

Health effects of modern environmental pollution by electromagnetic radiation

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ABSTRACT

Environmental experts have warned of the dangers of electromagnetic waves pollution, which is called pollution electronic is one of the most dangerous types of pollution that has begun to draw attention in recent years. magnetic fields resulting from the construction of giant electric stations as well as radio and television broadcasting antenna towers and in homes where we find electrical devices such as air conditioners, washing machines, fans, televisions, computers and mobile phones, which it has begun to be widely used. All sources of pollution are near us.

On the street, we find electric generators in the residential area, high-pressure electricity wires, cellular and wireless communication towers, and electric power transformers, as well as from the waves used for medical purposes, which are controlled thanks to advanced technologies, but it is a factor that cannot be forgotten.

The waves and electromagnetic fields emanating from these sources fill the atmosphere around us, and the secret of their danger lies in their ability to penetrate the bodies of living things and interact with living cells. This study aims to review the health damages of electromagnetic wave devices to come up with results and recommendations that guarantee the safety and security of humans from the danger of radiation and in what is appropriate for our current reality.

Keywords:

Electromagnetic radiation, health symptoms exposures ranging. Radiofrequency electromagnetic radiation (RF-EMR)

Introduction

The Electromagnetic radiation EMR can be defined as a continuous range of electromagnetic waves of varying lengths, ranging from short waves and high frequencies on one side to very long waves and low frequencies on the other side.

The electromagnetic spectrum includes the entire range of electromagnetic radiation.

The spectrum includes ionizing radiation gamma rays, X-rays, and extreme ultraviolet radiation, with wavelengths less than $\sim 10^{-5}$ cm and frequencies above $\sim 3 \times 10^{16}$ Hz, Visible non-ionizing radiation wavelengths from $\sim 4 \times 10^{-5}$ cm to $\sim 7 \times 10^{-5}$ cm and

frequencies between $\sim 4.3 \times 10^{14}$ Hz and $\sim 7.7 \times 10^{14}$ Hz .

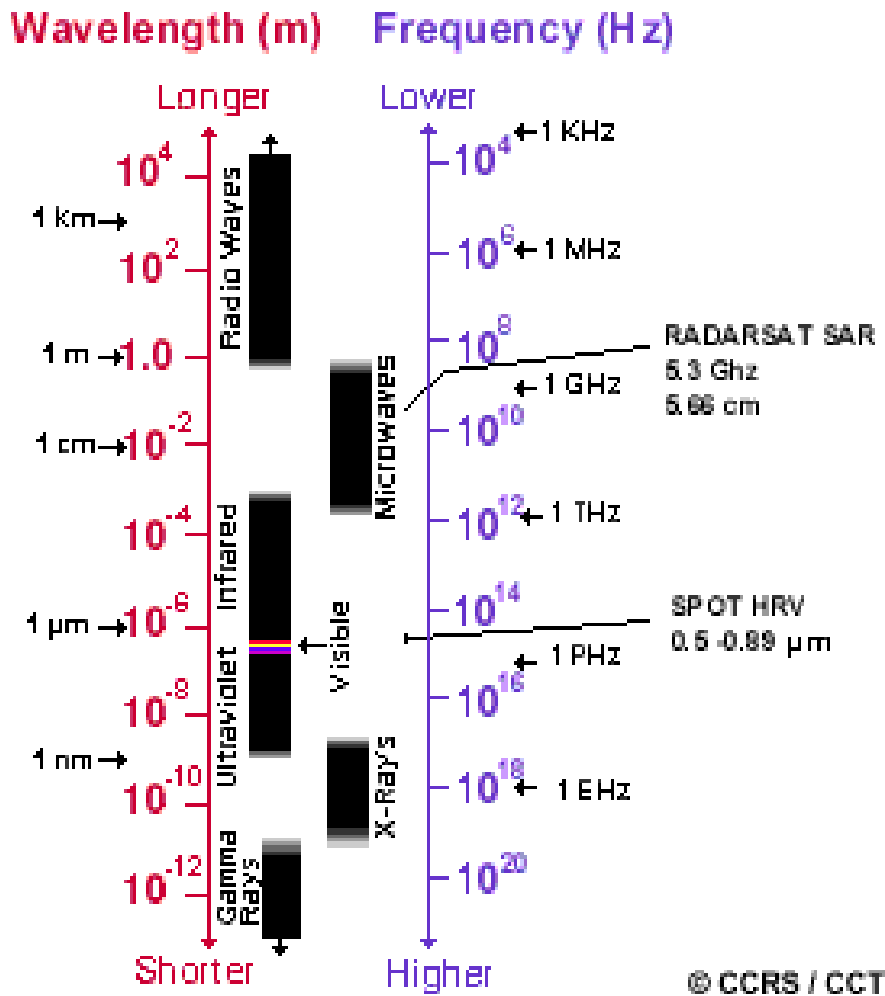
non-ionizing radiation with a frequency less than 3×10^{15} Hz and a wavelength greater than 7×10^{-5} cm that which does not have enough energy to change the molecular structure of living matter such as radio (RF), micro (MW) and infrared (IR) as shown in the figure(1).

As a wavelength increases in size, its frequency and energy (E) decrease.

$$f = c / \lambda \quad \text{and} \quad \lambda = c / f \quad \text{and} \quad E = h.f \quad (\text{or} \quad E = h.c / \lambda)$$

($h =$ Planck's constant $= 6.626068 \times 10^{-34}$ m² kg /s

and $c =$ the speed of light 3.0×10^8 m/s)



Figure(1): The electromagnetic spectrum ranges from the shorter wavelengths including gamma and x-rays to the longer wavelengths including microwaves and broadcast radio waves there are several regions of the electromagnetic spectrum .

Scientists from St. Vincent's Hospital in Sydney (Australia) they run research into long-term risks of electromagnetic radiation from cell phones cause brain cancer .However, not all cancer researchers believe that the risk from cell phones is significant. A spokesperson for the World Health Organization , the International Agency for Research on Cancer, said that dangers from mobile phones cannot be ruled out, but that they likely pose only a small risk [1]. People who live within 100-300 m of mobile phone towers are generally more concerned about the potential0 for some health risks0

that can be associated with living near them [2]. Some studies (Otitolaju , et al., 2010 ,Viel, et al. (2009)) this is a real environmental concern in many developing countries, since the non-discriminatory way in which these base stations are placed near residential homes, offices , hospitals and schools increases the level of exposure in such this environment [3,4]. Some selected epidemiological studies have been evaluated worldwide in which energy density measured near mobile phone transmitters is associated with some health

symptoms in a population . Their results indicate that common symptoms such as headache, fatigue, irritability, sleep disturbances , and nausea can be associated with exposures ranging from 20 $\mu\text{m}/\text{m}^2$ to 13.2 W/m^2 at distances less than 350 m [5].

There have been significant concerns raised about the potential health effects of exposure to radiofrequency (RF) electromagnetic fields, especially after the rapid introduction of mobile communication systems .

Increasing use of the range of a variety of electronic devices and telecommunications devices such as cell phones has also increased the daily exposure of individuals to radiofrequency electromagnetic radiation (RF -EMR) [6].

Pathological Symptoms

Diseases resulting from this type of pollution most of the research confirms that the diseases resulting from electromagnetic fields. It is caused by cumulative doses, which cause the appearance of many symptoms :

1. General symptoms , including fatigue , headache and tension.
2. Organic symptoms that appear in the nervous system, behavioral changes ,

suicide, and the system cardiovascular and immune.

3. The emergence of cancerous diseases .

4. An imbalance in the processes of living representation .

5. The effect on the auditory and visual nerve [7].

Environmental pollution and its problems have not been as important over the past years as it is in the present time, and the issue of environmental protection and human protection has not been raised at any time with the intensity with which it is being raised now and perhaps the reason for this is due to the danger and dependence on the present day As a result of the increase in the degrees of environmental pollution in all its forms, to the degree that it threatens the life and survival of all living organisms on the surface of the globe , especially humans.

These effects depend on the frequency of the waves, the energy absorbed within the body tissues , as well as the length of the period of exposure to these waves .

Studies have indicated that exposure to high levels of electromagnetic radiation and at accumulated doses may cause the appearance of many pathological symptoms, including :

Table 1: Epidemiological studies indicating some health symptoms and duration of exposure to electromagnetic radiation

Exposure time	Health symptoms	Reference
twenty minutes	Bradycardia	Sivani et al. (2012)
>10 years	Acoustic neuroma	Lönn, Stefan et al. (2004)
>30 years	Secondary cancers , and atwofold increase for ischaemic diseases , was observed	Fazzo et al. (2009)
Long -term exposure	Sperm head abnormalities	Otitoloju et al. (2010)
Long -term exposure	Degrade Heart , vesicular	Hakansson et al. (2003)
Different periods	DNA Damage	Koyama et al. (2008)

Suspected Health Symptoms :

In the current effort to find a link between RF exposure and some health symptoms, many studies have been conducted with

evidence of some association between them. Many studies have proven that there is an association between increased incidence of

cancer and living in the proximity of a cell phone transmitter station.

Table (2): Epidemiological studies indicating some health symptoms and maximum energy density

The distance from the source of the EMR	Max Power Density	Reference	Symptoms
350 meters	Below 0.53 $\mu\text{W}/\text{cm}^2$	Wolf and Wolf, (2004)	Cancer
100 meters or less	223.80 $\mu\text{W}/\text{m}^2$	Augner and Hacker (2009)	Psychological stress ,obsessive - compulsive, anxiety.
o24 – 60 meters	50 $\mu\text{W}/\text{m}^2$	Hutter et al. (2006)	Headache , tiredness , tiredness, inattention , feeling nervous , wanting to sleep
20-250 meters	20 $\mu\text{W}/\text{m}^2$	Hutter et al. (2006)	Headache , tiredness , tiredness, inattentiono, feeling nervous, wanting to sleep

To consider regulations for human and environmental protection static in electromagnetic fields , including children, pregnant women, elderly people, the disabled and the sick . Protection of persons within the greater EMF is subject to the supervision of the corresponding regulations [15].

Provide acceptable levels of non -ionizing radiation near equipment that generates electromagnetic fields .

To the radiation frequency range above 300 MHz to 300,000 MHz , acceptable value average power density 0.1 W/m^2 Permissible level measurement .

Non -ionizing electromagnetic radiation is not conducted in a place where people cannot access.

Exposure to EMF for Operation and Service Workers Cellular network equipment is subject to health and work safety regulations when using equipment that generates EMF in the microwave range [16].

(Eiger et al. 2004) found that the rate of new cancers is much higher among those patients who lived far away in the past 10 years within 400 meters of the site of cell transfer.

Compared with those patients who lived far away, patients got sick on average 8 years ago. After 5 years of operation of the transmission device, the relative risk of cancer incidence among the population in the vicinity has tripled compared to the population of nayla outside the area, it is constant.

The effects of smart phones on humans:

In the past 10 years, the number of antenna installations for large cellular mobile base stations in residential areas has increased dramatically , Radio frequency and electromagnetic radiation (EMR) and their effects on human health with increasing interest[17].

Excessive use of cell phones may have some adverse effects on health. According to recent

research, the most serious problem is the communication between cell phones and cancer. Although this data remains controversial, most scientists agree that excessive use of cell phones will lead to certain threats. According to reports, people who talk on the phone for a few hours have a 50 % increased risk of developing brain cancer. The reason is the radio waves generated by cell phones.

According to the calculations, the human brain receives about 220 electromagnetic impulses per minute, and these impulses are not necessarily harmful, but they will certainly affect the brain in a long-term state. Recent studies have shown the possibility of two types of brain cancer – glioma and acoustic neuroma, and neuroblastoma. In addition to cancer risks, cell phones can also affect our nervous system.

It can cause headaches, decreased concentration, bad mood, sleep disturbances, and depression, especially in adolescents [18].

Our child is the first person in his life to be exposed to microwaves, and microwaves grow massively under the ionosphere, which is designed to prevent them from entering the Earth at least in part. In recent years, there have been particularly rich reports, many of which have shown a significant effect on biology and health, while others have shown no effect. In this exchange. In recent years, some scientific reports in respected journals have shown significant effects on cells in vitro, lab animals, and humans, but they are usually weak. Recent epidemiological studies have shown that long-term exposure may increase the risk of developing certain types of tumors. In a case-control study in Sweden, it was reported that the use of analog and digital cell phones and cordless phones was associated with an increased risk of developing brain malignancies. The mechanism by which electromagnetic fields affect cells and organisms remains unclear. This may be part of the reason for the different results in different laboratories [19].

Since mobile phones are one of the most important sources of radiation for many

users, we make the following recommendations:

- Mobile phone use should be limited to important matters and not long-term discussion
 - The duration of the call shall not exceed two minutes.
 - Do not put your mobile phone in your pocket, whether it is a jacket or trousers, but in a handbag.
 - Do not put your mobile phone on your belt or in a metal case. Because this increases the rate of absorption of electromagnetic waves.
 - Certain types of earphones must be worn when talking in order to keep the phone away from your head and body.
 - Try replacing phone calls with messages.
 - Cell phones should not be used as indoor lifts or in the car.
- According to the research of scientists, they agreed that the only health effects of exposure to electromagnetic waves in the ocean is only a thermal effect, and it will lead to a temperature increase that exceeds 0.1 degrees Celsius, which is a slight increase that the body can tolerate and even encounter naturally in daily life.

Conclusion:

Recently, a lot of research has been done in experiments, cells, animals, and epidemiology, and a lot of research is needed to know the relationship between exposure to radiofrequency and some health symptoms. Epidemiological research has played a vital role in this regard and it's made great progress. Some selected epidemiological studies have been evaluated worldwide among which the energy density measured near the transmitter of a mobile phone and some health symptoms in the population as well as the radio-frequency field strength are high at the source and away rapidly declining. There is conflicting and unclear evidence about the effects of electromagnetic waves on common symptoms such as headaches, fatigue, DNA damage and cancer.

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