

COMMENTARY

Use of Mobile Phones and Cancer Risk

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Abstract

Mobile phones work by transmitting and receiving radio frequency microwave radiation. The radio frequency (RF) emitted by mobile phones is stronger than FM radio signal which are known to cause cancer. Though research and evidence available on the risk of cancer by mobile phones does not provide a clear and direct support that mobile phones cause cancers. Evidence does not also support an association between exposure to radio frequency and microwave radiation from mobile phones and direct effects on health. It is however clear that lack of available evidence of cancer as regards the use of mobile phone should not be interpreted as proof of absence of cancer risk, so that excessive use of mobile phones should be taken very seriously and with caution to prevent cancer.

Keywords: Mobile phones - radio frequency - cancer risk - cancer prevention - health

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Introduction

Mobile phones are portable telephone that does not require the use of landlines but works by means of a cellular radio system. Mobile phones are also referred to as wireless, cell or cellular phones. They operate over a relatively large area and their major function is communication from one person to another, from one location to another. Mobile phone has brought new possibilities to the whole world. Across urban-rural and rich-poor divides, mobile phones connect individual to individuals, information, markets, and services (Jenny and Isaac, 2010). Apart from their basic function, they have other additional functions such as browsers, videos, music, storage device e.t.c and they are manufactured by different makers e.g. Nokia, Blackberry, Samsung, Sony Erickson, Sagem, e.t.c. The first mobile phone operated on an analog service and was developed by Motorola, Inc. Mobile phones consist of handset which include printed circuit board (PCB), liquid crystal display (LCD), casing, a battery and a charger. The Printed circuit Board (PCB) is made mostly of copper and is holding to the board with protective coating and adhesive. The boards is made of epoxy resin and generally coated with gold plating other precious metals and hazardous substances in the PCB are arsenic (in chips made from gallium arsenide) antimony, beryllium, brominates flame retardants, cadmium, lead used in the solder that joins the parts) nickel, palladium, silver, tantalum and zinc. The lead and brominates flame retardants have the highest environmental impact due to their levels of toxicity and persistence in the environment (Kamberovic et al., 2009). Liquid crystal display (LCD)

contains liquid crystals which are embedded between layers of glass for illumination with transistors for an electric charge. The liquid crystalline substance can contain toxic substances such as mercury. Mobile phone batteries can contribute significantly to a device environmental impact. Rechargeable battery generates less waste than single - use batteries. They also contain toxic substance such as nickel, zinc, copper and cadmium which can cause hazard to the environment. The charger is used to recharge the battery and it often weights more than the handset and battery combined. It is generally interchangeable among different models and manufacturer of phones thereby contributing significantly to the waste generated. The chargers consist mainly of copper wires encased in plastic but materials like cadmium, gold and brominates flame retardants may likely be present in plastic casing (Arora, 2008). The plastic used to case the handset together is usually polycarbonate (PC), acrylonitrile butadiene styrene (ABS) or a combination of the two. These plastics are difficult to recycle through a normal mixed plastic process as they often contain brominates flame retardants, to reduce the risk of fire. Other Components include Antennas, speakers, microphones, keypads, and Accessories. These components are small in size but they contain heavy metals and hazardous materials which are hazardous to the environment.

Mobile phones work by transmitting and receiving radio frequency microwave radiation, which is very dangerous and detrimental to human health. The radio frequency (RF) emitted by mobile phones are stronger than an FM radio signal but just one-billionth the intensity of an X-ray, which are known on occasion to cause cancer.

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Part of the radio waves emitted by mobile phones is absorbed by the human head. The radio waves emitted by a GSM handset can have a peak power of 2 watts while a US analogue phone had a maximum transmit power of 3.6 watts. Other digital mobile technologies, such as CDMA2000 and D-AMPS, use lower output power, typically below 1 watt. The maximum power output from a mobile phone is regulated by the mobile phone standard and by the regulatory agencies in each country (Wikipedia). The amount of radio wave energy that the body absorbs from a mobile phone can be measured (Specific Absorption Rate).

Cancer is the uncontrolled growth of abnormal cells in the body. Cancerous cells are therefore also referred to as malignant cells. Cancer can develop in almost any organ or tissue, such as the lung, colon, breast, skin, head, bones, or nerve tissue. There are many causes of cancers including, Benzene and other chemicals, drinking of excess alcohol, environmental toxins, excessive sunlight exposure, genetic problems, obesity, viruses and radiation (PubMed Health, 2010). The potential cause of cancer by mobile phones is therefore the damage to the body's cells, caused by vibrating signals emitted by mobile phones. Governments around the world have drawn-up safety guidelines on recommended safe levels of mobile phone SAR levels to which manufacturers have to comply. In the U.S., this maximum level is 1.6 w/kg, while the European standard is slightly higher at 2 w/kg. Specific Absorption Rate (SAR) is expected to be available on all mobile phones sold in the UK. Over the years, there have been concerns about the possibility of adverse health effects resulting from exposure to radiofrequency electromagnetic fields, such as those emitted by mobile phones. The frequent mobile phone users are likely to suffer a tumour on the same side of their brain to the ear they used for phone calls.

Maine and San Francisco (United States) plan on making it compulsory for handset manufacturers to put cancer risk labels on phones. A phone shielding products i.e BlocSock to protect human from the harmful effects of phone radiation are thus made available but some of these devices can reduce the signal strength, so reception is likely be worse.

Global Usage of Mobile Phones

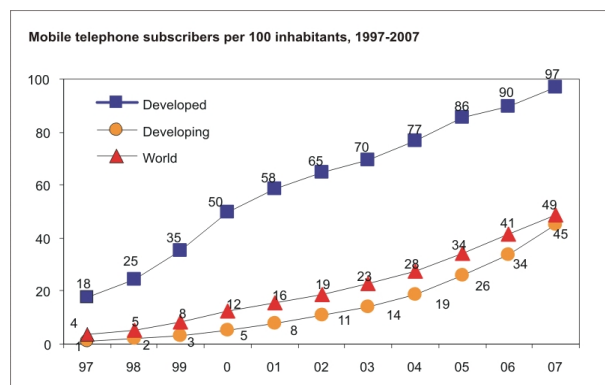


Figure 1. Mobile Phone Subscriber Per 100 Inhabitants (ITU, 2008)

The international telecommunication union reported that the growth of mobile phone users remains strongest in the developing world. In 2007 (Fig. 1), 45 out of 100 inhabitants in the developing world have a mobile phone; almost one out of two people had a mobile phone. In Europe, penetration has surpassed the 100% mark. More than one out of 4 Africans and one out of 3 Asian has a mobile phone while 49 out of 100 inhabitants in the world have a mobile phone (ITU, 2008). A high level of competition and a decrease in prices have been able to reduce the digital divide in mobile telephone, substantially. The explosion in mobile phone use has been driven by the developed countries and developing nations. On a planet with around 6.8 billion people, mobile phone subscriber reached 4.6 billion in 2009. There are ten times as many mobile phones as landlines in sub-Saharan Africa (ITU, 2009). The estimated number of mobile phone subscriptions worldwide reached 5.28 billion at the end of 2010 (BBC News, 2010).

Mobile Phone and Health Risk

Research is still in progress over the recent years to investigate mobile phones and the risk of cancer (Christensen et al., 2005; Deltour et al., 2009; Hardell and Carlberg, 2009 & The INTERPHONE Study Group, 2010). Researchers are studying tumors of the brain and central nervous system and other sites of the head and neck because mobile phones are typically held next to the head when used (National Cancer Institute, 2011). Research studies have not shown a consistent link between mobile phone use and cancer.

Although no solid evidence has been found to support the notion that mobile phones do cause cancer. In 2006 a research study involving over 2,500 people concluded that no link could be found between the use of mobile phones and contracting a type of brain tumor called Glioma. A Danish study using over 400,000 people conducted over 21 years found no increased risk of forming a brain tumor from mobile phone use. Also most of these studies have looked at the use of older analogue handsets, which emit far higher levels of radiation than digital phones which most people use nowadays. Using a digital phone greatly reduces the exposure of radio wave radiation (Medical Information, 2009).

A research programme called the Mobile Telecommunications and Health Research Programme (MTHR) was set up to investigate possible health effects of mobile phone radiation. In 2007 it reported the results of a 6 year research programme that found no link between short term mobile phone use and brain cancer. The MTHR recommended that no further research is needed on the effect of short term mobile phone use on cancer risk, although the committee noted that limited data is available for long term use and suggested that more research is needed in this area.

A large study COSMOS, including researchers from the UK and four other countries, has been set up to look at the long term effects of mobile phone use after 20 to 30 years. They will be following 250,000 people who regularly use mobile phones. Also, the MOBI-KIDS study,

involving 13 countries, has been set up to look at health effects in children.

Studies by the Centre for Reproductive Medicine in Cleveland, U.S., have shown that sperm is damaged or destroyed when men have their phones on standby in their trouser pockets. The study found that sperm cells were affected at just a tenth of the safe SAR threshold. In 2011, a group of 31 scientists from 14 countries met at IARC in Lyon (France) to assess the potential carcinogenic hazards from exposure to radiofrequency electromagnetic fields. They conclude that the use of mobile phone could result in the risk of cancer (World Health Organization, 2011).

The International Agency for Research on Cancer (IARC) has recently classified radiofrequency fields as possibly carcinogenic to humans based on limited evidence from human studies, limited evidence from studies of radiofrequency and carcinogenicity in rodents, and weak mechanistic evidence. The American Cancer Society states that most studies to date have not found an association between mobile phone use and development of tumors. However, results from these studies have been limited by the length of follow-up, changing patterns of mobile phone usage and technology, lack of study of children, and methods for measuring mobile phone use. Possible cancer risks of mobile phone exposure should continue to be evaluated using high-quality methodological approaches, particularly in relation to use in childhood and adolescence and longer-term use. The National Institute of Environmental Health Sciences (NIEHS) is currently conducting the largest laboratory rodent study to date on radiofrequency energy exposures in rodents; the studies are designed to mimic human exposure and are based on the frequencies and modulations of mobile phones currently in use in the United States. NIEHS states that the weight of the current scientific evidence has not conclusively linked mobile phones with any adverse health problems, but more research is needed. The U.S. Food and Drug Administration, which is responsible for regulating the safety of machines and devices that emit radiation (including mobile phones), notes that studies reporting biological changes associated with radiofrequency energy have failed to be replicated and that the majority of human epidemiologic studies have failed to show an association between exposure to radiofrequency from mobile phones and health problems. The U.S. Centers for Disease Control and Prevention states that although some studies have raised concerns, the scientific research as a whole does not support a significant association between mobile phone use and health effects. The Federal Communications Commission concludes that there is no scientific evidence to prove that wireless phone usage can lead to cancer or a variety of other health problems, including headaches, dizziness or memory loss (National Cancer Institute, 2011).

Government Recommendations

The Department of Health (DoH) has published that the effectiveness of hands free mobile phone in lowering radiation is still uncertain. The Government has

recommended that further research into the effectiveness of hands free mobile phones should take place. The Government have also agrees that shielding devices and hands free kits should be independently tested and that there should be clear information about the effectiveness of such devices in lowering radiation exposure. The Department of Trade and Industry (DTI) have commissioned independent SAR measurement of hands free kits and the Government recommends that mobile phones are only used for short calls and preferably with a hands free kit.

Conclusions

In conclusion, several studies have shown no link between mobile phones and cancer at this time. It should be noted that their reports are based on short-term studies. Exposure to radio waves depends on how long a mobile phone is used and hence the amount of time people spend on mobile phones has increased and should be taken into consideration during future studies. During the course of this study we observed that some females keep mobile phones under brassieres, most males keep mobile phones on standby in their trouser pockets while people now spend longer hours on calls most especially when service providers offer cheap or free calls. To prevent cancer, mobile phone users are therefore advised to always use hands-free devices such as ear phones or speaker phone for longer conversations. Keep mobile phone usage to very minimal for children and never hold the phone next to your ears, stomach, breast or body. Hands-free devices put more distance between the source of radiation in the mobile phone and the brain, but it also depends on which type of mobile phone is used and how it is used.

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