Technology is a queer thing. It brings you great gifts with one hand, and stabs you in the back with the other. — CP Snow

MOBILES — FRIEND OR FOE?

Today, cell phones are an intrinsic part of every day life. Most use it for at least an hour a day. However, experts warn against their over use and advocate hands-free operations that keep the phone away from the head, finds **Priya-Adhyaru Majithia**

EMR effects are deadlier in India due to lax radiation norms

Currently, there are more than 50 crore cell phone users and nearly 4.4 lakh cell phone towers to meet the communication demand in the country. And the numbers of cell phones and cell towers are increasing each day without a careful study of major health risks due to radiation from cell phone and cell tower.

IIT professor Girish Kumar, who has documented a detailed analysis of disadvantages of cell phone technology in India, has challenged the cell phone operators to prove their claim that EMR does not cause a major health risk. "If people in the mobile companies think there is no health hazard, then let them stand in front of their own transmitting tower at 1m distance in the main beam for 6 hours - are they willing to take the risk?," he asks.

His findings state that due to absence of stringent radiation norms, the radiation frequencies transmissions have remained unrestrained in India. "One operator may transmit 50 to 100W of power but in India multiple operators are present on the same roof top or tower, then the power values increase manifold and thereby total transmitted power may be 200 to 400W - making the radiation effects more lethal," notes the report.

Cell phone transmits 1 to 2 Watt of power in the frequency range of 824 -849 MHz (CDMA), 890 -915 MHz (GSM900), 1710 - 1780 MHz (GSM1800) and 3G base station antenna transmits in the frequency range of 2110 - 2170 MHz. The centre frequency of WiFi, WLAN, Bluetooth is approximately 2450 MHz.

And majority of the towers, mounted near the residential and office buildings, transmit these high radiations twenty four hours, so people living within 10's of meters from the tower end up receiving 10,000 to 10,000,000 times stronger signal than required for mobile communication.

A study of Usha Kiran building in Mumbai

Using the hand-held broadband radiation monitor (Frequency range of 800 to 2500 MHz) that has been developed to measure the total received power; Kumar analysed Mumbai's Usha Kiran building. After four cancer cases were reported to be linked to mobile towers installed on the facing Vijay Apartments conducting such an analysis had become necessary.

There are several antennas installed on the seventh floor of Vijay Apartments hence people living in the 6th, 7th and 8th floor in the opposite building (Usha Kiran) get maximum radiation as they are in the main beam direction. People living on the other floors receive lesser radiation as beam maxima is reduced considerably as can be observed from vertical radiation pattern.

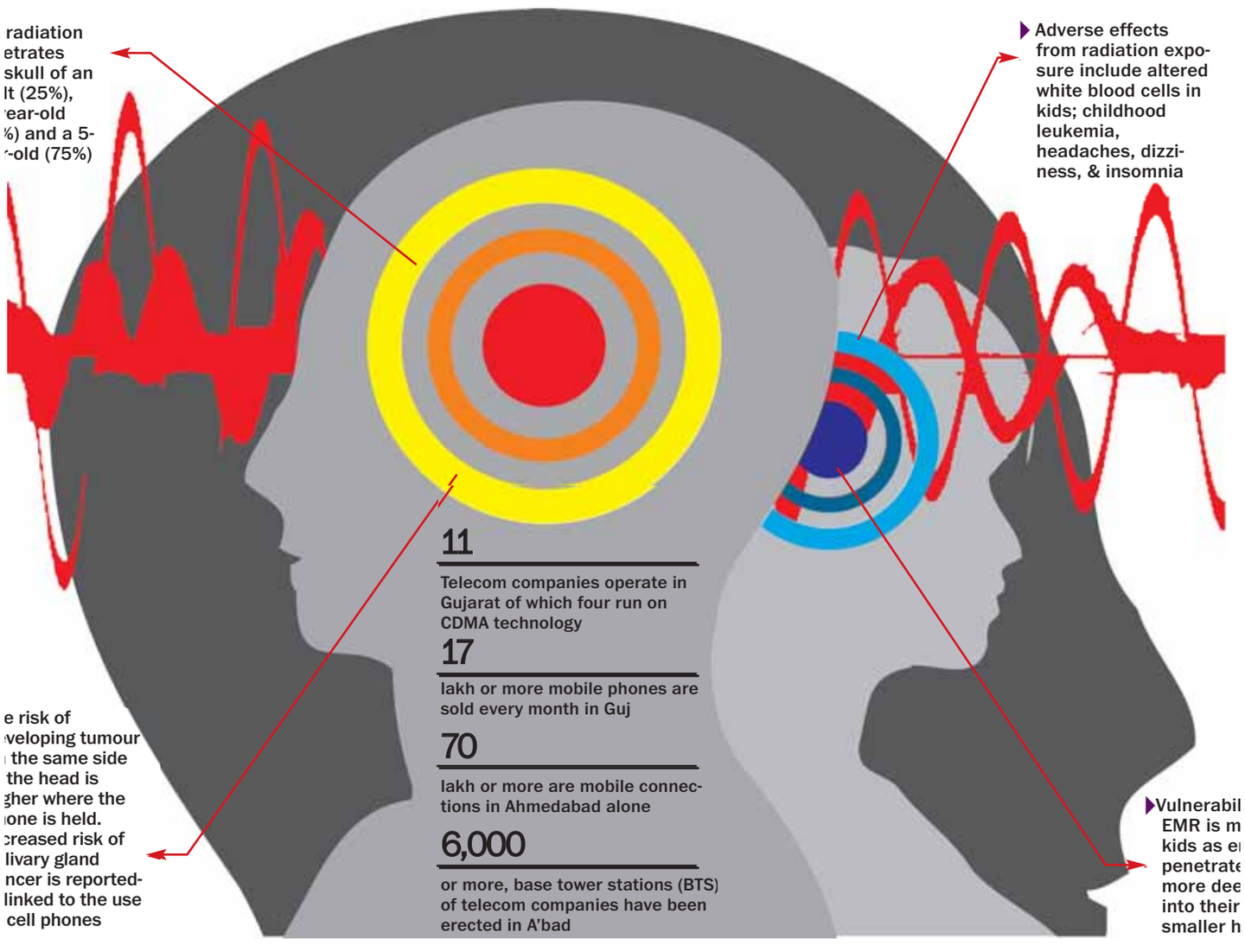
In the horizontal direction again, people living in the front side of the antenna receive much higher radiation compared to people living in the back side of antenna.

The report notes that power density from 3 transmitters in the same direction, which comes out to be approximately 0.1 W/m2 = 100,000 µW/m2, - has caused cancer to several people in a duration of 2 to 3 years.

Kumar also carried out radiation measurements in a lady's apartment in Mumbai, who had developed cancer within one year of installation of cell tower. His findings show that the radiation level was very high and it is between - 4 to -10 dBm.

'Tower'ing health hazards

Cell phone users have increased, and so have service providers & network towers. But, a large population in the country remains oblivious to the harms from radiation from cell phone towers...



Various research papers suggest that even small amount of radio frequency (RF) energy produced by cell phones can cause significant DNA damage. Revealing the link between the risk of brain cancer and mobile usage, large international study - Interphone - conducted by EU countries, Japan, Canada, New Zealand and UK, that was published in May 2010 in the International Journal of Epidemiology mentioned that excessive use of mobile phones has doubled brain tumour risk.

However, the Interphone researchers have taken an average user as a person who uses cell phone for 2 hours in a month while, in India, many people use cell phones for 1 to 2 hours a day.

Today, large population in India is using cell phones for several hours in a day without realising the severe health hazards, it can create. A detailed report on Cell Tower Radiation - prepared by IIT Bombay's professor Girish Kumar from electrical engineering department and submitted to department of telecom, Delhi last week - that focuses on the Indian contexts of the cell usage and potential health risks, notes "When electromagnetic radiation (EMR) from a cell phone (Frequency - GSM 900 MHz) hits the head, it penetrates the skull. The radiation penetrates the skull of an adult (25%), 10-year-old (50%) and a 5-year-old (75%)."

It implies that children are more vulnerable to EMR as the energy penetrates more deeply into their smaller heads. A number of adverse health effects of radiation exposure have been documented in the report which include altered white blood cells in children; childhood leukemia, headaches, dizziness, insomnia etc.

> Radiation from cell phones and its towers affects skin and may cause electromagnetic hypersensitivity (EHS). People suffering from this condition report a range of symptoms including biting and stinging sensations; lesions, rashes or sores

EMR frequencies can damage DNA and interfere with the natural processes involved in DNA replication and repair. Linking radiation with risk of cancers, the report says, damage to DNA is a central mechanism for developing cancer. Heavy use of mobile phones can cause cancer. Use of mobile phones for more than 10 years give a consistent pattern of increased risk for brain cancer - glioma (cancer of the glial cells that support the central nervous system) and acoustic neuroma (a tumour in the brain on a nerve related to hearing).

The risk is highest for developing tumour on the same side of the head where the instrument is held. Increased risk of salivary gland cancer is reportedly linked to the use of mobile phones.

Recent studies confirm that cell phone radiation can drastically affect male fertility. "Studies have found 30% sperm decrease in intensive mobile phone users. Similarly, motility of the sperm was also affected by mobile phone transmissions," it says.

The report notes that radiation from cell towers and mobile phones affects skin and may cause electromagnetic hypersensitivity (EHS). People suffering from this condition report a range of symptoms including biting and stinging sensations; or lesions, rashes or sores.

With potential to cause Tinnitus (Ringxiety - the psychological disease of hearing phantom sound), the radiation emitted by mobile phones may damage the delicate workings of the inner ear.

For many marketing professionals, engaging in long talks over mobile phone, the problem starts with a pain in the ear that gradually develops into a ringing sensation which finally leads to hearing loss, notes the report. Those, who are using cell phones for more than four years and for more than 30 minutes in a day, are at a higher risk of developing hearing loss, which cannot be reversed.

EMR exposure has been shown to affect the brain physiology and is also shown to be in connection with Alzheimer's and Parkinson's disease. "Use of the handsets before bed, delays and reduces sleep, and causes headaches, confusion and depression. People living near mobile phone base stations are also at greater risk for developing neuropsychiatric problems as headache, memory loss, dizziness, tremors, muscle spasms, numbness, muscle and joint pain and sleep disturbance," the report notes.

DIAL 'E' FOR EXPERT

One should not use a cell phone for more than 18-24 minutes a day. This information is not commonly known to Indians, and so crores of people use cell phones for more than an hour every day without realising its health hazards.

Girish Kumar, professor, IIT Bombay

There is greater risk of developing a non-cancerous tumour on the side of the head where the phone is kept, among users who have higher usage of phone or have been using a cell phone since 10 years or more.

Dr Kalpesh Shah, neurologist, Shalby Hospitals

Several studies by credible institutions such as WHO, Indian Institute of Technology Madras, Chennai (IITM), Thiagaraja College of Engineering, Madurai (TCE) and Centre of Excellence in Wireless Technology, Chennai (CEWIT) have confirmed that RF signals from base stations have no harmful effects on human body."

Rajat Mukarji, chief corporate affairs officer, Idea Cellular

We are not aware of this report and it would not be right for us to make any comment without taking a look at the matter first.

Official spokesperson, Uninor

There is a dire need to gather meticulous data on carcinogenic potential of mobile phones and GCRI is ready to assist any agency for the same. An in-depth analysis must be conducted in Gujarat's cities.

Dr Sandip Shah, oncologist, GCRI

Each mobile instrument emits different level of RF energy. People must be educated that the main criteria for selecting an instrument must be the level of RF energy emitted by the instrument.

Dr Sudhir Shah, neurologist, Sterling

Effects on environment

Electromagnetic radiation (EMR) from cell phone and cell tower affects birds, animals, plant and environment as well. One would never see a bee, sparrow, pigeon, or any bird flying and staying near the cell tower as the magnetic field disturbs their navigational skills. The rising electromagnetic pollution causes Colony Collapse Disorder (CCD) in bees and birds. Bees even cannot find their way back to the hive. The consistent electromagnetic background noise seems to disrupt intercellular communication within individual bees. Recently, a sharp decline has also been noticed in commercial bee population in Kerala, the state with highest density of mobile towers, posing a serious threat to honey bees.

When birds are exposed to weak electromagnetic fields, they become disoriented and begin to fly in all directions. A large number of birds like pigeons, sparrows, swans are getting lost due to interference from the new "unseen enemy" — EMR — which, affect migratory birds' navigational abilities too. Of the 230 species of birds, millions die during migration each year as accidents occur when birds might be using the earth's magnetic field for navigation, and could be seriously disoriented by the microwave radiation from telecommunication masts.

Apart from bees, birds and animals, electromagnetic radiation emanating from cell towers can also affect vegetables, crops and plants in its vicinity. Studies show definitive clues that cell phone EMF can choke seeds, inhibit germination and root growth, thereby affecting the overall growth of agricultural crops and plants. A reduction in wheat and corn yield in the fields near high EMF lines has also been reported.

Possible solutions

A few steps that can reduce the ill-effects

In India, we have adopted very **relaxed radiation norms of 4.7 W/m2 for GSM900, whereas serious health effects have been noted at as low as 0.0001 W/m2 = 100 µW/m2.** One of the first steps to be taken is to tighten the radiation norms and yet it should be practical enough to be cost effective.

Children must be discouraged from using mobile phones and restrict use to emergency, while adults should "keep calls short".

All the operators must be strictly instructed that power density inside residential or office buildings, schools, hospitals, and at common frequently visiting places should be followed within guidelines.

People must be informed about the harmful radiation effects and corrective measures taken by government of India.

Solution is to have more numbers of cell towers with lesser transmitted power. **In addition, signal enhancers or boosters may have to be installed where signal is weak.** Care must be taken that maximum power transmitted by these must not exceed 0.1W.

The solution is to address the underlying problem, which is that India and Pakistan view each other as enemies.