



Cellular Operators Association of India

“Position Paper”

On

**“Mobile RF Radiations and
Alleged Health Hazards”**



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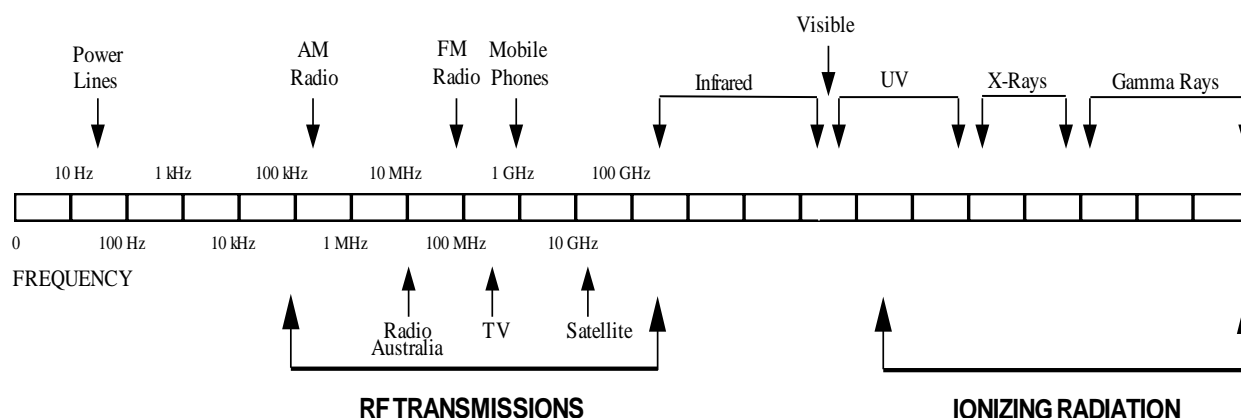
Position Paper – Mobile RF Radiations and Alleged Health Hazards

A. WHAT IS EMF?

Electromagnetic Fields (EMF) occur in nature and thus have always been present on earth. Besides natural sources the electromagnetic spectrum also includes fields generated by human-made sources: X-rays are employed to diagnose a broken limb after a sport accident. The electricity that comes out of every power socket has associated low frequency electromagnetic fields. And various kinds of higher frequency radiowaves are used to transmit information – whether via TV antennas, radio stations or mobile phone base stations.

1. What makes the various forms of electromagnetic fields so different?

One of the main characteristics which defines an electromagnetic field (EMF) is its frequency or its corresponding wavelength. Fields of different frequencies interact with the body in different ways.



2. What is the difference between non-ionizing electromagnetic fields & ionizing radiation?

Wavelength and frequency determine another important characteristic of electromagnetic fields: Electromagnetic waves are carried by particles called quanta. Quanta of higher frequency (shorter wavelength) waves carry more energy than lower frequency (longer wavelength) fields. Some electromagnetic waves carry so much energy per quantum that they have the ability to break bonds between molecules. In the electromagnetic spectrum, gamma rays given off by radioactive materials, cosmic rays and X-rays carry this property and are called 'ionizing radiation'. Fields whose quanta are insufficient to break molecular bonds are called 'non-ionizing radiation'. Man-made sources of electromagnetic fields that form a major part of industrialized life - electricity, microwaves and radiofrequency fields – are found at the relatively long wavelength and low frequency end of the electromagnetic spectrum and their quanta are unable to break chemical bonds.



Some practical information (maximum levels of public exposure) of most common sources of electromagnetic fields. In everyday situations, typical exposures are far below these values.

Source	Typical maximum public exposure	
	Electric field (V/m)	Magnetic flux density (μT)
Natural fields	200	70 (Earth's magnetic field)
Mains power (in homes not close to power lines)	100	0.2
Mains power (beneath large power lines)	10 000	20
Electric trains and trams	300	50
TV and computer screens (at operator position)	10	0.7
	Typical maximum public exposure (W/m^2)	
TV and radio transmitters		0.1
Mobile phone base stations		0.1
Radars		0.2
Microwave ovens		0.5

Source: WHO Regional Office for Europe

It is most important to note that the RF radiations emitted by Mobile Communication Systems lie in the **non-ionizing part of the electromagnetic spectrum and thus do not have enough energy to break the bonds that hold molecules in the cells together.** Thus, the exposure to EMF Radiations emitted from Mobile Systems cannot produce ionization or cause any genetic damage.

Also, the RF emissions from mobile phones and base stations are some **50,000 times lower than the levels at which the first health effects begin to be established.** The output power of mobile phones is **less than 1 Watt (typically is in the range of 0.2 to 0.6 watts),** which is **far lower than the emission levels that emanate from the microwave or even the radio.**

B. INTERNATIONAL SAFETY GUIDELINES

International safety guidelines for RF exposure were developed by the **International Commission on Non-Ionizing Radiation Protection (ICNIRP)** and published in 1998.¹ These guidelines have been widely adopted internationally and turned into national safety standards. They apply to mobile phones as well as base stations and incorporate wide safety margins to protect against all established health effects of RF exposure.

These guidelines form the basis for the recommended human RF exposure standards in the European Union², Australia³, much of Asia and Africa.⁴ ICNIRP is a non-governmental organisation formally recognised by the WHO. The guidelines 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.

The main conclusion from the WHO reviews is that EMF exposures below the limits recommended in the ICNIRP international guidelines do not appear to have any known consequence on health.

The reference levels for occupational exposure and exposure of the general public are as under;

Type of exposure	Frequency range	Electric field strength (V/m)	Magnetic field strength (A/m)	Equivalent plane wave power density S_{eq} (W/m ²)
General public	Up to 1 Hz	–	2×10^4	–
	1-8 Hz	10 000	$2 \times 10^4/f^2$	–
	8-25 Hz	10 000	$5\ 000/f$	–
	0.025-0.8 kHz	$250/f$	$4/f$	–
	0.8-3 kHz	$250/f$	5	–
	3-150 kHz	87	5	–
	0.15-1 MHz	87	$0.73/f$	–
	1-10 MHz	$87/f^{1/2}$	$0.73/f$	–
	10-400 MHz	28	0.073	2
	400-2000 MHz	$1.375f^{1/2}$	$0.0037f^{1/2}$	$f/200$
	2-300 GHz	61	0.16	10

In 1995, Dr Michael Repacholi commented in a report prepared by him as the then Chairman of **International Commission on Non-Ionizing Radiation Protection (ICNIRP)**:

¹ ICNIRP, *Guidelines For Limiting Exposure To Time-Varying Electric, Magnetic, And Electromagnetic Fields (Up to 300 GHz)*, Health Physics, 74(4):494-522, April 1998.

² Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (1999/519/EC), Official Journal of the European Communities, 30 July 1999, L199/59-70.

³ ARPANSA, *Radiation Protection Standard – Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz*, 7 May 2002.

⁴ World Health Organization *EMF World Wide Standards Database* accessed at <http://www.who.int/peh-emf/standards/en/> on 01 October 2004.



*“In the case of radio frequency, studies have continued for some 40 years and laboratory techniques are extremely sensitive. While it cannot be dismissed that subtle effects will be found in the future, it is comforting to know that a large amount of research has been conducted and international standards have not had to be lowered for more than fifteen years. **Another point that needs to be remembered is that RF emissions from base stations are some 50,000 times lower than the levels at which the first health effects begin to be established.**”*

Review of ICNIRP Guidelines

In July 2009, ICNIRP reviewed its guidelines in view of the important studies published, that needed detailed analysis and discussion to determine their implications for health. The review aims at providing input to the respective health risk assessment undertaken by the World Health Organization. Together with the review of the scientific evidence in the ELF range. They have published two review papers, one addressing epidemiological evidence related to mobile phones and one reviewing evidence for the full radio-frequency (RF) spectrum.

The first paper, authorized by the ICNIRP Standing Committee on Epidemiology concludes as follows:

'...Overall the studies published to date do not demonstrate an increased risk within approximately 10 years of use for any tumor of the brain or any other head tumor. The available data do not suggest a causal association between mobile phone use and fast-growing tumors such as malignant glioma in adults (at least for tumors with short induction periods)...For slow-growing tumors...the absence of association reported thus far is less conclusive because the observation period has been too short.'

The second report on RF review prepared as an input to the WHO EMF project concludes as below:

- *'...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.'*
- *A wide range of subjective symptoms including headaches and migraine, fatigue, and skin itches have been attributed to various RF sources both at home and at work.*
- ***However, the evidence from doubleblind provocation studies suggests that the reported 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.'*

C. ADOPTION OF ICNIRP GUIDELINES FOR TELECOM SECTOR IN INDIA TO ENSURE RADIATION LEVELS ARE WITHIN PERMISSIBLE LIMITS

Government of India has already taken necessary safety measures and has adopted the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines for telecom sector in India regarding basic restrictions and reference levels for limiting EMF exposure and the same have also been incorporated into the licenses of the operators. The basic restrictions/ proper limits for power density specified in ICNIRP guidelines for frequencies between 400 to 2000 MHz are as follows.

Type of Exposure	900MHz(inW/m ²)	1800MHz (in W/m ²)
Occupational	22.5	45
General Public	4.5	9

1. Certification for compliance with The ICNIRP Guidelines

On November 4, 2008, DoT made following amendment in the license with regards to the implementation of ICNIRP guidelines regarding the emission by Base Transceiver Stations (BTSs) as below:

“Licensee shall conduct audit and provide self certificates annually as per procedure prescribed by Telecommunication Engineering Centre (TEC)/or any other agency authorized by Licensor from time to time for confirming to limits/levels for antennae (Base Station Emissions) for general public exposure as prescribed by International Commission on Non-Ionizing Radiation Protection (ICNIRP) from time to time”.

Operators are fully conscious of their obligations on this issue and are in process of conducting audits and providing certificates to the Licensor regarding meeting of these standards for Base Station antennae.

2. Emission Measurement Study by Independent Bodies In India

The Industry associations recently commissioned an independent study **to carry out measurement of emissions from** over 300 locations in Delhi, Mumbai and Pune. The study was carried out by, **Indian Institute of Technology Madras, Chennai (IITM), (2) Thiagarajar College of Engineering, Madurai (TCE) and (3) Centre of Excellence in Wireless Technology, Chennai (CEWIT).**

The measurements of the cumulative emissions were meticulously carried out at various locations in Delhi, Mumbai and Pune area by the team of Independent experts using carefully calibrated equipment. While carrying out the measurements, the guide lines as per ICNIRP were followed. The measurements were done for 800 to 2000MHZ band of frequency (which



includes both GSM and CDMA technologies). It was observed that in all locations, multiple frequencies from various base stations were present. To deal with multiple frequencies environment, theoretical calculation method as per the guide lines of ICNRIP to assess whether the overall radiation is within the ICNRIP limits were used.

The measurement results showed that all the 300 places in Delhi, Mumbai and Pune, where the measurements were made from 14th July 2010 to 17th July 2010 and 27th October 2010 to 30th October 2010 respectively, were much below the compliance limit of ICNRIP standards.

D. INTERNATIONAL RESEARCH & REVIEWS

1. It is relevant to mention that for several decades extensive RF research has been undertaken by researchers of the highest integrity at organizations like World Health Organization, British Medical Association, Royal Society of Canada, International Commission on Non-Ionizing Radiation Protection, U.K. Independent Expert Group on Mobile Phones, Swedish Radiation Protection Institute, Food And Drug Administration (USA), Australian Radiation Protection and Nuclear Safety Agency, Indian Council for Medical Research etc. **and general consensus of these studies does not demonstrate any substantive link between human health risks and the use of digital mobile phones or living near a base station.**

2. Biological effects are measurable responses to a stimulus or to a change in the environment. These changes are not necessarily harmful to health. For example, moving from inside to outside on a warm day will produce a range of biological effects. Looking at light from a distant star causes a response in the eye due to the very weak visible light (a form of electromagnetic energy). The body has sophisticated mechanisms to adjust to the many and varied influences encountered in the environment. Changes that are irreversible and stress the system for long periods of time may constitute a health hazard. The WHO states:

An adverse health effect causes detectable impairment of the health of the exposed individual or of his or her offspring; a biological effect, on the other hand, may or may not result in an adverse health effect.

It is not disputed that electromagnetic fields above certain levels can trigger biological effects. Experiments with healthy volunteers indicate that short-term exposure at the levels present in the environment or in the home do not cause any apparent detrimental effects. Exposures to higher levels that might be harmful are restricted by national and international guidelines. The current debate is centred on whether long-term low level exposure can evoke biological responses and influence people's well being.

3. Further, many expert panels have reviewed the large body of existing scientific literature and have **consistently concluded that compliance with the existing science based standards is sufficient to protect public health.** These reviews have concluded that for exposures to radiofrequency energy up to levels below the safety limits prescribed by **International Commission on Non-ionizing Radiation Protection (ICNIRP) and endorsed by WHO**, there is **no substantive or convincing evidence of biological effects that could harm a person's health.**

4. World Health Organization (WHO) after studying the various research papers presented on the alleged harmful effect of electromagnetic effect on human health has concluded that **'...current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields. However, some gaps in knowledge about biological effects exist and need further research. While research continues the WHO has recommended:**

- *Strict adherence to existing national or international safety standards.*
- *Simple protective measures, such as barriers around strong electromagnetic field sources where exposure levels may be exceeded.*

- *Consultation with local authorities and the public in siting new power lines or mobile phone base stations.*
- *An effective system of health information and communication among scientists, governments, industry and the public to help raise general awareness of programmes dealing with exposure to electromagnetic fields and reduce any mistrust and fears.*

Summarized conclusion of some WHO reviews are as follows:

- Recently in May 2010 WHO has updated its factsheet No. 193 titled “Electromagnetic fields and Public health: mobile phones.” It concludes: ‘...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 for mobile phone use.’*
- WHO in their recent letter to Municipal Corporation of Delhi (MCD) stated that the studies published so far have not provided any evidence an increase in risk of cancer from exposure from low RF fields emitted from mobile towers.*

Relevant Extract from WHO letter

“Over the past 15 years, studies examining a potential relationship between RF transmitters and cancer have been published. These studies have not provided evidence that RF exposure from the transmitters increases the risk of cancer. **Likewise, long-term animal studies have not established an increased risk of cancer from exposure to RF fields, even at levels that are much higher than produced by base stations and wireless networks”**

iii. WORLD HEALTH ORGANIZATION, 2006

“Recent surveys have shown that the RF exposures from base stations range from 0.002% to 2% of the levels of international exposure guidelines, depending on a variety of factors such as the proximity to the antenna and the surrounding environment. This is lower or comparable to RF exposures from radio or television broadcast transmitters”.

iv. WORLD HEALTH ORGANIZATION, 2005

*“To date, all expert reviews on the health effects of exposure to RF fields have reached the same conclusion: There have been **no adverse health consequences established** from exposure to RF fields at levels below the international guidelines on exposure limits published by the International Commission on Non-Ionizing Radiation Protection”.*

v. WORLD HEALTH ORGANIZATION, 2004

*“Based on a recent in-depth review of the scientific literature, the WHO concluded that **current evidence does not confirm the existence of any health consequences** from exposure to low level electromagnetic fields. However, some gaps in knowledge about biological effects exist and need further research.”*

5. Further, the WHO recommends adoption of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998 guidelines and states that these guidelines ‘...**offer protection against all identified hazards of RF energy with large safety margins**’

6. The **UK Mobile Telecommunications Health Research (MTHR)** program has recently issued a progress report covering 23 studies that have been completed with many already published in peer reviewed scientific journals. The report states:

'None of the research supported by the Programme and published so far demonstrates that biological or adverse health effects are produced by radiofrequency exposure from mobile phones.'

7. The aforementioned **view has also been taken by the DoT** in its technical opinion dated 25.8.2004, wherein it has been stated :

*"As far as DOT is concerned, **we do not have any authentic information** from any study or report **about any health hazard** of mobile phones or from towers installed for the purpose of providing Mobile Telephone Service."*

8. Even the **Telecom Regulatory Authority of India**, which is the expert Regulator, has, in its letter dated 15.9.2004 addressed to the Finance Secretary, UT Chandigarh, stated that :

"Regarding Health Hazard: As per the information available with TRAI, there is no definite conclusive study, which confirms that health is adversely affected by radiation emitted by mobile phones."

9. Further, the Committee formed by the Government of India under the Chairmanship of Dr. N.K. Ganguly, Director General, Indian Council on Medical Research which included representatives from PGIMER, Chandigarh & AIIMS New Delhi, has also opined as under :-

*"Taking the above mentioned into account, the Committee opined that overall **there is not enough evidence to show direct health hazards** of RF exposures from Mobile Base Stations."*

10. **As stated above, several studies have been carried out internationally** with respect to the effect of Electro Magnetic radiation (EMR) on the environment as also the health concerns. However, **till date there is no conclusive evidence of any health ailment caused due to electromagnetic radiations emitted from mobile base stations.**

Some of the true facts and findings which are the result of extensive research and studies carried out by the expert International Bodies of highest reputation are as below:

a. **EUROPEAN COMMISSION EXPERT GROUP**

*"Overall, the **existing scientific literature** encompassing toxicology, epidemiology and other data relevant to health risk assessment, while providing useful information, **provides no convincing evidence** that the use of radiotelephones or other radio systems, whether analogue or digital, poses **a long-term public health hazard.**"*

b. **BRITISH MEDICAL ASSOCIATION**

*"There are **no definite adverse health effects** from mobile phones or their base stations."*

c. **THE BRITISH MEDICAL ASSOCIATION – (JANUARY – 2005)**

*"Current evidence suggests that it is **unlikely** that the special features of the signals from TETRA mobile terminals and repeaters **pose a hazard to health**".*

d. **THE HEALTH COUNCIL OF THE NETHERLANDS**

*“The **chance of health problems** occurring among people living and working below base stations as a result of exposure to electromagnetic fields **originating from the antennas is, in the Committee’s opinion, negligible**. The field strengths are always considerably less than the exposure limits.”*

*“On the basis of the present data, the Committee concludes that the **occurrence of health problems** at exposure levels associated with the use of mobile phones **is unlikely**. It is considered virtually impossible that the low field strengths in the vicinity of base stations give rise to changes in cognitive functions.”*

e. **THE HEALTH COUNCIL OF THE NETHERLANDS, 2004**

*“In conclusion, **there is no convincing scientific data** to assume a difference in the absorption of electromagnetic energy in heads of children and adults, nor is it likely that the electromagnetic sensitivity of children’s head changes significantly after the second year of life. Because of this, the Health Council of Netherlands sees no reason for recommending limiting the use of mobile phones by children.”*

f. **SWEDISH RADIATION PROTECTION INSTITUTE**

*“In many cases where the general public has shown concern, **radiation intensity has proved to be less than a thousandth of the permitted level**”.*

*“To summarize, **mobile telecommunications base stations do not constitute a risk** regarding radiation protection.”*

g. **NORDIC COUNTRIES: DENMARK, FINLAND, ICELAND, NORWAY, SWEDEN, 2004**

*“The Nordic authorities agree that **there is no scientific evidence for any adverse health effects** from mobile telecommunication systems, neither from the base stations nor from the handsets, below the basic restrictions and reference values recommended by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). However, certain knowledge gaps exist that justifies more research in this field. There are a number of published reports suggesting that biological effects may occur at exposure levels below the ICNIRP guidelines. These studies need to be reproduced and the scientific progress in these fields of research should be followed carefully. In this context, however, it is important to note that biological effects do not necessarily imply health hazard”.*

h. **FRENCH ENVIRONMENT HEALTH AND SAFETY AGENCY (AFSEE)**

*“The **strength of radiation received from base stations** beyond a few meters from the base stations is **considerably lower than the strength of radiation from radio and television transmitters**.”*

i. **AFSSE STATEMENT ON MOBILE PHONES & HEALTH, 2003**

*“The AFSSE notes that the **general analysis of current scientific data** on exposure to base station waves **show no health risk linked to mobile phone base stations**. Given this, the recommendations made are based on the principle of responsiveness in order to take into account the public worries about the siting of macro-cellular base stations”.*

j. **INTERNATIONAL COMMISSION IN NON IONIZING RADIATION PROTECTION (ICNIRP)**

*“Epidemiological studies on exposed workers and the general public have shown **no major health effects associated with typical exposure environments.**”*

k. **ICNIRP GUIDELINES**

*“There is **no substantive evidence that adverse health effects**, including cancer, can occur in people exposed to levels at or below the limits on whole body average SAR recommended by INIRC (IRPA / INIRC 1988) or at or below the ICNIRP limits for localized SAR set out in this document”.*

l. **GSMA WEBSITE**

GSM Association recognizes the fact that, apprehensions have been raised by the public / communities on siting of cellular antennas. However, these antennas are low powered, with typical signal levels in the community similar to those from broadcast services, such as radio and TV.

*In light of all the research / documents on record by various international agencies, GSMA is of the opinion that “To date expert groups have consistently found **no convincing evidence of a public health hazard from mobile communication services.** However, further research has been recommended”.*

m. **GSM ASSOCIATION, MMF AND THE EUROPEAN COMMISSION, 2006**

*A study of mice exposed to GSM900 and GSM1800 type signals has been published on-line in the journal Bioelectromagnetics and **overall finds no evidence that radio signals increase cancer risk.** The authors state ‘In conclusion, the **present study produced no evidence** that the exposure of male and female B6C3F1 mice to wireless GSM and DCS radio frequency signals at a whole body absorption rate of up to 4.0 W/kg **resulted in any adverse health effect** or had any cumulative influence on the incidence or severity of neoplastic and non-neoplastic background lesions, and thus the **study did not provide any evidence of RF possessing a carcinogenic potential.**’*

This study was co-funded by GSMA, the MMF and the European Commission and will make an important contribution to future health risk assessments by the WHO. It is the first whole of life animal study of radiofrequency (RF) exposures using standard toxicological procedures.

n. **UNITED STATES GENERAL ACCOUNTING OFFICE**

***Scientific research to date does not demonstrate** that the radio frequency energy emitted from mobile phones has **adverse health effects**, but the findings of some studies have raised questions indicating the need for further investigation.*

o. **USA: FOOD AND DRUG ADMINISTRATION, 2005**

*“FDA agrees with the NRPB on its conclusions that **there is no hard evidence of adverse health effects** to the general public from exposure to radio frequency energy while using wireless communications devices. A few studies have suggested low level of radio-frequency energy exposure could accelerate the development of cancer in laboratory animals, however, these studies have failed to be replicated, and the vast majority of studied reports in the scientific literature show no adverse health effect associated with low level of radio frequency energy exposure. With regards to the safety and use of cell phones by children, the scientific evidence does not show a danger to users of wireless communication devices including children”.*



p. NETWORK AND ACADEMIC COMPUTING SERVICE, UNIVERSITY OF CALIFORNIA,

*“There is **no reason to believe that such towers could constitute a potential health hazard** to nearby residents or students.”*

q. NETWORK & ACADEMIC COMPUTING SERVICES, UNIVERSITY OF CALIFORNIA, 2005

*“Measurements made near typical cellular and PCS installations, especially those with tower-mounted antennas, have shown that **ground-level power densities are thousands of times less than the FCC’s limits for the safe exposure**. In fact, in order to be exposed to levels at or near the FCC limits for cellular or PCS frequencies an individual would essentially have to remain in the main transmitting beam (at the height of the antenna)”.*

r. THE ROYAL SOCIETY OF CANADA

*Therefore at this point, the **epidemiological evidence to date** is inadequate for a comprehensive evaluation of risk, **and does not support a hypothesis of an association between exposure** to radio frequency fields **and risk of cancer, reproductive problems, or congenital anomalies**.*

To date, no convincing, reproducible data exist to demonstrate the ability of MW/RF field exposure to induce seizures or to worsen an existing seizure disorder in human patients.

Headache and fatigue are non specific complaints. For example, many factors can cause headache. Headache is not an indicator of “brain activity” and in general headaches occur in the absence of structural abnormalities of either the brain or the blood brain barrier. Given the high variability of headache as a symptom, correlating headache with some MW –induced neuro chemical alteration is very difficult. Although there is need to consider the possibility of MW induced symptoms such as headache and fatigue, existing data to do not support the conclusion that MW can induce headaches.

s. ROYAL SOCIETY OF CANADA

*All of the authoritative reviews completed within the last two years have concluded that there is **no clear evidence of adverse health effects associated with RF fields**.*

*The British Medical Association (2001), for example, concluded that “whilst there are small physiological effects within the existing guidelines, **there are not definite adverse health effects from mobile phones or their base stations**.*

t. AUSTRALIAN RADIATION PROTECTION AND NUCLEAR SAFETY AGENCY

*“It can be seen that **exposure levels are less than those from FM radio stations (100 MHz) and significantly less than levels from AM radio stations (1 MHz)**.”*

u. AUSTRALIAN RADIATION PROTECTION AND NUCLEAR SAFETY AGENCY

***No adverse health effects are expected from continuous exposure to the RF radiation** emitted by the antennas on mobile telephone base station towers.*



v. **AUSTRALIA: COMMITTEE ON ELECTROMAGNETIC ENERGY PUBLIC HEALTH ISSUES, 2003**

*“The weight of national & international scientific opinion is that **there is no substantiated evidence that exposure to low level RF EME cause adverse health effects.** The view is **backed by every major review panel on the subject** including the Royal Society of Canada (1999), the International Expert Group on Mobile Phones (2000), the French Health General Directorate (2001) and ARPANSA’s RF standard Working Group (2002)”.*

w. **MALAYSIA: COMMUNICATIONS & MULTIMEDIA COMMISSION (2001)**

*“For now, **we can conclude that there is no consistent and convincing scientific evidence of adverse health effects** caused by RF radiation. Meanwhile further ongoing research based on established scientific methods will continue to shed light on our understanding of this important health issue.”*

x. **MALAYSIAN INSTITUTE FOR NUCLEAR TECHNOLOGY RESEARCH (MINT), 2003**

“The findings of this study confirm that the presence of the radio frequency and microwave radiation in public accessible areas around the base stations was indeed very low and comparable to the radiation levels found in places away from the facilities. The levels were generally below 11% of the exposure limit for members of the public. The actual contribution made by the base stations themselves was often less than 0.2% of the limit”.

y. **INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS**

***Present scientific evidence**, as reviewed by standards setting organizations and other expert groups, **does not demonstrate health or safety risks** from cellular and other communications transmitters.*

z. **UPDATE OF DANISH COHORT STUDY**

In the latest research, published in the journal BMJ (British Medical Journal), researchers updated a previous study examining 358,403 cell phone users in Denmark from 1990 to 2007.

It was conducted to investigate the risk of tumours in the central nervous system among Danish mobile phone subscribers. The research included all Danes aged greater than 30 and born in Denmark after 1925, subdivided into subscribers and non-subscribers of mobile phones before 1995.

Cancer rates in people who used mobiles for about 10 years were similar to rates in people without a cell phone.

The study has reinstated that there is no evidence of any increased risk of brain or nervous system tumours or any cancer among mobile phone subscribers.

E. USAGE BY CHILDREN INTERNATIONAL RESEARCH & REVIEWS

1. Lastly, it is most relevant to mention that all of the reviews over the last ten years by expert panels and government agencies looking into the health and safety of mobile communications have agreed that the scientific evidence **does not demonstrate any health risks from the use of mobile phones for children**. These include agencies like WHO, ICNIRP, The Health Council of the Netherlands, Food and Drugs Associations, IEEE and many other international bodies
 - *“In conclusion, there is no convincing scientific data to assume a difference in the absorption of electromagnetic energy in heads of children and adults, nor is it likely that the electromagnetic sensitivity of children’s head changes significantly after the second year of life. Because of this, the Health Council of Netherlands sees no reason for recommending limiting the use of mobile phones by children”*

ICNIRP 1998 Guidelines

- *“The protection system using basic restrictions and reference levels makes the ICNIRP guidelines flexible and applicable to virtually any exposure condition, and any group of population. Therefore, there is no need, or justification, for a special approach to the protection of children.”*

Dr Paolo Vecchia, Chairman ICNIRP (2004)

- *“Therefore, in the opinion of ICNIRP, there is neither need nor any justification for a specific approach to the protection of children or other special groups of the population. Consideration of the peculiar characteristics of different groups enters spontaneously into each step of the process of development of the guidelines”*

Dr Paolo Vecchia, Chairman ICNIRP (2005)

- *“From the scientific point of view, there is no evidence to support the need for a special precautionary approach for children or adults”*
The Health Council of the Netherlands
- *“Selvin et al. (1992) reported no increase in cancer risk among children chronically exposed to radiation from a large microwave transmitter near their homes.”*
IEEE (revised Standard C95.1-2005)
- *‘Present scientific evidence does not indicate the need for any special precautions for the use of mobile phones. If individuals are concerned, they might choose to limit their own or their children’s RF exposure by limiting the length of calls, or by using “hands-free” devices to keep mobile phones away from the head and body’*
World Health Organisation
- *“The scientific evidence does not show a danger to users of wireless phones, including children and teenagers”*
Food and Drug Administration (FDA)



- *“The current World Health Organization view is that international safety guidelines protect everyone in the population with a large safety factor and so there is no scientific basis to restrict children’s use of phones or the locations of base stations. Mobile communications do provide important safety benefits for parents and children. The GSM Association supports parents making up their own mind about when and if their children should use mobile communication technologies.”*

GSM Association

2. Children and Brain Cancer Risk: the authors of the international CEFALO study conclude no overall evidence of increased risk of childhood brain cancer.

The authors conclude:

‘The absence of an exposure- response relationship either in terms of the amount of mobile phone use or by localization of the brain tumour argues against a causal association.’

CEFALO is a multi-centre case control study conducted in Denmark, Sweden, Norway and Switzerland.

F. SUMMARY

- It is most important to note that the **RF radiations emitted by Mobile Communication Systems lie in the non-ionizing part of the electromagnetic spectrum** and thus **do not have enough energy to cause any genetic damage**. The RF emissions from mobile phones and base stations are some **50,000 times lower than the levels at which the first health effects begin to be established**. Also, the output power of mobile phones is less than 1 Watt (typically is in the range of 0.2 to 0.6 watts), which is far lower than the emission levels that emanate from the microwave or even the radio.
- For several decades extensive RF research has been undertaken by researchers of the highest integrity at various international organizations and **general consensus of these studies does not demonstrate any substantive link between human health risks and the use of digital mobile phones or living near a base station**.
- Many expert panels have reviewed the large body of existing scientific literature and have consistently concluded that compliance with the existing science based standards is sufficient to protect public health. These reviews have concluded that for exposures to radiofrequency energy up to levels, below the safety limits prescribed by International Commission on Non-Ionizing Radiation Protection (ICNIRP) and endorsed by WHO, **there is no substantive or convincing evidence of biological effects that could harm a person's health, that is, ICNIRP guidelines are reliable safeguards for all segments of the population, including children**.
- All of the reviews over the last ten years by expert panels and government agencies looking into the health and safety of mobile communications have agreed that the scientific evidence **does not demonstrate any health risks from the use of mobile phones for children**. These include agencies like **WHO, ICNIRP, The Health Council of the Netherlands, Food and Drugs Associations, IEEE and many other international bodies**.
- The measurement results of study carried out by, **(1) Indian Institute of Technology Madras, Chennai (IITM), (2) Thiagarajar College of Engineering, Madurai (TCE) and (3) Centre of Excellence in Wireless Technology, Chennai (CEWIT)** showed that 300 places in Delhi, Mumbai and Pune, where the measurements were made from 14th July 2010 to 17th July 2010 and 27th October 2010 to 30th October 2010 respectively, were much below the compliance limit of ICNIRP standards.