

The following information has been published by NHS Choices in relation to research about links between mobile phones and brain cancer.

Mounting evidence suggests that there is no link between mobile phones and brain cancer, reports the BBC.

The news is based on a review of the evidence on whether mobile phone use raises the risk of the two main types of brain cancer: glioma and meningioma. In particular, the authors looked at the Interphone study, a large international case-control study. They say that combining the results of all the epidemiological, biological and animal studies, together with brain tumour rates, suggests that it is unlikely that mobile phones increase the risk of brain tumours in adults.

This review was written by experts in the field and the findings are likely to represent the consensus of expert opinion. Though reassuring, the authors say that there is still some uncertainty, as there are not enough data on the risk of childhood tumours or mobile use for more than 15 years. Current advice for children and young people under 16 is to use mobile phones only for essential purposes and to keep calls short.

The World Health Organization (WHO) has taken a precautionary approach, and recently classified mobile phones as a possible carcinogen, putting them into the same risk bracket as traffic fumes and coffee. The classification means that the link is far from certain, and WHO states there is only limited evidence of a link, and that the results supporting a link may be due to other factors that have distorted study data.

Where did the story come from?

The study was carried out by researchers from the Institute of Cancer Research, UK; the Karolinska Institutet, Sweden; the Queensland Institute of Medical Research, Australia and the University of California and Brown University, USA.

Funding was provided by a variety of sources including the European Fifth Framework Programme; the International Union against Cancer, which receives funds from the Mobile Manufacturers Forum and the GSM Association; the Mobile Telecommunications Health and Research Programme; the Swedish Research Council; AFA Insurance and VINNOVA (The Swedish Governmental Agency for Innovation Systems) which also received funds from mobile manufacturers.

The authors certify that their freedom to design, conduct, interpret and publish their research was not compromised by any controlling sponsor.

The study was published in the peer-reviewed journal Environmental Health Perspectives.

What kind of research was this?

This study was a review of the published evidence on whether there is a relationship between mobile phone use and the two most common brain cancers: glioma and meningioma. The researchers focused particularly on the findings from the Interphone study,

a recent large multinational case control study that took place across 13 countries.

This was a non-systematic review of the evidence. The best way to analyse whether there is a link between mobile phone use and brain cancer would be a systematic review. However, as this study was carried out by experienced researchers in this area, and there have been relatively few studies on the subject, it is likely that they identified most of the research in this area. The researchers also gave a critique of the Interphone study and an analysis of changes over time in brain tumour incidence.

What did the research involve?

The researchers described the Interphone study, and explored both its strengths and its weaknesses. They then combined the results with the findings of other studies.

No details are given in the scientific paper on how the researchers identified the other papers that they looked at in addition to the Interphone study.

What were the basic results?

The authors described the Interphone study and its results. Interphone was an international case-control study. The study compared 2,708 glioma cases diagnosed in people between the ages of 30 and 59 between 2000 and 2004, with 2,972 controls. For meningioma, 2,409 cases were compared with 2,662 controls.

A common questionnaire was used to determine the type and pattern of mobile phone use, other radiofrequency exposures and brain tumour risk factors. The data from the different countries were then pooled and analysed.

Interphone found that regular mobile phone users had a significantly lower risk of both glioma and meningioma compared with people who did not use mobiles or only occasionally used them. For the majority of users there were no trends found between tumour risk and their total mobile phone use. However, there was a raised risk of glioma and, to a lesser extent meningioma, in the highest 10% of use. There was no association between either tumour type and the cumulative number of calls, years of use or years since first use, that people reported.

The authors of this review then discuss the limitations of the Interphone study. They say that although it found a reduced risk of brain tumours in mobile phone users, there is evidence that this reduced risk is in part due to non-response rates. For example, of those who were asked to participate, only 64% of people with glioma agreed, as did 78% of meningioma cases and 53% of controls. Those who declined were then asked to complete a short non-response questionnaire. This questionnaire found that those who declined actually used their mobile phones less. It is possible that if these people had taken part in the study, they may have affected the results. The researchers say this problem may also have applied to other previous studies.

The researchers also say that the reduced risk of brain tumour in mobile phone users could be due to the fact that people with brain tumours that are undiagnosed could experience headaches and impaired cognition that may limit their mobile phone usage. They say that it

is not clear how best to account for these factors.

The study also analysed the risks after prolonged and heavy mobile phone use. As the study involved a questionnaire asking individuals about their past mobile phone usage, it is subject to recall bias. The authors describe validation studies that have looked at people's recollection of their phone use. These studies found that, on average, subjects underestimate the number of calls per month but overestimate the duration of calls. Also, people with brain tumours tend to overestimate the time they spent on calls. The researchers point to a finding from the Interphone study, which would appear to support this finding, where 10 individuals with brain tumours estimated their daily use as more than 12 hours a day. They think this usage is implausible.

The researchers say that, despite these limitations, Interphone still found that there was no increase in risk with cumulative hours of use, although there was an increased risk among heavy users. They say that other case-control studies have reported a markedly raised risk and positive dose-response gradient for malignant tumours but not for meningioma in heavy users. However, they say that these results are problematic.

The Interphone study also found that there was no association between glioma or meningioma risk and the cumulative number of calls a person made, their years of use or years since their first use. People who started using mobiles heavily between one and four years ago did seem to have a greater risk. The researchers suggest that this finding could be due to recall bias however, as meningioma has a long period of latency, and a period of use this long should have little impact.

The authors then examined the anatomical distribution of brain tumours compared with the anatomical distribution of exposure, i.e. whether there is an increase in risk of brain tumour on the same side of the head as the phone is held. Although a slightly elevated risk of a tumour on the same side of the head as that reported for normal phone usage was found, they conclude that bias is the likely explanation of any association.

Finally, the authors note that, despite extensive research, there is no biological mechanism for how radiofrequency fields could cause cancer. In contrast to X-rays, for example, radiofrequency fields are non-ionising and do not damage DNA.

The authors also looked at other studies that have analysed the effects of occupational and residential radiofrequency exposures; studies which linked private telephone records to cancer registry and death records; and trends in tumour incidence. The researchers present data, up to 2009, from Sweden, one of the earliest adopters of mobile phones. It shows that despite an increase in mobile phone subscriptions from zero per 100 inhabitants in 1986, to more than 120 mobile phone subscriptions per 100 inhabitants in 2010, there has been no change in the incidence of glioma. This suggests that mobile phone use does not impact on brain tumour occurrence.

How did the researchers interpret the results?

The researchers say that methodological deficits limit the conclusions that can be drawn from Interphone, but its results, along with those from other epidemiological, biological and animal studies, and brain tumour incidence trends, suggest that within about 10-15 years after first use of mobile phones there is unlikely to be a material increase in the risk of brain tumours in adults. Data for childhood tumours and periods beyond 15 years are currently

lacking+

The authors go on to conclude that, although there remains some uncertainty, the trend in the accumulating evidence is increasingly against the hypothesis that mobile phone use can cause brain tumours in adults.+

Conclusion

This was a non-systematic review of the evidence, mainly concentrating on the results of the Interphone study. No details are given in the scientific paper on how the authors identified the other papers that they looked at in addition to the Interphone study. The best way to analyse whether there is a link between mobile phone use and brain cancer would be a systematic review, which is designed to ensure that all relevant evidence is included. However, as this study was carried out by experienced researchers in this area, and there have been relatively few studies on the subject, it is likely that they identified most of the research in this area.

The World Health Organization (WHO) has taken a precautionary approach, and recently classified mobile phones as a possible carcinogen+, putting them into the same risk bracket as traffic fumes and coffee. The classification means that the link is far from certain, and WHO states there is only limited evidence+ of a link, and that the results supporting a link may be due to other factors distorting study data.

The authors of this review suggest that if there is no increase in brain tumour rates in the next few years after almost universal exposure to mobile phones in Western countries, it is unlikely that there is a link between mobile phone usage and brain cancer in adults. The methodological weaknesses of underlying studies and the trend in brain tumour incidence shown here suggest that any risk of brain tumours resulting from mobile phone use is likely to be very small, and possibly even non-existent.

Links To The Headlines

[Mobile phones 'not linked to cancer'](#). The Independent, July 2 2011

[Now experts say mobiles are not linked to cancer.](#) Daily Express, July 2 2011

[Mobile phones 'unlikely to cause brain tumours'](#). The Guardian, July 2 2011

[Mobile phones 'unlikely' to cause cancer.](#) BBC News, July 2 2011

Links To Science

Swerdlow AJ, Feychting M, Green AC, Kheifets L, Savitz DA, International Commission for Non-Ionizing Radiation Protection Standing Committee on Epidemiology 2011. [Mobile Phones, Brain Tumours and the Interphone Study: Where Are We Now?](#) Environmental Health Perspectives 2011

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