

# Microwave Radiation Pollution From Cell Phone and Tower

Jitendra Singh

Department of Physics, Sri. Lal Bahadur Shastri Degree College Gonda, Uttar Pradesh, India

## ABSTRACT

This paper has been devoted to the study of Microwave Radiation Pollution from cell phone and tower. In this paper we have studied the various of cell phone and tower radiation pollution which is very common now a days. The absorption of these radiation by human termed as specific absorption rate. i.e. SAR. Taking certain protection measures will certainly reduce the hazards of non-ionizing radiations.

**Keywords :** Microwave Radiation Pollution, Cell Phone and Tower.

## I. INTRODUCTION

Microwave radiations has risen many folds for past 35 years [1]. One of the basic reason for this increase is the use of modern communication technology. The most common of them, the cell phone, has led to increase in exposure to microwave radiation in the society. Before going further let us understand briefly microwave radiations. The term microwave frequency is generally used for those wavelength measured in 30 cm to 1 mm and 1 to 300 GHz. The cell phone operates in the frequency range of 900 to 1800 MHz. the radiations emitted are electromagnetic in nature and are non ionizing. It is not only the user of the mobile phone who may be effected but also the society around the transmitting towers may be effected by the radiations hazard due to 24 hrs emission of radiations from the towers which power billions of mobile phone world wide.

## II. ELECTROMAGNETIC ENERGY

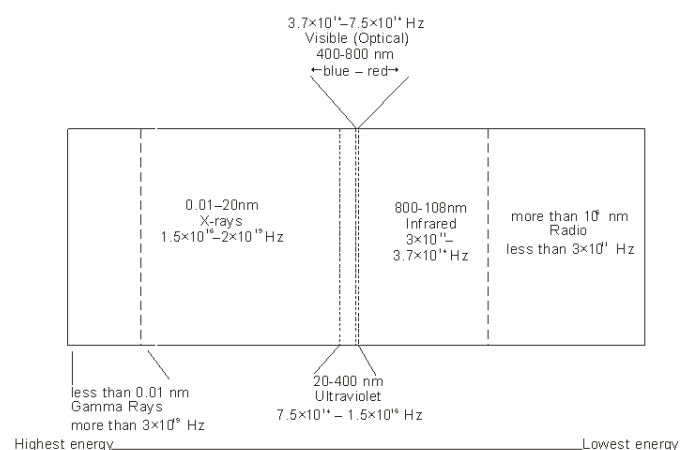
Electromagnetic energy at a particular wavelength  $l$  (in vaccum) has an associated frequency  $f$  and photon

energy  $E$ . Thus the electromagnetic spectrum may be expressed equally well in terms of any of these three quantities. They are according to the equations if wave speed ( $c$ ) then frequency of wave length  $l$  i.e.

$$l = c/f$$

$$\text{and } E = hf \text{ or } E = hc/l$$

where  $c$  is speed of light = 299792458 m/s and  $h$  is planck's constant.



**The Electromagnetic Spectrum**

The society and authorities not only in India but around the world treat low frequency electromagnetic fields have to be very intense to produce visible effects. The non ionizing nature may make it look even safer, but there is a mistake in assuming that if these extreme affect don't happen then no other effects can take place [2]. The electromagnetic pollution has gone up around 100 times in last 30 years (Hope Fauna, Dec. 2006) microwave exposure can be associated with leakage of albumin through the blood-brain-barrier as the exposure may change the permanently of the barrier [3], [4], [9].

The change in permeability can result in serious change into stress by thermal expansion. This phenomenon is caused by a rapid rise of temperature either deep within or at the surface of the material, and thus creates a time-varying thermal expansion that generates elastic stress waves in tissue [3], [5].

### III. SPECIFIC ABSORPTION RATE

SAR is the acronym for Specific Absorption Rate, and is a measure of the power per unit mass absorbed by a conducting body when exposed to an electromagnetic field, especially in the radiofrequency (RF) range. High SAR levels may be Harmful for the human body because an excessive temperature [6], [8]. The variable used to express absorbed energy per unit time is the specific absorption rate(SAR) expressed in watts per kg. in all guidelines it is assumed if the average SAR does not exceed 4W/kg body temperature does not rise by more than 1°C, but this data may be true for younger or sub population i.e. very old sick and very young people. The SAR is defined as the derivation as a function of time energy  $W$  absorbed by a mass min volume  $V$  of density  $\rho$  (in  $Kg/m^3$ ).

$$SAR = \frac{d}{dt} \left( \frac{dW}{dM} \right) = \frac{d}{dt} \left( \frac{dW}{\rho dV} \right) \quad (W/kg)$$

### IV. EFFECTS OF ELECTROMAGNETIC RADIATIONS

It has been suggested that exposure to weak electromagnetic fields (EMFs) can disturb the production of the hormone melatonin (secreted by pineal gland sensitive to light associated with sleep) by the pineal gland in the brain, eventually leading to an increase in the risk of degenerative diseases such as coronary artery disease. Parkinson's and Alzheimer's [6]. Likewise, epidemiological and laboratory reports suggest that children exposed to EMFs from power lines are at greater risk of developing leukemia, and that adults exposed to EMFs at work run a higher risk of leukemia and brain cancer. Epidemiologists point to the dozens of studies that have found anywhere from a twofold to a tenfold increase in the risk of cancer [7] among people routinely exposed to EMFs.

### V. BIOLOGICAL BARRIER

The blood-brain-barrier is a biological barrier surrounding the brain. It blocks the entry of certain, and possible harmful, molecules in the general blood circulation from entering the central nervous system. It is important here to mention that our brain is sensitive to electrical pulse. It is possible that any interface from external source with electric pulse generated by our brain to perform certain task may get manipulated. This might result in change in permeability of "BBB", as a result some harmful chemicals may enter into the brain thus effecting CNS [6], [7], [8], [9]. Significant changes in brain or body temperature seem to be a necessary condition for the effect to occur. For example, Chiang et al. [1] studied in the dog the penetration of albumin into the brain, 4 of the 11 dogs studied showed a significant increase in albumin penetration. In another study [9] the

permeability of the blood-brain-barrier in the rat after 5, 10 or 20 min of exposure to 2450 MHz pulsed RFR at an average power density of 3 W/cm<sup>2</sup> (SAR 240 W/kg) on the left side of the head. Brain temperature of the animals was increased to 43.

## VI. MATERIALS & METHODS

It was important to have an instrument which has operating range covering these frequencies. For the purpose Hypolog RF Meter 4060 (Aaronia Germany) was used to measure the frequency and power density and then converted into microwatt/cm<sup>2</sup>. Along with RF meter hand held antenna was connected to RF meter to receive the signal strength. All the reading were transferred to laptop computer through USB connection for unsequent analysis. To mark the exact location for measurement GPS (instrument) was used Global Positioning System) as the reading were to be taken at different time slots at the same location.

## VII. RESULTS & DISCUSSION

Research is still on may be may happily land in a negative note of report but its still a question mark. We can definitely do certain preventions which I feel are harmful and can be followed by both, authorities and people.

1. Reducing use is universally regarded as the best step. Use by children should be eliminated. Indoor use increases exposure significantly because the signal strength require to create a connection from inside a car or building is much greater. Home portable phones can be replaced

with wired phones and cell phone use significantly reduced.

2. If still using a cell phone or portable home phone keep the phone away from the body when in standby mode. When in use hold the phone as far away from the head as possible. Even three or four inches can significantly reduce the exposure because the energy density drops very rapidly with distance from the body. Keep the antenna away from the head and pointing away from the body [10].
3. I would like to mention the selection of model on the basis radiation level rather than looks is important, one can potentially reduce radiation exposure by over 80% simply by choosing the correct cellular phone As per FCC certification maximum SAR must be less than 1.6 W/kg [11].

The table below shows the measurements taken at various locations of Gonda City:

S.No.	Location	Recorded RF level (Micro watt/cm2)
1.	Rani Bazar	0.46
2.	Bus Station	0.56
3.	Railway Station	0.74
4.	Gonda	0.58
5.	Bargaon	0.46
6.	LBS Chauraha	0.48
7.	Bypass	0.51
8.	Kachahri Bahraich Road	0.49

## VIII. REFERENCES

- [1]. Chiang et al., Journal of Bioelectricity, 8(1), 127-131 (1989), EP12064
- [2]. Hope Fauna, Santa Rosa Community Market Newsletter, Dec. 2006.

- [3]. Guidelines on Limits of Exposure to Radio frequency Electromagnetic Fields in the Frequency Range from 100 kHz to 300 GHz, Health Physics, 54(1), 115-123 (1988).
- [4]. P. Rajendra et al., Biomagnetic Research and Technology, Uppal Hyderabad, 2004.
- [5]. Neil Cherry, Environment Management and Design Division, Lincon University, New Zealand, April 2001.
- [6]. Anurag Misra et al., Proc. of Neural, Parallel and Scientific Computations 4, p. 288-291, 2010.
- [7]. O.P. Gandhi, Biological Effects and Medical Applications of RF Electromagnetic Fields, IEEE Transactions on 30(11), 1831 (1982).
- [8]. Klitzing, L. von., Physica medica, April 28, 1995, EP11863
- [9]. Svenska Dagbladet, Microwaves open up the Blood Brain Barrier, Sept. 15, 1999, EP11829.
- [10]. Helin, Jan., How Dangerous Is Your Mobile Phone?, Aftonbladet, Feb. 8, 1997, EP 11881.
- [11]. From site : <http://www.earthpulse.com>, 2007

#### **Cite this Article**

Jitendra Singh , " Microwave Radiation Pollution From Cell Phone and Tower", International Journal of Scientific Research in Science and Technology(IJSRST), Print ISSN : 2395-6011, Online ISSN : 2395-602X, Volume 3, Issue 4, pp. 609-612, May-June-2017.

Journal URL : <https://ijsrst.com/IJSRST218287>