**RADIO FREQUENCY RADIATION**

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**ABSTRACT**

The development of the cellular system significantly increased the level and magnitude of exposure to radiofrequency (RF) radiation.

In recent years, people have been exposed to a wide range of electromagnetic fields (EMFs) that are produced by household appliances and portable communications equipment. There is growing public concern about the health risks of radio-frequency (RF) radiation, especially those produced by cell phones. Concerns about the possible risks of exposure to EMFs have led to numerous epidemiological studies, but the effects of EMF exposure on human and other mammalian cells are still unclear.

In 2011, the International Agency for Research on Cancer (IARC) reviewed published literature and classified the RFR as a “possible” carcinogen (Group 2B). A comprehensive list of RFR-associated adverse health effects has been reported since the IARC review.

Biological effects can be caused by exposure to radio frequencies, of particular concern are the effects of RFR exposure on the developing brain in childrenCompared to an adult male, a cell phone held to a child's head exposes deep brain structures at large masses per meter, and the small bone marrow of the small brain absorbs up to 10 times the local capacity.

This review provides a summary of the potential cellular impacts on RF platforms, including those generated by cell phones and radio frequency of their channels.

**INTRODUCTION**

We live in a generation that relies heavily on technology. Wireless devices, such as cell phones, are widely utilised around the world for personal or professional purposes, and radio-frequency radiation (RFR) exposure is commonplace, particularly in public settings.

The electromagnetic radiation wave is an important driver of modern technological growth and savings. Excessive use of EM wave-based device has negative effects on human health. This paper analyzes many of the negative effects of electromagnetic radiation.

There are two types of Electromagnetic radiation; ionizing radiation and non-ionizing radiation. These two types depend on their ability to form ionizing atoms and to break bonds or not. Ionizing radiation is ultra violet and high frequency radiation, such as X ray or gamma rays. Non-ionizing radiation creates two major electrical and biological problems. In addition, this radiation can cause fires and produce explosive hazards. The electric spectrum is divided into several different categories 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 frequency of different waves changes from one type to another.

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**Figure I-** Spectrum of electromagnetic radiation at different level that reflects human health problems**.**

In thisreview, we look at current scientific evidence of health risks from exposure to RFR, in the ionizing frequency range. We focus here on human health effects, but also on the evidence that RFR can cause physiological and / or morphological effects on bees, plants and trees.

We recognize a diversity of opinions on the potential adverse effects of RFR exposure from cell or mobile phones and other wireless transmitting devices (WTDs) including wireless phones and Wi-Fi.

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Electricand magnetic fields are portable agents capable of making health outcomes the subject of much research. Particularly controversial are the biophysical methods these RF sites can affect biological systems. A review of general health outcomes examines the possible carcinogenic, reproductive and emotional effects. Health effects on the source of exposure are observed on radar traffic devices, wireless communications, radio transmissions, and magnetic resonance imaging (MRI).

## **Carcinogenicity**

Based on a review of published studies up to 2011, the International Agency for Research on Cancer (IARC) classified RF radiation as "potentially carcinogenic to humans," based on limited evidence of possible increased risk of brain tumours among cellular users., and ample evidence of other cancers.

A more recent study released in 2014, “Occupational Exposure to Extremely Low-Frequency Magnetic Fields and Brain Tumour Risks in the INTEROCC Study,” focused on ELF, which is another form of non-ionizing radiation. This study found a “positive association between ELF in the recent past and glioma.” As noted earlier, according to the CDC, “RF radiation is much higher frequency than ELF radiation and therefore potentially more harmful.”

The majority of epidemiological studies looking into potential long-term dangers from radiofrequency exposure have sought for a link between brain tumours and cell phone use.However, because many cancers are not detectable until many years after the interactions that led to the tumour, and since mobile phones were not widely used until in the early 1990s, epidemiological studies could only analyse malignancies that appeared within a short period of time.

## Consequences for sensory system and psychologic issue

Cells are used close to the brain tissue. So, brain tissue is influenced by electromagnetic wave in general. Numerous studies indicate that the human nervous system and behaviour closely touched electromagnetic radio waves emanating from the base channels. Electromagnetic waves, particularly RF-EMFs released by mobile phones, are absorbed to such a degree in the brain that they might alter neuron activity.

It has been hypothesized that a variety of neurological effects may be due to exposure to RF-EMF due to the proximity of the nervous system during cell phone use. These neurological effects include headaches, changes in sleep habits and changes in blood pressure but there are many inconsistent results.

Emotional disturbances, such as headaches, tremors, dizziness, memory loss, concentration and sleep disturbances due to RF-EMF have also been reported in several epidemiological studies.

Research by the National Institutes of Health has reported that RF-EMFs emitted from mobile phones activates metabolic processes in the human brain (Volkow et al., 2011). RF-EMFs from cellular phones (837.5 MHz) were applied to 47 healthy human ears for 50 minutes, and alterations in brain metabolism were detected using a positron emission tomography scan immediately after injection of 18F fluorodeoxyglucose. The rate of glucose metabolism rose dramatically in the brains of those who were exposed to RF-EMF.This provided evidence that the brain is sensitive to the effects of RF-EMF exposure.

## Effects on testicle and spermatogenesis

Electromagnetic field waves affect the testicle and sperm production as they remain in the tissue in the pocket. Histopathological analysis by Tenorio shows that spending 30 minutes at 60Hz frequency can be transmitted to the development of the testicles.

Male fertility has undergone various studies in men. An association was reported between cell phone storage in pants pockets and low sperm count and quality.

Studies on human sperm confirm the negative effects of RFR on the testicular proteome and other indicators of male reproductive health, including infertility. Rago et al. the discovery of sperm DNA variation significantly changed in cell phone studies for more than 4 hours / day and especially those who put the device in the pants pocket. In a group study, Zhang et al. found that the use of cell phones may adversely affect sperm quality in men by reducing sperm volume, sperm concentration, or sperm count, thereby disrupting male fertility. Gautam et al. studied the effect of 3G cell radiation (1.8–2.5 GHz) on the male Wistar mouse breeding system. They found that exposure to cellular radiation caused oxidative stress in mice that could lead to changes in sperm parameters that affect their reproduction.

## Impacts on children’s

Because of the rapid growth rates and the high risk of developing nervous system development, long-term risks to children from exposure to RFR on cell phones and other WTDs are expected to be greater than those experienced by adults.

Modelling energy absorption can be an indication of potential exposure to RFR. Studies measuring the exposure of 3–14-year-old children to RFR have shown that a cell held in a child's head exposes almost twice as deep depths of radiation (including dynamic electrical and magnetic fields) per unit volume in adults, as well as bone marrow to a small, small brain. local area 10 times the size of an adult male's skull. Therefore, the number of children is among those most at risk of RFR exposure.

The proliferation of cell phone use in children, which can be viewed as an addictive behaviour, has been shown to be associated with emotional and behavioural disorders. Divan et al. a study of 13,000 mothers and children found that exposure to prenatal cell phones was associated with behavioural problems and childhood malnutrition. A subsequent Danish study of 24,499 children found that 23% increased the risk of emotional and behavioural complications at 11 years among children whose mothers reported any use of cell phones at 7 years of age, compared with children whose mothers reported no use at age 7 years old. A separate study of 4,524 U.S. children aged 8-11 from 20 study sites showed that short screen time and long sleep periodically independently improve a child's comprehension, with the benefits of low screen time and bedtime appropriate for years. Similarly, a study by a Swiss youth group suggested that the potential negative impact of RFR on brain functions involving the brain regions that are most exposed during cell phone use. Sage and Burgio et al. we point out that epigenetic mutations and DNA damage are less likely to be the negative effects of wireless machinery on a child's development.

RFR exposure occurs in the context of other exposure, both beneficial (e.g., nutritional) and negative (e.g., toxic substances or stress). Two studies have shown that RFR has the potential to have negative effects on lead development in neurodevelopment, with high maternal use during pregnancy [1,198 pairs of mothers and children, (46)] and Attention Deficit Hyper-Activity Disorder (ADHD) using high-end cell phones. and above. blood levels, 2,422 elementary school children.

## Effects on DNA

Evidence suggests that RF-EMR and continuous waves are able to induce single-sequence DNA breaks (Lai and Singh 1995). Recent studies have shown that short-term exposure (15 and 30 min) at 900 MHz RF-EMR from cell phones caused a significant increase in DNA fragmentation in human root hair cells near the ear, where the device was locatedput while on the phone (Cam and Seyhan 2012). A recent report on Japanese quail showed that exposure to GSM 890–915 MHz RF-EMR significantly changed the number of different somites. In radiant embryos within 38 hours, there was an increase in the number of different somites, while in radiant embryos within 158 hours, this number dropped. Short-term exposure led to a dramatic decrease in the DNA strand breakdown in 38-hour embryonic stem cells. But prolonged exposure caused increased DNA damage compared to controls (Tsybulin et al. 2013).

## Modified integrity of the blood-brain barrier (BBB).

BBB allows for a more limited exchange of cells and molecules between blood and brain parenchyma. Transcellular and paracellular transport can occur not only through the wall of the blood vessel, but also through the cranial and spinal nerves. Lipophilic compounds have limited access to the brain through the proliferation of endothelial cell cells. Charged and hydrophilic molecules are essential for brain function, such as ions, amino acids, glucose and nucleic acid components that pass BBB through special channels or carriers. Water molecules can pass BBB through protein channels called aquaporins or carriers. Transport of hydrophilic molecules such as proteins and peptides that do not have a specific transport system.

This has been widely studied for a few decades. Mice below 915 MHz continuous and pulse modulated (8, 16, 50, and 200 s-1) in high-frequency radiation, with 0.016 to 5 W / kg SAR for 2 hours, demonstrated the presence of albumin and fibrinogen. This confirms that something has changed the integrity of the BBB structure following exposure to electromagnetic radiation (Salford et al. 1994). A single 20-minute exposure to continuous 1.3 GHz or high-powered microwave power may also result in increased BBB access to the medulla, cerebellum, hypothalamus, hippocampus, and cortex.

The blood-brain barrier is usually low in hydrophilic and charged molecules; increased penetration of these molecules is harmful to the brain. Exposure to EMF enhances BBB penetration into macromolecules; however, this process is reversed (Stam 2010). In addition, 2 hours of exposure to the EMR (electromagnetic radiation) emanating from the GSM cell phone led to the release of albumin from the nerve tissue and led to the depletion of nerves. The increase in BBB infiltration was noted immediately after exposure and lasted for 14 days (Nittby et al. 2009). In addition, in one study, exposure to 900 MHz radiation for 3 hours / day for 14 or 28 days at SAR between 0.016 and 2 W / kg in the head area caused albumin exposure to the hippocampus and cortex caused by BBB injury. Cell enema and cell organelle deterioration have been noted in the 28-day exposure group.

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## EFFECTS ON BIRDS

This study identifies the species of birds that exist before and after the moving tower. Electromagnetic radiation from cell phones and cell towers affects birds, the environment. When birds are exposed to the elements, they become disturbed and fly in all directions, impairing their natural ability to navigate. A large number of birds such as doves, sparrows, swans are lost due to the interference of the "invisible enemy", i.e. a flying tower. It has recently been noted that animals used near mobile towers are often exposed to a variety of risks and health threats, including stillbirths, spontaneous abortions, birth defects, behavioral problems, and general decline in quality of life. Electromagnetic pollution is a possible cause of disability and a decrease in the number of people living in water. In addition to birds and animals, electromagnetic radiation emanating from cell towers can also affect vegetation, plants, and plants around it. This study aims to study the potential effects of Electromagnetic Radiations on birds and other species mentioned.

**EFFECTS ON MARINE LIFE**

Radiation can be dangerous to marine life. High levels of UV radiation (ultraviolet) are associated with reduced fertility. It can also cause variation in pollination patterns by disrupting the flowering period. It could also reduce the amount of food and oxygen produced by plankton, according to NASA. By immersion in water, plankton can react with high levels of UV-B or Ultraviolet-B light. This reduces the amount of visible light required for photosynthesis, preventing growth and reproduction. The amount of ozone depleted in the atmosphere can also rise as UV-B levels rise. Although some plants use this extra layer to protect themselves, others are at high risk for photochemical contamination.

## EFFECTS ON PLANT GROWTH

Plant development is frequently enhanced by natural radiation. Many plants need to be exposed to non-ionizing radiation in some way. Radiation that produces light is beneficial to plant life because it allows photosynthesis to take place. Ionized radiation from nuclear material, on the other hand, may weaken seeds and cause frequent mutations, according to the Environmental Literacy Council. For example, in 1986, a nuclear power station in Russia named Chernobyl exploded, causing massive amounts of radiation pollution in the area. A tremendous cloud of radiation was created, resulting in a massive amount of plant life being destroyed, notably pine trees in the region. High radiation dosages can be harmful to the environment.

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