

Environmental Agents – Mobile Phones

Mary Vijaya Ratna. A

Lecturer

Department of Physics

*St. Joseph's College for Women(A),
Visakhapatnam – 530 004*

Dr. K. Radhakrishna

Reader

Department of Physics

*St. Joseph's College for Women(A),
Visakhapatnam – 530 004*

Abstract

The chemicals or factors in the environment to which humans are exposed may cause adverse health effects. These are known as Environment Agents. Cellular or Mobile Phones are now integral part of modern telecommunications, which uses radio frequency energy or radiation for mobile communications. They transmit radio waves through network of fixed antennas called 'base stations'. Large number of users showed adverse health effects which are to be associated with cell phone use. This could potentially be a widespread public health concern. Current scientific evidence has not conclusively linked cell phone use with adverse health problems, but more research is needed. The National Toxicology program studies may help to clarify any potential health hazards from exposure to cell phone radiation. According to cell phone study, in the journal of American Medical Association, mobiles show effect on brain activity. In this study of effects by National Institute of Health scientists, it is found that 50 minutes of cell phone usage elevated brain glucose metabolism. Discrepancies among studies on the effects of Radio Frequency electromagnetic fields from cellular telecommunications highlighted the need for additional research. According to World Health Organization, mobile phone use is ubiquitous with an estimated 6.9 billion subscriptions globally. It will conduct a formal risk assessment of all studied health outcomes from Radio Frequency field exposure by 2016.

Keywords: Environmental agents, base stations, Radio Frequency, Electromagnetic Fields

I. INTRODUCTION

Personal / Cellular telecommunications is a rapidly evolving technology that uses radio frequency energy or radiation for mobile communications. In many countries over half of the population use mobile phones and the market is growing rapidly. In some parts of the world mobile phones are the most reliable or the only phones available.

The effects of mobile phones radiation on human health is the subject of recent interest and study as a result of the enormous increase in cell phone usage throughout the world. As of November 2011, there are more than 6 billion subscriptions worldwide. Cellular phones use Electromagnetic radiation in the microwave range. Mobile phones communicate by transmitting radio waves through a network of fixed antennas called base station.

The maximum power output from a mobile phone is regulated to mobile phone standard and by the regulatory agencies in each country. In most systems cell phone and base station check reception quality and signal strength and power level is increased or decreased automatically, within a certain span to accommodate different situations such as inside or outside of building and vehicles.

In 2011, International Agency for Research on Cancer (IARC) classified mobile phone radiation as Group 2B possibly Carcinogenic, which means that there could be some risk

Another area of concern is the radiation emitted by the fixed infrastructure used in mobile telephony, such as base stations and their antennas which provide link to and from mobile phones. This is because in contrast to mobile handsets, it is emitted continuously and is more powerful at close quarters. On the other hand, field intensities drop rapidly with a distance away from base of transmitters because of attenuation of power with the square of distance.

When we look into the short term effects, tissue heating is the principle mechanism of interaction between radio frequency, energy and human body. Most of the energy is absorbed by the skin and other superficial tissues resulting in negligible temperature rise in the brain or any other organs of the body.

According to cell phone study in JAMA (Journal of American medical Association), cell phones show effect on brain activity near the antenna as published in this journal in February 23, 2011, "The effects of cell phones usage on brain cell activity". National institute of health scientists found that 50 min of cell [phone usage (with the mobile muted to avoid confounding effects from auditory stimulation) elevated brain glucose metabolism in the parts of brain closest to the phone antenna. Elevation in glucose metabolism a measure of brain cell activity was correlated with the estimated strength of the electromagnetic field emitted by phone in those regions. The clinical evidence showed that the human brain is sensitive to the effects of radiofrequency electromagnetic fields room acute cell phone exposures.

Positron emission tomography (PET) provided a more direct measure of brain activity than cerebral blood flow. It uses a radioactivity tagged form of glucose known as (18 F) flouro deoxyglucose (FDG) to measure glucose metabolism in specific regions of the brain. FDG is direct substitute glucose; the brain's fuel measuring its concentration in the brain gives a highly specific measure of brain cell metabolism, which is a more direct measure of brain activity that measures blood flow. Brain glucose

metabolism measures obtained with FDG reflect the averaged brain activity occurring over a 30 minute period, which can assess the cumulative effects of cell phone exposure on resting brain metabolism, unlike blood flow measures which isolate a more restricted point in time.

One well understood effect of microwave radiation is dielectric heating in which any dielectric material (such as living tissue) is heated by rotations of polar molecules induced by electromagnetic field. In the case of a person using cell phone, most of the heating effect will occur at the surface of head, causing its temp to increase by a fraction of a degree. The temperature rise is less than the exposure of head to direct sunlight. The brain's blood circulation disposes excess heat by increasing local blood flow. However the cornea of eye does not has this temperature regulation mechanism and exposure for 2-3 hours showed cataract in rabbit eyes.

One popular design of mobile phone antenna is the sector antenna, whose coverage is 120 degrees horizontally and about 05 degrees from the vertical. It's been observed that as the base stations operate at less than 100 watts, the radiations at ground level is much weaker than a cell phone due to power relationship. Experts considered it was mandatory that main antenna must not be directly placed in front of a living place at a distance shorter than 100 meters.

II. RESULTS

There were no differences in overall brain metabolism between on and off condition, but during the on condition, the specific regions of the brain closest to the phone's antenna showed significant increases in brain glucose metabolism. The regions expected to have the greater absorption of radiofrequency – electromagnetic field from the cell phone exposure were the ones that showed the largest increase in glucose metabolism. The results also suggests that the metabolic increases are secondary to absorption of radio frequency – electromagnetic field from 'cell phone exposures'.

The response to public and government concern, World Health Organization established the International electromagnetic fields project in 1996 to assess the scientific evidence of possible adverse health effects from electromagnetic fields. WHO will conduct a formal risk assessment of all studied health outcomes from the RF fields by 2016. WHO is also developing information materials and promotes dialogue among scientists, governments, industries and public to raise the level of understanding about potential adverse health risks of mobile phones.

III. PRECAUTIONS

Mobile phones are low-powered radio frequency transmitters operating at frequencies between 450 and 2700 MHz with peak power range of 0.1 to 2 watts. The hand set only transmits power when it is turned on. The power falls of rapidly with increasing distance from handset. The wider use of hands free and ear phone technologies such as Bluetooth headsets and when placing the device away from body while text messaging, assessing internet will therefore have less exposure to radiofrequency field. Maintaining distance of base stations antennas from human habitation is advisable. Usage of telephone in car without an external antenna is harmful.

IV. CONCLUSIONS

There were suggestions of an increased risk of glioma at the highest exposure levels of glioma at the highest exposure levels but biases and error prevent casual interpretation. In order to protect the population users of mobile handsets, government and regulatory bodies must adopt safety standards.

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