

IARC 2B & RF epidemiological studies

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IARC evaluation of carcinogenicity May 2011

- IARC convened a working group of 30 experts from various scientific backgrounds
- The working group concluded:

“There is “limited evidence in humans” for the carcinogenicity of RF-EMF, based on positive associations between glioma and acoustic neuroma and exposure to RF-EMF from wireless phones.”
- The working group was not unanimous, some members considered the evidence “inadequate” because of:
 - inconsistencies between case-control studies,
 - lack of exposure-response in the Interphone study,
 - no increased risk in cohort study,
 - no increase in the brain tumor incidence since mobile phones were introduced – but incidence trends only available until early 2000s

Overall conclusion of IARC evaluation

- Radiofrequency electromagnetic fields was classified as “possibly carcinogenic to humans” (Group 2B), a category used when a causal association is considered credible, but when chance, bias or confounding cannot be ruled out with reasonable confidence

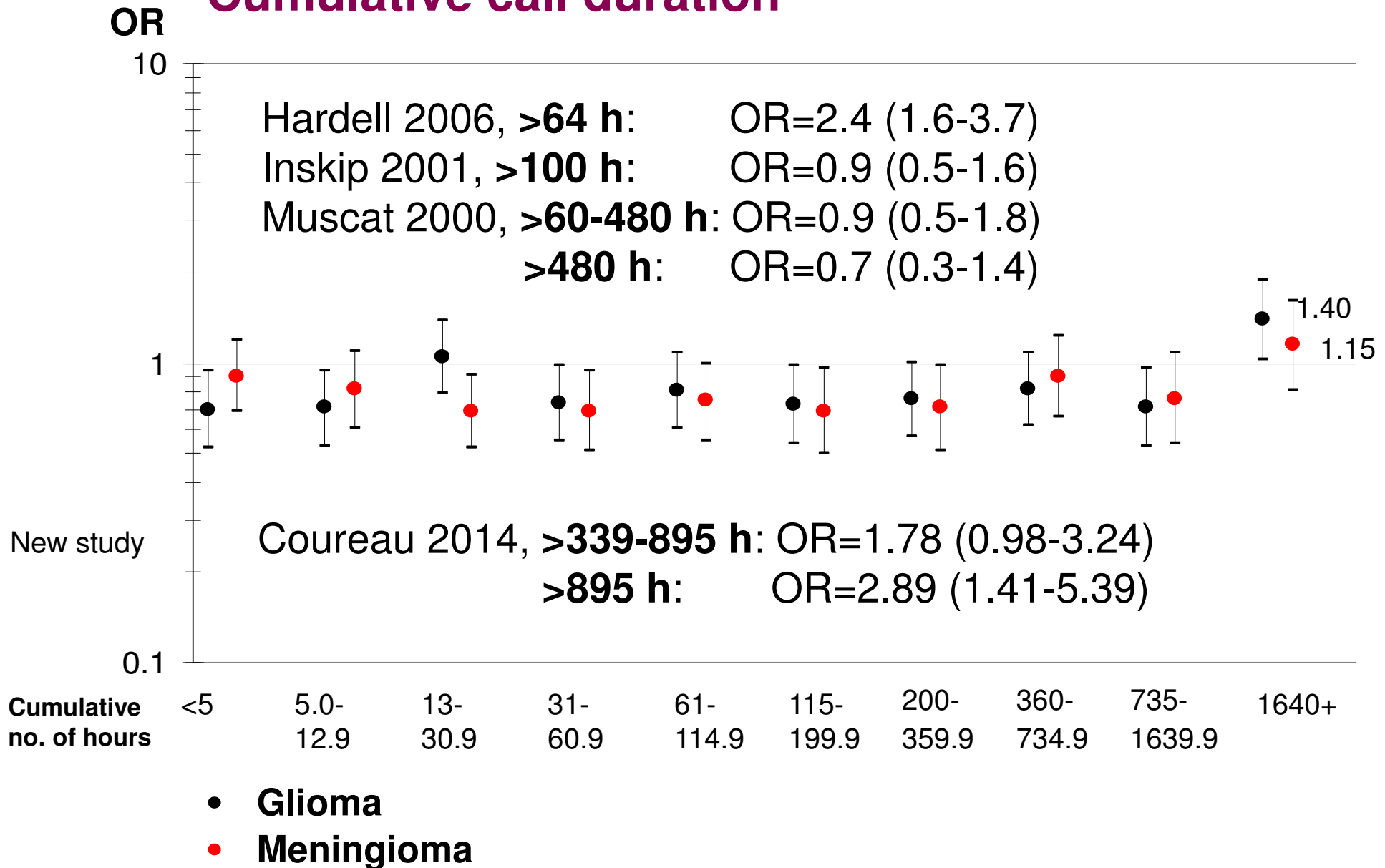
- Major biases discussed:
 - Selection bias in case-control studies from non-participation leads to underestimation of risk
 - Recall bias in case-control studies – cases tend to over-report mobile phone use in distant past, leads to over-estimation of risk

New evidence after IARC evaluation

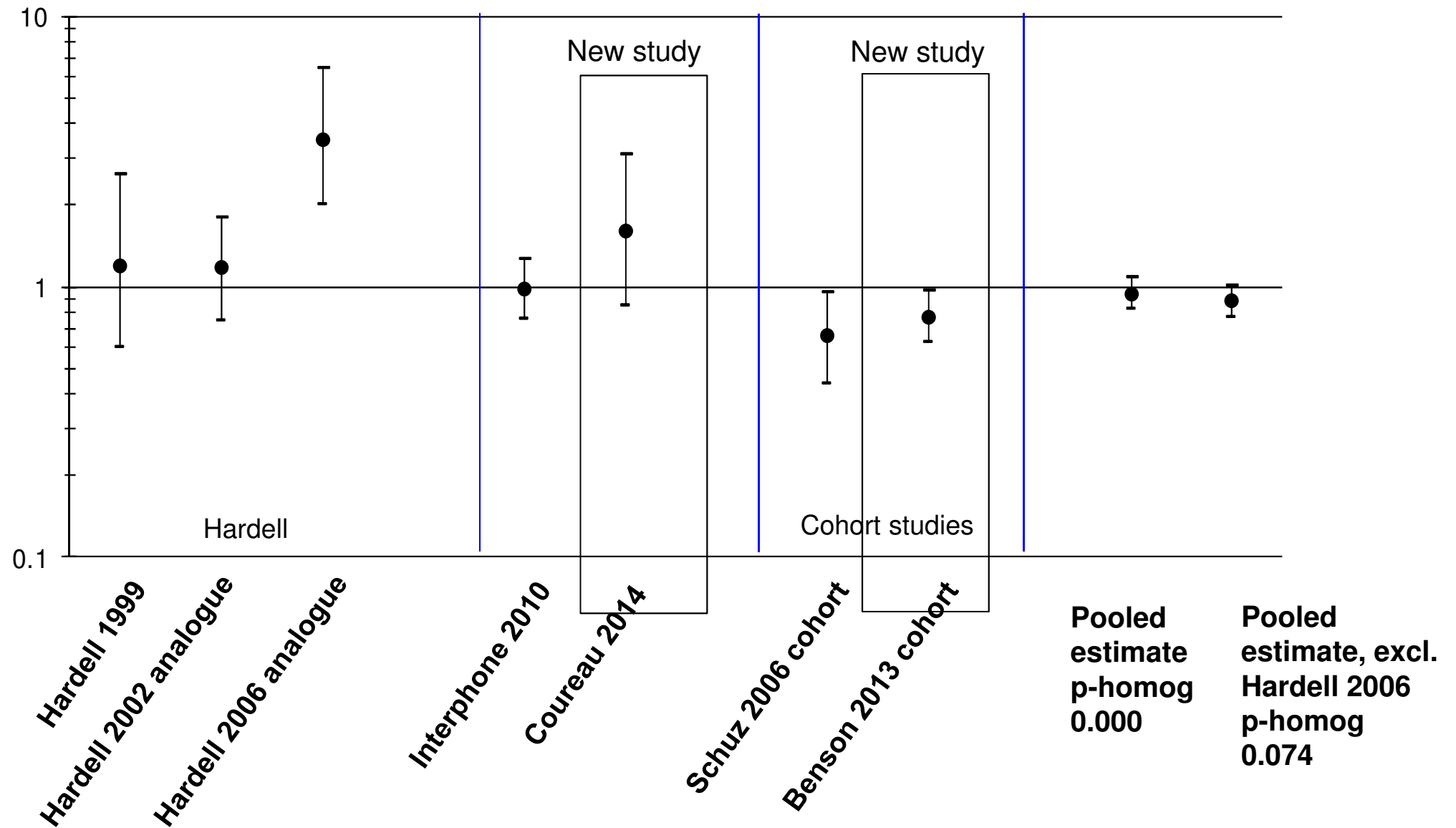
- Several brain tumor incidence trend studies with longer follow-up – until 2009
- Simulation studies – estimated what the incidence would have been if results from case-control studies were true
- A few new case-control studies with retrospective recall of phone use – potential recall bias
- New analyses of Danish cohort study of subscribers
- One new cohort study from the UK with prospectively collected information on mobile phone use – no recall bias

Interphone results brain tumors

Cumulative call duration



Glioma and mobile phone use, long induction period, ~ > 10 years



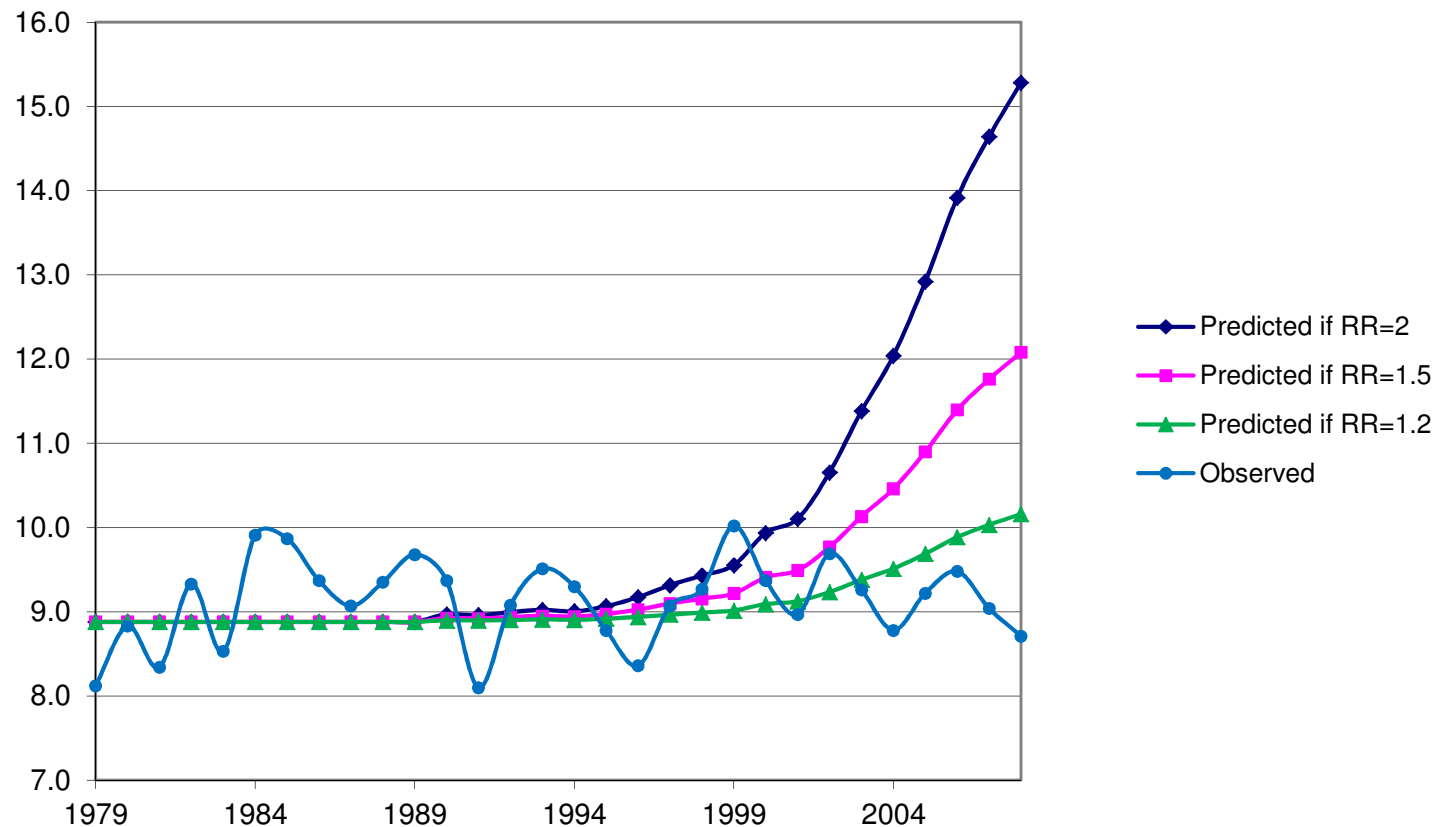
New case-control study from Hardell group, 2013 - glioma

Time since first use	OR (95% CI) Analogue phone	OR (95% CI) Digital phone
>1-5 years	-	1.8 (1.01-3.4)
>5-10 years	0.6 (0.1-3.1)	1.6 (0.97-2.7)
>10-15 years	1.4 (0.7-3.0)	1.3 (0.8-2.2)
>15-20 years	1.4 (0.7-2.7)	2.1 (1.2-3.6)
>20-25 years	2.1 (1.1-4.0)	-
>25 years	3.3 (1.6-6.9)	-

Note: 23 years is the maximum time possible that handheld mobile phones had been available in Sweden.

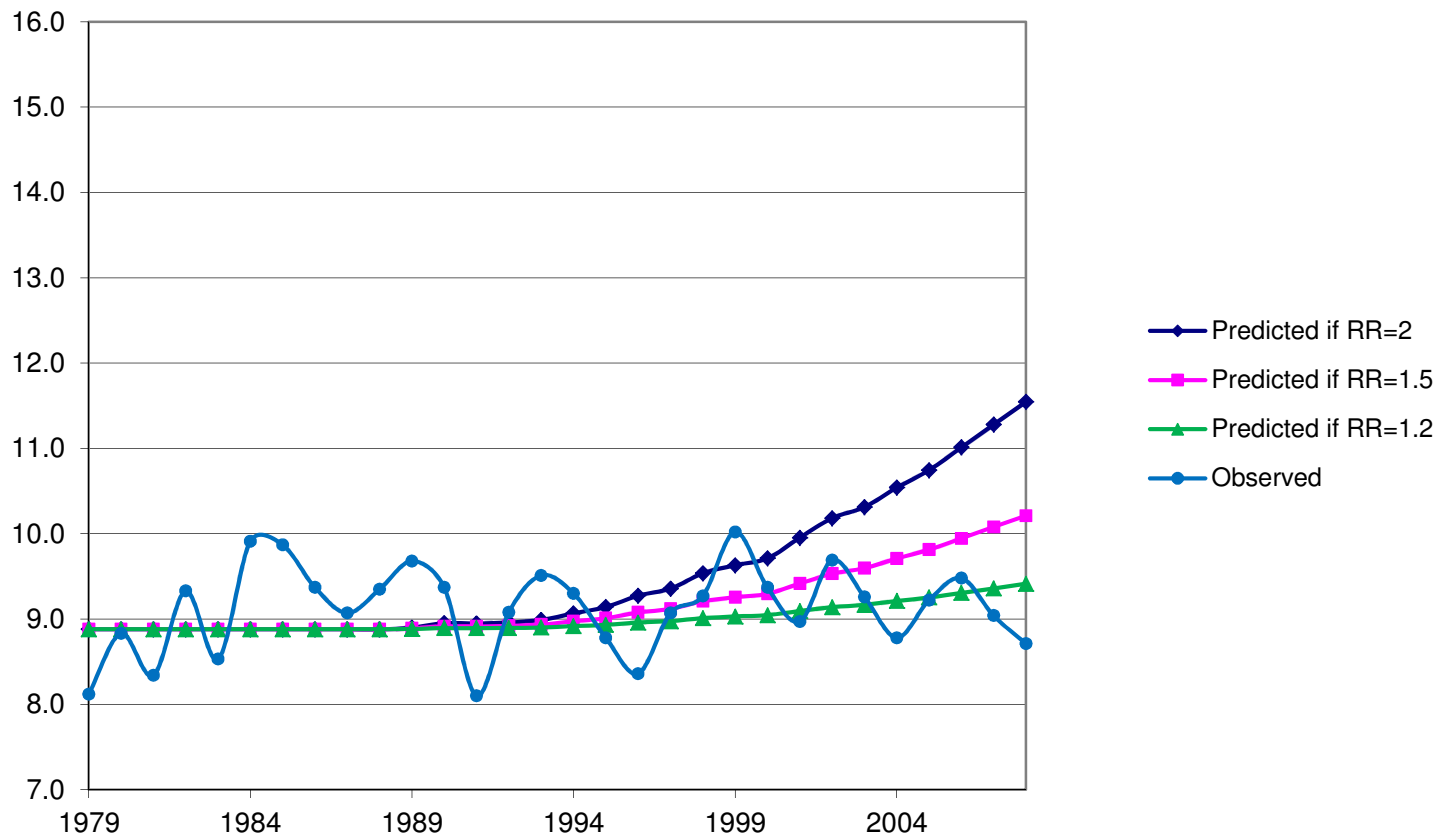
Observed and predicted glioma incidence rates under scenarios of risk, Nordic countries, men 40-59 years, 1979-2008

Under the assumption that all users at increased risk after 10 years:

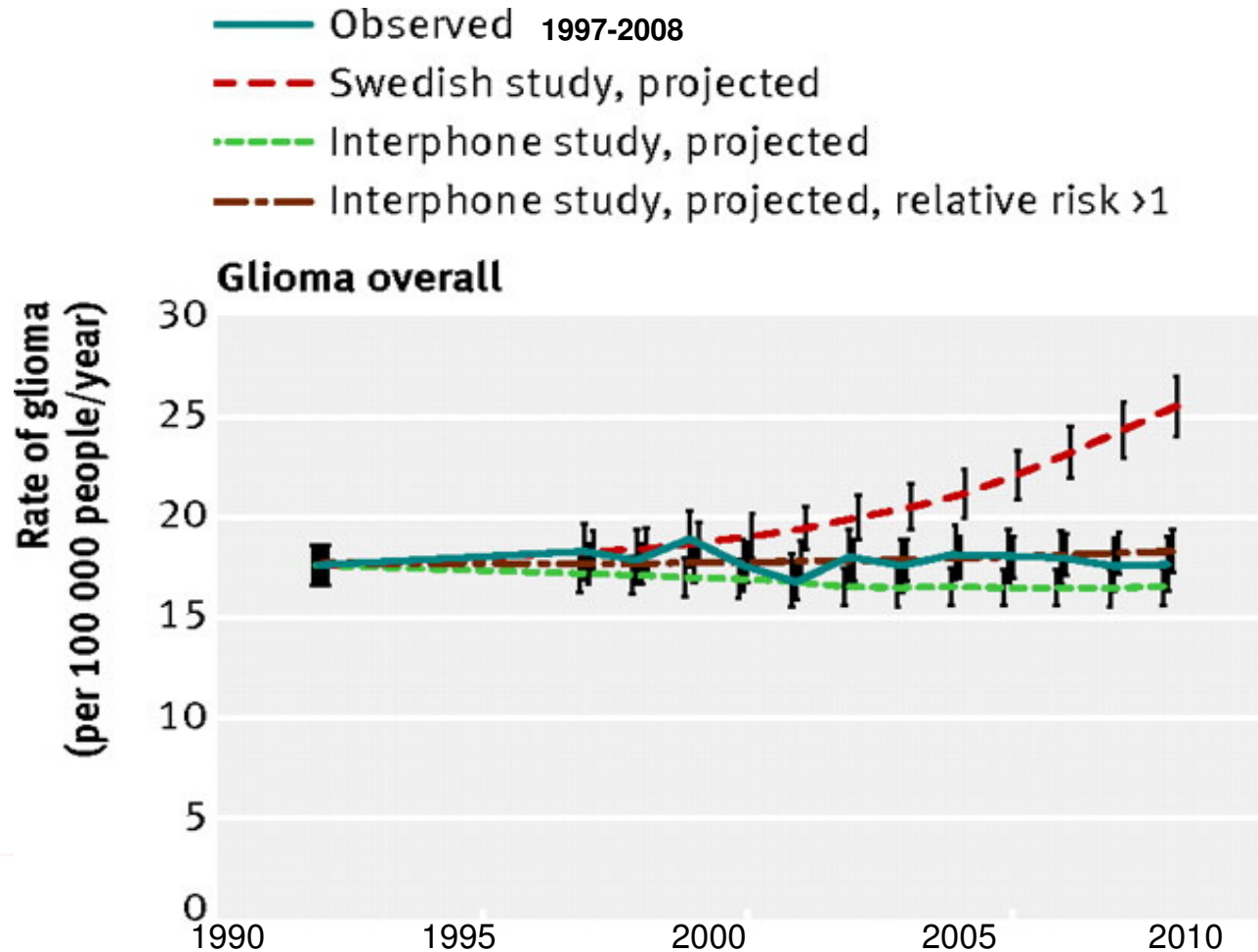


Observed and predicted glioma incidence rates under scenarios of risk, Nordic countries, men 40-59 years, 1979-2008

Under the assumption of risk for heavy users (>1640 hours)



Observed and projected incidence of glioma in the US based on results from case-control studies



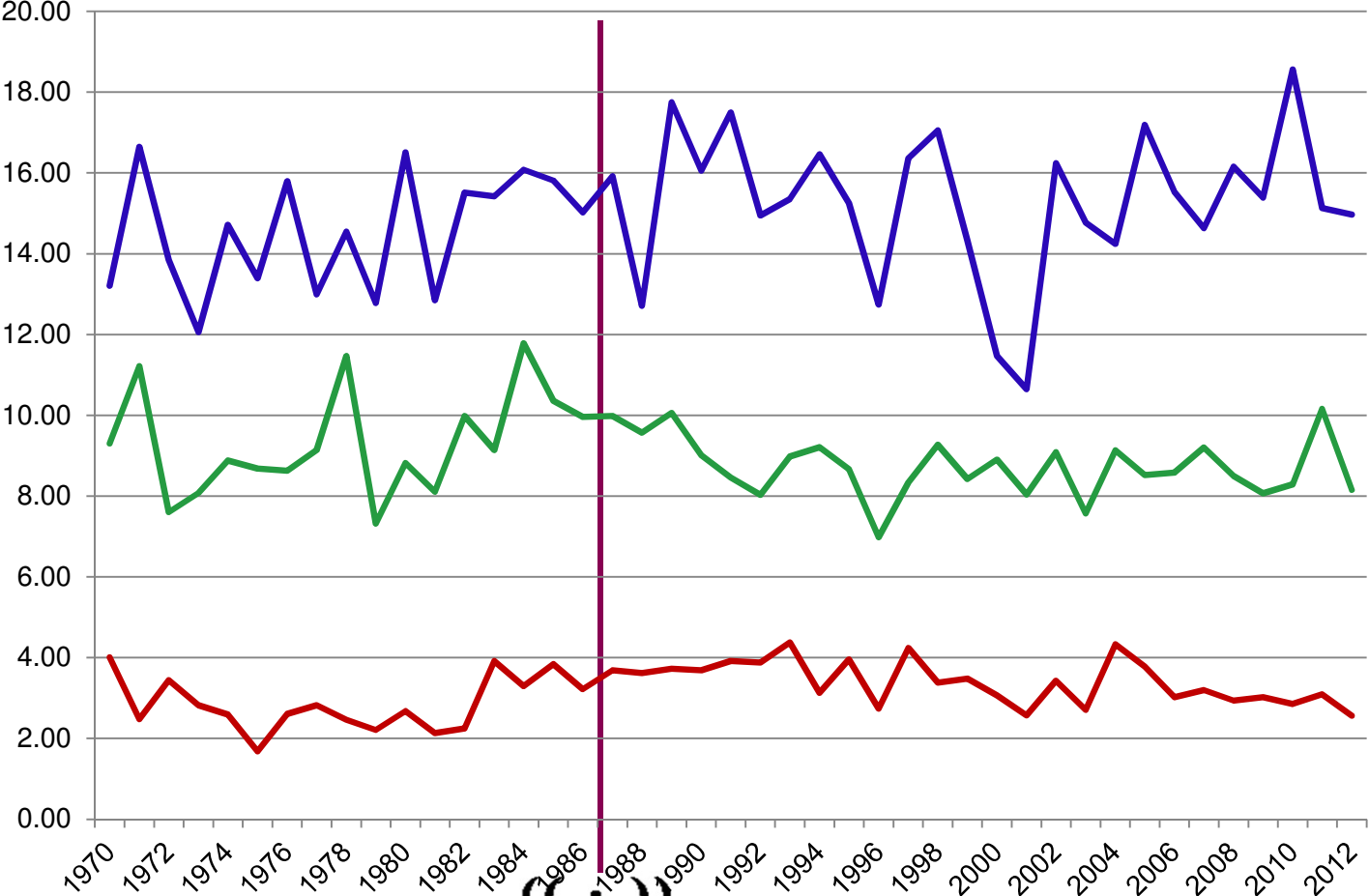
Little M P et al. *BMJ* 2012;344:bmj.e1147

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Glioma incidence, Sweden 1970-2012, Men

per/100 000
age standardized

Introduction of handheld
mobile phones

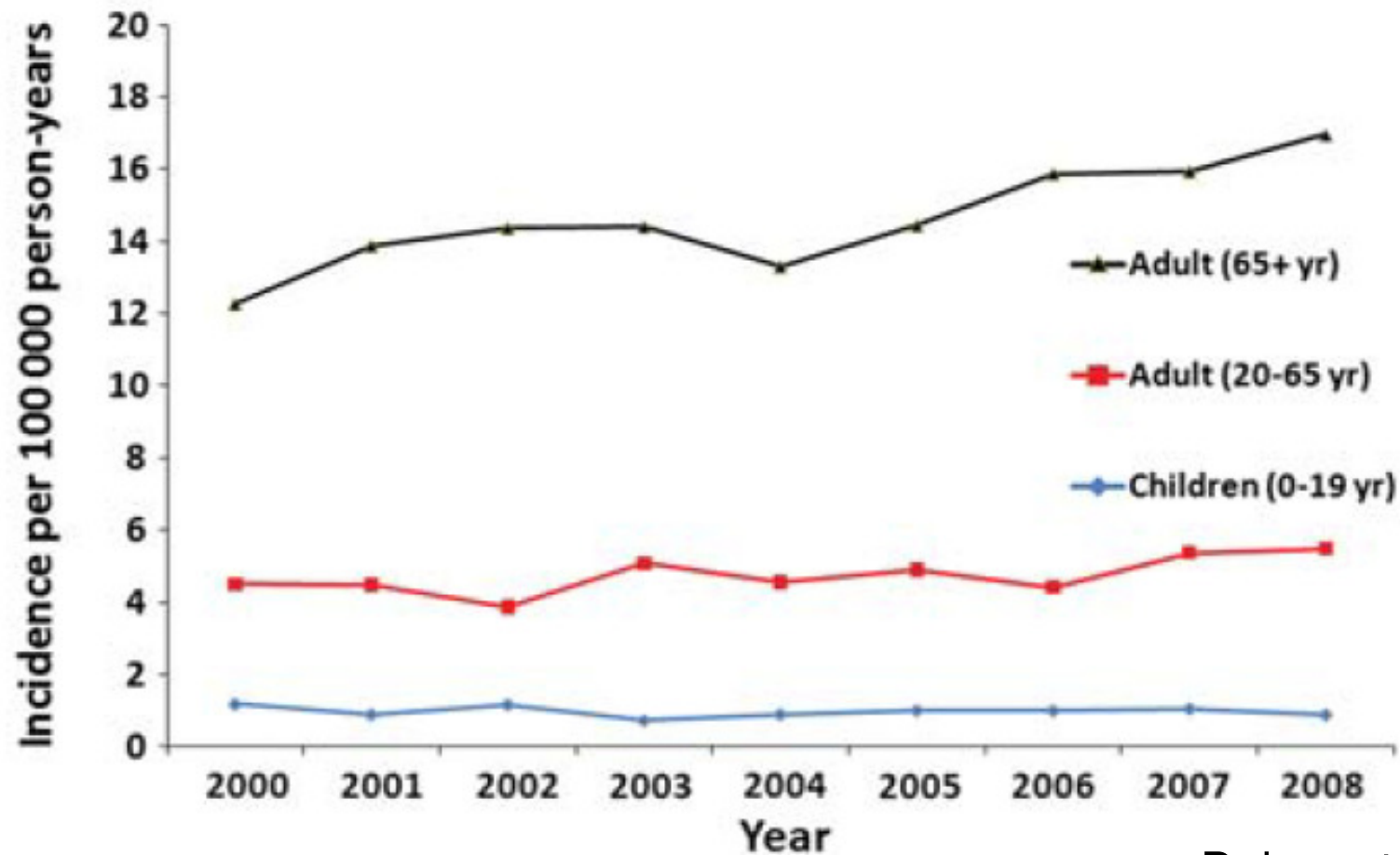


- 60+
- 40-59
- 20-39



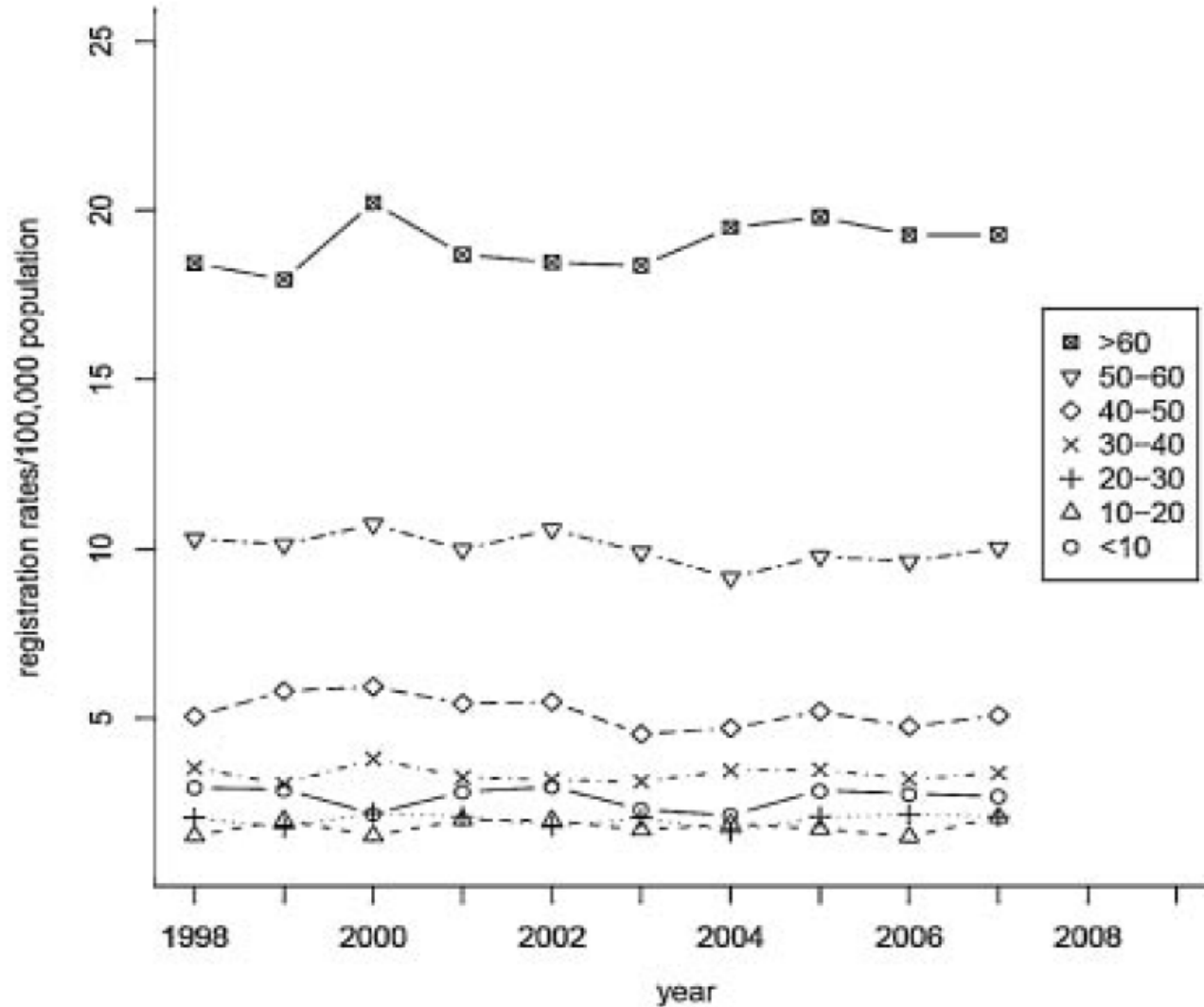
Source:
Cancer Register,
The National Board of
Health and Welfare

Glioma incidence – Australia 2000-2008

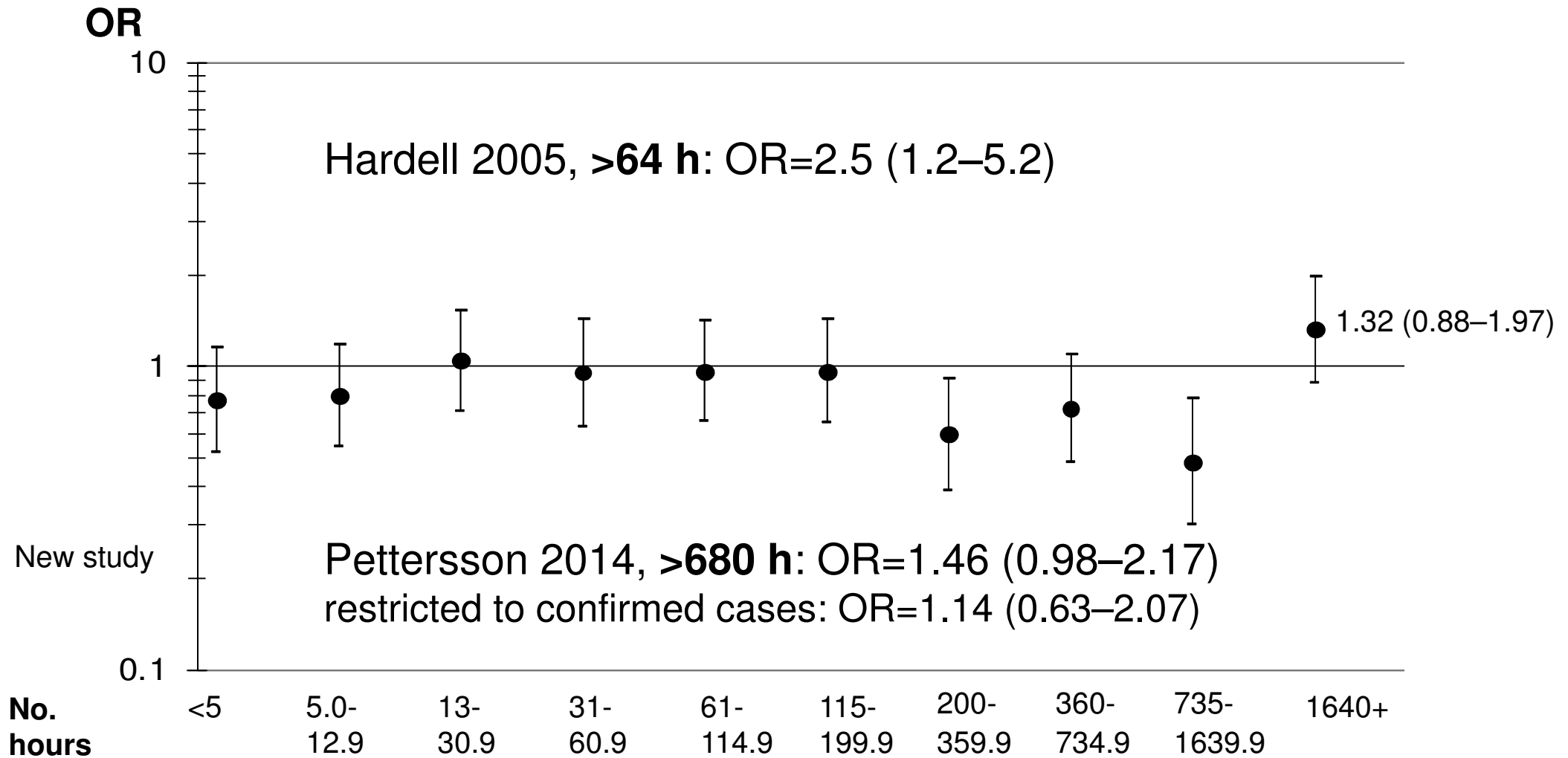


Dobes et al. 2011

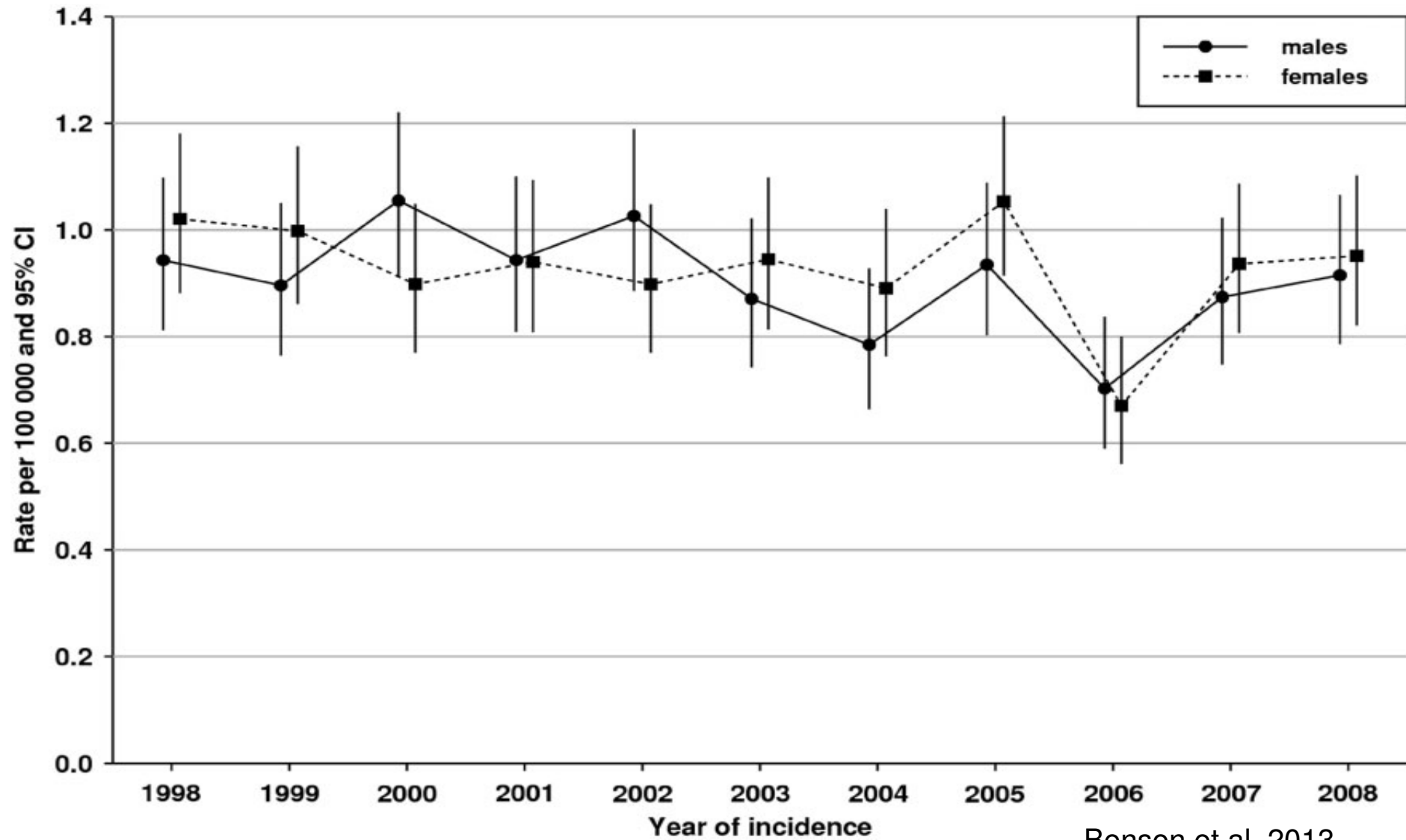
UK: Age specific brain cancer incidence trends 1998-2007, de Vocht et al., Bioelectromagnetics, 2011



Results acoustic neuroma, Interphone study: Cumulative hours of use

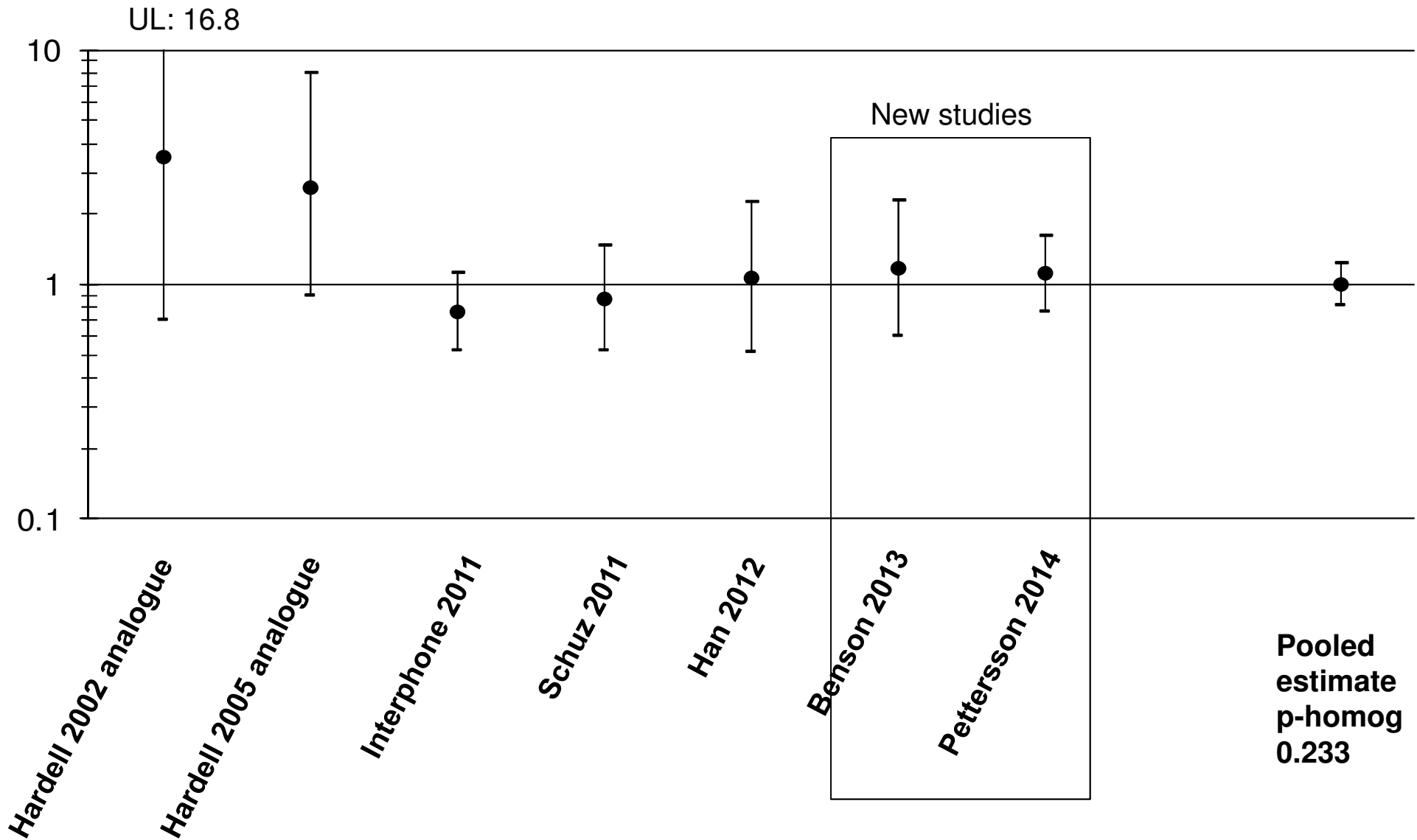


Acoustic neuroma incidence England



Benson et al. 2013

Acoustic neuroma and mobile phone use, **long** induction period

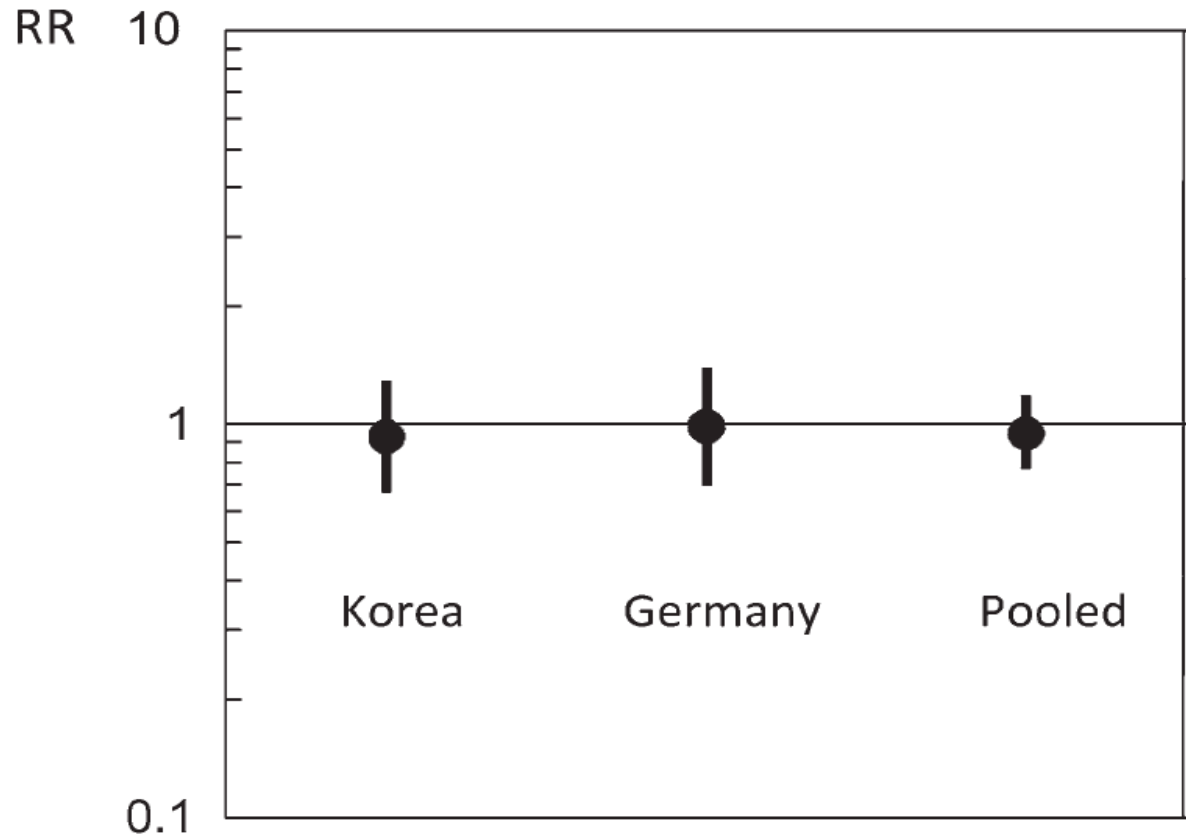


Children

- No increase in childhood leukemia incidence near radio- and television transmitters observed in two well-designed studies from Germany and South Korea

Large-scale systematic case-control studies (South Korea, Germany)

- Individually predicted RF field strength
- No evidence for an association between RF fields and childhood leukaemia risk



From Schuz J, Ahlbom A. Rad Prot Dosim, 2008

Children

- No increase in childhood leukemia incidence near radio- and television transmitters observed in two well-designed studies from Germany and South Korea
- No increased incidence in any types of childhood cancer (0-4 years) was observed in a UK study of children whose mothers were living near mobile phone base-stations during pregnancy
- No increased brain tumor risk related to mobile phone use was observed in a case-control study of childhood brain tumors (the CEFALO study)
- No increase in the incidence of childhood brain tumors have been observed since the introduction of handheld mobile phones

Conclusions

- Difficult to remember and correctly estimate amount of mobile phone use – especially long time in the past
 - Give room for recall bias
- Cohort studies with prospectively collected information about mobile phone use have not found an increased risk of brain tumors or acoustic neuroma – but crude exposure information
- New (and old) incidence trend studies do not support a causal interpretation of results from some epidemiological case-control studies
- Few data on children available
 - No increased cancer risk observed and no increased incidence of brain tumors in children