

# New Research Confirms an Increased Brain Tumour Risk from Mobile Phone Radiation

Alarming results from Professor Lennart Hardell's research group

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Professor Lennart Hardell's research team at the Orebro University in Sweden has completed the research project as described in its application to the Pandora Foundation in 2011 (1), and the results have been published (2,3,4,5,6). Funds for this research were provided exclusively by private organisations. For many years now Hardell has not received public funding as he is one of the researchers whose results firmly contradict the position taken by politics and industry.

This research project confirmed previous studies, which had indicated an increased brain tumour risk among long-term users of mobile and cordless phones. Modulation and effects of the radiation from cordless phones introduced in Sweden in 1988 are comparable with those of mobile phones. Thus, the length of radiation exposure documented in this study comprises more than 20 years, that is 10 years more as compared to other studies published previously. Among adults, the latency period from tumour initiation until diagnosis can be up to two to four decades. With the increased length of radiation exposure, the reliability of the risk assessment increases. Therefore, the validity of the current study far outreaches that of all previous studies.

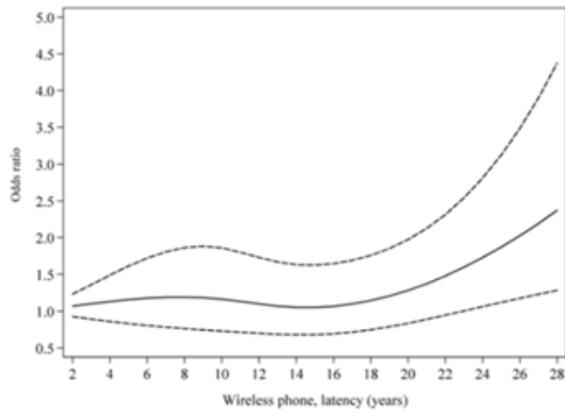
The patient group for this case-control study consisted of Swedish women and men aged 18-75 years with a tumour diagnosed between 2007 and 2009. In regard to the acoustic neuroma, additional cases from a previous study (1997-2003) were included since the low number of patients diagnosed between 2007 and 2009 did not allow a reliable evaluation. The aim was to find out, if the time and strength of the patients' exposure were higher than those of healthy Swedish women and men of the same age. The brain tumour risk calculated from the data obtained was indeed higher than that observed by Hardell and other researchers when they evaluated patients with up to 10 years of radiation exposure. This finding certainly speaks in favour of a causal link between tumour development and wireless phones. The following results have been obtained:

## **Malignant brain tumours and acoustic neuroma**

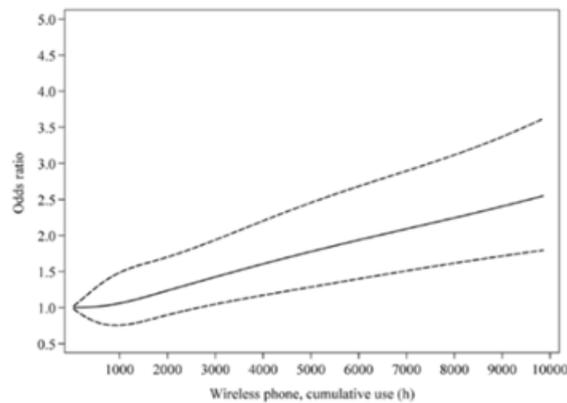
From Figure 1 and 2 we see that the risk for malignant brain tumours, especially for glioma, increases significantly both with the cumulated use of wireless phones in years and with the cumulated use in hours. Gliomas (with a prevalence of about 60 cases/million) are known for their different grades of malignancy. About 15% are accounted for by the multiform glioblastoma, which in most cases leads to death within one year. This type of cancer can be found in all ages and, especially, among children. Not unexpectedly and quite in line with results from basic research is the finding that mobile phone radiation may exert its carcinogenic effect via both initiation and promotion of the tumour (2,4).

Figure 3 shows that also the risk for acoustic neuroma also increases significantly with the length of radiation exposure. The increase in incidence of this relative rare benign tumour (with a prevalence of about 10 cases/million) in the course of last three decades in the Nordic countries may indeed be due to the introduction of wireless phones (3). Surprisingly, the radiation exposure did not have any influence on the development of the most common brain tumour, the mostly benign meningioma (5). This speaks in favour of the assumption that the increased risk of glioma and acoustic neuroma may not be caused by a methodical error, but be the result of the specific effect of mobile phone radiation.

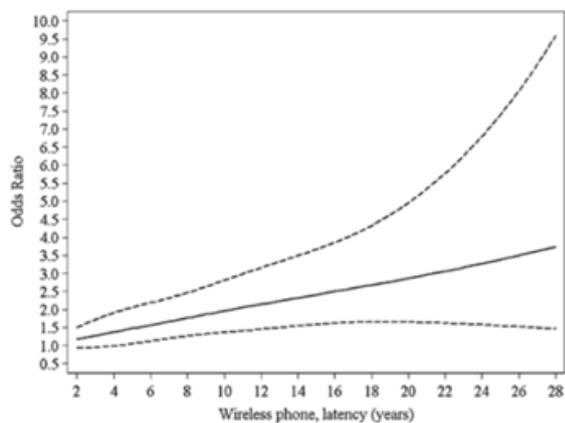
In 1965, at the height of the controversy on whether smoking cigarettes could cause lung cancer, Bradford Hill summarized the criteria which have to be met in order to assume a causal link. Hardell and Carlberg have now applied these internationally recognized criteria to evaluate if the link between brain tumours and mobile phone radiation can be considered a causal one (6). They concluded that mobile phone radiation must be considered to be the cause for an increase in glioma and acoustic neuroma incidence and, thus, has to be classified in Group 1 "carcinogenic for humans" by the International Agency for Cancer Research (IARC). The classification from May 2011 in Group 2B "possibly carcinogenic for humans" is, therefore, out-dated and urgently needs to be revised.



**Figure 1:** The solid line indicates the increased risk for malignant brain tumours related to a cumulative use of wireless phones in years. The early peak may indicate that an otherwise initiated tumour is promoted, while the rise after about 16 years may be evidence of its tumour initiating capacity as well. The broken lines represent the 95% confidence interval and demonstrate that the increase in the brain tumour risk is significant. Results were adjusted for year of diagnosis, age, gender, and socio-economic index of the patients (2).



**Figure 2:** The solid line indicates the increased risk for malignant brain tumours related to a cumulative use of wireless phones in hours. The broken lines represent the 95% confidence interval and demonstrate that the increase in the brain tumour risk is significant. Results were adjusted for year of diagnosis, age, gender, and socio-economic index of the patients (2,4).



**Figure 3:** The solid line indicates the increased risk for benign acoustic neuroma related to a cumulative use of wireless phones in hours. The broken lines represent the 95% confidence interval and demonstrate that the increase in the tumour risk is significant. Results were adjusted for year of diagnosis, age, gender, and socio-economic index of the patients (3,4).

1. <http://www.pandora-foundation.eu/research-projects/hardell-project/hardell-project-description.html>
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3. Hardell L, Carlberg M, Söderquist F, Hansson Mild K (2013) Pooled analysis of case-control studies on acoustic neuroma diagnosed 1997-2003 and 2007-2009 and use of mobile and cordless phones. *Int J Oncol* 43: 1036-44. DOI: 10.3892/ijo.2013.2025
4. Hardell L, Carlberg M, Hansson Mild K (2013) Use of mobile phones and cordless phones is associated with increased risk for glioma and acoustic neuroma. *Pathophysiology* 20(2): 85-110. DOI: 10.1016/j.pathophys.2012.11.01
5. Carlberg M, Söderquist F, Hansson Mild K, Hardell L (2013) Meningeoma patients diagnosed 2007-2009 and the association with use of mobile and cordless phones: a case-control study. *Environmental Health* 12: 60. DOI: 10.1186/1476-069X-12-60
6. Hardell L, Carlberg M (2013) Using the Hill viewpoints from 1965 for evaluating strength of evidence of the risk for brain tumours associated with use of mobile and cordless phones. *Rev Environ Health* 28(2-3): 97-106. DOI 10.1515/reveh-2013-0006