

ELECTROMAGNETIC RADIATION AND ASSOCIATED HEALTH COMPLICATION

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Abstract: Electromagnetic radiation wave is the essential driver of modern technological and economical growth. The excessive use of EM wave based electrical device has some adverse impacts on human health. This paper analyses most of the negative impacts, such as Brain tumors, sensory system collapse, lymphatic system down, testicle and spermatogenesis problem, malformed formation of cartilage from proven studies investigation. Separate in vivo and in vitro studies result accumulated in the paper. The ultimate finding is whether EM wave is dangerous or not. There are two types of Electromagnetic radiation; ionizing radiation and non-ionizing radiation. These two types depend on whether they are capable of ionizing atoms and breaking covalent bonds or not. Ionizing radiations are ultra violet and higher frequency radiations, such as X-rays or gamma rays. Non-ionizing radiation creates two major problems that are electrical and biological.

Introduction: The electromagnetic spectrum is divided into several different classes of radiation such as low frequency (LF), radio waves (RW), microwaves (MW), infrared waves (IW), visible light, ultraviolet light, x-rays and gamma rays. This different wave frequency converts from one type to another [1]. Figure 1 shows the spectrum of electromagnetic energy or radiation. EM pollution is significant because of frequencies which are oscillating more slowly than light waves we are sensing. But in case of x-rays and gamma rays (which oscillate more quickly than visible light) are quite dangerous. But bright side is that these rays are not present at our living and work places. Electromagnetic pollution has been captured everywhere. This short review paper will discuss various health conditions caused by the electromagnetic fields.

Non-ionizing radiation (NIR) refers to the formation of energy with lower frequencies, and it has been found non-risky for human health by researchers and scientists. But recently, evidence shows that some NIR frequencies may have potential to accelerate biological injury. The research concerning Non-ionizing radiation (NIR) human health hazard is focused on the following two cases : (1) extremely low-frequency (ELF) energy waves produced and emitted by power stations, power lines and some electrical equipment; and (2) radio and microwave frequencies produced from wireless communication technologies, cordless and cellular phones, and some electrical materials. Like fresh water can become contaminated when it passes through contaminated surroundings, electricity becomes fouled when it comes into contact with electronic equipment. Nominal electricity coming from electrical power line to buildings at a frequency of 50-60 Hz and power becomes 'lousy' or polluted when it develops lots of distorted higher-frequency signals by contacting with equipments such as computers, televisions and some appliances [2].

Sources: The electrical appliances are the main drivers of electromagnetic radiation. Electrical appliances and electronic equipment computers and related equipment cell phone masts microwave ovens house-wiring Cellular (mobile) phones

Information networks: different voltage level power lines in current world most new electrical appliances create electromagnetic pollutions. Hence pollution increases exponentially [3].

Electromagnetic Frequency: Wireless communication has been used across the world wide in many years for point-to point (p2p) and point-to multipoint connectivity. AM and FM radio, television broadcast stations, mobile and cellular phones, radar and microwave systems are the most usual wireless solutions. The electromagnetic (EM) spectrum has range of frequencies like Extremely Low Frequency (ELF) and Very

Low Frequency (VLF), through Radio Frequency (RF) and Microwaves, to Infrared (IR) light, Visible Light, Ultraviolet (UV) light, X-rays, and Gamma rays [1].

Health Complication due to Electromagnetic radiation: Rough metals vulnerability and electromagnetic sensitivity Mortazavi and his researchers group [4], has found Electro-hypersensitivity (EHS) from electromagnetic radiation. Electro-hypersensitivity (EHS) is the disordered physiological processes associated with disease or injury of EHS and it is less significant. Also researchers proved that it is related with significant metallic element. Solid metallic element attached with the proteins within tissues and organs are believed to have fewer danger. In addition, Mortazavi and associates have observed that steady magnetic field usually generated from mobile phones and other wireless devices may affect mercury vapor release from dental amalgam. The diluted mercury gradient is increasing in saliva within amalgam carriers [4,5].

IV.B Consequences for sensory system and psychological issue Cellular phones are being used close to brain tissue. Hence brain tissue is influenced by electromagnetic wave mostly. Many studies show that human sensory system and behavior are affected closely by the radio frequency electromagnetic waves coming from the base stations(BTS) [5]. A study of Heinrich S [5] shows that increasing use of wireless devices forces mass people to live under RF electromagnetic waves and affecting their health particularly in children. According to Sauter C [6] studies show long term affect people who are using GSM and WCDMA technology based devices. The study shows that EM wave released from mobile phones more or less affect the functions of the body. He examined 30 male persons for nine days under three different arbitrary EM wave in GSM 900 and WCDMA. All these examinations were held according to fixed time and two times a day. Vigilance test and attention test were taken in both GSM 900 and WCDMA exposure cases and found less significant issues. That may not affect human health. Time-of-day effects were evident for the tests on divided, selective attention, and working memory. They underline the requirement of control time-of-day [6]. The effect of using mobiles while sleeping has been studied by Lowden. A Few studies show that using excessive mobile phones can harm the sensitivity of sleeping.

IV.C Impacts on Bone and formation of cartilage Studies show that some time low electromagnetic fields advantageous for ligament tissue [7,8]. Proliferation and mineralization affected when EM fields come across osteoblast cells observed by Lin and Lin [9]. Impacts of 50 Hz and 0 Hz on rat bones were examined by Okudan, Suslu and others. These experiments were measured by dual energy X-ray absorption (DEXA) measurements on bone substances and compactness when body expose through electrical fields. This result shows that static and 50hz shape the primary growth of rat bones [10].

IV.D Impacts on testicles and spermatogenesis Electromagnetic field waves affect testicle and sperm generation as it kept in the clothes pocket. Histopathological analysis done by Tenorio and showed that spending 30 minutes in 60Hz frequency can devolution in testicular development [11]. Impact of 900MHz electromagnetic wave on rats was examined by Ozguner and co-workers and the results show that massive loss of spermatogenesis.

IV.E Effects on lymphatic system High frequency em fields may cause lymphatic and hematopoietic disease. It may turn to cancer later on. Hocking studies in Australia shows that more adolescence affected by leukemia than anticipated [12]. He reported a higher leukemia occurrence among grown-ups and children living 2 km around TV transmitter stations [13].

IV.F Brain tumors According to Baldi I [14] test shows that the exact reasons behind brain tumors are still obscure, but electromagnetic field components have potential to distort brain formations. It was discovered that the danger for meningioma was higher in subjects living in the region of electrical cables when the increment was viewed as independently for Mythical being. According to Baldi's information on occupational or residential exposure to ELF may play a vital part in the occurrence of meningioma [14]. 6 Baldi I [15] shows that the etiology of brain tumors essentially stays obscure, and among potential danger components. They dissected the relationship between cerebrum tumors and residential exposure in adults. They performed a case control concentrate in southwestern France between May 1999 and April 2001. The study incorporated an aggregate of 221 focal sensory system tumors. A nonsignificant increment in danger was found for electromagnetic fields. It was discovered that the danger for meningioma was higher in subjects living in the region of electrical cables when the increment was viewed as independently for Mythical being. The latest survey by Khurana (16) covering a sum of 11 meta analyses demonstrated that the brain tumors, in particular glioma and acoustic neuroma expanded 2-fold in individuals utilizing remote telephones for over 10 years, achieving a statistical significance [15].

Conclusion: The exponential rise of using mobile phones increases vast concern because of radio frequency and its harmful nature to human health. Studies are continuing for finding exactly what happens in cell level. Using electronic gadgets makes life easier. In the vast use of electronics and electrical appliances it is still in doubt that electromagnetic fields are really harmful. There is no immediate proof of dangerous consequences for human wellbeing recorded by low-frequency radiofrequency waves. But investigations are advancing in cell level which is more focused on high frequency. There are ton of studies about impacts of EMF on cell level; DNA, RNA atoms, a few proteins, and hormones, intracellular free radicals, and particles are indicated.

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