

ELECTROMAGNETIC WAVES AND THEIR EFFECTS ON HUMAN BODY

Radiation consists of both electric and magnetic fields. They come from natural and manmade resources. Electromagnetic Radiation (EMR) is present in everyone's life and originates from different sources. Some of the most common sources of electromagnetic fields are the ones everybody experiences daily, for example: solar radiation or electric current that supply household appliances (Mobile Phones, Television sets, Wi-Fies, Microwaves, Computers, etc.) and antennas for telecommunications. Artificial resources are used to generate high-level electromagnetic radiations which may be typically found in medical devices such as Magnetic Resonance Imaging (MRI), laser lithotripsy, X-ray Computed Tomography (CT). In a residential environment, the diffusion of the induction cooktop, hairdryers, cordless phones, modems, routers, appliances, alarm system, etc. increases the possibility of domestic exposure to magnetic fields. Nevertheless, electromagnetic fields can also be used for the treatment of different diseases (e.g., cancer, kidney stones, gallstones, brain tumor, etc.). The practicality of the above described technologies is due to the range of frequencies decreasing from ultra-high frequencies to extra low frequencies available in the electromagnetic spectrum. The EMR spectrum is widely used in different areas of science and technology. EMR can be broadly divided into two categories: ionization and non-ionization. Ionizing radiation has high energy as compared with non-ionizing radiations. The ionizing radiations have a frequency ranging from 1 PHz (petahertz) to 10 ZHz (zettahertz), which includes X-rays and Gamma rays. The non-ionizing radiations have a frequency ranging from 1 to 1000 of THz (terahertz). It consists of Microwave (MW), Infrared (IR), Visible Light (VL) and Ultra-Violet light (UV). Ionization radiation has the capacity to cause changes in the structure of atoms or molecules by ionization, so that's why ionizing radiation can cause damage to living atoms/molecules and also have the tendency to cause changes in the structure of DNA in the living organism.

The telecommunication devices (Mobile Phones, Wi-Fies, Computers, Televisions, etc.) have proved to have revolutionary effects in terms of communication anywhere and anytime in the whole world, but it is mostly accompanied with the EMR hazards. The human body has the ability to absorb these radiations that might be harmful and can cause even different diseases like cancer, mental disorder, neurologic illness, cardiovascular disease. EMR has very

beneficial uses in our daily life to make it more comfortable and easier. Nowadays, we can talk to anyone on a mobile phone through the Internet: it is because of EMR, since these waves can transmit signals at very long distances. So EMR plays the key roles in making our lives more comfortable. The health problems due to long-term effects of EMR from telecommunication and biomedical devices have been addressed among people all over the world. The organizations like World Health Organization (WHO), Federal Communication Commission (FCC), and International Commission on Non-Ionization Radiation Protection (ICNIRP) have recommended some safety guidelines for protection of all living beings.

Given the ubiquitous nature of Electromagnetic Fields (EMF), their widespread applications, and their capability to produce deleterious effects, conclusive investigations of health risks are critical. With the published literature on EMF, it is still not sufficient enough to reach a concrete conclusion. But the possibility of negative consequences cannot be excluded. Several studies with appropriate methodologies reflect the capacity of EMFs to cause adverse health effects.

For the time being, since it is difficult to protect oneself from EMFs, the only practical way to check exposures is to distance oneself from the source. Together, the precautionary approach and ALARA (as low as reasonably achievable) principle can also be applied to save us from substantial exposures and the possible ill effects if any. The objective is to minimize EMF exposures to the greatest degree possible without significant economic cost and disturbance.