Recent epidemiological studies on mobile phones and brain cancer

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Outline

- Summary of studies published before 2009- what are the current research questions?
- Published studies in 2009 and 2010
  - Incidence studies
  - Interphone – brain tumours
- On-going studies
  - Interphone – acoustic neuromas
  - Cosmos
  - Cefalo
  - Mobi-kids

Research questions (ICNIRP)

Review on mobile phones and brain tumour risk (Sept 2009)

Ahlbom, Feychting, Green, Kheifets, Savitz, Swerdlow, and ICNIRP (International Commission for Non-Ionizing Radiation Protection) Epidemiology committee

Conclusion: Overall, the studies … do not demonstrate an increased risk within approximately 10 years of use…

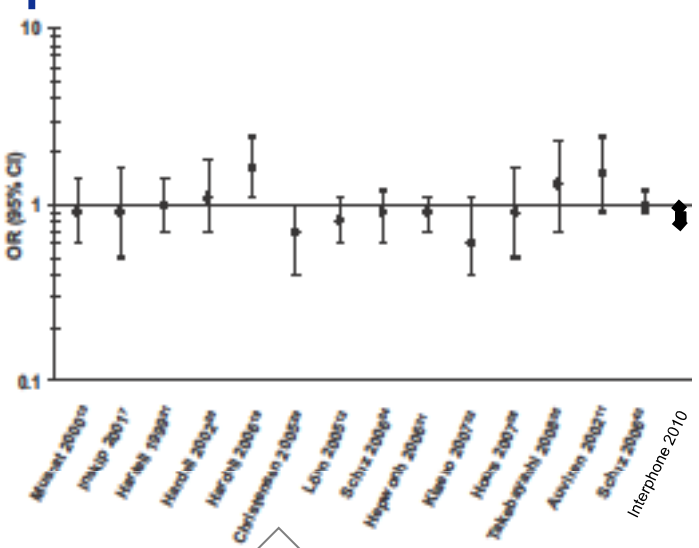
- Data for **use > 10 years** sparse
- **Inconsistencies** across studies (Hardell et al versus rest)
- Small increased or decreased risks among users (***increased risks among heaviest users***)
- Methodological issues (exposure misclassification, selection bias)
- Data completely lacking for **children and adolescents**

Interpretation of results of epidemiological studies – in very brief

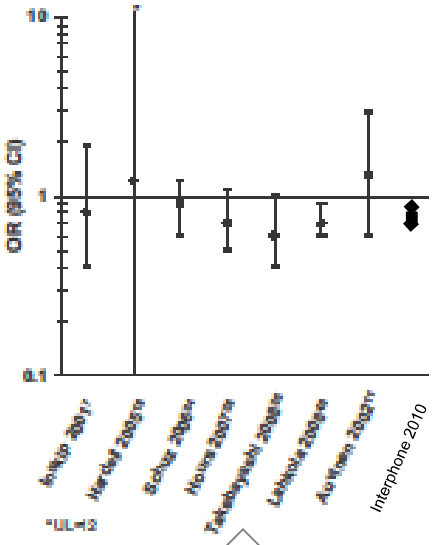
- By comparing disease occurence and mobile phone use, compute Odds Ratios (OR).
  - If OR = 1 $\Rightarrow$ No association
  - If OR > 1 $\Rightarrow$ Excess risk associated to use of phone
  - If OR < 1 $\Rightarrow$ Protective effect associated to use of phone

- Confidence Interval reflects the **Precision** of results
  - If wide $\Rightarrow$ study (and results) imprecise
  - If narrow $\Rightarrow$ study precise
  - If Confidence Interval includes 1, result could be due to **Chance**

Brain tumour risk estimates for use of mobile phone from case control and cohort studies

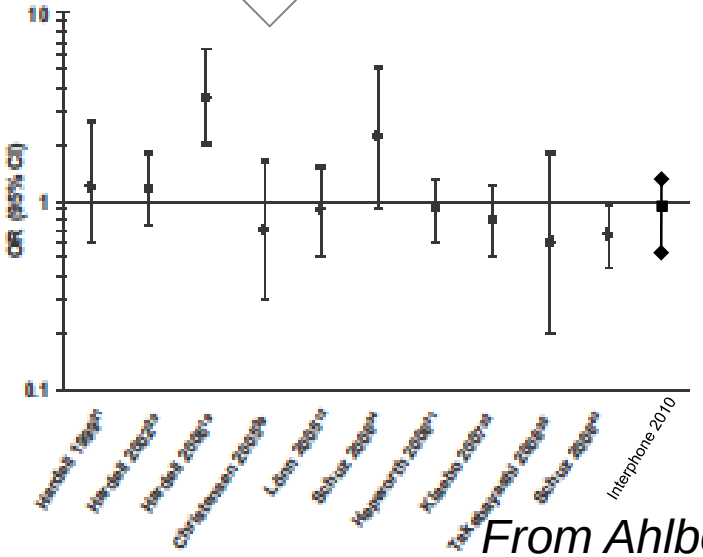


Short-term use (<5y)

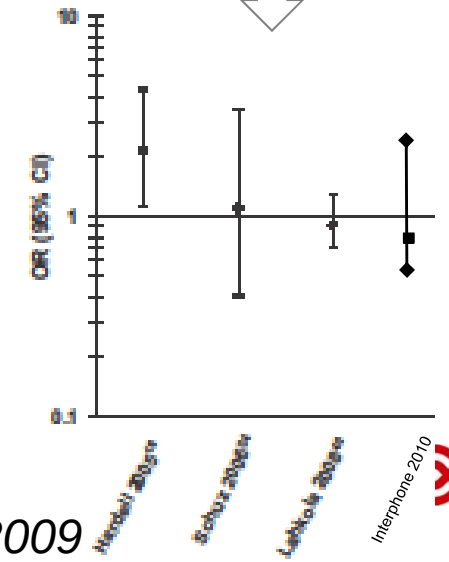


Glioma

Meningioma



Long-term use (>10y)



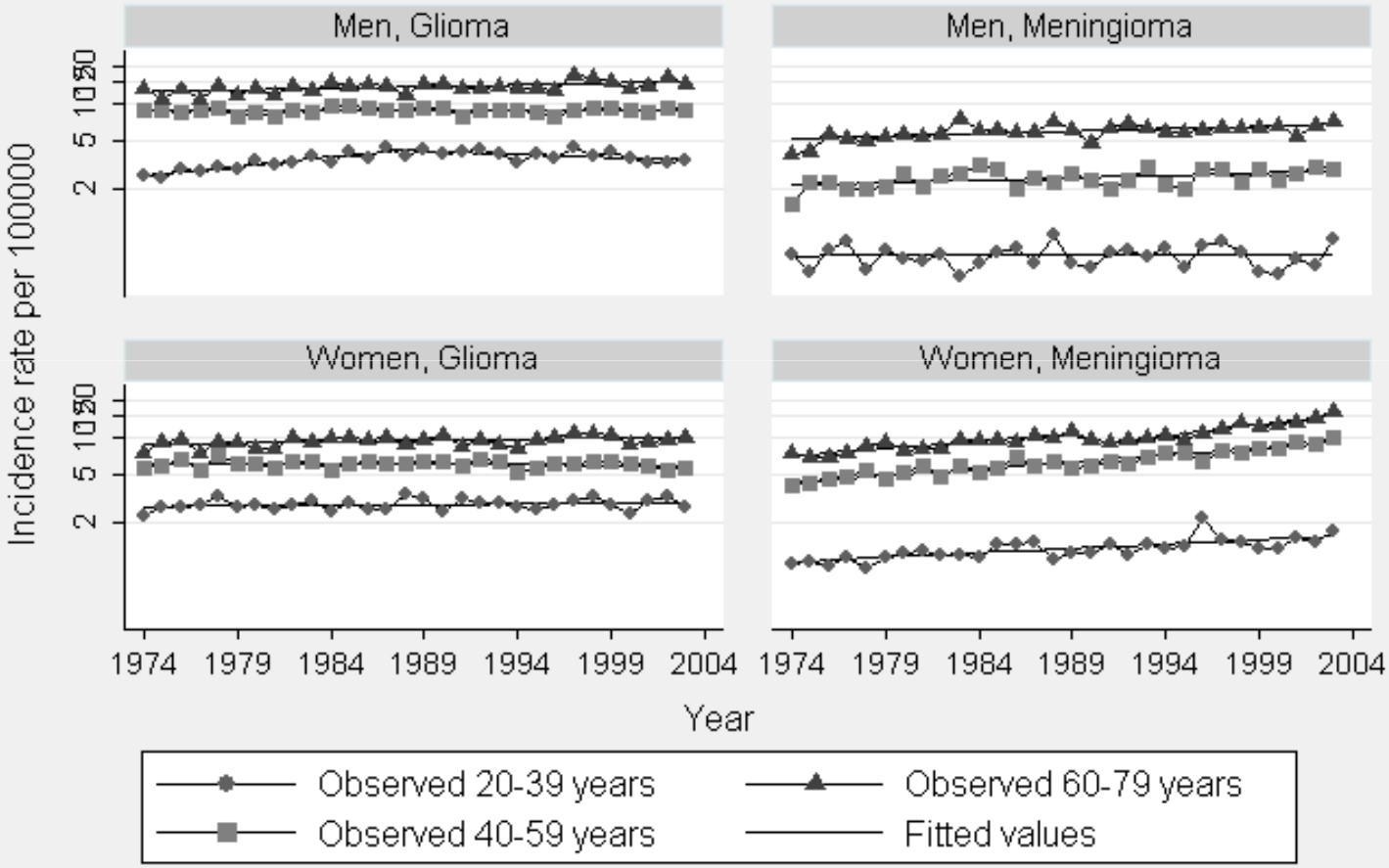
From Ahlbom et al, Epidemiology, 2009

Incidence studies: tools for public health surveillance

- If the use of mobile phone increases the risk of brain tumour, then the number of cases of brain tumours will increase

- Because the cancer registries record all (brain) tumour cases, the changes in number of cases will be reflected in the records of the cancer registries

Incidence brain tumour in Nordic countries among adults



Glioma and meningioma incidence trends by age in Nordic countries,1974-2003

From Deltour et al, JNCI, 2009

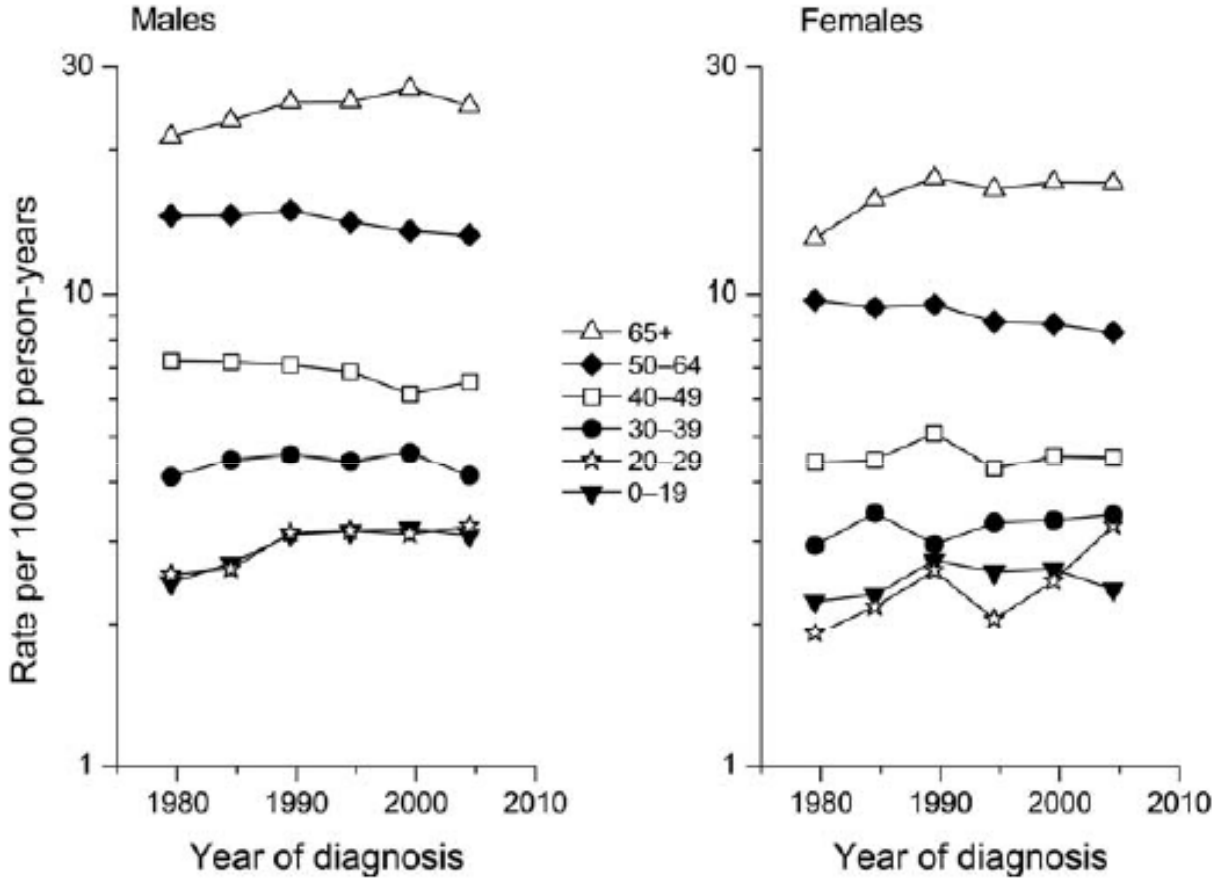
Conclusion: no observable effect of mobile phone up to 2003 in time trends of the incidence rates

- Research question: Inconsistencies across studies (Hardell vs rest)

Among men aged 40–59 years, the reported prevalence of use was 7% in 1989 and reached 28% in 1993 … If the risk of gliomas associated with mobile phone use doubled after 10 years of use as reported in Hardell et al. … the incidence rate in this subgroup should have increased by approximately 20% or more between 1999 and 2003; in fact, it remained stable during this time period.

Deltour et al., J Natl Cancer Inst, 2010; in response to: Hardell et al.:

Incidence malignant brain tumour in USA



Brain cancer incidence trends among whites by age, SEER 9, 1977–1981 to 2002–2006.

From Inskip et al, Neurology, 2010

Interphone Study

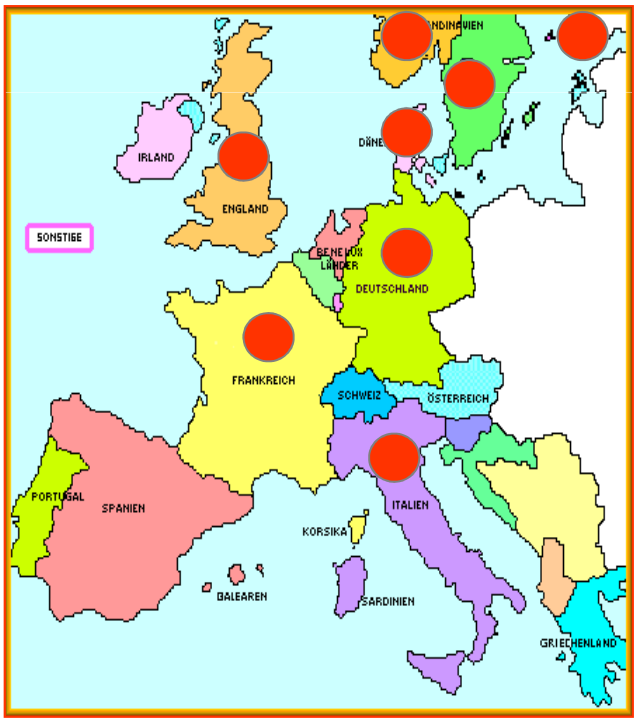
Cardis et al., Eur J Epidemiol, 2007

International Agency for Research on Cancer

World Health Organization

16 centers in 13 countries

European centers



Study of mobile phone use and risk of brain tumours among adults (30-59 years old).
Characteristics:

Personal interviews with:
- 2708 patients with glioma
- 2409 patients with meningioma
- similar number of controls or their proxies

Ascertainment: 2000-2003

Interphone Study

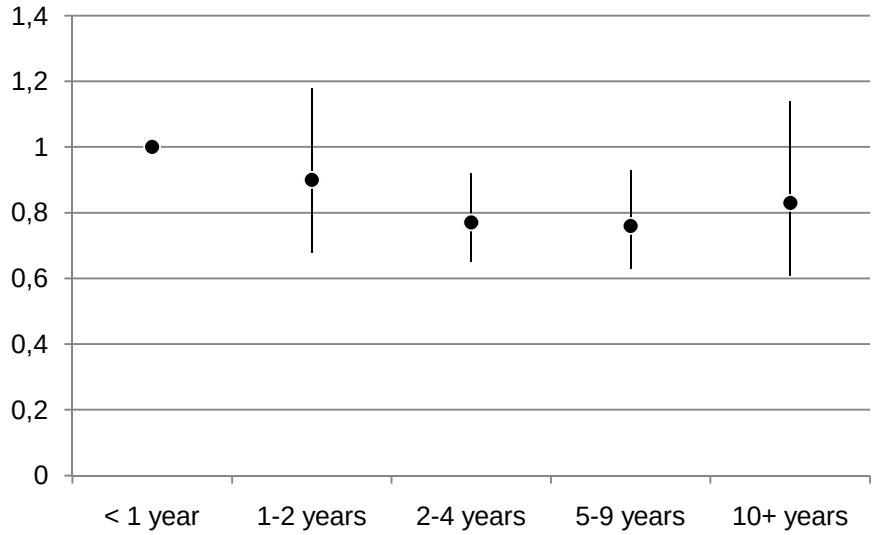
International Agency for Research on Cancer

World Health Organization

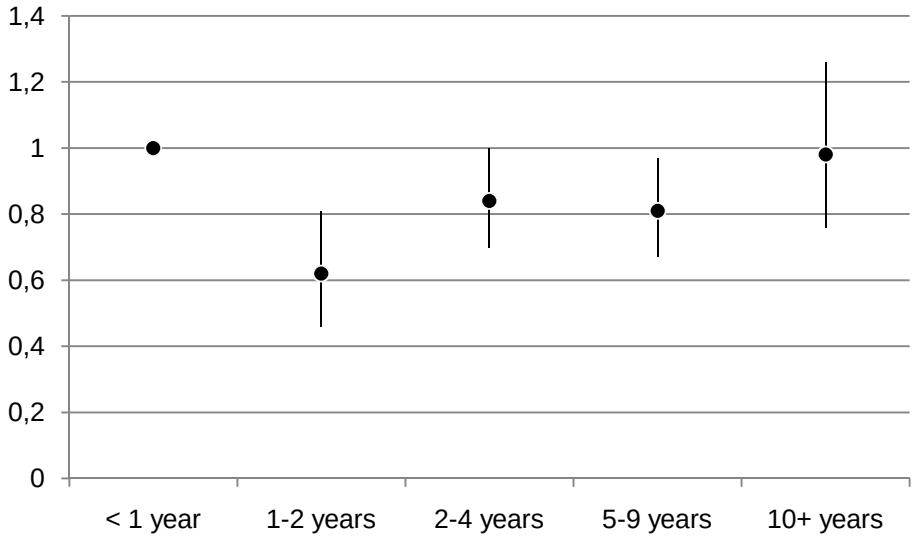
Interphone Study Group, Int J Epidemiol, 2010

Time after first regular use [years]

Meningioma



Glioma



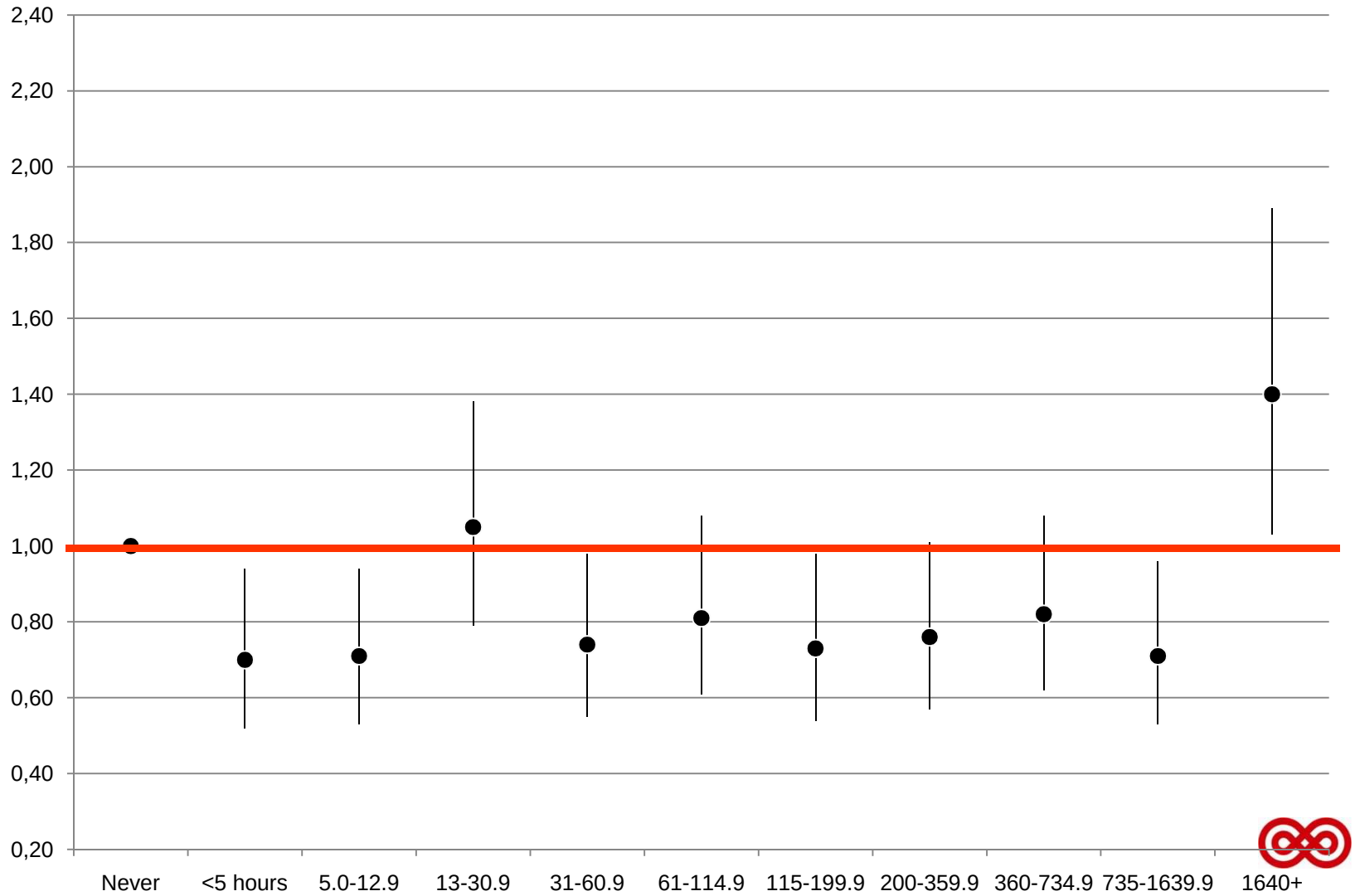
Interphone Study

International Agency for Research on Cancer

World Health Organization

Interphone Study Group, Int J Epidemiol, 2010

Glioma – cumulative hours of use

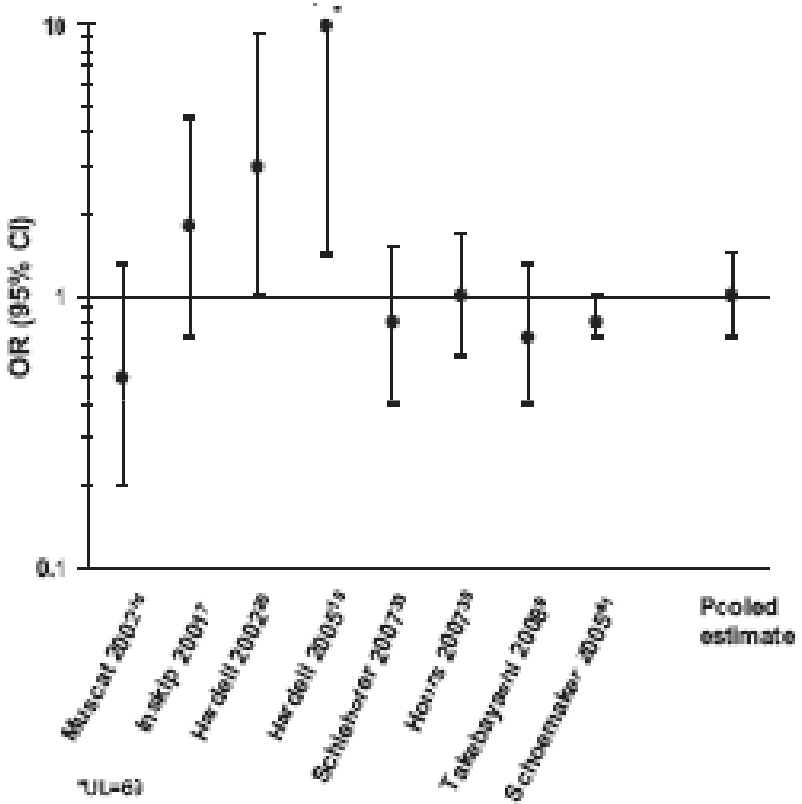


Interphone – brain tumours

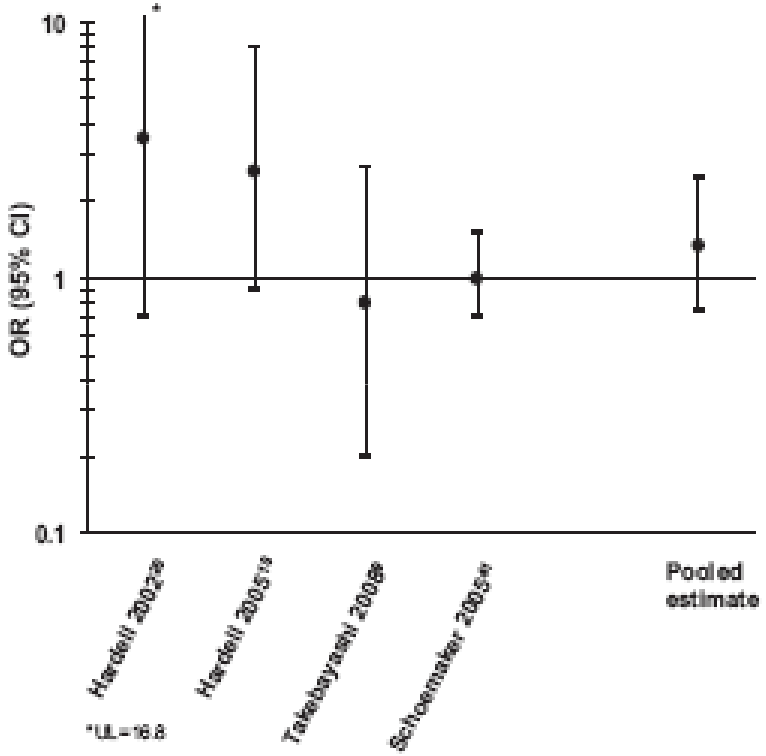
- Conclusions
  - No **overall** increased risk
  - Observation of an increased OR for glioma in **most intensive** users
    - OR (use > 1640 hours)= 1.40 (1.03 – 1.89)
  - temporal lobe, ipsilateral mobile phone use
  - Little evidence of an association with meningioma
- But: ”biases and errors prevent a causal interpretation” so question:
  - Are these increases due to bias or are they real ?

Case-control studies on Acoustic Neuromas

(a rare tumor of the acoustic nerve sheaths)



Short term use
(<5 years)



Long term use
(> 10 years)

From Ahlbom et al, Epidemiology, 2009

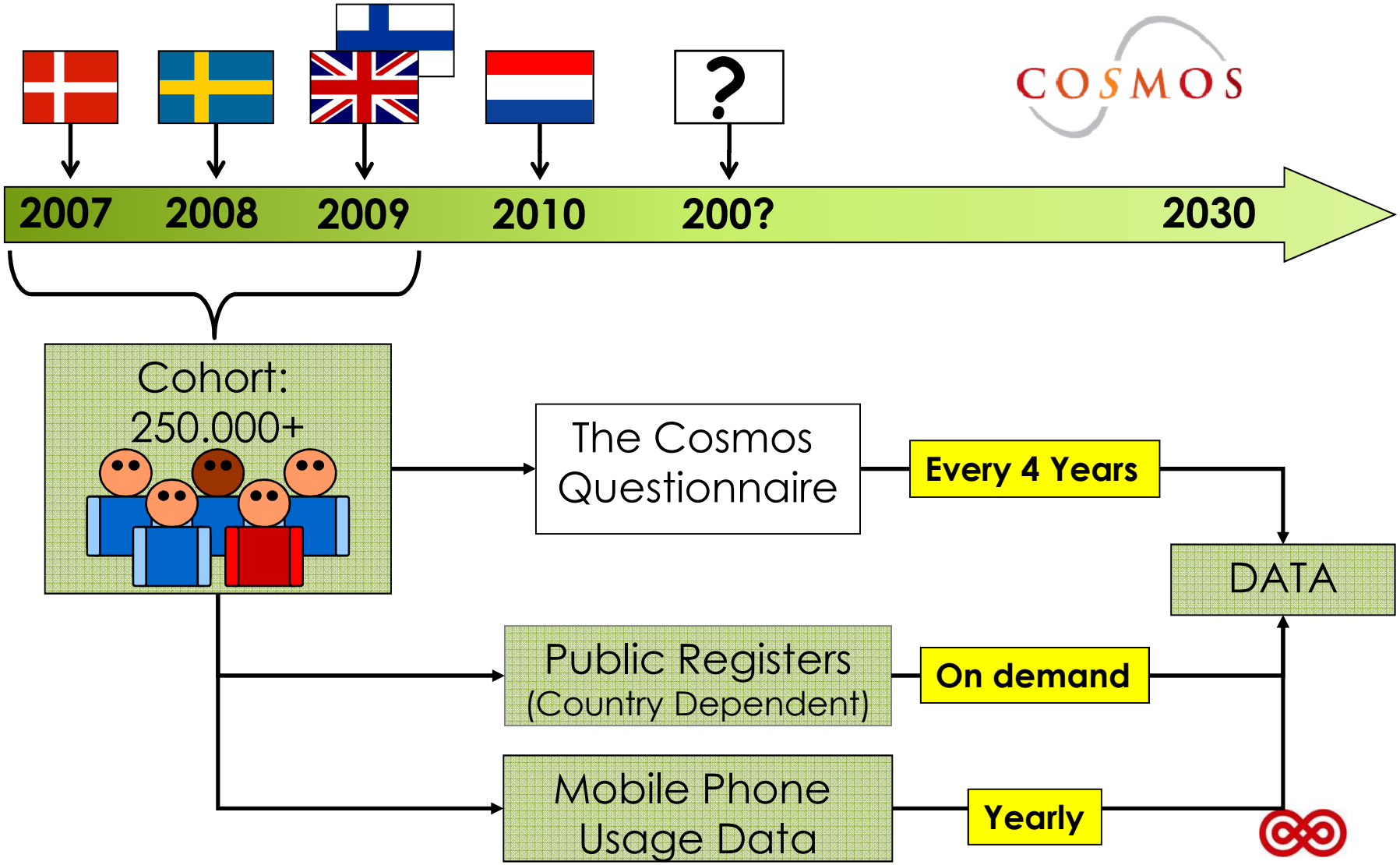
Interphone – Acoustic Neuromas

- Same overall study design as brain tumours
- International study:
  - 1121 cases, 4415 controls
- Ascertainment period: 1999-2004
- Face-to-face interviews using CAPI

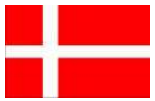
- Analyses and writing of publication on-going

COSMOS:

International Cohort Study of Mobile Phone Use and Health



Prospective Cohort Study



Aslak Poulsen
Joachim Schüz
Institute of Cancer Epidemiology
~ 28.000 respondents

Anders Ahlbom
Karolinska Institute
~ 55.000 respondents

Paul Elliott
Imperial College London
ongoing

Anssi Auvinen
STUK + University of Tampere
~ 4.000 respondents

Hans Kromhout
Utrecht University
use existing cohorts

Features:

Sample stratified by high and low use of mobile phones

Network operator records

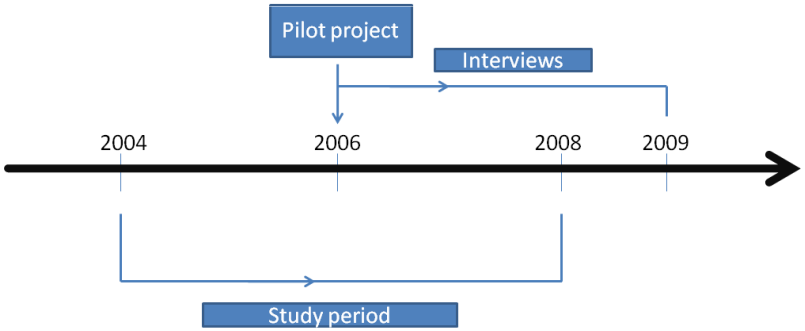
Exposure information assessed before the diagnosis of disease

Various outcomes (cancer, other)

Follow up questionnaires

Cefalo : International Childhood Brain Tumor Study

- International case – control study among children (age 7-19)
- Use of mobile phones
  - Self reported + operators info



- Data collected
  (350 cases, 650 controls)
- Analyses ongoing

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Norwegian Cancer Registry

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Karolinska Institute

Martin Röösli
University of Berne

mobi-kids
Tecnologías de la comunicación, medioambiente y tumores cerebrales en la gente joven

Risk of brain tumours from exposure to EMF from mobile communication technologies in young people

- International case control study among children (Age 10-24)
- 2000 cases and 4000 hospital based controls *foreseen*
- Detailed tumour localisation using CT and MRI scans
- First interviews started in oct 2010, expected to last 2.5 years

Austria
France
Germany
Greece
Israel
Italy
The Netherlands
Spain

Australia
New Zealand
Canada
India
Taiwan
Japan ?
US ?

MobiKids international coordinator:
E. Cardis (CREAL)

IARC monograph meeting in May 2011

- The Monograph programme of IARC will evaluate the evidence regarding radio frequency electromagnetic fields and cancer (including mobile phones)
- Interdisciplinary working groups of expert scientists review the published studies and evaluate the weight of the evidence that an agent can increase the risk of cancer.
- All aspects
  - In vitro
  - In vivo
  - Epidemiological evidence