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Analysis of Radio Frequency Radiation from Cell Phone

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Abstract *– The analysis of electromagnetic field radiation exposure from cellular wireless system is expected to become more and more important in research field so that researchers can provide the solution of the effect of electromagnetic field radiation on human living things. Due to drastic use and demand of services by cellular wireless system from the human beings which will result in increase effect of RF radiation. Likewise, the development of upcoming wireless equipment will also participate to an enlarge in EMF exposure. This research provides a complete study relating to the prospective vigor vulnerability related with EMF experience and the unusual metrics that are presently used for calculating, restraining and justifying the possessions of this type of exposure on the universal community. This survey also reviews the feasible impacts of new cellular technologies on EMF exposure and some new research guidelines for updating the EMF exposure evaluation framework and addressing these effects in future cellular devices.*

Keywords*- Electro Magnetic Field (EMF), Radio Frequency (RF), Global System for Mobile Communication (GSM), Specific Absorption Rate (SAR), Radio Frequency electromagnetic fields (RF-EMF)*

I - INTRODUCTION

For the last few decades, a huge studies carried out for knowing the actual effect of radio frequency radiation from the cellular phones on human beings and according to that various outcomes will be available with limited and unbound solution to overcome form thatpoint. Now a days, mobile phone and smart watches, have been commonly used in our every day routine. The communication and inclusion of electromagnetic fields with the human beings have received significant awareness over the last few years. An evaluation of this immersed electromagnetic power by the human body is known as Specific Absorption Rate (SAR). Considerable work and development have been reported in last years to expand further precise methods of SAR estimation and measurements and SAR reduction techniques formobile phones, different communication devices. in addition, the exposure of a human being to RF radiation from use of a cell phone is relevant to the question of possible health effects of mobile phones. This evaluation summarizes the modern scientific verification on this issue, concentrating on studies that present the actual concepts with their solutions. Since it is not so easy to understand the mechanism of radio frequency radiation on the human beings so as to find exact and effective technique for SAR reduction. Further parameter of exposure such as the SAR at particular locations within the body or the total absorbed power in the body are not relevant for observance consideration of mobile phones but might be

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important for other purposes including research on possible biological effects of RF energy.

Radio Frequency electromagnetic radiation exposure evaluation on living organism is demanding due to the existence of different EMF sources with their specific characteristics, interaction and inter relations. However, most of the research work has been focused on practical approaches, rather than theoretical methodology, to design systems with low SAR values, and many key questions associated with SAR remain unanswered. In general, the effects of radiofrequency (RF) radiation on human systems have been attributed to interactions, although the existence of effects at low field intensities is still a subject of active investigation. This introduction summarizes RF effects on major physiological systems and provides the detailed literature about the threshold specific absorption rates (SARs) required to produce such effects. Technological advances of mankind, through the development of electrical and communication technologies have resulted in the exposure to artificial electromagnetic fields (EMF). Technological growth is expected to continue; as such, the amount of EMF exposure will continue to increase steadily.

II- LITERATURE REVIEW

Exposure of Sprague-Dawley rats to electromagnetic fields at different frequencies in standing and travelling wave chambers by authors in [A]. Values of specific absorption rate for practical analysis were obtained from available FDTD-based simulation software. An experimental radiation system developed which keeps electromagnetic parameters constant while easing stress-free exposure of living organism to non-thermal radiation. This makes it achievable to unswervingly determine the power absorbed by the animal and determine SAR according to weight. The simple picrotoxin model made allow identifying morphological signsof neurotoxicity in rat brain tissue. In the model, animals exposed to radiation showed visible morphological and invulnerable property. The experimental modelsof controlled exposure of animals to radiofrequency allow author in [A] to know in the short term the mechanisms and risks that can affect human health. The modulation of EEG measures rhythms in epileptics, the revision of the vulnerable response and the increase in cellular stress are natural effects that could be caused in humans by radio frequency inter action ecological particles cortical excitability, provocative response and cell harm can be modified.

A comprehensive analysis of electromagnetic field absorption by the human body has been carried out in [B] using the boundary conditions and simulations of electromagnetic fields. Presented analytical methodology and outcomes have significant impact on the research of SAR reduction and antenna efficiency improvement when a hand-held or wearable mobile device is closely placed to the human body. Electromagnetic power absorption in the block of the human tissue is taken into account with the detailed analysis of the boundary conditions and the vector electromagnetic fields in the air gap between the antenna and the individual influence have been dissembled. To further validate the mechanism of electromagnetic absorption by the human body, it is pertinent to examine a more realistic model have a phantom head and hand with a mobile handset at frequency = 1800 MHz.

User's Radiofrequency Electromagnetic Fields (RF-EMF) radiation exposure assessment is pivotal, to verify compliance with current legislation thresholds in [C]. Study of the E-field characterization of the particular cell phone uses within town public is presented, considering different cellular technologies (from 2G to 5G) by using consumer mobile phone base station up-link radiation exposure in addition, different user densities have been considered at different frequency bands, from 2G to 5G (FR1 and FR2), by means of an in house developed deterministic 3D Ray-Launching (3D-RL) system in order to give clear imminent spatial E- field distribution, including the impact in the use of directive antennas and ray forming ways, within sensible operation conditions. A complete E-field strength distribution spatial characterization within public transportation trams, considering different cellular systems and user densities in realistic-case conditions, applicable to dosimetric estimation and analysis.

In [D] summarizes the some of the complications in comparing the fascination of RF energy in different persons from use of cell phones i.e., possible age-related differences in immersion of RF energy in the heads of mobile phone consumers. For exposure, there is a clear substantiation that age can play a factor, the specific absorption rate in particular anatomically defined locations within the brain, will vary with head size and with age due related differences in the dielectric properties of tissue.

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III- EFFECTS OF RADIO FREQUENCY ELECTROMAGNETIC FIELD EXPOSURE

Volatile use of different electronic equipment in the world has unavoidably led to increase continuously the probability of electromagnetic radiation exposure. The development of wireless communication technologies, such as computers and smart phones, has become a necessity for modern people. As a outcome, each human being and animal are facing ecological changes and are being exposed to electromagnetic radiation which is harmful for health.

There are many controversies regarding RF-EMF exposure, but many of the studies have focused on cancer, genetic damage, neurological disease, reproductive disorders, immune dysfunction, kidney damage as well as electromagnetic hypersensitivity and cognitive effects. Different unfamiliar possessions of Radio Frequency radiation exposure is articulated as negative effects to the technical society and general community. RF-EMFs emitted by cellular phones are absorbed into the brain, to a degree, that can affect neuronal activity in addition; the thermal effects of RF-EMFs suggest the possibility of disturbing neuronal movement by temperature generated by cell phones. Therefore, there is a requirement for scientifically demonstrated information on the effects of increasing exposure to RF-EMFs on nerve cells.

While using electronic equipment essentially electromagnetic radiation are generated. These radiation can be expose by living organisms. SAR refers to the amount of radio wave energy absorbed in unit mass of human body (1 kg or 1 g); units are W/kg or mW/g. RF radiation produced by cell phones are proficient to increase body temperature; which are measured quantitatively by SAR. Due to the exposure of RF radiation, it can pierce into the body and cause pulsation of stimulating inside which is harmful to living organism.

Many neurological influences may occur as a outcome of EMF exposure due to the position of the cellular phone and the proximity of the cranial nervous system. Also, cell phone consumers have an enlarged risk of malignant gliomas, especially those with acoustic neuromas**.** In addition, exposure of Electromagnetic field radiation has been found source of many harmful diseases like chromosomal unsteadiness, variation of gene appearance and gene mutations. It has also been found that exposure to electromagnetic radiation, a type of RF-EMF, increases the incidence of chromosomal aneuploidy. Genetic toxic effects, including aneuploidy, can lead to genetic disorders with abnormal gene formation, and can even lead to cancer.

Many different neurological damage may occur due to the exposure which result may affect to the immediacy of the cranial nervous system while using cell phone. These neurological effects include headache, changes in sleep habits, changes in electroencephalogram and changes inblood pressure. Electromagnetic waves, particularly RF-EMFs emitted by mobile phones are absorbed into the brain to such an extent that it can affect the activity of neurons. RF-EMFs emitted from mobile phones activate metabolic processes in the human brain and glucose metabolism in the brains increased rapidly.

IV- CONCLUSION

With the progress of science and technology, we have easily been exposed to the created artificial electromagnetic waves in our daily life because of use of many electronic devices therefore; it is very difficult to understand the mechanism of electromagnetic field absorption in the human body so as to find accurate and effective approaches to deal these consequences. Technical analysis on the Behavioral, Biological, Body parameter are also required to realize effect due to RF radiation. The possible biological effects of RF-EMF exposure have not yet been proven, and there are insufficient data on biological hazards to provide a clear answer to possible health risks. Therefore, it is necessaryto study the biological response to RF-EMF in consideration of the comprehensive exposure with regard to the use of various devices by individuals.

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