

## CELL PHONE TOWERS ELECTROMAGNETIC RADIATION (EMR): HAZARDOUS POLLUTANT

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Cell phone technology has several advantages and has grown rapidly in the last decade. there are nearly 1 billion cell phone subscribers and around 10 lakhs cell phone towers worldwide. Cell tower antennas transmit in the frequency range of 869 to 890 MHz (CDMA), 935 to 960 MHz (GSM900), 1810 to 1880 MHz (GSM1800) and 2110 to 2170 MHz (3G). Base stations are usually from 50-200 feet high. The power levels are relatively low, the antennas are mounted high above ground level, and the signals are transmitted intermittently, rather than constantly. Human population centers are flooded with massive amounts of powerful wireless microwave radiation. When a human body is exposed to the electromagnetic radiation, it absorbs radiation,

because human body consists of 70% liquid (Panagopoulos DJ, 2007).

Cell phones communicate with nearby cell towers mainly through radiofrequency (RF) waves, a form of energy in the electromagnetic spectrum between FM radio waves and microwaves. Like FM radio waves, microwaves, visible light, and heat, they are forms of **non-ionizing radiation**. This means they do not directly damage the DNA inside cells, which is how stronger (**ionizing**) types of radiation such as x-rays, gamma rays, and ultraviolet (UV) light are thought to be able to cause cancer. At very high levels, RF waves can heat up body tissues. (This is the basis for how microwave ovens work). Effect is more pronounced where the movement of the fluid is less, for example, eyes, brain, joints, heart, abdomen, etc. Also, human height is much greater than the wavelength of the cell tower transmitting frequencies, so there are multiple resonances in the body, which creates localized heating inside the body. This results in boils, drying up of the fluids around eyes, brain,

joints, heart, abdomen, etc (Sudharshan, October 2011). Evidence does not support the hypothesis that mobile phone radiation has an effect on the permeability of the blood-brain barrier. (Stam R, 2010).

There are several health hazards associated with cell phones and cell towers. Children are more vulnerable to cell phone/tower radiation as their immune system is not as well developed as adults and will have longer life time exposure. A pregnant woman and the fetus both are vulnerable because of the fact that these RF radiations continuously react with the developing embryo and increasing cells. Microwave radiation can damage the placental barrier; the membrane which prevents the passage of some materials between the maternal and fetal blood, protecting the fetus, implying that pregnant woman should avoid exposure to cell phone and tower radiation. Radiation from cell towers and mobile phones affects human skin. The radiation degrades the immune system and stimulates various allergic and inflammatory responses. The high radiation from cell towers can result in an increase in mast cells, which explains the clinical symptoms of itch, pain, etc (Sudharshan, October 2011).

Recent studies confirm that cell phone radiation can drastically affect male fertility. In 2006, the American Society for Reproductive Medicine reported that use of cell phones by men is associated with decrease in semen quality, sperm count, motility, viability and normal morphology and is related to the duration of cell phone use. Studies have found 30% sperm decrease in intensive mobile phone users, in addition to damage of sperms, damage to sperm DNA increases the risk further and can pass on the genetic changes to subsequent generations (Vijayalaxmi, 2008).

Frequent use of mobile phones can also damage the visual system in many ways and cause uveal melanoma i.e. tumor of the eye. Increase in temperature close to the eye lens (as low as 3 °C) can result in lens opacities and increase the risk of developing cataracts in humans. Electromagnetic fields have been shown to affect the brain physiology. Use of the cell phones before bed, delays and reduces sleep, and causes headaches, confusion and depression. The findings are especially alarming for children and teenagers as they use cell phones at night and also keep the phone next to their head; which may lead to mood and personality changes, depression, lack of concentration and poor academic performance. Exposure to electromagnetic fields has shown to be in connection with Alzheimer's disease, motor neuron disease and Parkinson's disease. People living near mobile phone base stations are also at risk for developing neuropsychiatric problems as headache, memory loss, nausea, dizziness,

tremors, muscle spasms, numbness, tingling, altered reflexes, muscle and joint pain, leg/foot pain, depression, and sleep disturbance. More severe reactions include seizures, paralysis, psychosis and stroke (Muscat JE 2000).

Heavy use of mobile phones can cause cancer. Use of mobile phones for >10 years give a consistent pattern of increased risk for brain cancer - glioma and acoustic neuroma. The risk is highest for ipsilateral (on the same side of the head where the instrument is held) exposure. Children and teenagers, before the age of 20 are five times more likely to get brain cancer, as their brain is not fully developed and radiation penetration is much deeper. It is possible that today's young people may suffer an "epidemic" of the disease in later life. Cancer rates more than tripled among people living within 400 meters of cell phone towers or antennas, a German study found. Those within 100 meters were exposed to radiation at 100 times normal levels. An Israeli study found risk of cancer quadrupled among people living within 350 meters (1,148 feet) of a cell phone transmitter—and seven out of eight cancer victims were women. Both studies focused only on people who had lived at the same address for many years (Muscat JE, 2000).

The radiation emitted by mobile phones may damage the delicate workings of the inner ear, and long-term and intensive mobile phone use for more than four years and for longer periods than 30 minutes in a day are at a higher risk of developing hearing loss, which cannot be reversed. Today, more and more young people between 18 and 25 years of age are suffering from hearing loss. RF exposure from mobile phones and cellular phone base antennas can also affect patients carrying Pace Maker, Implantable Cardiovascular Defibrillators (ICDs) and Impulse Generators. The signals generated by mobile phones cause electromagnetic interference with the device and interfere with its proper functioning (Sudharshan, October 2011).

Non-thermal effects of Radio frequency radiation accumulate over time and the risks are more pronounced after several years of exposure. The effects are not observed in the initial years of exposure as the body has certain defense mechanisms and the pressure is on the stress proteins of the body, namely the heat shock proteins (HSPs). If the stress goes on for too long, there is a reduced response, and the cells are less protected against the damage. This is why prolonged or chronic exposures may be quite harmful, even at very low intensities (Sudharshan, October 2011).

Electromagnetic radiation from Cell phone and cell tower affects the birds, animals, plant and environment. One would never see a bee, sparrow, pigeon, or any bird flying and staying near the cell tower. The reason is that surface area of a bird is relatively larger than their weight in comparison to human body, so they absorb more radiation (power = power density x area). Since fluid content is small due to less weight, it gets heated up very fast and also the magnetic field disturbs their navigational skills. In the case of honey bees, the group observed that high radiation resulted in an unusual phenomenon known as 'colony collapse disorder' which is characterized by sudden disappearance of a hive's inhabitants, leaving only queens, eggs and a few immature workers behind. The vanished bees were never found. Also, the navigational skills of the bees were affected by high-tension lines. The bees also play a vital role in pollinating flowers to sustain vegetation. Radiation decreases egg production in the bees. Sparrows and other small birds exposed to the radiation suffered from reproductive and co-ordination problems. They also became aggressive. They are becoming extinct (Sudharshan, October 2011 and Christensen H C, 2004).

Sustainable development should be done to protect all animals on the planet by providing less MHz frequency range towers where it should not affect insects and birds. Use of cable internet supply is better way of avoiding.

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