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Interphone study reports on mobile phone use and brain cancer risk

The Interphone Study Group today published their results¹ in the *International Journal of Epidemiology* ([direct media link](#)). The paper presents the results of analyses of brain tumour (glioma and meningioma) risk in relation to mobile phone use in all Interphone study centres combined. This interview-based case-control study, which included 2708 glioma and 2409 meningioma cases and matched controls was conducted in 13 countries using a common protocol. Analyses of brain tumours in relation to mobile phone use have been reported from a number of cohort and case-control studies, including several of the national components of Interphone. No studies, however, have included as many exposed cases, particularly long-term and heavy users of mobile phones, as this study.

Background

Mobile phone use has increased dramatically since its introduction in the early-to-mid 1980's. The expanding use of this technology has been accompanied by concerns about health. In the late 1990s, several expert groups critically reviewed the evidence on health effects of low-level exposure to radiofrequency (RF) electromagnetic fields, and recommended research into the possible adverse health effects of mobile telephone use.

IARC co-ordination of a multinational effort in cancer research

As a result, the [International Agency for Research on Cancer \(IARC\)](#) coordinated a feasibility study in 1998 and 1999, which concluded that an international study of the relationship between mobile phone use and brain tumour risk would be feasible and informative.

Scope of the Interphone study

Interphone was therefore initiated in 2000 as an international set of case-control studies in 13 countries around the world² focusing on four types of tumours in tissues that most absorb RF energy emitted by mobile phones: tumours of the brain (glioma³ and meningioma⁴), of the acoustic nerve (schwannoma⁵), and of the parotid gland⁶. The objective was to determine whether mobile phone use increases the risk of these tumours. Interphone is the largest case-control study of mobile phone use and brain tumours yet and includes the largest numbers of users with at least 10 years of exposure.

Scientific direction of Interphone

The Interphone International Study Group, made up of 21 scientists⁷, was responsible for the progress of the study, the choice of analyses to be conducted, and the interpretation and publication of results. All the decisions about the study were made exclusively and collectively by the Interphone International Study Group. In the course of the study, the IARC Principal Investigator, Dr Elisabeth Cardis, moved to the [Centre for Research in Environmental Epidemiology \(CREAL\)](#) in Barcelona, Spain, where she continues her role as Interphone Principal Investigator, although the 13-country dataset remains at IARC.

Funding of Interphone

The Interphone study was undertaken as a collaborative effort between a number of partner institutions⁸, co-ordinated by IARC. To date, the overall funding assigned to the Interphone study amounts to approx. 19.2 million euros (€). Of this amount 5.5 million € were contributed by industry sources.

Of these 5.5 million €, 3.5 million € were contributed by the Mobile Manufacturers' Forum (MMF) and the GSM Association, each contributing half of that amount, through a firewall mechanism provided by the [UICC \(International](#)

¹ "Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case-control study", the Interphone Study Group. *International Journal of Epidemiology* 2010;1–20. doi:10.1093/ije/dyq079. Plus Appendix 1; Appendix 2.

² Australia, Canada, Denmark, Finland, France, Germany, Israel, Italy, Japan, New Zealand, Norway, Sweden and the UK.

³ A cancer of the brain that begins in glial cells (cells that surround and support nerve cells). See also *Epidemiology of brain tumours*.

⁴ A type of slow-growing tumour that forms in the meninges (thin layers of tissue that cover and protect the brain and spinal cord). Most meningiomas are benign and usually occur in adults.

⁵ A tumour of the peripheral nervous system that arises in the nerve sheath (protective covering). It is almost always benign, but rare malignant schwannomas have been reported.

⁶ Tumour that forms in a parotid gland, the largest of the salivary glands, which make saliva and release it into the mouth. There are two parotid glands, one in front of and just below each ear. Most salivary gland tumours begin in parotid glands.

⁷ See Annex A for list of members.

⁸ See list of participating institutions in Annex B.

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[Union against Cancer](#)) to guarantee the independence of the scientists. Most of the rest of the 5.5 million € came indirectly to individual centers from mobile phone operators and manufacturers, for example, through taxes and fees collected by government agencies. Only 0.5 million € (2.5%) of the overall study costs were provided directly by the industry, in Canada and France, under contracts which preserved the independence of the study.

Other funding was provided by the European Commission (3.74 million €) and national and local funding sources (9.9 million € in total) in participating countries.

Additional funding for the extension of the research to younger and older age groups was received directly from mobile phone operators in the UK under contracts which preserved the independence of the study.

Results

The Interphone Study Group summarized its findings as follows:

"A reduced odds ratio (OR)⁹ related to ever having been a regular mobile phone user was seen for glioma [OR 0.81; 95% confidence interval (CI) 0.70-0.94] and meningioma (OR 0.79; 95% CI 0.68-0.91), possibly reflecting participation bias or other methodological limitations. No elevated OR was observed ≥ 10 years after first phone use (glioma: OR 0.98; 95% CI 0.76-1.26; meningioma: OR 0.83; 95% CI 0.61-1.14). ORs were < 1.0 for all deciles of lifetime number of phone calls and nine deciles of cumulative call time. In the tenth [highest] decile of recalled cumulative call time, ≥ 1640 h, the OR was 1.40 (95% CI 1.03-1.89) for glioma, and 1.15 (95% CI 0.81-1.62) for meningioma; but there are implausible values of reported use in this group. ORs for glioma tended to be greater in the temporal lobe¹⁰ than in other lobes of the brain, but the CIs around the lobe-specific estimates were wide. ORs for glioma tended to be greater in subjects who reported usual phone use on the same side of the head as their tumour than on the opposite side."

Conclusions

The Interphone Study Group concluded with the following key message:

A reduced OR for glioma and meningioma related to ever having been a regular mobile phone user possibly reflects participation bias or other methodological limitations. No elevated OR for glioma or meningioma was observed ≥ 10 years after first phone use. There were suggestions of an increased risk of glioma, and much less so meningioma, in the highest decile of cumulative call time, in subjects who reported usual phone use on the same side of the head as their tumour and, for glioma, for tumours in the temporal lobe. Biases and errors limit the strength of the conclusions that can be drawn from these analyses and prevent a causal interpretation.

Change in pattern of use

The majority of subjects were not heavy mobile phone users by today's standards. The median lifetime cumulative call time was around 100 hours, with a median of 2 to 2½ hours of reported use per month. The cut-point for the heaviest 10% of users (1640 hours lifetime), spread out over 10 years, corresponds to about a half-hour per day.

Today, mobile phone use has become much more prevalent and it is not unusual for young people to use mobile phones for an hour or more a day. This increasing use is tempered, however, by the lower emissions, on average, from newer technology phones, and the increasing use of texting and hands-free operations that keep the phone away from the head.

What next?

Dr Christopher Wild, Director of IARC said: "An increased risk of brain cancer is not established from the data from Interphone. However, observations at the highest level of cumulative call time and the changing patterns of mobile phone use since the period studied by Interphone, particularly in young people, mean that further investigation of mobile phone use and brain cancer risk is merited."

Professor Elisabeth Cardis said that "the Interphone study will continue with additional analyses of mobile phone use and tumours of the acoustic nerve and parotid gland." She added: "Because of concerns about the rapid increase in mobile phone use in young people – who were not covered by Interphone –, CREAL is co-ordinating a new project, [MobiKids](#), funded by the European Union, to investigate the risk of brain tumours from mobile phone use in childhood and adolescence."

IARC has scheduled a comprehensive review of the carcinogenic potential of mobile phone use under the auspices of its [Monographs Programme](#). The review, scheduled for 24-31 May 2011, will consider all published epidemiological and experimental evidence, including the new data from the Interphone study.

⁹ The odds ratio (OR) is a measure of relative risk. In other terms, an OR of x is taken as meaning that people exposed have x times the risk of non-exposed people.

¹⁰ The temporal lobe is the region of the brain located nearest the ear.

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Communication of results to media and interested parties

This press release was prepared jointly by [IARC](#), [UICC](#) and [CREAL](#). It was decided by the Interphone Study Group, and in conformity with the [Study Protocol](#), that the [IARC Communications Group](#), jointly with [CREAL](#) and [UICC](#), would communicate with international partners, including the European Commission and the World Health Organization, a maximum of 7 days ahead of publication, under embargo conditions.

-ENDS-

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ANNEX B: LIST OF PARTICIPATING INSTITUTIONS

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Cancer Council New South Wales
Cancer Council Victoria
The University of Sydney

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-INRS-Institut Armand Frappier, Université du Québec, Laval, Québec
-CRCHUM, Université de Montréal, Montréal, Québec
-Cancer Control Research, British Columbia Cancer Agency, Vancouver

Denmark

- Division for Cancer Epidemiology, Danish Cancer Society, Copenhagen

Finland

-Finnish Centre for Radiation and Nuclear Safety, Helsinki

France

-Institut de Médecine du Travail, Lyon

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-Unit of Environmental Epidemiology, German Cancer Research Center, Heidelberg

Israel

-Chaim Sheba Medical Center, Tel-Hashomer

Italy

-Istituto Superiore di Sanità, Rome

Japan

-Tokyo Women's Medical University, Tokyo, Japan

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-School of Population Health, University of Auckland
-Centre for Public Health Research, Massey University

Norway

-Norwegian Radiation Protection Authority, Osteras

Sweden

-Karolinska Institute, Institute of Environmental Medicine, Division of Epidemiology, Stockholm

United Kingdom

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-National Radiological Protection Board, Didcot
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International Organizations

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