

RENCONTRE SCIENTIFIQUE

Radiofréquences et santé :

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Effects of recall bias from mobile phone use on modelling cancer risk : Results from a case-control simulation study

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Disclaimer

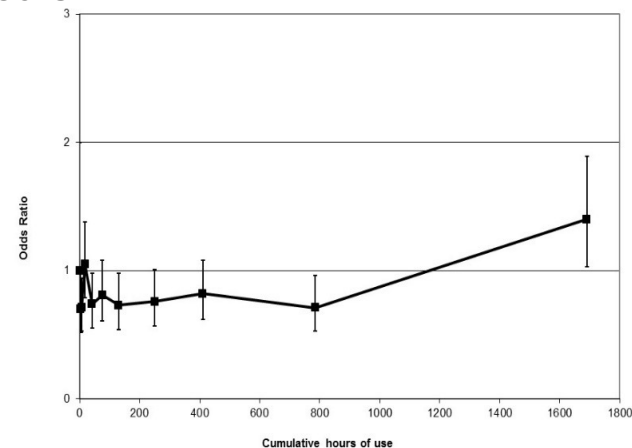
- No conflicts of interest to disclose in relation to this work

Today's outline

1. Rationale
2. Objective(s)
3. Main findings of the Inter-cal project on RF-EMF

Rationale

- RF-EMF classified as possibly carcinogenic to humans by IARC in 2011
- Concern from the public that RF fields increases cancer risk
- Mains findings from the largest case-control study (Interphone) - aimed to examine the possible association between mobile phone use and brain tumours - :
 1. A J-shaped glioma risk function observed
 2. 40% increased risk among the 10% heaviest users
 3. A decreased risk among the lower/moderate users
- **Could the entire J-shape relationship be biased ?**



Objectives

1. Create a model of the various biases and uncertainties present in Interphone
 - Applying reporting errors observed in Interphone to an hypothetical dataset of no association between mobile phones and risk of glioma
 - Determine whether **risk estimates** obtained **are compatible** with those reported in **Interphone** once the uncertainties are accounted for
2. Extend the modelling approach from RF-EMF to the analysis of pesticide exposure

Methods

- 1) Monte-Carlo simulation study on a case-control study design
 - a. Input parameters derived from two Interphone validation studies : Self-reported and operator-recorded data available.
 - b. Simulated several data sets with no association between mobile phone use and glioma
 - Using exposure categories (deciles)
 - True and error-prone (observed) mobile phone use exposure data were generated
 - c. Bayesian hierarchical estimates of mobile phone use data heterogeneity across the Interphone countries
- 2) Several biased scenarios of error in mobile phone use recall considered
- 3) Test potential association between the error made and the true level of use

Scenarios investigated on recall errors

- Differential recall errors: random, systematic, and both combined
- Findings from validation studies:
 - Greater errors among cases than controls
 - Random errors: average standard deviation is 30% higher in cases
 - Systematic errors: average error is 0.33 higher in cases

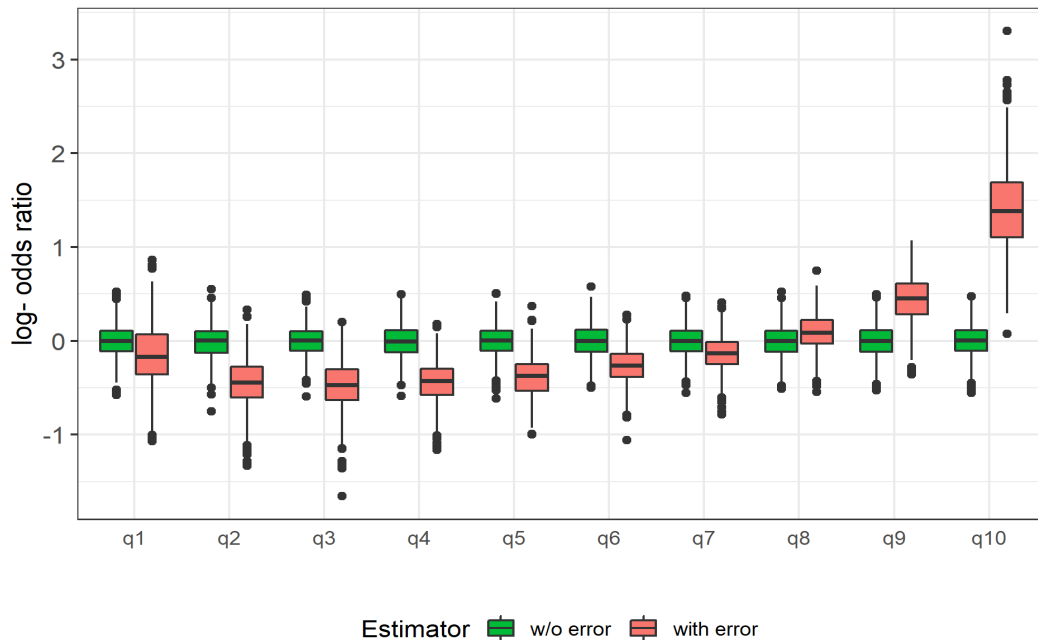
Results (I) : Mobile phone use

- Among interviewed control participants:
 - Over-representation of regular mobile phone users vs. non-regular users
- Systematic exposure misclassification:
 - Under-estimation of mobile phone use among low users
 - Over-estimation of mobile phone use among heavy users
- More cases than controls reported doubtfully high levels of use and larger variance

Results (II)

D Differential systematic and random error: under H0 (NumberCalls)

OR = 1 ; Error ($\mu_{\epsilon}^{\text{controls}} = 0$, $\mu_{\epsilon}^{\text{cases}} = 0.21$ | $s^{\text{controls}} = 0$, $s^{\text{cases}} = 0.54$ | $\sigma_{\epsilon}^{\text{cases}} = 1.3 \sigma_{\epsilon}^{\text{controls}}$)



Take-home messages

- The J-shaped exposure-risk in interphone is fully compatible with an assumption of no effect
- The finding of association in the 10% heaviest mobile phone users in Interphone is most likely an artifact

Challenges

- Case-control studies results are not sufficient to resolve the question studied
- Cohort studies (e.g., Cosmos) would help to address whether mobile phone use is related to an increased brain tumour risk

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THANK YOU

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Types of measurement errors

