

## Commentary on Re-Analysis of Risk of Glioma Using the Interphone Protocol

There have been 2 large case-control studies of brain cancer: a team in Sweden led by Dr. Lennart Hardell, and a 13-country study known as the Interphone. The former has found consistent risk of brain tumors from cellphone and cordless phone use. The latter has found inconsistent risk of brain tumors from cellphone use (they did not report risk from cordless phone use). However, the latter did find significant risk for >10 years of cellphone use.

This study showed, after re-analyzing the previous published Hardell study for the same ages used in the Interphone study (30-59 years) and when treating cordless phone use as a non-exposure (as was done in the Interphone study), both studies have very similar results.<sup>1</sup>

Indeed for >10 years of cellphone use (either side of head, ipsilateral side or contralateral side), the risk of brain cancer was not statistically different. Similarly for >1,640 cumulative hours of cellphone use (either side of head, ipsilateral side or contralateral side), the risk of brain cancer was not statistically different.

Table 1 shows 3 design flaws, by study group, and the approximate underestimation of risk that each contributes.

Design Flaw	Interphone	Hardell	Comments
Selection bias <sup>2</sup>	Yes, ~10% <sup>3</sup>	Very little to none	
Exposure bias	Yes, ~9% <sup>4</sup>	No	Cordless phone use treated as unexposed
Age range bias, removal of 20-29 ages	Yes, ~12% <sup>2</sup>	No	Hardell 20-80, Interphone 30-59

**Table 1.** Three design flaws compared by study group with the approximate underestimation of brain cancer risk.

This latest Hardell study is highly important because, as noted in Table 1, the Hardell re-analysis (using the Interphone protocol), shows the approximate Interphone study underestimation of brain cancer risk for exposure and age range bias factors, along with the Interphone's own underestimation due to selection bias.

The conclusion of the Interphone study's abstract stated, "There were suggestions of an increased risk of glioma at the highest exposure levels, but biases and error prevent a causal interpretation."

<sup>1</sup> Lennart Hardell, Michael Carlberg and Kjell Hansson Mild, Re-analysis of risk for glioma in relation to mobile telephone use: comparison with the results of the Interphone international case-control study. *Int. J. Epidemiol.* Advance Access published December 17, 2010.

<sup>2</sup> Selection bias occurs when more controls decide not to participate in a "cellphone study" when controls are not cellphone users.

<sup>3</sup> Interphone study's estimation

<sup>4</sup> Based on Hardell Re-Analysis study

This re-analysis study has shown that when the Hardell team analyzes their results using the Interphone protocol,<sup>5</sup> the Hardell results *are not statistical different* from the Interphone results and that both the Interphone results and the re-analyzed Hardell results show and equivalent increased risk for heavy use.

### **Conclusion**

- Both studies found a statistically significant. larger than a doubled risk of brain cancer when a cellphone was used for >10 years of cellphone use, or for more than 1,640 cumulative hours of cellphone use.
- The conclusion in the Interphone study's abstract is wrong. If corrected, it should read, "We found a significant doubling of risk of glioma (brain cancer) at the highest exposure levels."
- As stated in the final paragraph of the Hardell team's re-analysis where they stated, "We urge Interphone to fill in the gaps in our Tables 1 and 2, so as to make full comparison with our data possible."
- The Interphone study should analyze their results to include within Appendix 2: >10 years of ipsilateral and contralateral risks as well as >1,640 cumulative hours of ipsilateral and contralateral risk.
- The Interphone study should release its entire dataset (glioma, meningioma, acoustic neuroma, parotid gland, and tumors within the 20% volume of the brain's volume irradiated by cellphone use) so that other researchers can independently analyze the industry-funded Interphone dataset.

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<sup>5</sup> Interphone protocol included only ages 30-59 and treated cordless phone use as unexposed.