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# RF and Electromagnetic Field Effects on Body cells

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***Abstract*— the general opinion that there is gradual hazardas effect at the cellular level related to human health. The study of the low frequency radio frequency wave reveled that different dimension of EM wave have not shown any DNA damage directly burt there is concern about evidance of cellular effect of EM.The static of very low frequncy EM field lead to biological effect associated with redistribution of ions. Extremely low frequency electromagnetic radiation has received considerable attention recently as a possible threat to the health of persons living near high tension electric power lines, distribution substations, and even in close proximity to common household electric appliances. Until now no satisfactory mechanism has been proposed to explain the biological effects of these fields. This study is to investigate effect of MW radiation on cell proliferation. Health risks associated with such fields include a wide variety of ills ranging from disruption of normal circadian rhythms to childhood cancers. Risk assessment has been particularly difficult to deter-mine in light of an ostensible lack of a dose-response relationship.**

***Keywords*— Biochemical reaction, Biological, Electromagnetic field, epidemiological, Radio frequency, etc.**

## I. INTRODUCTION

The Exposure to electromagnetic fields is not a new phenomenon. However, during the 20th century, environmental exposure to man-made electromagnetic fields has been steadily increasing as growing electricity demand, ever-advancing technologies and changes in social behaviour have created more and more artificial sources. Everyone is exposed to a complex mix of weak electric and magnetic fields, both at home and at work, from the generation and transmission of electricity, domestic appliances and industrial equipment, to telecommunications and broadcasting. Postulate that mechanism of EM signal transaction in the cell membranes may be explained by direct interaction of electric and magnetic field with mobile charges within enzymes. On the other hand, there is a lot of contrary study published in recent years. Most of them concerned about evidence of biochemical or cellular effects of electromagnetic fields. Marino and Becker have shown that static or very low-frequency electromagnetic fields may lead to biological effects associated with redistribution of ions. Furthermore, many studies demonstrated that biological effects of low frequency magnetic fields may penetrate into deeper tissues. Foletti et al. showed that ELF-EMF may have an effect on several cellular functions such as cell proliferation and differentiation Giladi et al. demonstrated that EMF of Intermediate frequency was effective in arresting the growth of cells. Kirson et al. indicated that this direct inhibitory effect on cell growth can be used for therapeutic purposes in the treatment of cancer. The levels of radiofrequency fields to which people are normally exposed are very much lower than those needed to produce significant heating.

The heating effect of radiowaves forms the underlying basis for current guidelines. Scientists are also investigating the possibility that effects below the threshold level for body heating occur as a result of long-term exposure. To date, no adverse health effects from low level, long-term exposure to radiofrequency or power frequency fields have been confirmed, but scientists are actively continuing to research this area.

## II. BIOLOGICAL EFFECTS

An adverse health effect causes detectable impairment of the health of the exposed individual or of his or her offspring; a biological effect, on the other hand, may or may not result in an adverse health effect.

It is not disputed that electromagnetic fields above certain levels can trigger biological effects. Experiments with healthy volunteers indicate that short-term exposure at the levels present in the environment or in the home do not cause any apparent detrimental effects. Exposures to higher levels that might be harmful are restricted by national and

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international guidelines. The current debate is centered on whether long-term low level exposure can evoke biological responses and influence people's well being. Early development is characterized by the rapid proliferation of embryonic cells, which then differentiate to produce the many specialized types of cells that make up the tissues and organs of multicellular animals. As cells differentiate, their rate of proliferation usually decreases, and most cells in adult animals are arrested in the G0 stage of the cell cycle. A few types of differentiated cells never divide again, but most cells are able to resume proliferation as required to replace cells that have been lost as a result of injury or cell death. In addition, some cells divide continuously throughout life to replace cells that have a high rate of turnover in adult animals. Cell proliferation is thus carefully balanced with cell death to maintain a constant number of cells in adult tissues and organs.

In 1996 the World Health Organization (WHO) launched a large, multidisciplinary research effort. The International EMF Project brings together current knowledge and available resources of key international and national agencies and scientific institutions. The cells of adult animals can be grouped into three general categories with respect to cell proliferation. A few types of differentiated cells, such as cardiac muscle cells in humans, are no longer capable of cell division. These cells are produced during embryonic development, differentiate, and are then retained throughout the life of the organism. If they are lost because of injury (e.g., the death of cardiac muscle cells during a heart attack), they can never be replaced. In contrast, most cells in adult animals enter the G0 stage of the cell cycle but resume proliferation as needed to replace cells that have been injured or have died. Cells of this type include skin fibroblasts, smooth muscle cells, the endothelial cells that line blood vessels, and the epithelial cells of most internal organs, such as the liver, pancreas, kidney, lung, prostate, and breast. One example of the controlled proliferation of these cells, discussed earlier in this chapter, is the rapid proliferation of skin fibroblasts to repair damage resulting from a cut or wound.

## III. EFFECTS ON LIVING CELL

### *A. Effects on DNA cells*

High frequency radiation or fast moving particles plow into a living cell with enough energy to knock electrons free from molecules that make up the cell. These molecules with missing electrons are called ions. The presence of these ions disrupts the normal functioning of the cell. The most severe damage to the cell results when the DNA (deoxyribonucleic acid) is injured. DNA is at the heart of the cell and contains all the instructions for producing new cells. The DNA is a complex molecule formed of two long strands that are twisted around each other and linked by chemical subunits. There are two major ways that radiation injures the DNA inside your cells. There are two main ways of radiation that can damage the DNA inside cells. Radiations can strike the DNA molecules directly, ionizing & damaging it. Alternately, radiation can ionize water molecules, producing free radicals that react with damaged DNA molecules. The UV-photon is directly absorbed by the DNA (left). One of the possible reactions from the excited state is the formation of a thymine cyclobutane dimer (right). The direct DNA damage leads to sunburn, causing an increase in melanin production, thereby leading to a long-lasting.

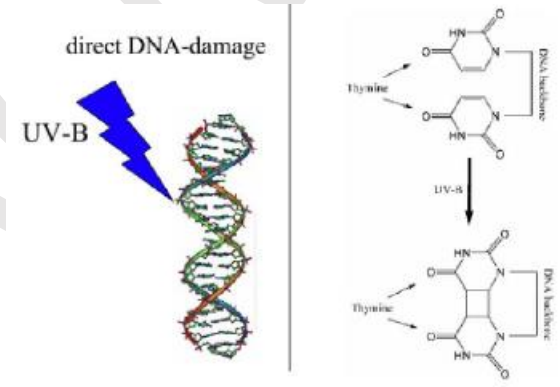


Fig.1. Effects on DNA cells

The overall weight of evidence shows that exposure to fields at typical environmental levels does not increase the risk of any adverse outcome such as spontaneous abortions, malformations, low birth weight, and congenital diseases. There have been occasional reports of associations between health problems and presumed exposure to electromagnetic fields, such as reports of prematurity and low birth weight in children of workers in the electronics industry, but these have not been regarded by the scientific community.

### *B. Neurobehavioral effects*

People are generally exposed to MPBS radiation under arfield conditions, i.e. radiation from a source located at a distance of more than one wavelength. This results in relatively homogenous whole-body exposure. MPBS exposure can occur continuously but the levels are

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considerably lower than the local maximum levels that occur when someone uses a mobile phone handset.9 A recent study that measured personal exposure to radiofrequency electromagnetic fields in a Swiss population sample demonstrated that the average exposure contribution from MPBSs is relevant for cumulative long-term whole-body exposure to radiofrequency electromagnetic fields. However, as expected, it is of minor importance for cumulative exposure to the head of regular mobile phone users. Personal exposure measurements assess the total radiation absorbed by the whole body, whereas spot measurements quantify short-term exposure in a single place, usually the bedroom.

### *C. Effects of Electromagnetic Field*

There is little scientific evidence to support the idea of electromagnetic hypersensitivity. Recent Scandinavian studies found that individuals do not show consistent reactions under properly controlled conditions of electromagnetic field exposure. Nor is there any accepted biological mechanism to explain hypersensitivity. Research on this subject is difficult because many other subjective responses may be involved, apart from direct effects of fields themselves. More studies are continuing on the subject. The long-term health effects of mobile telephone use are another topic of much current research. No obvious adverse effect of exposure to low level radiofrequency fields has been discovered. However, given public concerns regarding the safety of cellular telephones, further research aims to determine whether any less obvious effects might occur at very low exposure levels.

The electromagnetic spectrum includes forms of energy ranging from cosmic rays and X-rays on the high frequency side to microwaves and electricity on the low frequency end Hertz (Hz) is the term commonly used to describe frequency or the number of times per second that electromagnetic waves alternate. Extremely high frequency radiation such as X-rays and gamma rays are referred to as ionizing and are able to disrupt matter by stripping electrons from atoms. The current controversy focuses on the opposite end of the electromagnetic spectrum, extremely low frequency radiation (ELF). The strength of electric fields is directly related to voltage, the higher the voltage, the stronger the electric field. Electric fields are easily blocked by normal building materials from which houses are constructed. Their strength decreases rapidly with distance from the source. The current controversy focuses not on electric fields but on magnetic fields which produce a series of force waves in concentric loops around electric currents.

Both animal and human studies on the effects of ELF electromagnetic fields have shown a decrease in the secretion of pineal melatonin, a hormone which stimulates the daily cycle of sleep and wakefullness, the circadian rhythm. Research on the effects of electromagnetic fields on reproduction have produced mixed and equivocal results. Studies of chicken eggs and miniature swine have indicated slight possibilities of abnormal development, while other studies have shown no measurable effects.

## IV. CONCLUSIONS

This study is based on methodology and architecture of useful and effectiveness biological effects of electromagnetic and RF microwave signals. Although electronic devices and the development in communications make the life easier, it may also involve negative effects. These negative effects are particularly important in the electromagnetic fields in the Radiofrequency (RF) zone which are used in communications, radio and television broadcasting, cellular networks and indoor wireless systems.

The general opinion is that there is no direct evidence of hazardous effects on human health incurred by low-frequency radiofrequency waves. Studies at the cellular level, which uses relatively higher frequencies, demonstrate undesirable effects. In recent years there are a lot Electromagnetic Waves and Human Health of studies.

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