# INTERPHONE Project Validation Studies

The INTERPHONE project was set up to determine whether radiofrequency exposure from mobile phones increases the risk of head and neck cancers. Exposure is determined both by how much the phone is used and the power transmitted by the phone. Validation studies have been conducted to assess the quality of the collected data on both these measures. They also assessed possible bias in participation of study subjects.

**Subject Recall**
Mobile phone usage in the INTERPHONE studies was primarily obtained by standardised interviews with the subjects. These interviews included a full history of mobile phone use including number and duration of calls. The recall period extended back to the subjects' first use of a mobile phone, which may have been more than ten years.

**Subject Recall Validation**
Validation studies in 11 countries using special software modified phones or billing records were used to evaluate potential error in the recall of phone usage. They found large differences between countries but that in general people were better able to remember the number of calls than the duration of calls. They also found that phone use was under-estimated by light users and over-estimated by heavy users. There was also some evidence that cases overestimated their past usage in more distant time periods.

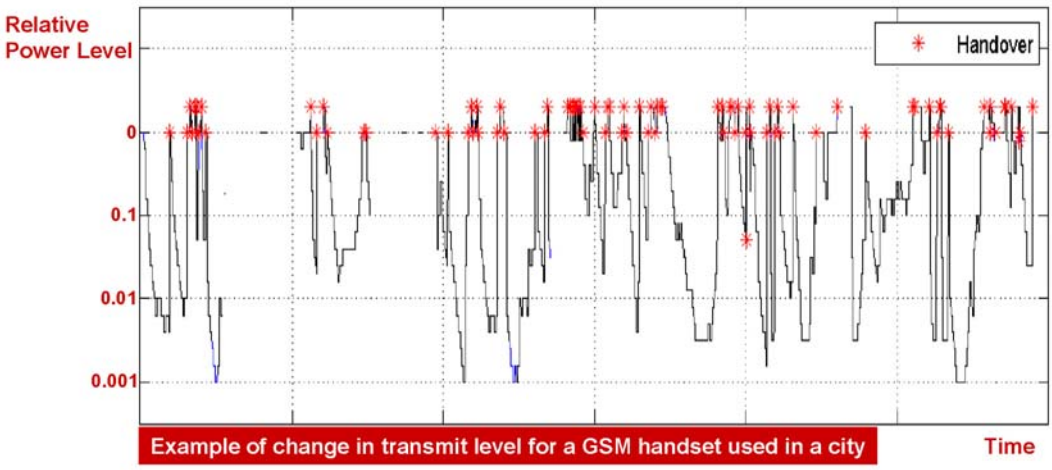
**Effects of Recall Errors**
The large random recall errors may reduce the power of INTERPHONE to detect an effect (if one exists). However, the apparent overestimation of long-term past usage by cases could lead to an overestimation of possible risk.

**Impact of Selection Bias**
Selection bias occurs when the decision whether or not to participate in a study is not random but is somehow related to case or control status. In the INTERPHONE study, mainly due to informed consent requirements, 87% of controls were aware that the study involved mobile phones and this could have affected their decision to participate. The potential impact of selection bias was evaluated in a sub-set of the study population. It was found that refusal to participate was related to lower mobile phone use. This could result in about a 10% reduction in the risk estimates.

**Factors Affecting Phone Power**
The transmit power of a mobile phone is continuously monitored and adjusted by the network to maintain call quality with the minimum phone transmitter power. For a GSM phone the minimum level is 1,000 times lower than the maximum power level. Factors that influence the power level include: distance to the base station; type and orientation of the phone, clutter (e.g. buildings) between the phone and base stations and the number of handovers (transfers from one base station to another) during a call.

**Measurements of Phone Power**
More than 500 volunteers in 12 countries used software-modified GSM phones for approximately one month each resulting in measurements of over 60,000 phone calls. These showed that the average output power was approximately 50% of the maximum due to the effect of handovers. In Sweden where the study covered very sparsely populated areas, higher output powers where found for rural compared with urban use.

**Power Deposited in the Head**
The exposure from mobile phones is localized to the area of the head near the mobile phone antenna. Measurements were made on over 100 phones used in different countries, which confirmed that more than 97% of the absorbed energy is in the brain hemisphere closest to the phone. INTERPHONE will analyse risk by location of tumour relative to the phone exposure to improve the risk assessment.



Example of change in transmit level for a GSM handset used in a city

## Where to go for more information

GSMA: **http://www.gsmworld.com/health**



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