Mobile Phones and Cancer: More Evidence Needed

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A World Health Organisation research centre which has reviewed hundreds of studies on the health effects of mobile phone use has decided to classify the radio frequency electromagnetic fields emitted by mobile phones as “possibly carcinogenic”. This classification says more about the quality of the evidence available from studies, rather than about whether radio frequency electromagnetic fields increase the risk of cancer. In plain language, the WHO centre’s answer to whether mobile phone usage poses a cancer risk is that it might but we do not know enough about it as yet.

Shortly after the International Agency for Research on Cancer (IARC) announced in May that using mobile phones could possibly increase the risk of some kinds of brain cancer, the mobile phone industry held its own conference on mobile phones and health. However, the industry’s conference in early June in Cape Town looked not at the health risks posed by mobile phones, but at how mobile technology could be used to provide access to healthcare (GSMA 2011b). There appeared to have been little or no discussion of the challenges that the IARC finding might produce for the industry. The only public response has been a statement by the mobile phone operator industry association, GSMA, stating that “present safety standards for mobile phones and base stations provide protection for all persons against established health hazards” (GSMA 2011a). The mobile phone industry can afford to take a relaxed attitude towards IARC’s decision to classify the radio frequency electromagnetic fields emitted by mobile phones as “possibly carcinogenic”.

Classification

IARC, a World Health Organisation (WHO) – administered research centre, classifies substances in five groups, ranging from Group 1 (carcinogenic to humans) to Group 4 (probably not carcinogenic). In between are Group 2A (probably carcinogenic) and Group 2B (possibly carcinogenic) into which radio frequency electromagnetic energy from mobile phones has been placed (IARC 2011).

The difference between 2A and 2B (probably and possibly carcinogenic) is not merely semantic. In both cases, there is limited evidence of carcinogenicity in humans. However, substances in Group 2A have shown some evidence of carcinogenicity in animal experiments. Group 2B is one step lower in the scale of cancer causation, because in addition to limited evidence of carcinogenicity in humans, there is also only limited evidence of carcinogenicity in animals.

As one of the members of the IARC working group that looked into mobile phones and cancer, Jack Siemiatycki of Montreal University said 2B indicates that there was some evidence of cancer. To get into 2B, there are many different combinations of human and animal experimental evidence. But in neither case [human or animal] was it strong. Both the human epidemiologic evidence and the animal experimental evidence were judged to be of ‘Limited’ strength to support the hypothesis (SMCC 2011).

Placing a substance in Group 2B, as electromagnetic fields associated with mobile phones have been, is a signal that while there is very limited evidence at present, it is worth carrying out further studies. To put these findings in perspective, coffee (possibly linked with bladder cancer), Asian pickled vegetables, gasoline engine exhaust and marine diesel fuel are in the same category of possible carcinogens as mobile phone electromagnetic radiation (IARC 2011).

Findings

The IARC findings were restricted to two kinds of cancers: glioma and acoustic neuroma, where there might be an association with mobile phone use. In the case of other tumours like meningioma, parotid
gland tumours and lymphoma, the findings found insufficient evidence of association with mobile phone usage (Baan et al 2011).

It is important to point out that this classification says more about the quality of the evidence available from studies, rather than about whether radio frequency electromagnetic fields increase the risk of cancer. Since the 1990s, when mobile phone usage began to spread across the world, questions have been asked about the effect on human health of radio frequency electromagnetic fields which mobile phones, as well as mobile phone base stations, Bluetooth devices and cordless phones emit.

Unlike ionising radiation, such as x-rays and gamma rays, which carry enough energy to break molecular bonds in human cells, electromagnetic radiation at the frequency of radio waves is of much lower energy and has not proven to be a health risk. But the exposure to radio frequency electromagnetic energy has exploded with the use of mobile phones over the last few decades. According to the International Telecommunication Union’s (ITU) figures, the number of mobile phone subscriptions has risen from 719 million in 2000 to 5.4 billion in 2010. Much of this growth has occurred in the developing world, which accounts for a little over 3.9 billion mobile phone subscriptions (ITU 2011).

Mobile phones (as well as cordless phones and Bluetooth devices) are low frequency radio transmitters, and holding a mobile phone to the ear while making a call can lead to energy being absorbed in the brain leading to higher brain temperatures. Most of the energy from a mobile phone is however absorbed by the skin and other surrounding tissues, and the temperature rise in the brain is thought to be negligible.

Review of Studies

But given the ubiquity of mobile phone usage IARC, the WHO body which deals with cancer, convened a group of 30 scientists from 14 countries who met at the end of May to assess the existing evidence on linkages between radio frequency electromagnetic energy and cancer. The experts reviewed several hundred studies that had been published over the last three decades, ranging from epidemiological studies, animal studies and laboratory based cellular level studies.

Their work focused on reviewing the evidence contained in six epidemiological studies that had been conducted at different times and different places over the last decade. The largest of these was the Interphone study which compared evidence from 13 countries on the relationship between mobile phone use and the risk of two forms of brain cancer, glioma and meningioma. Researchers selected 2,409 patients diagnosed with meningioma and 2,708 diagnosed with glioma, and paired each of them with a healthy person with the same demographic characteristics. The cases and their matched controls were then each interviewed about their mobile phone usage, to see whether the cancer cases reported higher mobile phone usage than those who did not have cancer. The results showed no relationship between mobile phone use and developing cancer, except in the case of the heaviest group of users, who had accumulated more than 1,640 hours of call time. In this case, there was a slight increase in risk for both glioma and meningioma. But as the authors of the study themselves pointed out, the conclusions could have been biased.
by the fact that people were asked to remember and estimate their mobile phone usage, which could have led to mistaken estimates of usage.

The IARC expert group also looked closely at a Swedish study that compared the mobile phone usage of 1,148 glioma cases with the mobile phone usage of people without glioma. The study found that those who had used mobile phones for more than a year had a marginally greater chance of having developed glioma than those who had not, with the odds of developing glioma increasing as mobile phone usage increased. Similar results were reported with those using cordless phones. This study was also subject to recall bias, as people were asked to answer questionnaires about their past mobile phone habits.

However, the expert group concluded that the findings in these studies could not be due to bias alone, and that it could be possible that there was a causal relation between mobile phone use and glioma, as well as with acoustic neuroma, another form of brain tumour, even though the evidence was limited. In plain language, the IARC group’s answer to whether mobile phone usage poses a cancer risk is that it might but we do not know enough about it as yet.

Though this conclusion was supported by a majority of the IARC group’s members, there were some dissenters who thought the existing evidence was not strong enough to conclude that there was even a possible link between mobile phone usage and brain cancer. Among other things, they pointed out that trends in increasing mobile phone use should by now have led to increased incidence rates of glioma and other brain tumours if there was indeed a relationship between mobile phone use and cancer. This had not happened.

Need for a Cohort Study

Better evidence is required before a definitive conclusion can be made on the health risks posed by mobile phones. But establishing solid epidemiological links between mobile phone use and brain cancers, based on well-designed studies, poses several difficulties. The best form of evidence would come from a cohort study: following a group of people over several decades, monitoring their mobile phone usage, and then looking at whether those with high mobile phone usage were developing brain cancers at higher rates than those with lower rates of phone usage. But such studies take decades, and mobile phones have only been around for about two decades so far. Existing studies have studied those with a maximum of 10 years of mobile phone usage. It is quite possible that if there is an increased risk from mobile phone usage, this might only manifest itself after more than a decade.

As Siemiatycki said,

There are two questions burning in the background...one is whether long-term use has an effect that wouldn’t appear in those that have used cell phones for only five years or so. The second issue is whether tumours take 10-15 years to appear after the exposure. In either of these cases, we don’t have any evidence one way or the other (SMCC 2011).

Impact of Technological Change

Changes in mobile phone technology also confound the issue. The latest 3G phones, for example, emit on an average 100 times less radio frequency energy than earlier 2G handsets (Baan et al 2011). The amount of energy that a handset emits is also linked to the strength of a signal from a base station. The stronger the signal, the less energy the handset emits.

Therefore, those who use their phones in urban environments, where signals are strong, would typically be less exposed to radio frequency electromagnetic waves than those who live in areas where signals are weak. Any study trying to establish a relationship between phone usage and cancer risk would have to take this variable into account, as well as other variables such as the kind of phone used and the purposes for which the phone is used. Earlier studies have assumed that phones are primarily used for voice messages. However, the new generation of smart phones are also equally used for data transfer, texting and social networking. They are devices to access the internet, as much as they are devices for voice calls. Therefore, methods will have to be devised to accurately measure different kinds of phone use. Earlier studies have used mobile phone subscription as a proxy for phone use, but this has limitations in situations when phones can be used in a variety of ways other than for voice calls.

Other studies which will provide more definitive answers are under way, including one study in Europe which will track 2,50,000 users aged between 18 and 69 in five European countries for 20 to 30 years. (Schuz et al 2011). In earlier times, the link between cigarette smoking and cancer was only conclusively established through such prospective, cohort studies in the 1940s and 1950s.

Missing Studies

What is missing are studies focused on the developing world. The big growth in mobile phones is going to be in Asia and Africa, with mobile phone ownership in the developed world reaching saturation point. Much of the growth in the poorer countries will probably be met by traditional 2G services, and phones are likely to be used for voice rather than internet access and data transfer by populations in areas where literacy is low. Voice services, perhaps using older handsets, will increase exposure to radio frequency electromagnetic in the developing world. Studies conducted in Europe and other parts of the developing world will not capture the health impact of mobile phones in the developing world, and there is need for large-scale prospective studies to be launched in Asia and Africa.

REFERENCES


