain cancer risk, 2010-
http://www.iarc.fr/en/media-centre/pr/2010/pdfs/pr200_E.pdf

Re-evaluation of Interphone studies has been reported by the concerned scientists.
One of the references is given below:
http://www.radiationresearch.org/pdfs/reasons_a4.pdf
It mentions about Cell phones and Brain Tumors - 15 Reasons for Concern
Science, Spin and the Truth Behind Interphone- August 25, 2009
It is endorsed by 43 scientists from 14 countries.

Also, I will like to mention that Interphone study included only adults between the ages of 30 to 59 years. The following figure demonstrates how the risk for brain tumors from cell phone use is much higher in young adults (red column) when compared to older adults (blue columns).

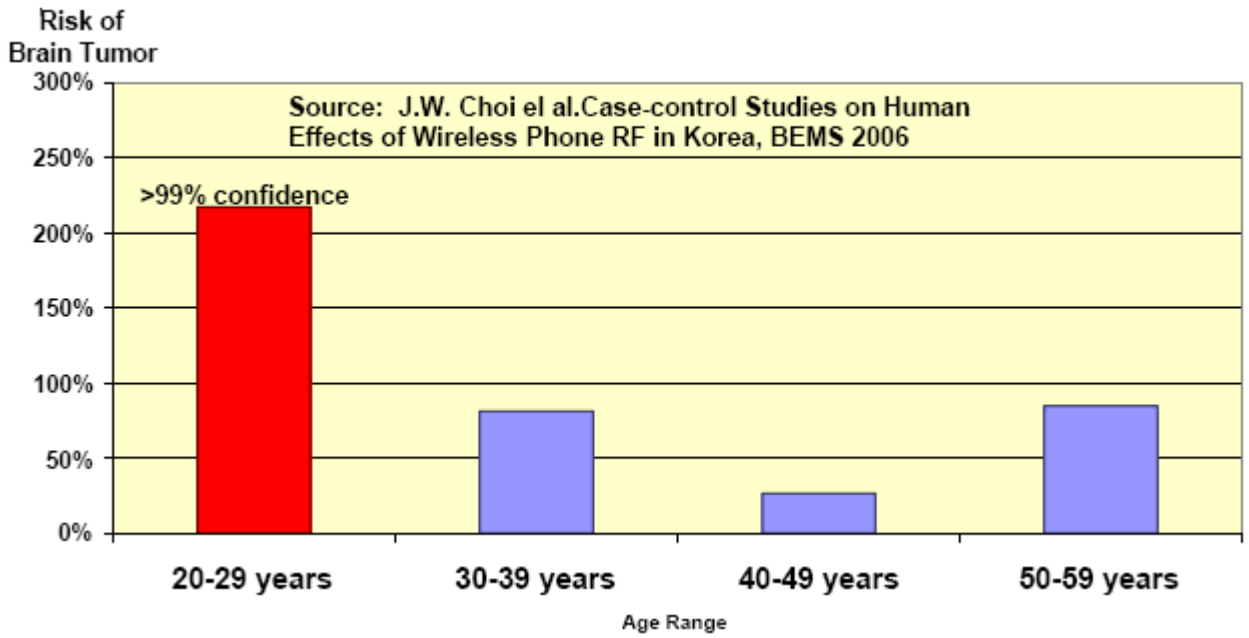
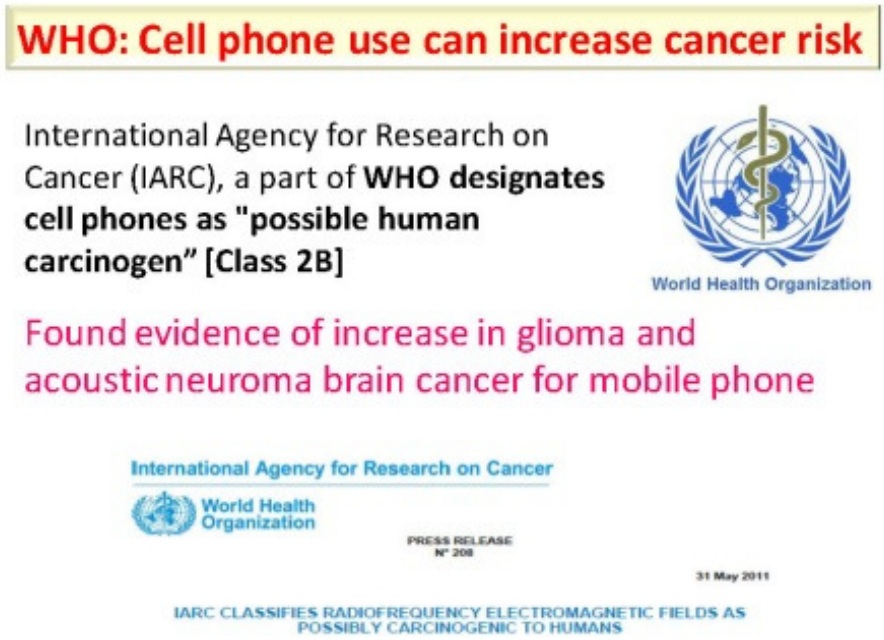


Figure : Increased Risk of Brain Tumor in Young Adults Compared to Older Adults



The World Health Organisation does not state that cell phone use can increase cancer risk.

The IARC classification is for all radiofrequency electromagnetic fields. The classification of all these being a possible carcinogen is based on an increased incidence of one type of rare brain tumour (glioma) after exposure to one source of radiofrequency electromagnetic fields (mobile phones).

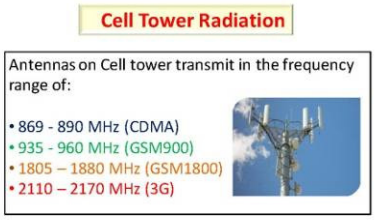
WHO Fact Sheet 193, published June 2011, after the IARC study classification

- The electromagnetic fields produced by mobile phones are classified by the International Agency for Research on Cancer as possibly carcinogenic to humans.
- Studies are ongoing to more fully assess potential long-term effects of mobile phone use.
- WHO will conduct a formal risk assessment of all studied health outcomes from radiofrequency fields exposure by 2012.

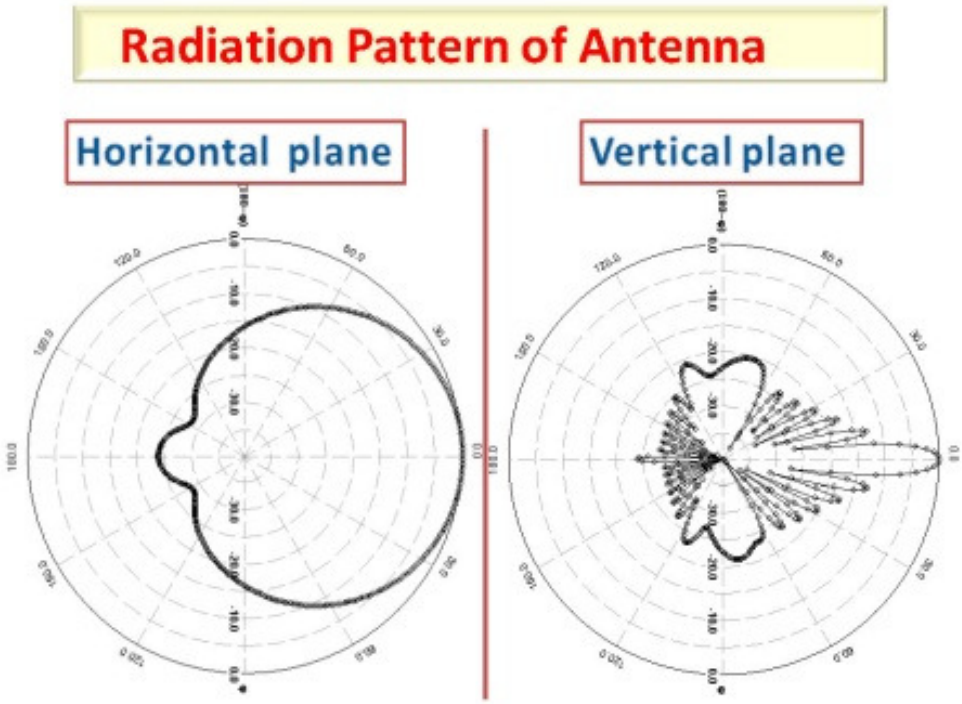
10 *"A large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established as being caused by mobile phone use."*

http://www.who.int/mediacentre/factsheets/fs193/en/index.htmlIt is significant that the International Agency for Research into Cancer (IARC) has concluded that RF electromagnetic fields are not a definite nor a probable human carcinogen. Rather, IARC has only concluded that it may still be possible that RF fields are carcinogenic and has identified areas for further research.

Press Release IARC: Classified 2B *"based on an increased risk for glioma, a malignant type of brain cancer, associated with wireless phone use."* It adds, *"The evidence was reviewed critically, and overall evaluated as being limited among users of wireless telephones for glioma and acoustic neuroma, and inadequate to draw conclusions for other types of cancers..."* **["Limited"** *is defined by IARC as "A positive association has been observed between exposure to the agent and cancer for which a causal interpretation is considered by the Working Group (WG) to be credible, but chance, bias or confounding could not be ruled out with reasonable confidence."* **"Inadequate"** *is defined as "The available studies are of insufficient quality, consistency or statistical power to permit a conclusion regarding the presence or absence of a causal*

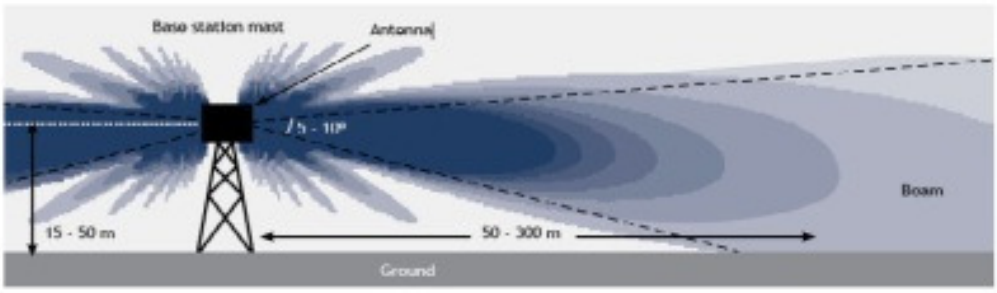
	association between exposure and cancer, or no data on cancer in humans are available."] **On May 31, 2011, WHO reported, "The electromagnetic fields produced by mobile phones are classified by the International Agency for Research on Cancer as possibly carcinogenic to humans." The IARC classification of all these being a possible carcinogen is based on an increased incidence of one type of rare brain tumour (glioma) after exposure to one source of radiofrequency electromagnetic fields (mobile phones). It is surprising why they have not included cell tower radiation, which is for 24 hours unlike cell phones, which is used for much shorter time. Cumulative effect will be much larger.**	
11		No response needed.
12		
12	**Without these antennas, the network would not exist and people cannot talk to each other**. The clusters are because people's concerns over installations at other sites have forced the clustering of antennas in a more publicly acceptable site. When planning a network sites are first selected where they will deliver the best performance if these locations cannot be used and the choice becomes limited to using an existing site we therefore get the clusters of antennas being found. Referring to the incidence of cancer clusters, the World Health Organisation Fact Sheet number 304 states: http://www.who.int/mediacentre/factsheets/fs304/en/index.html *"Media or anecdotal reports of cancer clusters around mobile phone base stations have heightened public concern. It should be noted that geographically, cancers are unevenly distributed among any population. Given the widespread presence of base stations in the environment, it is expected that possible cancer clusters will occur near base stations merely by chance. Moreover, the reported cancers in these clusters are often a collection of different types of cancer with no common characteristics and hence unlikely to have a common cause."*	

	I know that, "Without these antennas, the network would not exist and people cannot talk to each other" but the important point here is, why transmit so much power. In India, Telecom operators transmit 20W of power per carrier and they use number of carriers. Also, antennas of multiple operators are placed on the same roof top or tower to cut down the cost, so cumulative transmitted power is very high. The operators should not transmit more than 1 to 2W of power in the densely populated area.

13	
13	This is an engineering diagram which basically confirms that the power that is effectively transmitted into the side lobes and behind the antenna is orders of magnitude below that at in the main beam. It further demonstrates that the gain of the antenna is different in both the horizontal and vertical planes, thus when calculating fields the **two** components must be taken. **Gain of the antenna includes both horizontal and vertical half-power beam-widths.**

14

Radiation Pattern of a Cell Tower Antenna



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

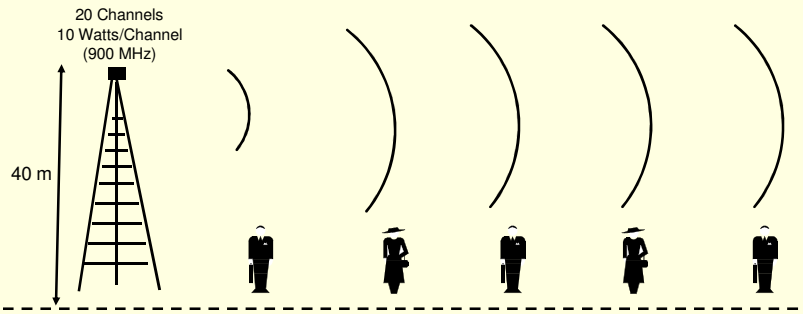
People living within 50 to 300 meter radius are in the high radiation zone (dark blue) and are more prone to ill-effects of electromagnetic radiation

14

The slide as presented makes it hard to qualify or quantify any of the statements, particularly without knowing the parameters that were used to generate the "Radiation Pattern".

Below is an example showing the loading on the antennas as well as field values at the ground.

Cellular Transmission Towers



Distance from transmission source	3 m	15 m	30 m	124 m	300 m
Power density per square centimeter*	.00004 mW	.00006 mW	.00004 mW	.00002 mW	.00013 mW
Number of times below internationally recognized safety standards**	11,250	7,500	11,250	22,500	3,500

**The ICNIRP and IEEE C95.1-2005 safety standards for the general public in the environment depicted above are 0.45 milliwatts per square centimeter for 900 MHz

14

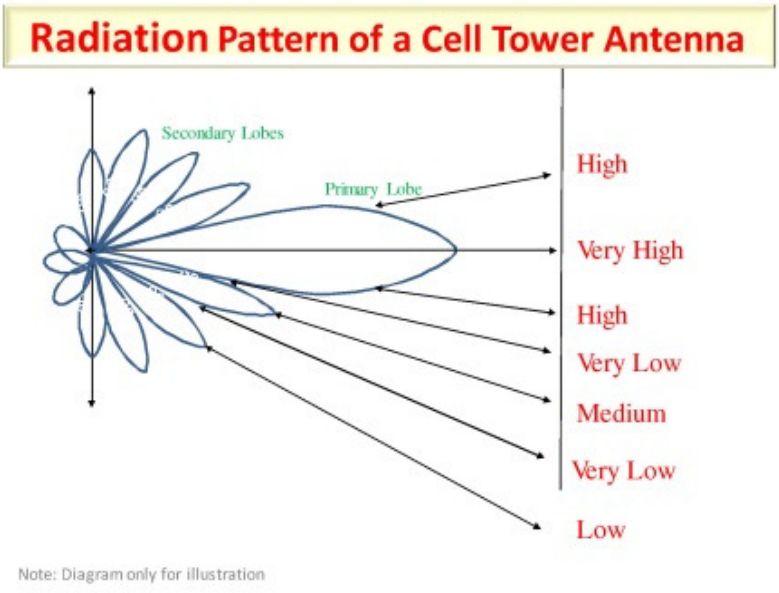
With numerical modelling it is easy to vary any of these parameters and make conclusions as to exposure levels.

The only certainty is that reducing the compliance limits will make the compliance zones larger. More measurements will be needed to ensure residents are within compliance particularly in all the dense urban areas. This may generate more concerns from the public, not be a reassurance to them.

The claim is made that people living within 50 - 300m are in the high radiation zone. The diagram demonstrates that at the distances that are mentioned, the maximum exposures are between 1/100th and 1/1000th of ICNIRP guidelines (1/10th and 1/100th of proposed IMC guidelines). This representation is unrealistic as it does not assume any losses caused by power control or building materials. This could further reduce exposures by several orders of magnitude.

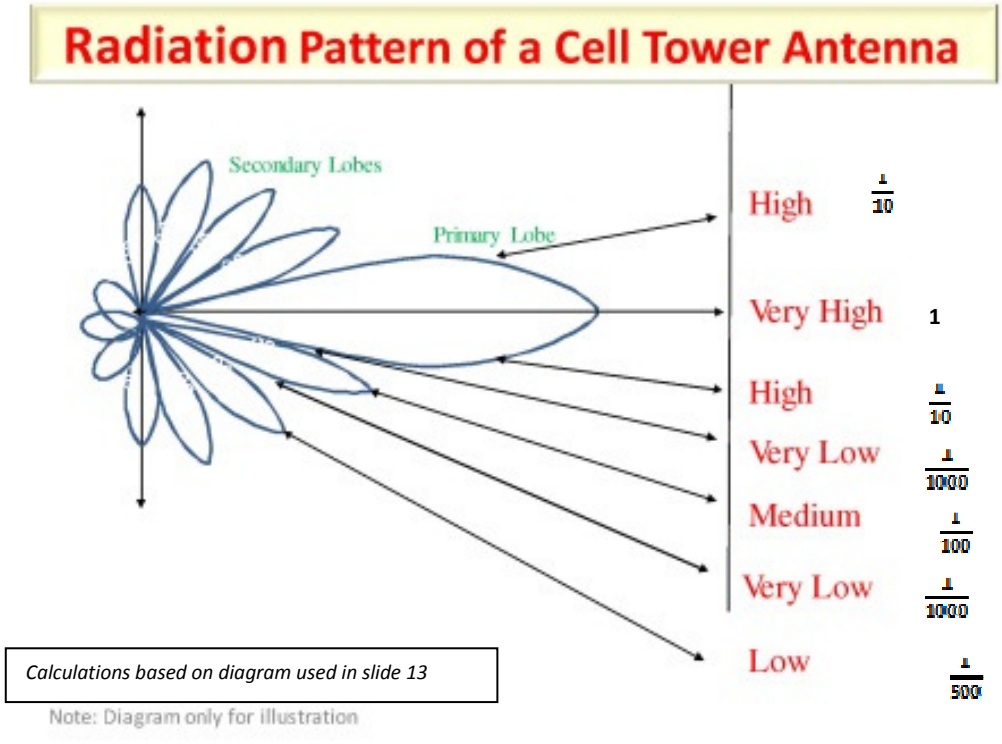
To put this into context, exposures from the base station within many people's homes would be equivalent, if not below, those that would be expected from TV towers or other EMF Sources within the home.

I do not agree with ICNIRP Guidelines (9.2 W/sq.m for GSM1800) for 24 hours exposure. According to Bio-Initiative report and my research, safe radiation density for 24 hours exposure over the life time of human is 0.0001 W/sq.m. So, 1/10th and 1/100th of ICNIRP Guidelines is very high. The diagrams show people on the street but we are concerned about the people living down below the tower and people living across the tower.



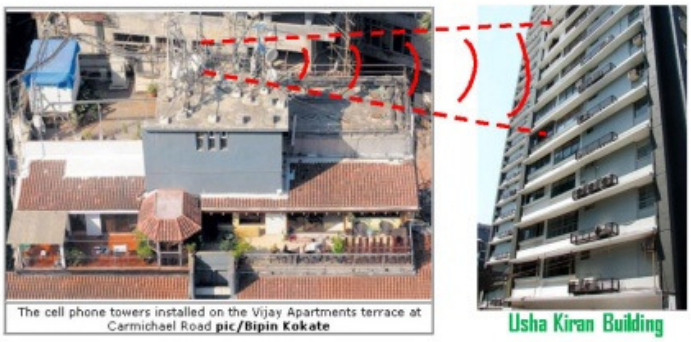
15

Within radio planning and engineering, we tend to quantify parameters differently, thus this slide may be read as follows giving the relative proportions to "Very High" which would be the equivalent of 1.



1/10th and 1/100th of ICNIRP Guidelines is very high, which comes out to be 0.92 W/sq.m and 0.092 W/sq.m for GSM1800) for 24 hours exposure. According to Bio-Initiative report and my research, safe radiation density for 24 hours exposure over the life time of human is 0.0001 W/sq.m.

CASE STUDY Usha Kiran Building, Worli, Mumbai



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.

There are many cancer cluster reports, but in none is the caused proven to be RF exposure. According to **American Cancer Society** statistics, **one of two** men gets cancer in life time, and **one of three** women gets cancer. **Therefore, getting cancer although unfortunate, it is not a rare disease.**
http://www.cancer.org/Cancer/CancerBasics/lifetime-probability-of-developing-or-dying-from-cancer

The WHO states that:

"Media or anecdotal reports of cancer clusters around mobile phone base stations have heightened public concern. It should be noted that geographically, cancers are unevenly distributed among any population. Given the widespread presence of base stations in the environment, it is expected that possible cancer clusters will occur near base stations merely by chance. Moreover, the reported cancers in these clusters are often a collection of different types of cancer with no common characteristics and hence unlikely to have a common cause."

http://www.who.int/mediacentre/factsheets/fs304/en/index.html

16 Since the previous version of this slide (below), no information has been provided on the types of cancers being identified or any investigations into other factors that may contribute these cases.

On May 31, 2011, WHO reported, "The electromagnetic fields produced by mobile phones are classified by the International Agency for Research on Cancer as possibly carcinogenic to humans." It is surprising why they have not included cell tower radiation, which is for 24 hours unlike cell phones, which is used for much shorter time. Cumulative effect will be much larger.

Exposure from the cell towers comes under the category of full body absorption. People living in these apartments develop cancer in 2 to 3 years and the radiation level was between 0.01 and 0.1 W/sq.m, which are much below ICNIRP guidelines. ICNIRP guidelines are not valid for 24 hours exposure.

FCC Limits for whole body and partial body are given in the following table.

Table 2. *FCC Limits for Localized (Partial-body) Exposure*

Specific Absorption Rate (SAR)	
Occupational/Controlled Exposure (100 kHz - 6 GHz)	**General Uncontrolled/Exposure (100 kHz - 6 GHz)**
< 0.4 W/kg whole-body **≤ 8 W/kg partial-body**	**< 0.08 W/kg whole-body** **≤ 1.6 W/kg partial-body**

FCC Limits for SAR - whole body is <0.08 W/Kg and partial body is <1.6 W/Kg. It is mentioned SAR of 1.6W/kg is averaged over 6 min/day exposure (averaging time of 6 min is also written in ICNIRP guidelines). It should be noted that for whole body exposure, limit is 50 times less.

FCC limit for maximum permissible exposure is better than INCNIRP Guidelines.

Table 1A indicates - safe power density = f/300 averaged over 6 min exposure. So, for GSM 1840; safe power density is 1840/300 = 6.13 W/sq.m, which is for 6 min exposure.

Table 1B indicates - safe power density = f/1500 averaged over 30 min exposure. So, for GSM 1840; safe power density is 1840/1500 = 1.22 W/ sq.m, which is for 30 min exposure.

It can be clearly seen that if exposure time is increased from 6 minutes to 30 minutes, then maximum permissible exposure limit is reduced by 5 times. If we extrapolate the results for 24 hours exposure, then f/1500 must be reduced by at least 48 times, which gives safe power density of 0.025 W/ sq.m. Here, I will like to mention that if body is exposed for 30 min (=0.5 hours), then body gets 23.5 hours to recover, whereas if body is exposed for 24 hours continuously, then there is no time to recover. Thus, safe limit should be much less than 0.025 W/ sq.m

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

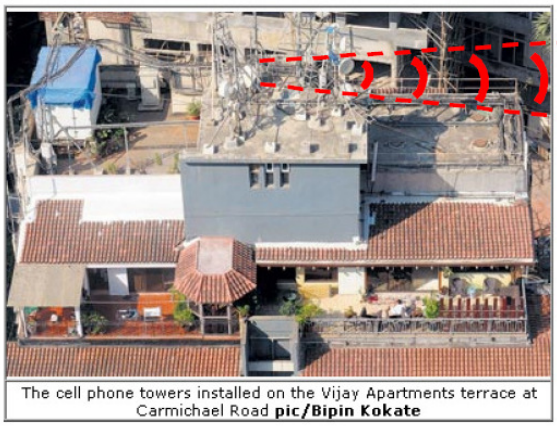
f = frequency in MHz *Plane-wave equivalent power density

NOTE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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.

Four cancer cases were reported in 2010 and that increase to six cases in 2011.

17

Power Density Calculations

Power density P_d at a distance R is given by

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

P_t = Transmitter power in Watts
G_t = Gain of transmitting antenna
R = Distance from the antenna in meters

17

This is correct for 1 point assuming both V & H gain components are included in G_t. **However the formula is only theoretical and is not useful for evaluation of all fields around a real antenna.**

17

The formula is extremely useful for evaluation of fields in the main beam of a real antenna. All the link budgets are based on this formula. Of course, radiation in the other direction is less as mentioned in the other slides.

18

Power Density at distance from cell tower

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

Distance R (m)	P_d (W/m²)	P_d (µW/m²)
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**.

18

The standard engineering unit is for power density is W/m2, **expressing in microwatt/m2 to expand the number and give the impression of larger values is misleading.**

Given the limitation of the equation and knowing the variation of gain as illustrated in slides 13, 14 and 15 this is only valid for a single victor direction from the antenna. This would not for example be valid as the exposure of a person walking at ground level for 500m.

The unit for power density can be W/m2 or mW/m2 or microwatt/m2. Some people even use mW/cm2. As long as we are writing the units properly, completely, and uniformly, it is not misleading. Units are given in microwatt/m2 to compare with recommendations of Bio-Initiative report. We are more concerned about radiation level inside an apartment or house, where people live and are exposed for 24 hours per day. We should also be concerned about radiation levels inside school or office, where children and people spend around 40 hours per week. A person walking at a ground level may be exposed to this radiation for only a few minutes.

19

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.

19

The standard engineering unit is for power density is W/m2**, expressing in microwatt/m2 to expand the number and give the impression of larger values is misleading.**

Given the limitation of the equation and knowing the variation of gain as illustrated in slides 13, 14 and 15 this is only valid for a single victor direction from the antenna. This would not for example be valid as the exposure of a person walking at ground level for 500m.

19

The standard unit for power density can be W/m2 or mW/m2 or microwatt/m2. Some people even use mW/cm2. As long as we are writing the units properly, completely, and uniformly, it is not misleading. Units are given in microwatt/m2 to compare with recommendations of Bio-Initiative report. We are more concerned about radiation level inside an apartment or house, where people live and are exposed for 24 hours per day. We should also be concerned about radiation levels inside school or office, where children and people spend around 40 hours per week. A person walking at a ground level may be exposed to this radiation for only a few minutes. Multiple operators and carriers increase the radiation level in many directions.

20

International Exposure Standards and Guidelines

International Exposure limits for RF fields (1800MHz)	
9.2 W/m²	ICNIRP and EU recommandation 1998 – Adopted in India
2 W/m²	Exposure limit in Australia
1.2 W/m²	Belgium (except Wallonia)
0.5 W/m²	Exposure Limit in Auckland, New Zealand
0.24 W/m²	Exposure limit in CSSR, Belgium (Wallonia), Luxembourg
0.1 W/m²	Exposure limit in Poland, China, Italy , Paris, Toronto Board of Health1999
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
0.001 W/m²	Bio-Initiative Working Group 2007) *Precautionary recommendation – outdoor*
0.0001 W/m²	Bio-Initiative Working Group (2007) *Precautionary recommendation - indoor*
0.00001 W/m²	BUND 2007 (Germany) *Precaution recommendation only*
0.00001W/m²	New South Wales, Australia (2010)

20

EMF limits/Exposure Standards in few individual countries - An Update
(Table I - IMC Report for Base stations/1800 MHz refers)

ICNIRP standards (WHO supported) are 9.2 W/m^2 for 1800 MHz

RF Field/Exposure limit	Country	Facutually Correct/Incorrect	Factual Update
12 W/m^2	USA	⌐	USA limits are higher than ICNIRP
	Canada	⊗ Partially correct	Canada ICES (ICNIRP), since 2009
	Japan		
9.2 W/m^2	India	⌐ ⊗	ICNIRP Approved by Telecom Commission of India for implementation in 2009
9 W/m^2	Australia		ICNIRP since 2003
2.4 W/m^2	Belgium	⊗ Partially correct	Varying 0.045 to 1.125 W/m^2 in the Regions of the country
0.5 W/m^2	Auckland	⊗	

		New Zealand		New Zealand = ICNIRP since 1999
	0.45 W/m^2	Luxemberg		The update = 0.024 W/m^2
	0.4 W/m^2	China		
	0.2 W/m^2	Russia		Russia = 0.1 W/m^2
		Bulgaria		
	0.1 W/m^2	Poland		
		Paris		
		Hungary		Hungary = ICNIRP
	0.1 W/m^2	Italy - Exposure Limit in sensitive areas	Partially correct	Italy = 0.1 W/m^2 in areas > 4 hours since 2003 Public concerns on safety have increased, since lowering of the limits
	0.095 W/m^2	Switzerland		Switzerland = ICNIRP
		Italy	Partially correct	Italy = 0.1 W/m^2
	0.09 W/m^2	Germany Precaution Recommendation		Germany = ICNIRP
	0.001 W/m^2	Austria		Austria = ICNIRP (Precautionary limit in Salzburg city only; public concerns on safety have since increased)

20

ICNIRP guidelines have been developed based on very conservative assumptions, in order to protect any group of the population worldwide, taking into account differences in body characteristics and physiology, environmental conditions, etc. None of the countries that have adopted limits stricter than international standards has justified the choice with similar arguments.

Comments relate to exposure limits relevant to base station operation:

- **Australia** adopted ICNIRP in 2003.
- **Belgium** has no national limit since January 2009, each of the regions has adopted different limits in the range 0.045 to 1.125 W/m^2.
- **New Zealand** adopted ICNIRP in 1999. The Auckland value was a city policy with no legal weight.
- **Russia** applies 0.1 W/m^2; see above for **Belgium**; **Luxembourg** 0.024 W/m^2.
- **Poland** adopted 0.1 W/m^2 in 2003; **China** applies 0.4 W/m^2; **France** adopted ICNIRP in 2002. Council policies in Paris and Toronto have no legal weight. **Canada** uses the same limits as the US (similar to ICNIRP).
- **Switzerland** adopted ICNIRP in 2000 with additional installation limit values of 0.042 W/m^2 (900MHz) and 0.095 W/m^2 (1800 MHz/2100 MHz) in places of 'sensitive use', which includes apartments, schools, hospitals, offices and playgrounds, but not balconies, roof terraces, stairways, garages, storage, archive rooms, temporary workplaces, churches, concert halls and theatres, camp sites, sports and leisure-time facilities, passenger areas in railways and observation decks. **Italy** adopted a limit of 1 W/m^2 in 2003 with an additional attention value of 0.1 W/m^2 applied to children's playgrounds, residential dwellings, school premises, and in areas where people are staying for 4 hours or more per day, as well as in outdoor annexes that may be used as residential environments, such as balconies, terraces, courtyards, but excluding rooftops.
- **Germany** follows ICNIRP, the ECOLOG value was from a NGO and has no legal weight.
- **Italy**, see above.
- **Russia**, see above. **Bulgaria** uses 0.1 Wm^2 since 1991; **Hungary** adopted ICNIRP in 2004.
- **Austria** uses ICNIRP, the Salzburg policy has no legal weight. Measurements conducted in Salzburg in 2001 found that about 50% of locations exceeded the Salzburg value.
- **BioInitiative** report is not a balanced scientific assessment and has been criticised by several groups, including the Health Council of the Netherlands (http://www.gezondheidsraad.nl/en/publications/bioinitiative-report-0).
- **Germany** follows ICNIRP. BUND is an NGO and value has no legal weight.
- **Australia** follows ICNIRP, see above. The value appears to trace to a Wollonogong council policy from the late 1990s and has been repealed (at least since 2009) and regardless would have no legal weight.

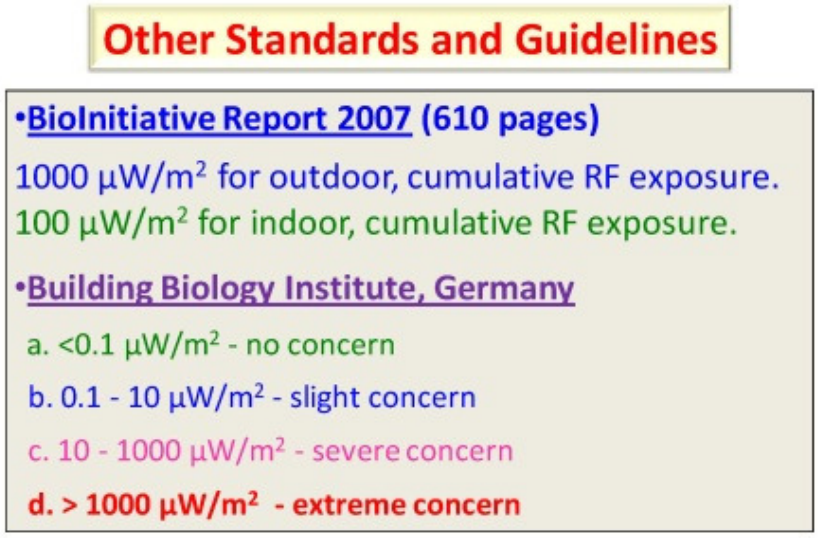
ASSOCHAM people have mentioned in their reply safe radiation density adopted in different countries,

which are repeated below with my comments:

- **Belgium** has the range 0.045 to 1.125 W/m^2.
- **New Zealand** - Why Auckland adopted lower value?
- **Russia** applies 0.1 W/m^2
- **Belgium**; **Luxembourg** 0.024 W/m^2.
- **Poland** adopted 0.1 W/m^2 in 2003
- **China** applies 0.4 W/m^2
- **Switzerland** adopted ICNIRP in 2000 with additional installation limit values of 0.042 W/m^2 (900MHz) and 0.095 W/m^2 (1800 MHz/2100 MHz) in places of 'sensitive use', which includes apartments, schools, hospitals, offices and playgrounds, but not balconies, roof terraces, stairways, garages, storage, archive rooms, temporary workplaces, churches, concert halls and theatres, camp sites, sports and leisure-time facilities, passenger areas in railways and observation decks.
  (The rationale of the standards adopted in Switzerland is the most sensible thing to do in the world. Why not we adopt this for India.)
- **Italy** adopted a limit of 1 W/m^2 in 2003 with an additional attention value of 0.1 W/m^2 applied to children's playgrounds, residential dwellings, school premises, and in areas where people are staying for 4 hours or more per day, as well as in outdoor annexes that may be used as residential environments, such as balconies, terraces, courtyards, but excluding rooftops.
  (The rationale of the standards adopted in Italy is sensible but has much higher value than Switzerland)
- **Germany** follows ICNIRP, the ECOLOG value from a NGO should have weight as in general, NGO's work for the benefit of the people.
- **Bulgaria** uses 0.1 W/m^2 since 1991
- **Austria** uses ICNIRP, the Salzburg policy should have weight. Measurements conducted in Salzburg in 2001 found that about 50% of locations exceeded the Salzburg value of 0.001 W/m^2, which will be equivalent to 0.0015 W/m^2 but still much lower than **Switzerland. If a working network can be deployed there, then why not in India.**
- **BioInitiative** report is the most balanced scientific assessment and has been criticised by several groups, which are mostly from telecom operators. **BioInitiative** report mentions that cumulative safe radiation density for outdoor exposure is 1000 microwatts/ m^2 and cumulative safe radiation density for indoor exposure is 1000 microwatts/ m^2
- **Germany** follows ICNIRP. BUND is an NGO and should have weight.

In all the above countries, safe radiation density is 1/100th to 1/100th of the value adopted in India. I recommend that we should adopt 0.01 W/m^2 with immediate effect.

21	**FCC Guidelines – Human exposure to RF fields** Cellular cell site towers are typically 50-200 feet high. Majority of cellular or PCS cell sites in urban and suburban areas operate at an ERP of 100 watts per channel or less. An ERP of 100 watts corresponds to an actual radiated power of 5-10 watts, depending on the type of antenna used. In urban areas, cell sites commonly emit an ERP of 10 watts per channel or less. http://www.fcc.gov/guides/human-exposure-rf-fields-guidelines-cellular-and-pcs-sites In INDIA, cell sites transmit 100's of Watts of power with antenna gain of 50, so ERP = 5000 Watts
21	Indian cell sites transmissions are not unusual when compared to other countries with urban environments and widespread use of mobile phones. In India 20W/channel is the typical output, this can be multiplied by the number of channels, but assuming the gain for all is also misleading. **In India, we must reduce the cumulative radiated power from each roof top or tower to maximum 1 to 2W especially in the densely populated area.**

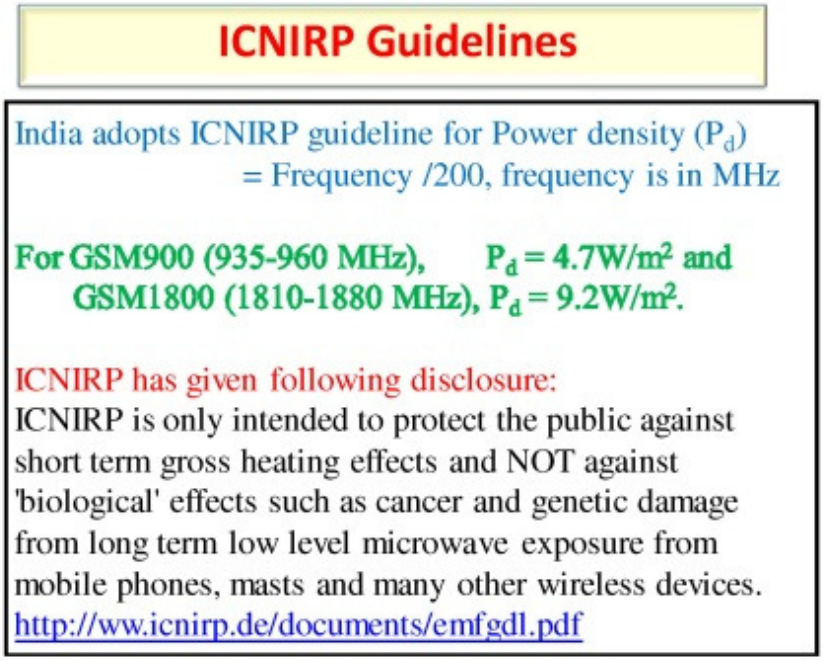


22	WHO recognizes only two organizations (ICNIRP and IEEE) on developing EMF exposure standards or guidelines. (See WHO Fact Sheet #193) BioInitiative Report has been criticised by several Governmental groups. **The BioInitiative Report and the Building Biology Institute are not recognised standards bodies in the area of EMF, and it is misleading to suggest that they are.** See http://www.gezondheidsraad.nl/en/publications/bioinitiative-report-0 The 2007 BioInitiative Report (BIR) is a compilation of distinct chapters or sections with no consistent approach and no evidence of consensus among all the authors or any statement to that effect. The report is not an objective comprehensive review, nor a weight-of-evidence assessment. For example, critical literature was ignored, including the animal tumor studies. Furthermore, the BIR does not provide a rationale to show how their recommended limits were derived. Setting RF exposure limits based on the "precautionary principle" as recommended in the BIR is inappropriate and inadvisable because of the large database on the biological and health effects of RF exposure that was ignored. Furthermore, we contend that by incorporating large safety factors into the IEEE C95.1 exposure limits, i.e., 10 and 50 for exposures in the workplace and for the general public, respectively, ICES is recommending safe limits based on a defensible scientific process. A critique of the BIR is included in the Technical Information Statement (TIS) published in 2009 by the IEEE Committee on Man and Radiation1 (COMAR) [1]). The COMAR position, as summarized in the abstract of the TIS, is consistent with that of ICES and a number of international expert panels that have recently reviewed the literature. Specifically, *"Since appearing on the Internet in August 2007, the BIR [BioInitiative Report] has received much media attention but, more recently, has been criticized by several health organizations (see Section titled "Views of health agencies about BIR"). COMAR concludes that the weight of scientific evidence in the RF bioeffects literature does not support the safety limits recommended by the BioInitiative group. For this reason, COMAR recommends that public health officials continue to base their policies on RF safety limits recommended by established and sanctioned international organizations such as the Institute of Electrical and Electronics Engineers International Committee on Electromagnetic Safety and the International Commission on Non-Ionizing Radiation Protection, which is formally*

	related to the World Health Organization."
22	The COMAR statement concludes *' that the weight of scientific evidence in the RF bioeffects literature does not support the safety limits recommended by the BioInitiative group. For this reason, COMAR recommends that public health officials continue to base their policies on RF safety limits recommended by established and sanctioned international organizations such as the Institute of Electrical and Electronics Engineers International Committee on Electromagnetic Safety and the International Commission on Non-Ionizing Radiation Protection, which is formally related to the World Health Organization.'* Serious criticism has been made of the BioInitiative Report, including: • **Danish National Board of Health**[1]: noted that the Bio Initiative report (a) does not provide any reason to change the current health risk assessment on exposure to electromagnetic fields and (b) does not include new data and has not taken the scientific quality of the cited reports into consideration in the way that is customary. • **German Federal Office for Radiation Protection** (BfS)[2]: stated that the BioInitiative report has clear scientific weaknesses including selection bias in several research areas. • **The Health Council of the Netherlands**[3] who compared the sound scientific method used for reports issued by WHO as well as ICNIRP and other relevant health bodies to the BioInitiative report. The Health Council was highly critical of the approach used by the Bio Initiative Report: "[WHO's and ICNIRP's] multidisciplinary weight-of evidence method leads to a scientifically sound judgment that is as objective as possible. The BioInitiative report did not follow this procedure." The Health Council of the Netherlands summarized its assessment by stating that the BioInitiative report "is not an objective and balanced reflection of the current state of scientific knowledge and does not provide any grounds for revising the current views as to the risks of exposure to electromagnetic fields." • The **IEEE's Committee of Man and Radiation (COMAR)**[4] that concluded that the weight of scientific evidence in the RF bioeffects literature does not support the safety limits recommended by the BioInitiative group. For this reason, COMAR recommends that public health officials continue to base their policies on RF safety limits recommended by established international organizations such as the Institute of Electrical and Electronics Engineers International Committee on Electromagnetic Safety and the International Commission on Non-Ionizing Radiation Protection, which is formally related to the World Health Organization. Sources: 1. http://www.sst.dk/Forebyggelse/Miljo_hygiejne_og_sol/Ikke_-_ioniserende_straaling.aspx?lang=da (in Danish) 2. http://www.emf-forschungsprogramm.de/int_forschung/wirk_mensch_tier/Synopse_EMFStudien_2008.pdf (in German) 3. Health Council of the Netherlands. BioInitiative report. The Hague: Health Council of the Netherlands, 2008; publication no. 2008/17E http://www.gr.nl/adviezen.php (in English) Health Phys. 97(4):348 –356; 2009 http://www.baubiologie.de/site/english.php RF measurements are not mentioned under this Institute's documents, but they are an Institute who advocates the use of the precautionary principle, and comment on a wide range of elements in any living environment, not specialists in RF. Nonetheless, the German government continues to apply ICNIRP guidelines. **BioInitiative report mentions that cumulative safe radiation density for outdoor exposure is 1000**

	microwatts/ m^2 and cumulative safe radiation density for indoor exposure is 100 microwatts/ m^2 and Building Biology Institute, Germany has given finer classifications as mentioned in the slides. These recommendations are criticised by mostly telecom operators, which is more from commercial reason than from the health point of view. **Detailed answer is given in Slide 16 by extrapolating the guidelines given by FCC. Also, see answers given in Slide 20 about guidelines adopted in various countries.**

23



23

The claim that "The existing standards are based on thermal (heating) limits and do not address non-thermal (or low intensity) exposures …" (par. 5.1, page 29 IMC report) is false**. ICNIRP considers very seriously the possibility of long-term effects, and continuously monitors the studies in this area**.

The **World Health Organization** has said:

"The exposure limits for EMF fields developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) - a non-governmental organization formally recognised by WHO, were developed following reviews of all the peer- reviewed scientific literature, including thermal and non-thermal effects. The standards are based on evaluations of biological effects that have been established to have health consequences."

Only thermal effects are regarded as established and used to set the limits. Non-thermal biological effects have not been shown to be a health hazard.

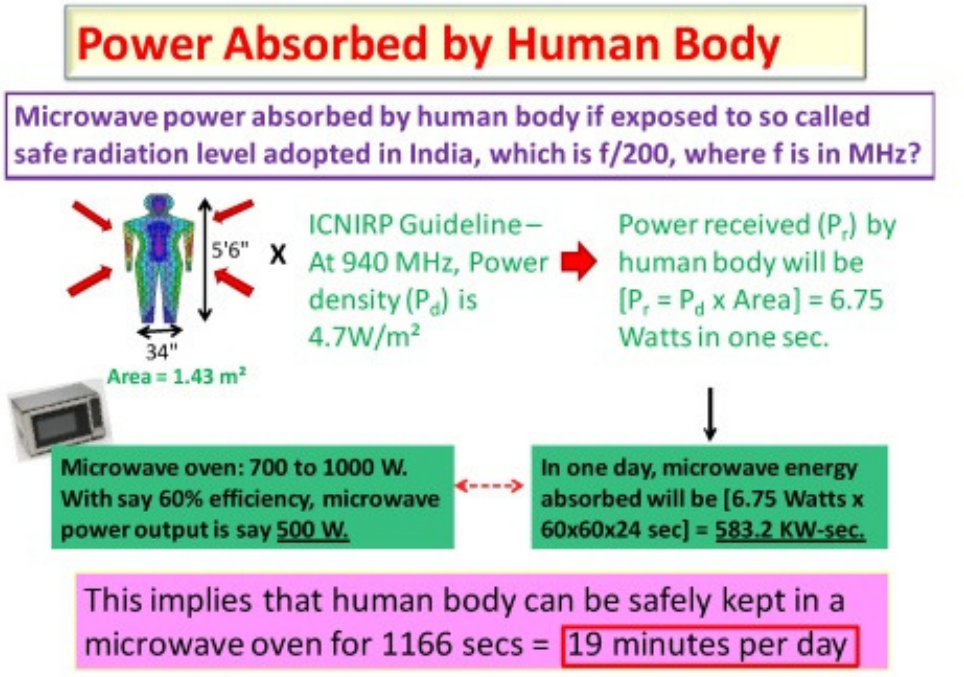
Cancer and genetic damage not established as due to low-level RF exposures.

ICNIRP establishes guidelines for limiting EMF exposure that will provide protection against known adverse health effects.

Also see WHO Fact Sheet #304, on base stations, and Fact Sheet #193 on mobile phones.

WHO Fact Sheet # 304 is dated May 2006 and has no relevance after May 31, 2011. WHO Fact Sheet # 193 in June 2011 has reported, "The electromagnetic fields produced by mobile phones are classified by the International Agency for Research on Cancer as possibly carcinogenic to humans." Also, ICNIRP guidelines specifically mention that it is for short term gross heating effect and not for long term, then why this should be adopted for 24x7.

24



24

As previously, in an unreal world where we can **selectively suspend some laws of physics** and for this scenario we also need to **selectively suspend some body metabolism and physiology processes**, only then would the following be correct…

For a whole body exposure in a perfectly uniform field at 4.7W/m^2 over 1.43m^2 = 6.72j energy absorption in 1s. In 1 day 6.72 x 60x60x24 = 580.7kj which equates to 1,161s or 19mins of perfect absorption from a 500W microwave oven.

Table-3.3.5 ICMR's RDA for Energy (reference body weights and actual body weights)

Sex	Ref.Body weight	Actual body weight	Energy RDA			
			Activity category	For Ref. Body Weight	For Actual body weight	Percent difference
Man	60.0	52.0	Sedentary	2425	2115	13
			Moderate	2875	2492	13
			Heavy	3800	3293	13
Woman	50.0	44.0	Sedentary	1875	1740	12
			Moderate	2225	1958	12
			Heavy	2925	2594	11

Source: Dr.B.S.Narasinga Rao-Gopalan Oration 2001

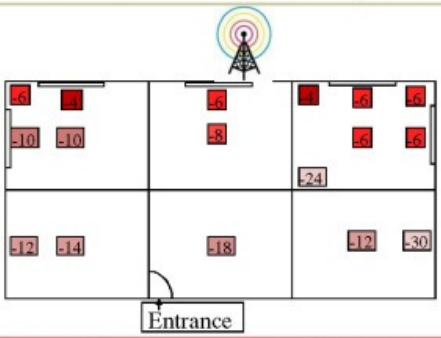
http://planningcommission.nic.in/plans/planrel/fiveyr/10th/volume2/v2_ch3_3.pdf

Based on the above data specific to Indian men and women doing light to heavy work their energy requirement would be 1,875Kcal to 3,800Kcal = 2837Kcal and 2837Kcal x 4.18 = 11,860Kj

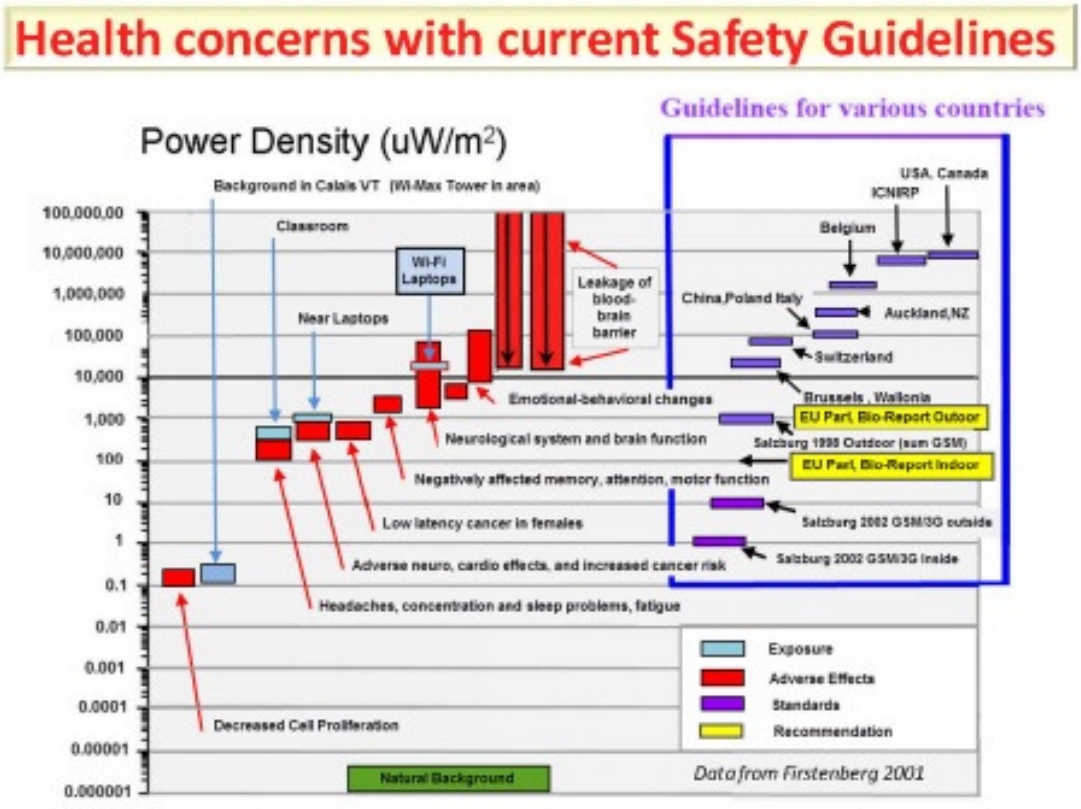
Thus the energy requirement of the body is equivalent to 6.5hrs output from the 500W microwave should you want to quantify it in this way. We must again emphasise this theoretical calculation is only valid if we can disregard the laws of nature.

	Please note however, it is not advised to place the human (or animal) body in a microwave for **any** period of time. **They are validating my calculation at least for an ideal case. I will also like to mention that my calculations are given for 4.7W/m2 and not for 9.2W/m2 corresponding to GSM1800, which is 2 times more and will compensate for difference in body weight of men and women. I agree that it is not advised to place the human (or animal) body in a microwave oven for any period of time. However, operators are making part of India as an open microwave oven by transmitting large amount of RF power in the environment.**

25	**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/m² = 31,800 µW/m².
25	Accepting the assumptions that have been made here then the calculations are correct. **What needs to be emphasised here is the tiny power values that he has established**. In both cases the, the power received is very small at less than 1 mW in both cases. (phone considers to operate at time averaged maximum of 125 mW (see slide 5) Just for comparison, the energy received from the Sun, in terms of Sunlight, is about 1 - 1.5 kW/m^2. To put this into context, this is about 30,000 times greater than the figure that has been given in the example. **The power received is small at a distance of 50m for a single channel. For multiple channels and operators, power is much large. However, even for this small power density, health hazards occurred within a few years, which is similar to those reported in Bio-Initiative report.** **A person can stand in the Sun for a few minutes to maximum few hours. Radiation from the towers is 24x7, it is like standing in the sun for 24 hours for years. Also, sun heating is from outside the skin to inside the body, in which skin acts as a protective layer. Outside temperature can vary from say, 20^0 to 44^{0}C, but body temperature stays around 37^{0}C (36.9^{0}C = 98.4^{0}F). However, if body temperature goes up by even 1^{0}C to 38^{0}C (=100.4^{0}F), it implies fever. Microwave energy penetrates the skin and its heating is from inside to outside, this heat is trapped inside the body due to skin, which directly raises the body temperature.**

26	**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
---	---	---	---
Delhi-Gurgaon Highway - near Toll (3 towers)	0	0.0706	70,686
Vashi Bridge - after Railway Station	-4	0.0282	28,274
Resident 1, 4th Fl: Sergean House Lady w/cancer	-6	0.0177	17,756
Resident 2, Opposite roof, Rane Society, Powai	-10	0.00706	7,069
Near Hub mall, Goregaon	-10	0.00706	7,069
Gandhi Nagar Over railway bridge-near building	-12	0.00446	4,460
Ustav Chowk, Kharghar	-12	0.00446	4,460
Vikroli - before Godrej	-14	0.002814	2,814
Giovandi- Residential towers - near Indian Oil	-14	0.002814	2,814
Belapur Flyover, near RBI- CIDCO	-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
Powai police station	-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	 **ICNIRP norms are not safe for 24 hours exposure over a long period of time. This limit must be reduced immediately to less than 10,000 microwatts/m2 = 0.01 W/m2.**
26	This slide just demonstrates that of many sites surveyed ICNIRP compliance is the norm. **ICNIRP norms are not safe for 24 hours exposure over a long period of time. This limit must be reduced immediately to less than 10,000 microwatts/m2 = 0.01 W/m2.**
27	**Measurement inside an Apartment**  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 are in dBm, which are very high.
27	**The text does not provide any evidence (medical or other) that this particular cancer is due to the exposure from the tower.** The reader is simply expected to accept the inference whilst there are many other reasons that people including this particular lady developed a cancer **High radiation level of 17,756 microwatts/m2 is one of the reasons. We know large number of cancer cases where we found the radiation level to be of this order. Headache, sleep disorder, memory loss, miscarriage, etc. have been noticed at lower levels of even 1,000 microwatts/m2 within a few years.**

28



28

This figure is misleading in the presentation of Firstenberg 2001 data and current standards.

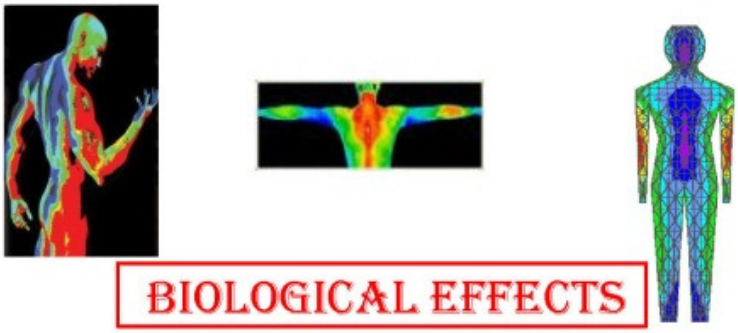
This selective presentation of the Firstenberg 2001 data is inaccurate in its presentation; the units have also been changed leading to error.
www.goodhealthinfo.net/radiation/radio_wave_packet.pdf

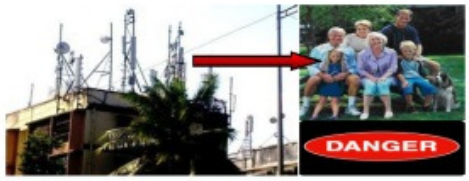
Data not sourced from Firstenberg 2001 is mixed with the cited source to add credibility to it. The original data, dates back to reports from 1950, with limited recent data reflecting improved measurement techniques.

Finally, in reviewing the cited sources in Firstenberg 2001, we see:

- data sources are for a broad range of frequencies,
    - 20-80Hz, low-frequency, ranging up to EHF and super high frequency
- many studies are based on occupationally exposed workers
    - some sample sizes are as low as 50, others are undefined here.

Units have been changed from microwatts/cm2 to microwatts/m2 for uniformity of the presentation, and correspondingly values have been changed without any error. Background radiation level is only 0.000001 microwatts/m2, whereas noticeable health hazards start at 100 microwatts/m2. in India, we have adopted 4,700,000 microwatts/m2 for GSM900, which is considerably higher than serious health hazards occurring around 10,000 microwatts/m2.





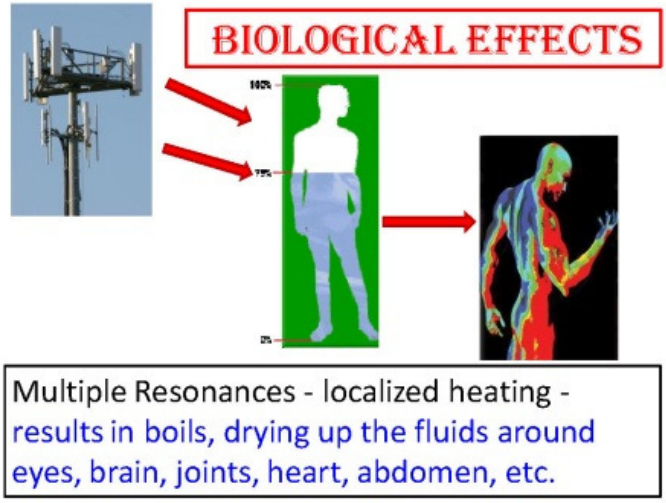
29

The red arrow implying a direct linkage of antenna site to people and danger is misleading. **As long as the power density level at the location of people is below the ICNIRP limits, there are no proven health effects**.

See WHO Fact Sheet 304 (2006):

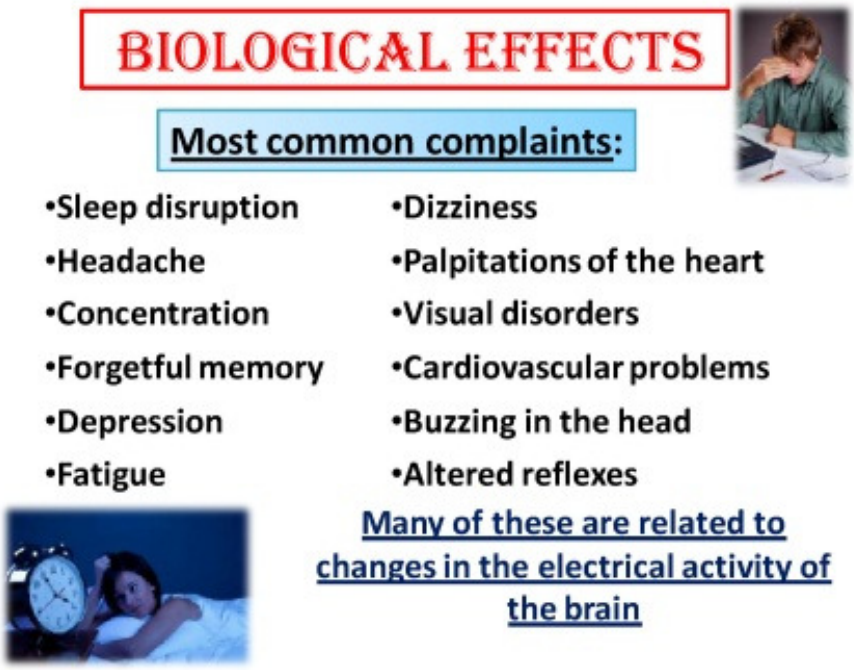
"Considering the very low exposure levels and research results collected to date, there is no convincing scientific evidence that the weak RF signals from base stations and wireless networks cause adverse health effects."

WHO Fact Sheet # 304 is dated May 2006 and has no relevance after May 31, 2011, when WHO reported, "The electromagnetic fields produced by mobile phones are classified by the International Agency for Research on Cancer as possibly carcinogenic to humans." Radiation from cell towers is 24x7, and many older people, house wives, small children, who stay at home, are exposed to this radiation for 24 hours continuously and body does not get any time to recover.



30

Only intense RF exposures can cause "results in boils, drying up the fluids around eyes, brain, joints, heart, abdomen, etc". **At public locations, the fields are very low as stated in the WHO Fact Sheet #304**, unless the person is within touch distance from an active high power antenna.

	WHO Fact Sheet # 304 is dated May 2006 and has no relevance after May 31, 2011, when WHO reported, "The electromagnetic fields produced by mobile phones are classified by the International Agency for Research on Cancer as possibly carcinogenic to humans." Radiation from cell towers is 24x7, and many older people, house wives, small children are exposed to this radiation for 24 hours continuously, who stay at home, and body does not get any time to recover.
31	
31	The only proven low level effect, reproducible and with a mechanism, is the hearing of radar pulses. **None of other low level effects have been established.** See WHO fact sheet on claims of symptoms: http://www.who.int/entity/mediacentre/factsheets/fs296/en/index.html **My report submitted to DOT in Dec. 20, 2010 consist of 30 pages of report and nearly 200 technical/scientifical references. In which, category wise, we have mentioned these health effects with separately titled references at the end of the report.**

32

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

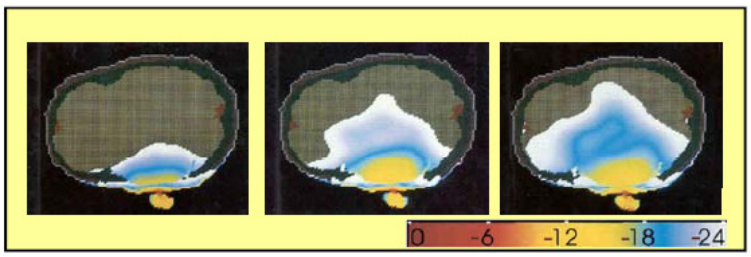
RF penetration in the skull of an adult (25%), 10 year (50%) and a 5 year old (75%).

Although spatial variations in SAR are expected for RF exposures to the head in the near field, as pointed out by Gandhi et al. (1996) [1], de Salles et al. (2006) [2], Wiart et al. (2008) [3] and Christ et al. (2010) [4], spatial peak SARs in the SAM head model used for compliance evaluation have been shown to be conservative for both adults and children (by the teams of Kuster and Wiart 2010 [4], [5]). Their conclusions are summarized in the following statements taken from the abstracts of their papers:

"The peak spatial specific absorption rate (SAR) assessed with the standardized specific anthropometric mannequin head phantom has been shown to yield a conservative exposure estimate for both adults and children using mobile phones." [4]

"The specific anthropomorphic mannequin (SAM) homogeneous head model has been also used to compare all the results and to confirm that the SAM model always overestimates adult and child head exposure… It was also pointed out that the value of the maximum local peak SAR in the SAM was always higher than in the adult and children models." [5]

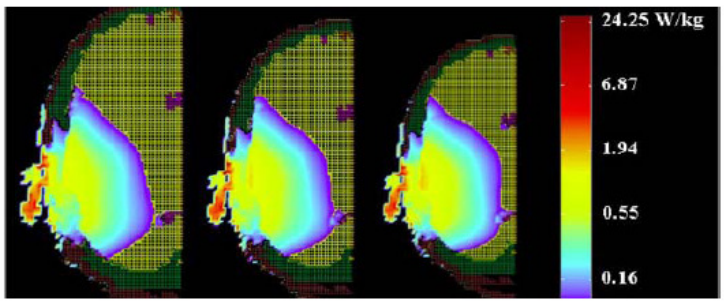
The apparent concern stems from recent media reports and presentations by those promoting precautionary measures when using mobile phones. Their arguments are usually based on a figure (Figure 1) from Gandhi et al. (1996) [1] that represents the results of numerically-computed SAR patterns for 5 yr, 10 yr and adult heads.



a) Adult **b) 10-year old** **c) 5-year old**

Figure 1: The apparent dramatic increase of penetration depth in smaller heads. (Gandhi et al., 1996 [1])

Kang (2002) [6]. In this paper, the revised scaling and colour presentation show that the penetration depth in the three head models is about the same (see Figure 2). While the authors still claim that the penetration is deeper in the smaller heads, this statement is true only if RF penetration is expressed as a percentage of the width of the head, and not penetration depth, per se.

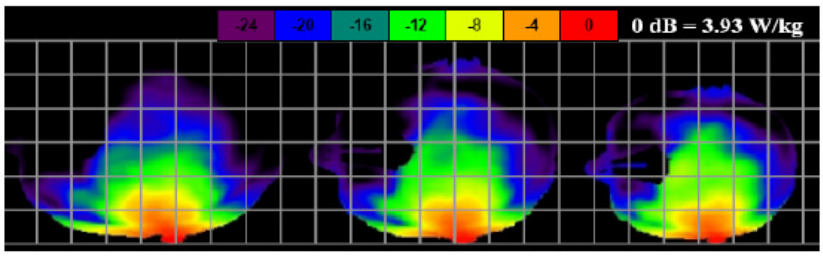


a) Adult b) 10-year old c) 5-year old

Figure 2: In contrast with Figure 1, the 2002 Gandhi and Kang paper [5] shows that with the corrected scaling with respect to physical size, the SAR patterns in the different sized heads are similar.

Based on the physical theory of RF exposure in the near-field, the results shown in Gandhi and Kang (2002) [6] are expected. Similar results obtained by Bit-Babik et al. (2005) [7] are shown in Figure 3. In spite of the fact that Gandhi and Kang [2002] revised their earlier results, activists repeatedly use the Gandhi et al. [1996] results to argue that RF energy has deeper penetration in the heads of children compared with adults.

32



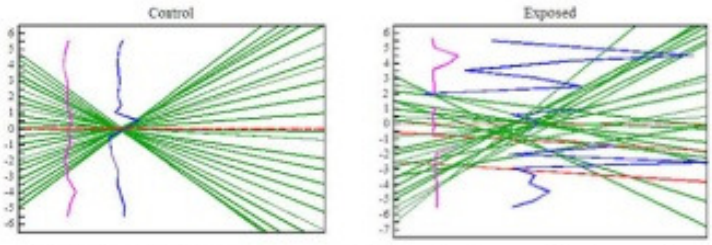
a) Adult b) 10-year old c) 5-year old

Figure 3: Results by Bit-Babik et al. (2005) [7] (SAR 1-g average) using scaled head models that are similar to the results of Gandhi and Kang [2002].

MRI-based adult and child models used for simulation of exposure to mobile phones show that the peak SAR in the brain of smaller heads is greater than in the adult head. This is expected because smaller heads have smaller ears and a thinner skull, i.e., the antennas are closer to the brain. Some use this fact to argue that because the SAM head is large, SAR measurements using the SAM phantom are not conservative, especially for children [8]. However, IEEE/ICES TC34 was aware of the fact that the closer the antenna is to the brain the greater the absorption. To compensate for this and to ensure conservative estimates, the SAM phantom possesses both a thin ear to allow cell phone antennas to be close to the head and a simulant liquid with greater absorption properties than those found within the human head. For details see Chapter 5 Phantom Model of IEEE Std. 1528-2003 [9]. Three recent studies ([4], [5], [10]), using the finite difference time domain (FDTD) method and MRI-based human head models, have shown that measurements using the SAM phantom are conservative. No study has shown that the SAM

I will like to mention that Interphone study included only adults between the ages of 30 to 59 years. Please see answer in Slide 9, where it is shown that the risk for brain tumors from cell phone use is much higher in young adults (red column) when compared to older adults (blue columns).

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.

33

Not an accepted or proven effect.

Mobile Phone Use and Risk of Uveal Melanoma: Results of the Risk Factors for Uveal Melanoma Case-Control Study, Stang et al., Journal of the National Cancer Institute, 101(2):120-123 21 January 2009. http://jnci.oxfordjournals.org/cgi/content/abstract/jnci;djn441v1

We recently reported an increased risk of uveal melanoma among mobile phone users. Here, we present the results of a case-control study that assessed the association between mobile phone use and risk of uveal melanoma. We recruited 459 uveal melanoma case patients at the University of Duisburg-Essen and matched 455 case patients with 827 population control subjects, 133 with 180 ophthalmologist control subjects, and 187 with 187 sibling control subjects. We used a questionnaire to assess mobile phone use and estimated odds ratios (ORs) and 95% confidence intervals (95% CIs) of risk for uveal melanoma using conditional logistic regression. Risk of uveal melanoma was not associated with regular mobile phone use (OR = 0.7, 95% CI = 0.5 to 1.0 vs population control subjects; OR = 1.1, 95% CI = 0.6 to 2.3 vs ophthalmologist control subjects; and OR = 1.2, 95% CI = 0.5 to 2.6 vs sibling control subjects), and we observed no trend for cumulative measures of exposure. We did not corroborate our previous results that showed an increased risk of uveal melanoma among regular mobile phone users.

Following Scientific References show the effect on Eye/ Uveal Melanoma

Stang A, Anastassiou G, Ahrens W, Bromen K, Bornfeld N, Jöckel K-H: The possible role of radio frequency radiation in the development of uveal melanoma. Epidemiology 2001 , 12(1):7-12.- http://www.jstor.org/stable/3703672

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Guy, A.W.; Lin, J.C.; Kramar, P.O.; Emery, A.F.; Effect of 2450-Mhz Radiation on the Rabbit Eye, Microwave Theory and Techniques, IEEE Transactions on , 1975, 23(6), 492 – 498, http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1128606

Wainwright PR., Computational modelling of temperature rises in the eye in the near field of radiofrequency sources at 380, 900 and 1800 MHz, Phys Med Biol. 2007 Jun 21;52(12):3335-50 - http://www.ncbi.nlm.nih.gov/pubmed

Hirata A, Watanabe S, Taki M, Fujiwara O, Kojima M, Sasaki K. Computation of temperature elevation in rabbit eye irradiated by 2.45-GHz microwaves with different field configurations. Health Phys. 2008 Feb;94(2):134-44. - http://www.ncbi.nlm.nih.gov/pubmed/18188048

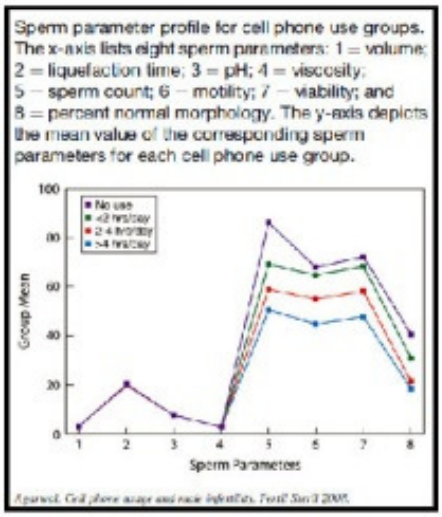
Lin, J.C. ,Cataracts and cell-phone radiation, Antennas and Propagation Magazine, IEEE 2003, 45 (1), 171 – 174 - http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1189664

Hirsch F. G. and Parker J. T. "Bilateral Lenticular Opacities Occurring in a Technician Operating a Microwave Generator,"A M A Arch Ind Hyg Occup Med., 1952 ,6(6):512-7.

Dovrat A. , Berenson R., Bormusov E., Lahav A., Lustman T., Sharon N., Schächter L. , Localized effects of microwave radiation on the intact eye lens in culture conditions, Bioelectromagnetics 26:398^405 (2005) http://onlinelibrary.wiley.com/doi/10.1002/bem.20114/pdf

Irreversible infertility

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



34

There are many confounding factors in life involved. Not proven a causal relationship to mobile phone.

Recent reviews report that the research is inconsistent:

Challenging cell phone impact on reproduction: A Review, Merhi, Journal of Assisted Reproduction and Genetics, Published Online: 16 February 2012.
http://dx.doi.org/10.1007/s10815-012-9722-1

Following scientific references on Irreversible Infertility show the effect.

Agarwal A., Prabakaran S. A., Ranga G., Sundaram A. T., Sharma R. K., Sikka S. C., Relationship between cell phone use and human fertility: an observational study, Oasis, The Online Abstract Submission System, 2006

Agarwal A., Deepinder F.,Sharma R.K, Ranga G., Li J., Effect of cell phone usage on semen analysis in men attending infertility clinic: an observational study, Fertil Steril, 2008 Jan; 89(1):124-8.- http://www.clevelandclinic.org/reproductiveresearchcenter/docs/agradoc239.pdf

Aitken RJ, Bennetts LE, Sawyer D, Wiklendt AM, King BV. Impact of radio frequency electromagnetic radiation on DNA integrity in the male germline. Int J Androl 2005;28:171–9.- http://www.ncbi.nlm.nih.gov/pubmed/15910543

Dasdag S, Ketani MA, Akdag Z, Ersay AR, Sari I, Demirtas OC, et al. Whole-body microwave exposure emitted by cellular phones and testicular function of rats. Urol Res 1999;27:219–23.- http://www.ncbi.nlm.nih.gov/pubmed/10422825

Fejes I, Zavaczki Z, Szollosi J, Koloszar S, Daru J, Kovacs L, et al. Is there a relationship between cell phone use and semen quality? Arch Androl 2005;51:385–93- http://www.ncbi.nlm.nih.gov/pubmed/16087567

Forgács Z, Kubinyi G, Sinay G, Bakos J, Hudák A, Surján A, Révész C, Thuróczy G.Effects of 1800 MHz GSM-like Exposure on the Gonadal Function and Haematological Parameters of Male Mice," Magy Onkol. 2005;49(2):149-51- http://www.ncbi.nlm.nih.gov/pubmed/16249811

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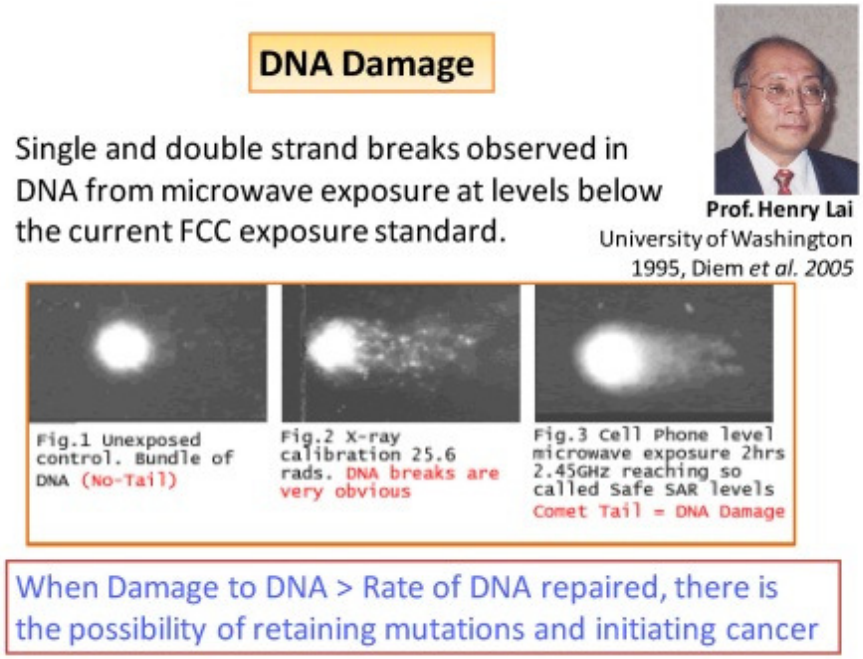
Kumar S, Kesari KK, Behari J., Influence of microwave exposure on fertility of male rats, Fertil Steril. 2010 Jun 17 - http://www.ncbi.nlm.nih.gov/pubmed/20723534

Magras IN, Xenos TD, "RF radiation-induced changes in the prenatal development of mice", Bioelectromagnetics, 18, 455-461, 1997 - http://www.ncbi.nlm.nih.gov/pubmed/9261543

NATO Handbook on the Medical Aspects of NBC Defensive Operations, Chapter five, "Cellular Effects of Ionizing Radiation" Section III, 508. - http://www.fas.org/irp/doddir/army/fm8-9.pdf

Shine R, Peek J, Birdsall M., Declining sperm quality in New Zealand over 20 years, N Z Med J, 121(1287), 50-6, 2008 - http://www.ncbi.nlm.nih.gov/pubmed/19098968

35



35

DNA effect is not a reproducible effect and not an established effect. There are more than 40 animal studies and many of them involve long term up to life time exposures showing no increase of tumor incidence.

IEEE C95.1: "*A review of numerous supportive studies addressing cancer and basic cellular interactions show no consistent evidence for a reproducible biological effect of low level (non thermal) RF exposure. These studies include examination of DNA breaks, mutation, specific DNA absorption, chromosome aberration induction, micronucleus formation, sister chromatid exchange induction, DNA repair synthesis, inhibition of DNA repair synthesis, phenotypic mutagenesis, transformation, cell cycle elongation, cell toxicity, proliferation, growth rate, cell cycle analysis, gene and protein expression and activity, and oxidative stress. The majority of studies report no effect. The magnitude of the reported effects are generally very small, often in the range of variability that normally occurs in clinical laboratory tests ordered by physicians, and thus the direct health implication of such reports would still remain unclear even if they were independently verified.*"

35

Following scientific references show the effect on DNA damage

G.J. Hyland, The Physiological and Environmental Effects of Non-ionising Electromagnetic Radiation, Germany, February 2001, - http://www.studiosra.it/news/hyland.htm

G J Hyland, How Exposure to GSM & TETRA Base-station Radiation can Adversely Affect Humans, August 2002 - http://www.psrast.org/mobileng/hylandbasestation.pdf

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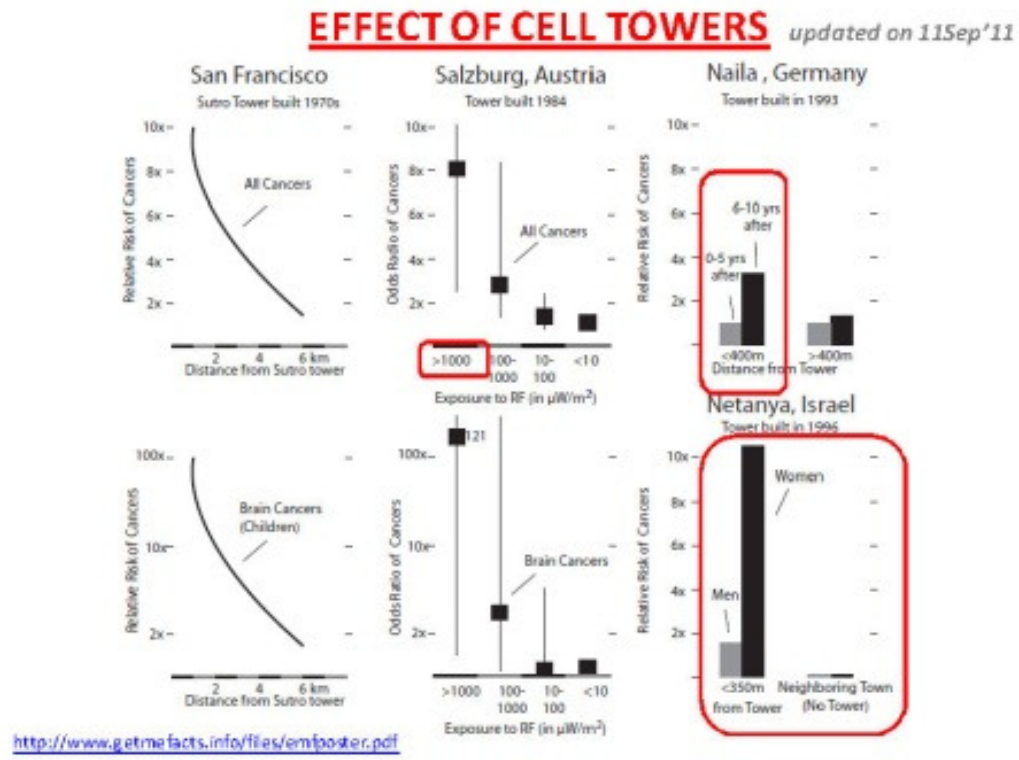
	BRAZIL **New study from Brazil: direct link to 4,924 cancer deaths from cellular antennas radiation**  *May 17, 2011* ❑ Scientists found between 1996 and 2006 died in Belo Horizonte a total of 4924 victims of cancer types that may be caused by electromagnetic radiation, such as **tumors in the prostate, breast, lung, kidneys and liver.** ❑ 80% of victims lived within 500 m's away from cell phone antennas Source: http://www.next-up.org/pdf/Brazil_New_study_direct_link_to_4924_cancer_deaths_from_cellular_antennas_radiation_28_07_2011.pdf
36	**This report and the slide, give information out of context**. The title stating "direct link" is not qualified. In the quoted text the linkage "may be caused" by electromagnetic radiation. The abstract of the original study does not cite any other factors that were studied and excluded in their conclusions. Referring to the incidence of cancer clusters, the World Health Organisation Fact Sheet number 304 states: http://www.who.int/mediacentre/factsheets/fs304/en/index.html *"It should be noted that geographically, cancers are unevenly distributed among any population. Given the widespread presence of base stations in the environment, it is expected that possible cancer clusters will occur near base stations merely by chance. Moreover, the reported cancers in these clusters are often a collection of different types of cancer with no common characteristics and hence unlikely to have a common cause."* **The word "direct link" was reported in the reference and not added by me. People suffered from cancer and died and they are writing about a word is qualified or not, is that what humanity all about?** **WHO Fact Sheet # 304 is dated May 2006 and has no relevance after May 31, 2011, when WHO reported, "The electromagnetic fields produced by mobile phones are classified by the International Agency for Research on Cancer as possibly carcinogenic to humans."**



37

In the graph on the left, there has been comment on the Sutro Tower. This is predominately a TV tower with several radio stations on it see the website www.sutrotower.com. There is no mention of cellular on the website. Further to this, there is a suggestion that they have been collecting data from 1973, long before Cellular.

In terms of the remaining studies, i.e. Nalia and Netanya, it is worth considering the views of the IARC group who considered environmental exposures as part of Monograph 102. The views of IARC were represented in a poster which stated

Environmental exposure to RF-EMF: no solid data

"Ecological and case-control studies have been carried out to investigate potential associations of brain cancer with RF emissions from transmission antennas. These studies are generally limited by reliance on measures of geographic proximity to the antennas as an exposure surrogate. Substantial exposure misclassification is unavoidable. For the same reason, no conclusions can be drawn from the limited data that were available on risk for leukaemia, lymphoma or a number of other cancers."

Radiofrequency Electromagnetic Fields: evaluation of cancer hazards
Robert Baan, Yann Grosse, Béatrice Lauby-Secretan, Fatiha El Ghissassi, Véronique Bouvard, Lamia Benbrahim-Tallaa, Neela Guha, Farhad Islami, Laurent Galichet, Kurt Straif, on behalf of the WHO International Agency for Research on Cancer Monograph Working Group)

This collection of data needs verification.
For example the Gandhi et al. 1996 SAR pattern in heads from the cited website are incorrect.
The graph is taken from the reference and not prepared by me. It is a good thing to point out that relative risk of cancer also increase from TV tower at a distance of even 2 Km in a few decades. Graph of

	Salzburg, Austria clearly indicates that relative risk of cancer is 8 times more for radiation density > 1000 microwatts/m2, that's why they adopted stricter guidelines. **Graph of Naila, Germany clearly indicates that relative risk of cancer increased to 3 times in 6 to 10 years. Graph of Netanya, Israel indicates that relative risk of cancer for women is much higher than men as they probably stay at home and exposed to the radiation for 24 hours a day compared to men who spend much lesser time at home.**
	INDIA ❖10 Housewives in Sher-e-Punjab Colony - Andheri (E), Mumbai have been diagnosed with various forms of cancer 6 - Breast Cancer cases, 1 - Ovarian Cancer , 1 - Blood Cancer,1 - Inguinal Lymph Node Cancer, 1 - unknown – relapsed after chemotherapy ❖Increased cancer cases with proximity to Towers Within 91 m from a mobile tower  Source: [ ] Deshpande, who studied the deaths in his Solapur locality since two towers were installed four years ago

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

38	As stated before, there is no proof that these types of cancer are related to RF exposure. Cancer is unfortunately a very common disease. See slides 16 and 36 for WHO comment. **Names of the people, their age, types of cancer are given and their proximity to tower is also given. This slide was uploaded by concerned citizens and reference is given.**
	 Effect on Environment  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.  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.
39	**No references to support these claims**.

In 1999, the WHO International EMF Project, the ICNIRP and the German Federal Office for radiation Protection (BfS) hosted a seminar on the effects of electromagnetic fields in the environment. A review produced after the seminar concluded that:

'Overall, it appears that the human EMF exposure limits recommended by the International Commission on Non-Ionizing Radiation (ICNIRP, 1998) would also be protective of the environment.'

UNEP 2011:
'Electric and magnetic fields may also influence bee behaviour, as bees are sensitive to these fields through small abdominal crystals that contain lead. However, currently there is insufficient data and research to establish a causal link between the impact of these fields and bee mortality.'

See Slides 41 and 42 and the answers regaring serious effects on human, birds, animals and plants. Specific references are given below:

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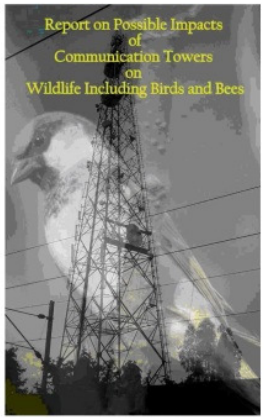
	
40	No response needed.

Expert Group to study the possible impacts of communication towers on Wildlife including Birds and Bees *(2011)*

Table 3. Number of research studies (collected from Open access Bibliographic databases) collected and collated based on the study subjects and results

	Impact	No Impact	Neutral/ inconclusive	Total (n)
Birds	23	3	4	30
Bees	6	1	0	7
Human	459	109	174	742
Other Animals (+Wildlife)	85(+13)	16(+1)	10(+7)	111(+21)
Plants	7	0	1	8
Total	593	130	196	**919**

Scientific studies should not just seek to report effects. Any effect must have a mechanism or mechanisms. Otherwise the study is not done.

The data on this slide misrepresents the number of studies published in this area claiming 919 studies (742 of them are human studies).

Compare what the European Commission's DG Health website says about the issue including the number and quality of the studies:

Certain species have been recognised as likely to be particularly sensitive to EMF namely:

- *species that are strongly dependent on magnetic fields for orientation/migration (migratory birds, certain fish*
- *and insects, bats etc) and/or possess electric sense organs (e.g. sharks and rays).*
- *species with a high vulnerability to stress due to poorly developed or impaired defence mechanisms.*
- *For example animals with poor thermoregulation may be more vulnerable to the effects of high frequency EMF.*

Nonetheless data to characterise this vulnerability and its implications have been very limited. Foster and Repacholi (2000) in their important review of the published data concluded that*: 'attempts at environmental analysis of the effects of environmental EMF, with few exceptions have been scattered in focus, sporadic in publication and uneven in quality'.*

The available data thus provided a seriously inadequate basis to assess the risk of EMF to environmental species. However, apart from some local minor effects no significant effects of EMF on environmental species were identified.

http://ec.europa.eu/health/opinions2/en/electromagnetic-fields07/l-3/9-environmental-effects.htm#1p0

41	Almost 2000 studies cover wide range of frequencies and modulations ➢ Do not support the “non-thermal hypothesis” 1) Biophysical analyses and reviews do not support that non-thermal interactions are plausible at RF frequencies 2) Examination of biological effects literature does not provide a consistent body of data supporting theoretical postulates on “non-thermal” mechanisms ■ "Many interaction mechanisms have been considered, both thermal and nonthermal, but it has not been established that any of these could result in adverse health effects at radiation levels below guidelines." L.J. Challis (2005). Mechanisms for Interaction Between RF Fields and Biological Tissue. BEMS Supplement 7: S98-S106. ■ Sheppard A. R., Swicord M. L., Balzano Q. “Quantitative Evaluations Of Mechanisms Of Radiofrequency Interactions With Biological Molecules And Processes” Health Physics, Vol. 93, Pg. 365 - 396, 2008 Many of the 919 studies are ELF power line studies and not suitable for RF fields discussion. The quality of studies is also questionable. Counting positive and negative studies is not a scientific way to study effects. IEEE uses weight of scientific evidence that also used by regulatory agencies, such as the US EPA. **Weight of scientific evidence:** For purposes of this standard, the outcome of assessing the published information about the biological and health effects from exposure to RF energy. This process includes evaluation of the quality of test methods, the size and power of the study designs, the consistency of results across studies, and the biological plausibility of dose-response relationships and statistical associations. **Expert Group was formed by Environment Ministry, India to study the possible impacts of communication towers on Wildlife including Birds and Bees.** **Members of the Expert Committee** 1. Dr. Asad Rahmani, Director, BNHS (Chairman) 2. Representative of Wildlife Institute of India (Dr. Dhananjai Mohan, Dr. B.C. Choudhary) 3. Representative of Deptt. of Telecommunications, New Delhi [Shri. P. K. Panigrahi, Sr. DDG (BW)] 4. Representative of the Centre for Environment & Vocational Studies, Punjab University 5. Representatives of WWF India (Gp Captain Naresh Kapalia, Dr. Parikshit Gautam) 6. Representative of Indian Institute of Science, Bangalore (Prof. H.S. Jamadagni) 7. Representative of Indian Institute of Technology, New Delhi (Prof. R.K. Patney, Deptt. of Electrical Engineering) 8. Representative of SACON (Dr. P.A. Azeez, Director, Dr. Arun Kumar) 9. Dr. Sainuddin Pattazhy, Associate Professor, Deptt. of Zoology, University of Kerala 10. Ms. Prakriti Srivastava, DIG(WL), MoEF (Member Secretary) **Why anyone of the above eminent scientists and Govt. officials will submit a biased report to the Govt.? They have given 919 scientific/technical references.**

Expert Group to study the possible impacts of communication towers on Wildlife including Birds and Bees *(2011)*

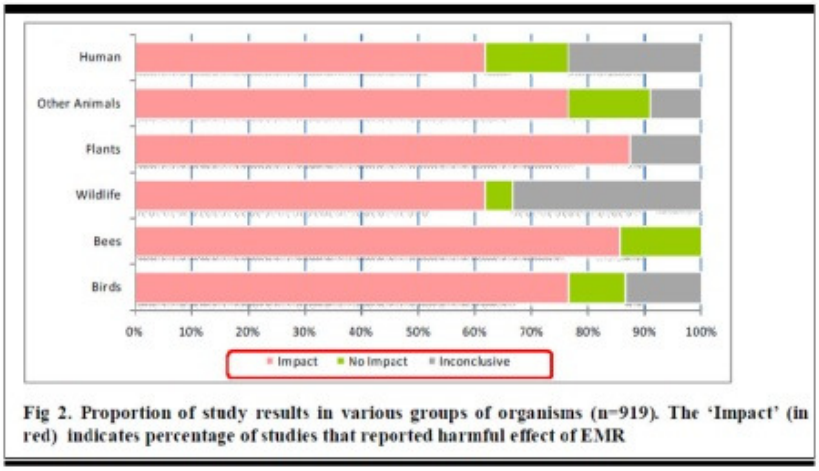


Fig 2. Proportion of study results in various groups of organisms (n=919). The 'Impact' (in red) indicates percentage of studies that reported harmful effect of EMR

42

Compare what the European Commission's DG Health website says about the issue including the number and quality of the studies:

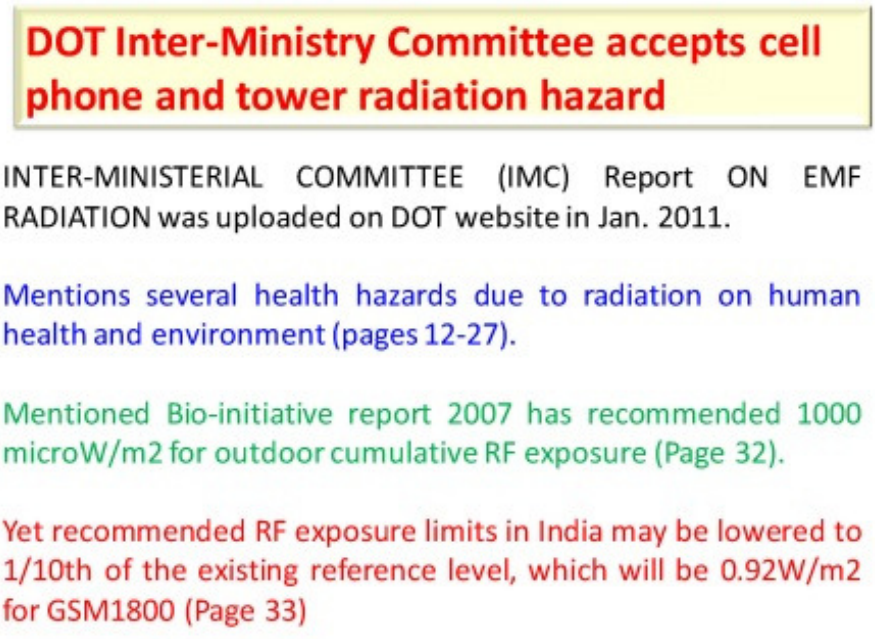
Certain species have been recognised as likely to be particularly sensitive to ….

Nonetheless data to characterise this vulnerability and its implications have been very limited. Foster and Repacholi (2000) in their important review of the published data concluded that: 'attempts at environmental analysis of the effects of environmental EMF, with few exceptions have been scattered in focus, sporadic in publication and uneven in quality'.

The available data thus provided a seriously inadequate basis to assess the risk of EMF to environmental species. However, apart from some local minor effects no significant effects of EMF on environmental species were identified.

http://ec.europa.eu/health/opinions2/en/electromagnetic-fields07/l-3/9-environmental-effects.htm#1p0

Expert Group was formed by Environment Ministry, India to study the possible impacts of communication towers on Wildlife including Birds and Bees. Why anyone of these eminent scientists and Govt. officials will submit a biased report to the Govt.? They have given 919 scientific/technical references and presented the results in a simple pictorial form.



43	See comments above on BioInitiative Report on slide 22. IMC report has many inaccuracies as previously identified by Assocham, by MMF, by GSMA and as discussed at the New Delhi EMF Conference by expert speakers. **In INCIRP and IEEE standards, there are basic restrictions and reference levels. The standards allow an exposure exceeds the reference levels, but if the exposure is below the basic restriction, the exposure is still within compliance.** **An Inter-ministerial committee consisting of officers from Department of Telecom, Indian Council of Medical research, Ministry of Health, Department of Biotechnology and Ministry of Environment and Forest was constituted to examine the effect of EMF Radiation from base stations and mobile phones: The details of the committee members are given below.** **i) Advisor (Technology) … Chairman** **ii) Sr. DDG (BW), DoT – Member Secretary** **iii) Scientist ICMR, Ministry of Health Member** **iv) Advisor, Dept. of Bio-technology Member** **v) Scientist 'E', MOEF Member** **vi) DDG (R) TEC, DoT Member** **vii) Jt.Wireless Adviser, WPC, DoT Member** **viii) DDG (CS), DoT Member** **They went through large number of reports and came out with IMC report in Jan. 2011. They have also mentioned Bio-Initiative Report.**

List of Members of the Organizing Committee and Participants of Bio-Initiative Report of 2007 are given below:

Organizing Committee:
Carl Blackman, USA
Martin Blank, USA
Michael Kundi, Austria
Cindy Sage, USA
Participants:
David Carpenter, USA
Zoreh Davanipour, USA
David Gee, Denmark
Lennart Hardell, Sweden
Olle Johansson, Sweden
Henry Lai, USA
Kjell Hansson Mild, Sweden
Eugene Sobel, USA
Zhengping Xu and Guangdin Chen, China
Research Associate
S. Amy Sage, USA

These are eminent scientists of the world and they prepared 610 pages of report after carefully going through large number of scientific/technical references.

Guideline of the Austrian Medical Association for the diagnosis and treatment of EMF related health problems and illnesses - Adopted at the meeting of environmental medicine officers of the Regional Medical Association´s and the Austrian Medical Association on 3rd March 2012 in Vienna. PLEASE NOTE THE DATE. The followings are taken from the guideline.

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

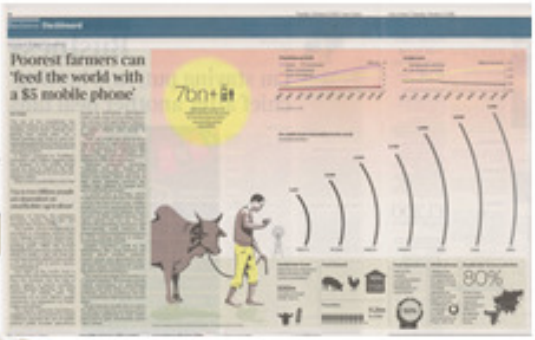
High-frequency electromagnetic radiation (as power flow density)
_ ≥1000 microW/m2 (≥1 mW/m2) - very far above normal
_ 10-1000 microW/m2 (0.01-1 mW/m2) - far above normal
_ 1-10 microW/m2 (0.001-0.01 mW/m2) - slightly above normal
_ ≤1 microW/m2 (≤0.001 mW/m2) - within normal limits

The above guidelines also agree with Building Biology Institute, Germany.

NEWS COVERAGE

44

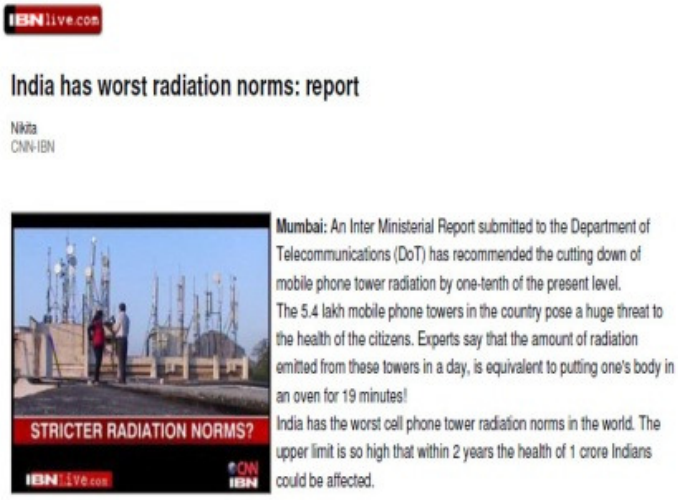
News 2011/2012



Newspaper headline grabbing items on risk and newly released research are not always consistent with a full scientific analysis that can appear further in the publication, or after adequate discussion with the scientists themselves.

There are also many benefits of mobile which gain media attention.

Agreed - Newspaper headlines may not be always consistent with scientific analysis.

	THE TIMES OF INDIA 7 June 2011, Pg 1  State to nix cell towers on schools, hospitals Prafulla Marpakwar | TNN 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 expressed about the radiation from mobile towers, we are readying to remove them from school and hospital buildings," a senior official told TOI on Monday. "Once the DC 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 already imposed stringent restrictions on mobile towers. We have proposed that they should be at least six metres away from a school or hospital and that the radar should not face the school or hospital," the official said. The proposed measures will be implemented by the concerned civic corporation. Mobile towers in Mumbai 1,600 On schools and hospitals 500 6 metres Proposed distance from schools and hospitals The Indian EXPRESS Chandigarh - 8 June 2011, Pg 1  Inform public about health hazard of mobile towers: High Court to Govt 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 residents about the harmful effects. A division bench ruled the government will be duty bound to inform the public living where a mobile tower is to be erected, about the "amount of radiation it will emit" and its harmful effects thereof on the health of people. The information will have to be supplied in the shape of a public notice, the court has ruled, before the mobile tower is erected. The HC has also directed the companies in the business of installing mobile towers to do the same. The directions were passed on an appeal by M/s Wireless TT Info Services Limited and another which had moved the HC against Haryana challenging the validity of Haryana Municipal (erection of communication towers) by-laws, 2009. HC has upheld by-laws. The petitioner had challenged the key of bar, terming it unreasonable. Making it clear that "there is no absolute right to carry on any business", the division bench held that "it [radiation] 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 affect chemical and electrical reaction in our brain, changing, in effect, the way the brain cells communicate. Studies conducted revealed that sparrows have declined in most contaminated electromagnetic fields".
45	No response needed.
	 IBNlive.com India has worst radiation norms: report Nikita CNN-IBN STRICTER RADIATION NORMS? IBNlive.com CNN IBN **Mumbai:** An Inter Ministerial Report submitted to the Department of Telecommunications (DoT) has recommended the cutting down of mobile phone tower radiation by one-tenth of the present level. The 5.4 lakh mobile phone towers in the country pose a huge threat to the health of the citizens. Experts say that the amount of radiation emitted from these towers in a day, is equivalent to putting one's body in an oven for 19 minutes! India has the worst cell phone tower radiation norms in the world. The upper limit is so high that within 2 years the health of 1 crore Indians could be affected.
46	Based on inputs from non experts and without paying attention to thermodynamics and thermal regulation. **India has adopted worst radiation norm of ICNIRP guidelines for 24x7, whereas ICNIRP guidelines mention that it is valid for short term exposure.**

47

Actress Juhi Chawla check cell tower radiation

❑ Got an independent radiation check

The radiation levels were extremely high all around my house!

This is a cause for concern, not only for my family, but also for all the people living in Malabar Hill.

http://www.groundreportindia.com/2011/06/juhi-chawla-radiation-from-sahyadri.html#links

Actress Juhi Chawla is entitled to her opinions just like any other person, it carries the same weight as any other similarly qualified person's opinion.

Actress Juhi Chawla is not like any other person. There were 14 cell towers on the roof top of Sahyadri Guest House, Mumbai (opposite to her home). Radiation levels in her house varied between 100 to 40,000 microwatts/m2, which are much below ICNIRP Guidelines. Yet on her complaint and persistent effort, 13 out of 14 cell towers from Sahyadri Guest House were removed.

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 / m²)
Haji Ali Juice Center	85,000 µW / m²
Raj Niketan, Opp. Sahyadri State Guest House, Malabar Hill	Max: **42,260 µW/m²** Min: ~178 µW/m²

The TERM team says

"We were within WHO limits of 4,500,000 µW/ m²".

48 No response needed.

ANALYSIS OF READINGS

Standard/ Location	Reading (in µW / m²)	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/m².
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)

49

No response needed.

No response on this slide implies that they agree that health problems do occur for radiation density > 100 microwatts/m2 and severe health problems occur for radiation density > 10,000 microwatts/m2, so we should adopt these as safe radiation guidelines for INDIA.

Ultimately, everything is related to Energy

Energy = (Power x Time)

If we want to be safe for:

- 100 years, power density must be <100 µW/m²
- 10 years, power density must be <1000 µW/m²
- 1 year, power density must be <10,000 µW/m²

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.

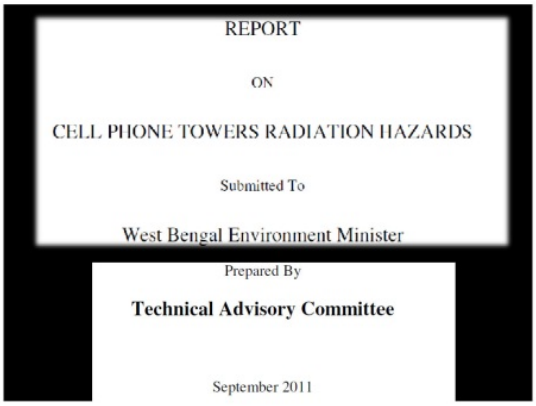
50

This presentation has no basis is science, physics or radio engineering, it also makes flawed assumption about the absorption of energy.

The starting value here is the 100 µW/m² as quoted in the BioInitiative report that is criticised by many and is not accepted as a standard by any Government or standards body.

Energy is equal to power x time, and it is the basis of science, physics and radio engineering. As

	mentioned earlier, Bio-Initiative Report of 610 pages was prepared by eminent scientists of the world after they carefully went through large number of scientific/technical references. **Guideline adopted on 3rd March 2012 in Vienna by Austrian Medical Association for the diagnosis and treatment of EMF related health problems and illnesses also agree with my basis of calculations. Details given in Slide 43**
	News Coverage in Jaipur, Rajasthan *Dec 2011*  आदिनाथ मार्ग पर ज्यादा रेडिएशन सात लोगों को कैंसर, दो की मौत रेडिएशन से खामोश हो रही चहचहाट लोग लामबंद सरकार गंभीर अगर मोबाइल टावर सुरक्षित हैं ... ...तो इनकी बीमारी का राज क्या है?
51	**Problems in media communication:** Media reports on EMF issues often are not verified and reviewed. Statements may be used from so called "Experts" that in some cases have no qualification or experience. "Spot light" reporting, not "weight of evidence" is often used for sensationalism and the need to have a "hook" in each story Misinformation propagates fast and continuously, corrections do not make the news in the same way as the original reporting. General public acquire knowledge from media and NOT from scientific journals. Scientists have an overall responsibility to ensure their findings are robust before peer reviewed publication and not to mislead the public. **Agreed - Newspaper headlines may not be always consistent with scientific analysis. However, in these cases, newspapers have reported the experiences of the concerned citizens and sufferers, which cannot be overlooked or ignored.**
52	**News Coverage in Jaipur, Rajasthan** *17 Jan 2012*  चिकित्सा मंत्री भी चिंतित, लिखा सीएम को पत्र सुरक्षा निदेशालय जरूरी
52	**Problems in media communication**: Media reports on EMF issues often are not verified and reviewed.

	Statements may be used from so called “Experts” that in some cases have no qualification or experience. “Spot light” reporting, not “weight of evidence” is often used for sensationalism and the need to have a “hook” in each story Misinformation propagates fast and continuously, corrections do not make the news in the same way as the original reporting. General public acquire knowledge from media and NOT from scientific journals. Scientists have an overall responsibility to ensure their findings are robust before peer reviewed publication and not to mislead the public. **Agreed - Newspaper headlines may not be always consistent with scientific analysis. However, in this case, health minister has written to Chief Minister after interacting with concerned citizens and sufferers, which cannot be overlooked or ignored.**
53	 IIT expert to help Kolkata City to tackle radiation The Bengal Post, May 15 2011, Page 5  The Bengal Post CITY 5 IIT expert to help city tackle tower radiation
53	**It is not clear what specific local research the IIT expert has carried out for Kolkata City to help them**. It is also not clear what specific changes have occurred in Kolkata City as a direct response to the IIT’s expert. **I had given presentation to Environment Minister, West Bengal and after that a Technical Advisory Committee was formed consisting of one professor from IIT Bombay and two professors from IIT Kharagpur.**
54	 REPORT ON CELL PHONE TOWERS RADIATION HAZARDS Submitted To West Bengal Environment Minister Prepared By Technical Advisory Committee September 2011
54	This report contains much of the material used in this presentation document. The errors and inaccurate statements made in this document are reproduced here. **Technical Advisory Committee consisting of one professor from IIT Bombay and two professors from IIT Kharagpur submitted their report to Environment Minister, West Bengal after going through large number of scientific/Technical references.**

55	Measurements in the presence of West Bengal Environment Minister  20 Recommendations made
55	It is not clear if any of the recommendations have been accepted or implemented. **Recommendations made in the report to Environment Minister, West Bengal are under consideration for implementation.**
56	**Solutions – Better Radiation Norms** ❑ With immediate affect, we should adopt safe radiation level as 0.01 W/m², so power transmitted from each tower must be reduced. ❑This will reduce coverage area. There may be some call drops initially. ❑People must be informed about harmful effects of radiation and this is being done to protect them. ❑In 1 to 2 years, the safe radiation level should be reduced to 0.001 W/m², this will give enough time to operators to plan the network for smooth operation. ❑Requires large number of towers with reduced output power, more number of repeaters, fiber optic solutions, etc.
56	Many independent experts conclude that no risk has been established for low-level exposures within ICNIRP limits: http://www.gsma.com/science-overview-reports-and-statements-index/ **Please refer above slides, where we have reported several health risks at levels much below ICNIRP limits:**

57	**Solutions – Better Radiation Norms (Continue)** ❑24 hours monitoring of cell tower radiation must be done at various places. ❑Utmost care must be taken to ensure that main beam of the antenna is not in the direction of residential/office buildings as well as, where there is large concentration of people, animals, birds, trees, etc. Operators must be informed: "**Reduce the Power or Remove the Tower**" ❑**High cost for operators - not more than health of people**
57	These "Solutions" are but a single set of opinions, they are not widely accepted. **We must adopt better radiation norms. Radiation must be monitored 24 hours. Health of the people must be given highest priority.**
58	**Solutions – How to meet the increased cost?** ❑Low power RF output (max. 1 to 2 Watts) means less heating and power consumption, so cooling cost is reduced, low power solar solution can be adopted, carbon credit can be claimed. ❑Can increase cost per minute by Rs. 0.10 ❑Govt. can reduce the license fee ❑Can be subsidized for 1 to 2 years to recover investment cost.
58	These "Solutions" are but a single set of opinions, they are not widely accepted. **We must adopt better radiation norms and protect the people living in the near vicinity from long term radiation health hazards. Health of the people, birds, animals, and environment is much more important than the cost involved. This cost can be recovered in several ways as mentioned in the slide.**

59

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

Cell tower radiations are even more harmful than cigarettes because

- One can not see it
- One can not smell it
- One can not move away if his house/office is near cell towers

59

Cigarettes cannot be directly compared to EMF.

Tobacco smoking has been proven, with established effects with known mechanisms, to cause cancer. The WHO agency IARC has classified tobacco smoking as Group 1, a carcinogen. In fact the IARC monograph states, "There are over 70 carcinogens in tobacco smoke that have been evaluated by the IARC Monographs programme as having sufficient evidence for carcinogenicity in either laboratory animals or humans (IARC, 2004a)."
http://monographs.iarc.fr/ENG/Monographs/vol100E/mono100E.pdf

In contrast with RF exposure, after 60 years of research the only proven effects are related to thermal heating. No mechanisms have been identified for any low level exposure effects and that are reproducible, except the hearing effect which is due to thermal expansion. There are no proven harmful effects from the low level exposure.

Independent expert groups and health authorities around the world agree that ICNIRP and IEEE exposure limits are protective of human health.

The WHO statement about EMF:

"**Are there any health effects?**
A large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established as being caused by mobile phone use.".
Source: http://www.who.int/mediacentre/factsheets/fs193/en/index.html

The **WHO** statement about smoking:
"**Leading cause of death, illness and impoverishment**
The tobacco epidemic is one of the biggest public health threats the world has ever faced. It kills nearly six million people a year of whom more than 5 million are users and ex users and more than 600 000 are nonsmokers exposed to second-hand smoke. Approximately one person dies every six seconds due to tobacco and this accounts for one in 10 adult deaths. Up to half of current users will eventually die of a tobacco-related disease."
Source: http://www.who.int/mediacentre/factsheets/fs339/en/index.html

	Agreed - Cigarettes cannot be directly compared to EMF. Long term exposure to high power EMF is more harmful than cigarettes as mentioned in the slide.
60	

Finally, I will like to conclude that

The rationale of the standards adopted in Switzerland is the most sensible thing to do in the world. These are written by ASSOCHAM people; details are given in Slide 20, and are reproduced below.

Switzerland adopted ICNIRP in 2000 with additional installation limit values of 0.042 W/m^2 (900MHz) and 0.095 W/m^2 (1800 MHz/2100 MHz) in places of 'sensitive use', which includes apartments, schools, hospitals, offices and playgrounds, but not balconies, roof terraces, stairways, garages, storage, archive rooms, temporary workplaces, churches, concert halls and theatres, camp sites, sports and leisure-time facilities, passenger areas in railways and observation decks.

However, Bio-Initiative Report, Building Biology Institute and Guidelines of the Austrian Medical Association for the diagnosis and treatment of EMF related health problems on 3rd March 2012 in Vienna recommend Safe radiation level should be less than 100 microwatts/m^2 = 0.0001 W/m^2 for 24 hours exposure.

India is a hot and humid country and the safe radiation guidelines should be more stringent than the colder countries.

Final Recommendations

We should adopt safe radiation density as 0.0001 W/m^2 in places of 'sensitive use', which includes apartments, schools, hospitals, offices and playgrounds.

We can adopt 0.01 W/m^2 in balconies, roof terraces, stairways, garages, storage, archive rooms, temporary workplaces, churches, concert halls and theatres, camp sites, sports and leisure-time facilities, passenger areas in railways and observation decks, where people spend few minutes a day.