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The Effects of Radio Frequency And Mobile Phones on Human Health

KEYWORDS

Mobile phone, Electromagnetic radiation, Cancer, health, computational bio electromagnetic modeling

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ABSTRACT Mobile phones emit "non-ionizing electromagnetic radiation". But the non-ionizing radiation from mobile phones has no effect on hearing. However, its risk profile is included in the same category as a coffee and salted vegetables. But a recent study estimated that excessive mobile phone use will have a significantly huge effect on people while reduced usage of mobile phones has a medium effect on humans. World Health Organization announced that the most frequent cause of cancer is due to cell phone use. Every cellphone generates microwave radiations which are absorbed by the body. Many researchers have been unable to make a decision regarding this. Compared to 10 years ago, number children that are using mobile phone have increased. But now, many children are taking a huge risk by over using mobile phones every day for purposes such as text messaging and call. Mobile phone is visible to the human eye, but is found that regular electromagnetic radiation alters and damage proteins that are emanating from human brain. In this paper we intend to review the possible effect of RF microwave radiation by mobile phone on human health.

1. Instruction

Every cell phone generates microwave radiations which are absorbed by the body. The main problem with excess of this wave is the cause of brain tumors. Many researchers have been unable to make a decision regarding this. Following are some articles, studies and scientific publications. In 2008, [10] a survey conducted in Sweden regarding mobile phone use in 2,000 children in particular concluded that children have a high risk of glial cell tumors of the central nervous system. Earlier last year, World Health Organization announced that the major possible cause of cancer is due to cell phone use. However, since babies have a smaller head and thin skull, it absorbs 10 times more radiation than an adult and how this effect a child is yet to be determined.

Researchers in this study of [12] Medicine Clinic University Oryebro Swedish banking sector reached the conclusion that children and teenagers who use mobile phones have risk of brain tumors. In addition, a major study leader Professor Lennar Hardell [10] started investigating the effects of using mobile phones before the age of 20 and concluded that there is 5 times increased risk of developing brain glial cell tumors in children and he prohibited cellphone use of children below 12 years of age and from children under the age of 20, who are issued with cell phones got recommendations to limit consumption. Relatively reduced risk of an adverse effect ends by 20 years of age. In 2011, World Health Organization announced that there are no effects of cell phone radiation to hearing. However, its risk profile is included in the same category as a coffee and salted vegetables. The Internet has disclosed that Mobile and wireless application has no effect on the human brain, but this new long-term study of mobile phones that provided explains it using some of toxic materials. And development of malignant brain tumors on the side of the head which the person used to keep his cellphone to speak is interesting.

1.1 The human Brain and mobile phone models

According to the EN 50361 SAM phantom [3] head (specific Anthropomorphic Mannequin) from the 3D CAT design software made by Solid works, originally as a NURBS model (Non-Uniform Rational B-Splines), a human head was modeled. It was then converted to a corresponding 3d soid STL model by addition of layer such as brain and ear cavity. The basic model has been modified. The model consists of three layers and two doming. A layer of constant thickness is made by skin, fat and muscles. The human head is anatomically modeled with average anthropometric dimensions.

High (h)	Wide (w)	Diagram (d)
256mm	166mm	270mm

The human brain model is inscribed in a parallelepiped with dimensions are 174mmx145mmx170mm. Every inner layer is converted by an outer layer. It was assumed that ear canals are 25mm deep and 7mm wide.

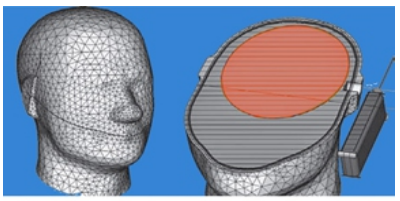

Figure 1 Human head numerical model and across-section

(Source: Predicting the biological effect of mobile phone radiation)

In the table 1, the characteristics of the biological tissue Relative dielectric constants (εr) and Electric conductivity (σ/S m-1) at 900 MHz, which the most frequently used frequency in GSM mobile are presented mass density (p) frequency-independent but is different for each tissue observed.

Table 1 Characteristics of tissues at 900 MHZ

Tissue	Relative dielectric constants (εr)	Electric conductivity (σ/S m^{-1})	Mass density (p/kgm^{-3})
Brain	45,8000	0,7660	1030
Fat	5.4619	0,0510	1100
Skin	41,4053	0,8667	1100
Bone	12,4537	0,1433	1850
Muscle	56,8790	0,9953	1040

1.2 In present era : In the world, lots of mobile companies, hospitals and universities studied with RF or microwave radiation from mobile phone and its association with risk of cancer development and also the correlation between mobile phone and cancer. Mobile phone companies made seven studies, out of which, six were not correlated to finding the relation between mobile phone and cancer. The studies didn't find a correlation in 85% of the studies which these mobile phone companies funded. The large mobile companies did not acknowledge any correlation between mobile phone and cancer. Still the companies study in similar area named as Interphone study. Next part is a study done by affiliation of hospitals and universities, both hospitals and universities made 18 studies out which, 12 studies found a correlation. [9] They found a correlation in 66.67% of studies. This is the biggest result which shows significant correlation between mobile phone and cancer.

1.3 Interphone study: Around the usage of mobile phones have skyrocketed the past ten years, also its technology has developed from an analogue to a digital system, unknowingly causing more

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harm than good.

Due to the rapid increase in mobile phone usage in the past ten years, it has increased the possible effects of exposure to Radio Frequency and its technology. For convenience, most people are choosing and adapting to the digital phones. Mobile phone and base station emit Radio Frequency (RF) or microwave radiation. The 1ts generation mobile phone, which used analogue technology, transmitted only sound waves. Since 1991, new development has been made as data and image transmission and received are in the form of RF and electromagnetic spectrum. Many researches are being conducted on Interphone study. The interphone study was initiated by international set of case-control focusing a 4 type of tumors in tissues. The most absorbed radio frequency energy is emitted by mobile phones. The interphone study is a "Multinational case-control study" Interphone study was developed to investigated whether mobile phone use increase the risk of cancer. The interphone study collected information from 13 different countries. The study found 2,765 cases of glioma, 2,423 case of meningioma, 1,121 case of acoustic, neuroma, and 109 case of malignant gland tumour [11] (2007) include 7,658 controls.

1.4 Theoretical Concepts Radio frequency

Radio frequency is electromagnetic spectrum (Electronic and Magnetic) wave frequencies. Radio frequency has become wireless and are in the form of high-frequency signals. The range extending from nearly 3 kHz to 300 Hz this frequency make it in the electromagnetic radiation spectrum. Lots of wireless devices are using radio frequency fields. Such as Mobile phones, wireless routers, computers, etc.

- Radio frequency between 1 and 3 Ghz
- Microwave Frequency refer to 3-30 Ghz
- Millimeter wave frequency 30 to 300 Ghz

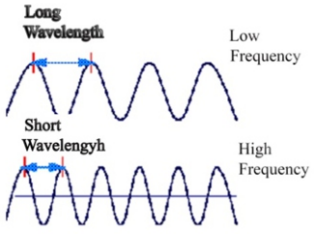
Radio frequency can be transmitted via different media

- Coaxial cable (up to 1GHz over longer distance)
- Wireless Radio frequency transmission

The number of electrometric wave cycle that pass a given point unit time. Hertz (Hz) (Wave cycles per sound)

- Kilohertz (Khz)
- Megahertz(MHZ)
- Gigahertz (Ghz)
- Formula: Frequency=1/Period

1Hz	1 second
1KHz	1 Millisecond
1MHz	1microsecond



(Figure 2 D

2. Observation

1. Numbers of studies are made on electromagnetic field (EMF) radiation and its effect on human health. To this end, a number of sources have been identified that emit levels of Electromagnetic field radiation. Such us: Power transmission lines, base transmitter stations (BTS), mobile phones and many household appliances, of which some have been classified as extremely low frequency (ELF) non-ionizing radiating devices. The global system of mobile telecommunications (GSM) [15]

2. The use of cellphones in metallic enclosed environments. Such as: Cars, Train and even airplanes has lot of attention. In these environments, most of the radio frequency (RF) energy comes from mobile phones. [4]

3. This study was to investigate the effect of mobile phone exposure on nervous function in the human brain and heart. The problem is associated with mobile phone and Electromagnetic field. [7]

3. Conclusion

Many of the studies were based on number of case control. Some studies said that there are no effect from radio frequency and electromagnetic field (EMF) radiation. The mobile phone companies did not find correlation between mobile phone and human health. The evidence available does not provide a clear pattern to association between exposure to radio frequency (RF) and microwave radiation from mobile phone and human health. It is impossible that exposure to RF and microwave radiation have no adverse effect on the human health. The studies made by the Universities and hospitals on exposure of RF or microwave radiation and its effects on increasing risk of cancer found a correlation in 66.67% of the study. It proves us that Mobile phones have direct effect on human health.

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