

The SCENIHR Assessment on EMF

Interpretation of Evidence:

Critical assessment of epidemiological studies
on mobile phone use and brain tumours

Dr. Joachim Schüz
Member of SCENIHR-WG on EMF

Summary of case-control studies

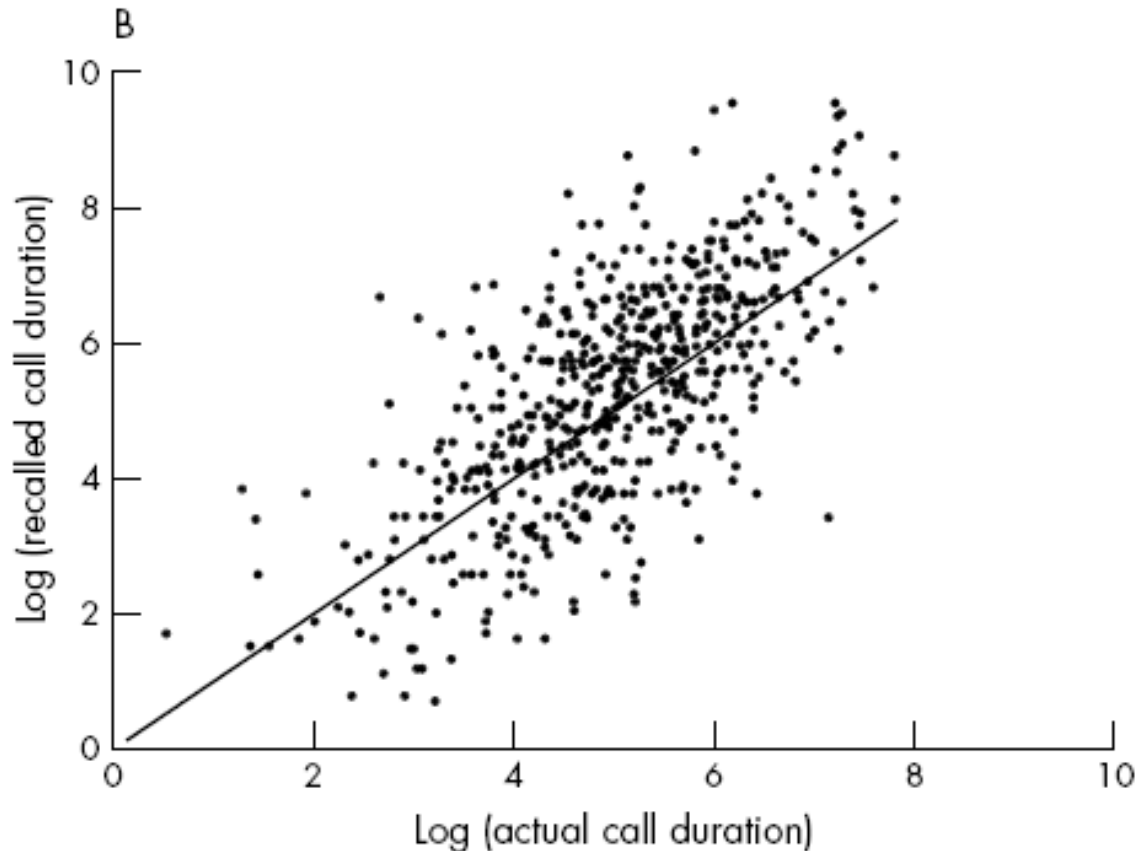
| Study | OR | 95% CI |
|------------------------------------|------|-----------|
| Hardell (2006), analogue / Sweden | 2.4 | 1.6 – 3.4 |
| Hardell (2006), digital / Sweden | 2.8 | 1.4 – 5.7 |
| Lahkola (2007) / Nordic + UK South | 0.95 | 0.7 – 1.2 |
| Hepworth (2006) / UK North + South | 0.9 | 0.6 – 1.3 |
| Schüz (2006) / Germany | 2.2 | 0.9 – 5.1 |

Risk of glioma
Time since first use
of mobile phone of
≥ 10 years

| Meta-analysis | OR | 95% CI | Model | p homogeneity |
|------------------------|-----|-----------|--------|---------------|
| All (Hardell analogue) | 1.4 | 0.8 – 2.4 | Random | < 0.01 |
| All (Hardell digital) | 1.3 | 0.8 – 2.1 | Random | < 0.01 |

| Sensitivity to exclusion | OR | 95% CI | Model | p homogeneity |
|--------------------------|-----|-----------|--------|---------------|
| All but Hardell | 1.0 | 0.8 – 1.4 | Fixed | 0.15 |
| All but Lahkola | 1.6 | 0.8 – 3.4 | Random | < 0.01 |
| All but Hepworth | 1.7 | 0.8 – 3.4 | Random | < 0.01 |
| All but Schüz | 1.3 | 0.7 – 2.3 | Random | < 0.01 |

Source of error I: Recall of past events



Comparison between self-reported mobile phone use and data from traffic records

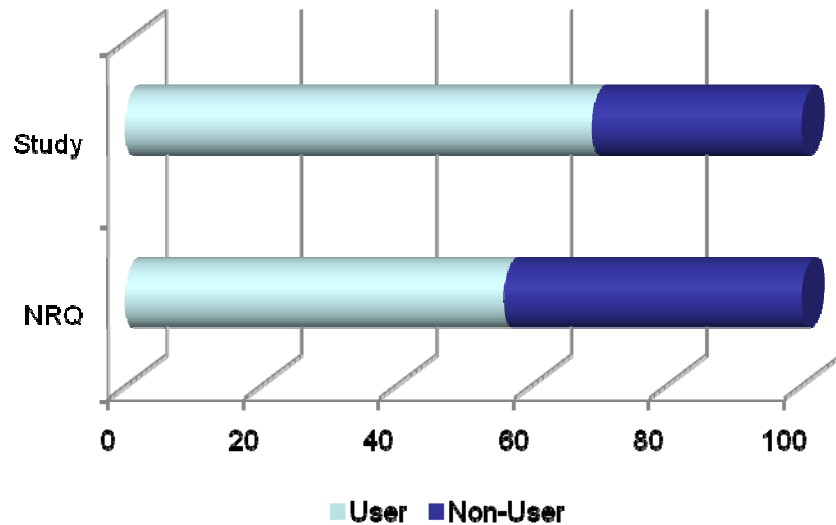
Figure 1 Scatter plot of (A) number of calls and (B) duration of calls (in minutes) reported in the questionnaire against the actual use recorded by operator or SMP (including line of equality).

Source of error II: Study participation

Controls

53% Participation rate

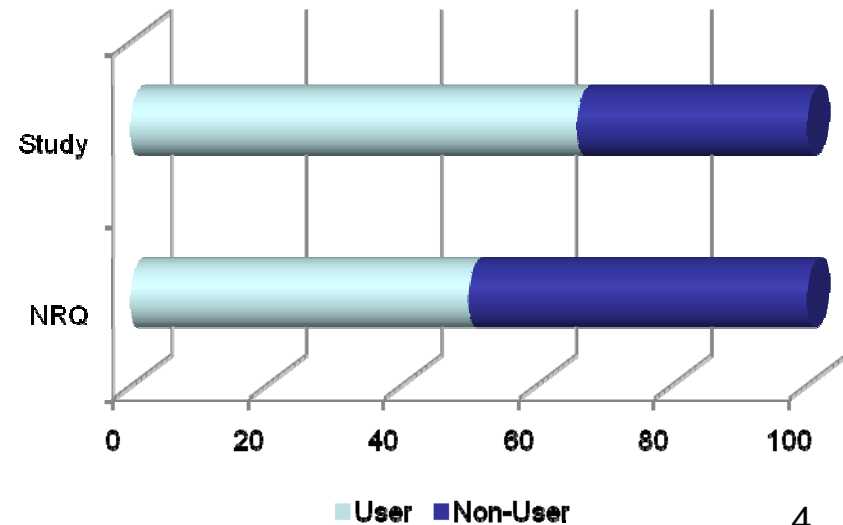
~ 60% filled in NRQ



Cases

82% Acoustic neuroma
 78% Meningioma
 64% Glioma

~ 40% filled in NRQ



Critical assessment of findings

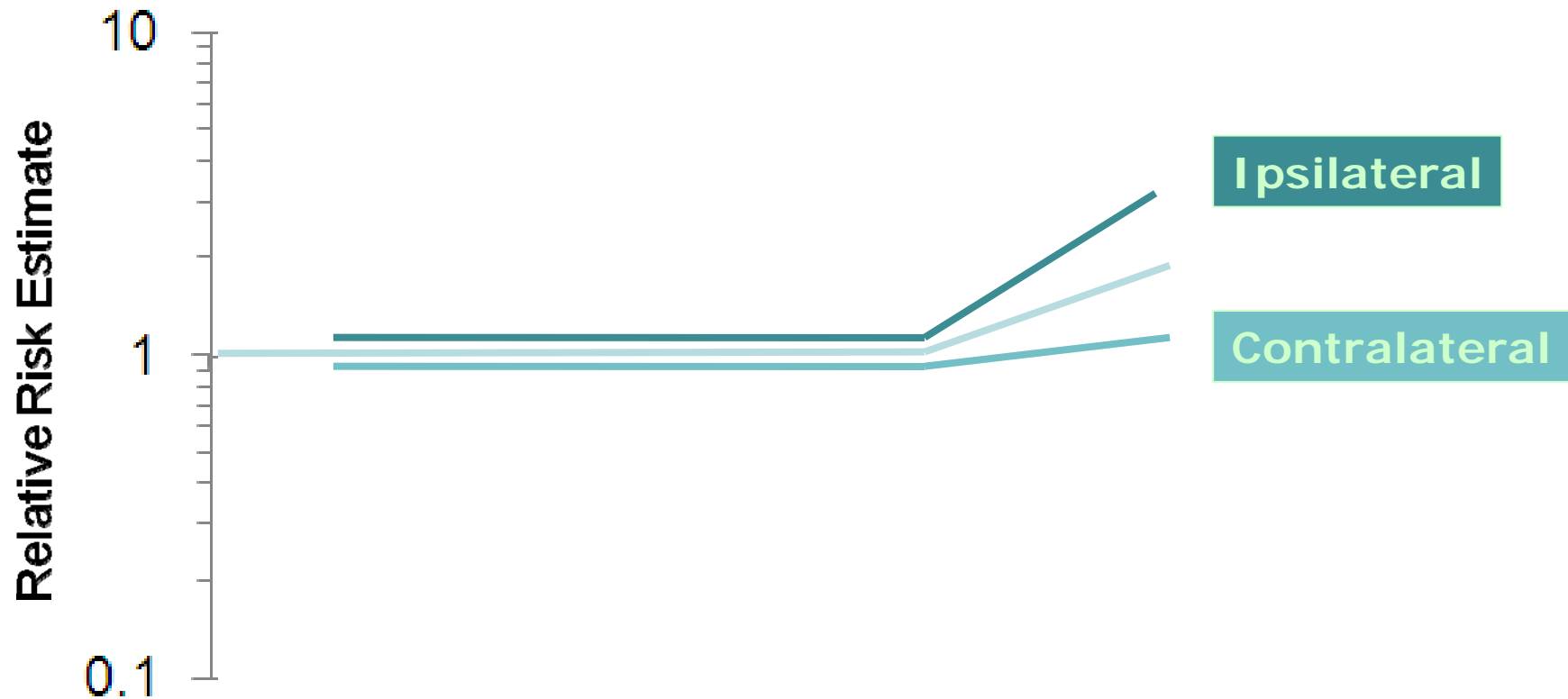
The „signal“ (true effect) is much stronger than the „noise“ (bias and confounding)

The „noise“ (bias and confounding) is too weak to dilute the „signal“ (true effect)

The shape of the „noise“ (bias and confounding) can be identified in a way so that in statistical analyses „signal“ (true effect) and „noise“ can be separated

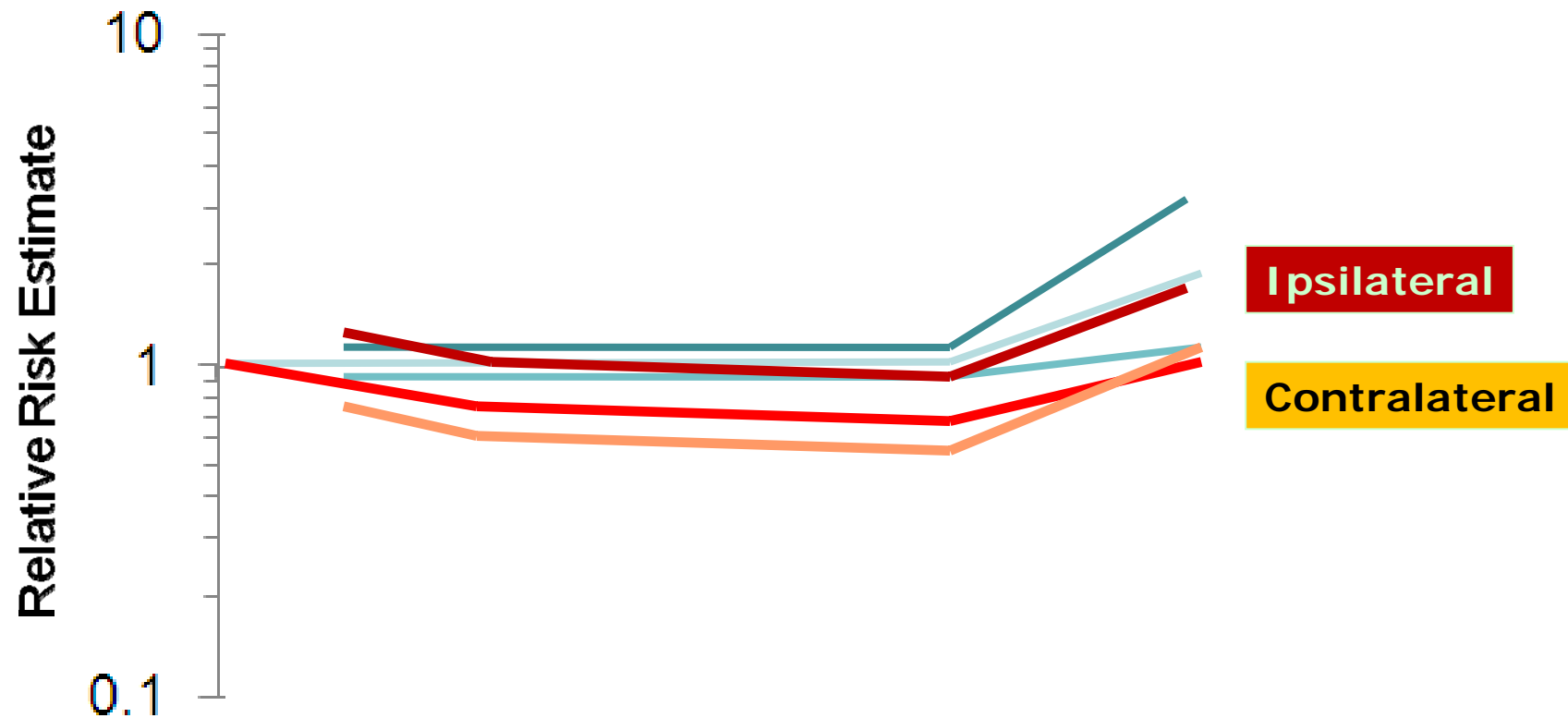


What would we expect?



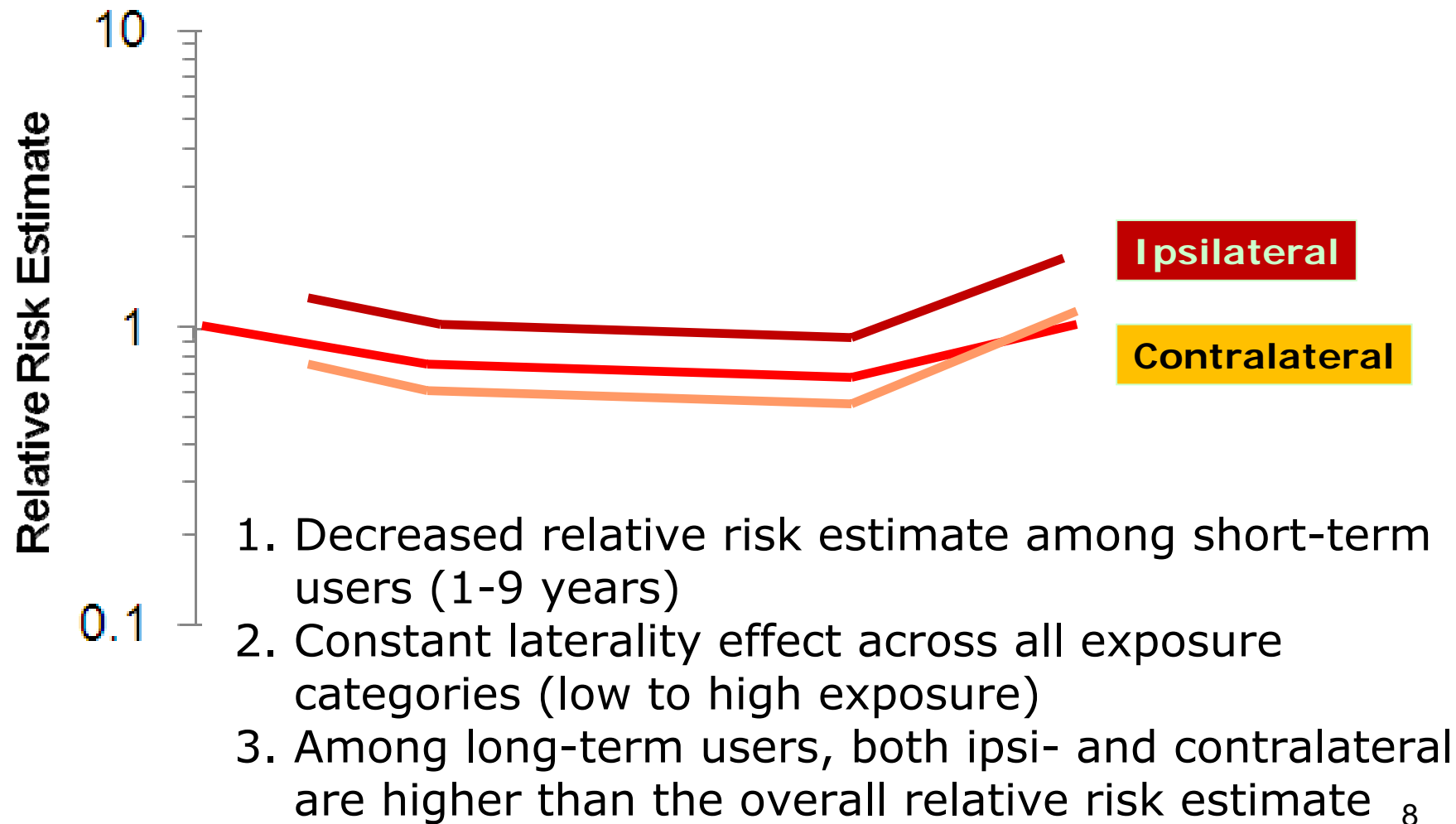
Model: Long latency period and distinct ipsilateral effect

What do we observe?

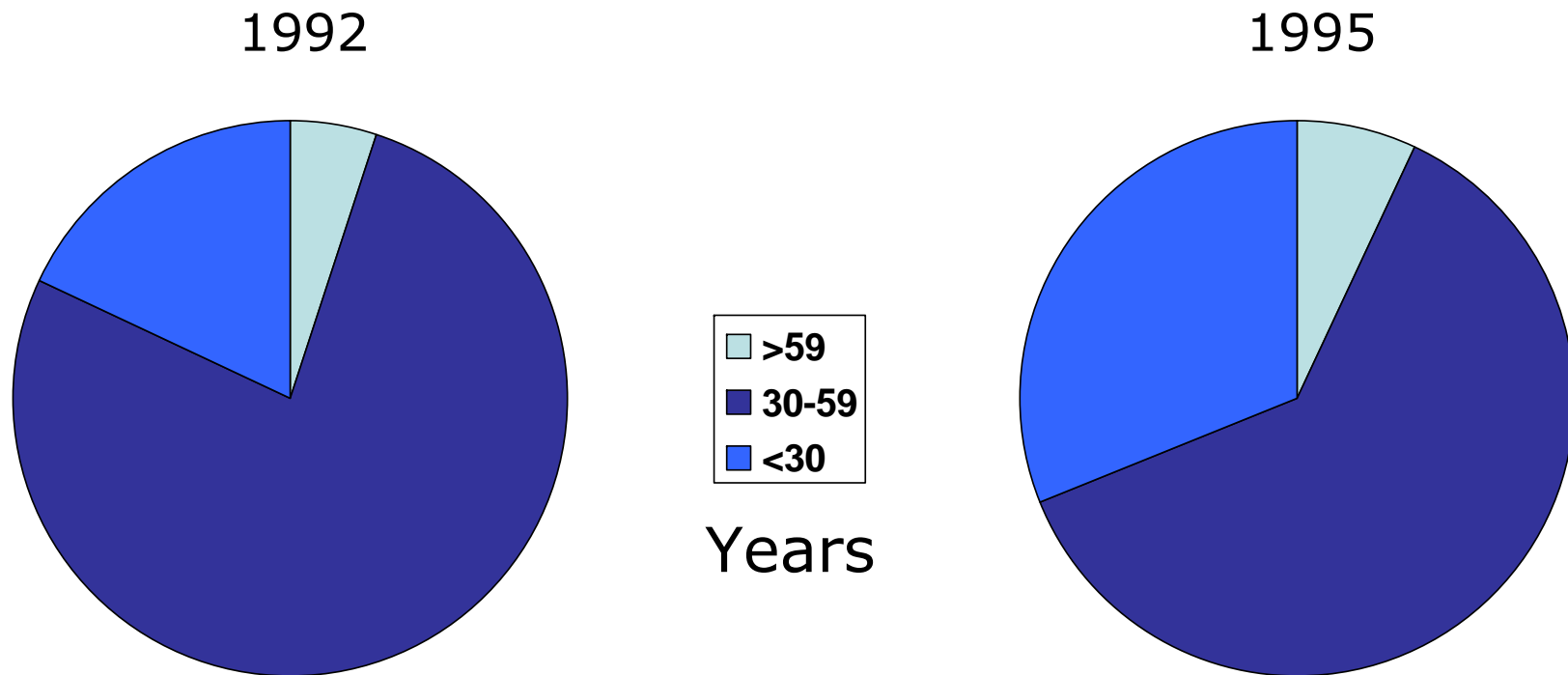


Interphone Study Nordic countries + UK – Lahkola et al, Int J Cancer, 2007

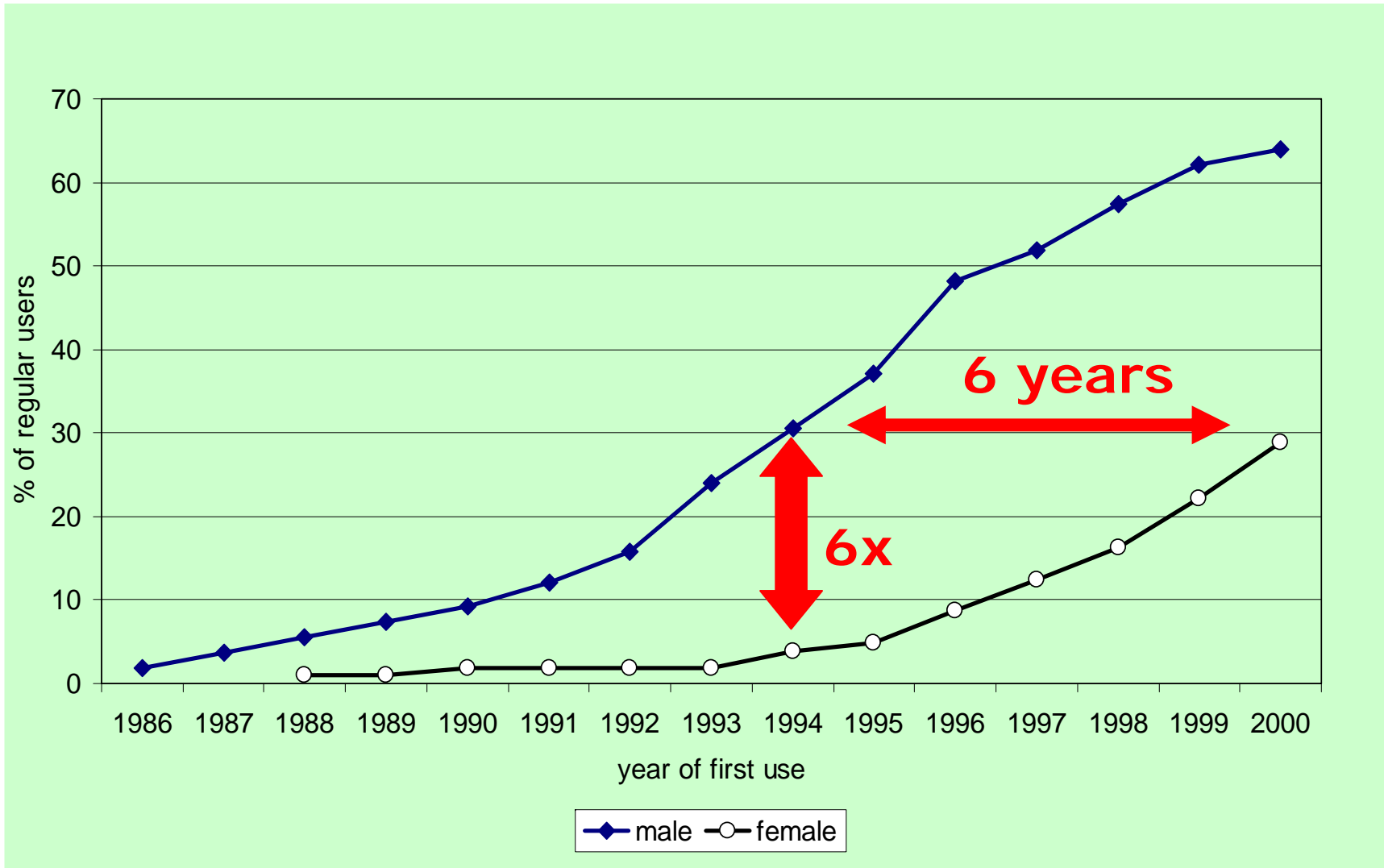
What do we observe?



Age distribution of MP subscribers

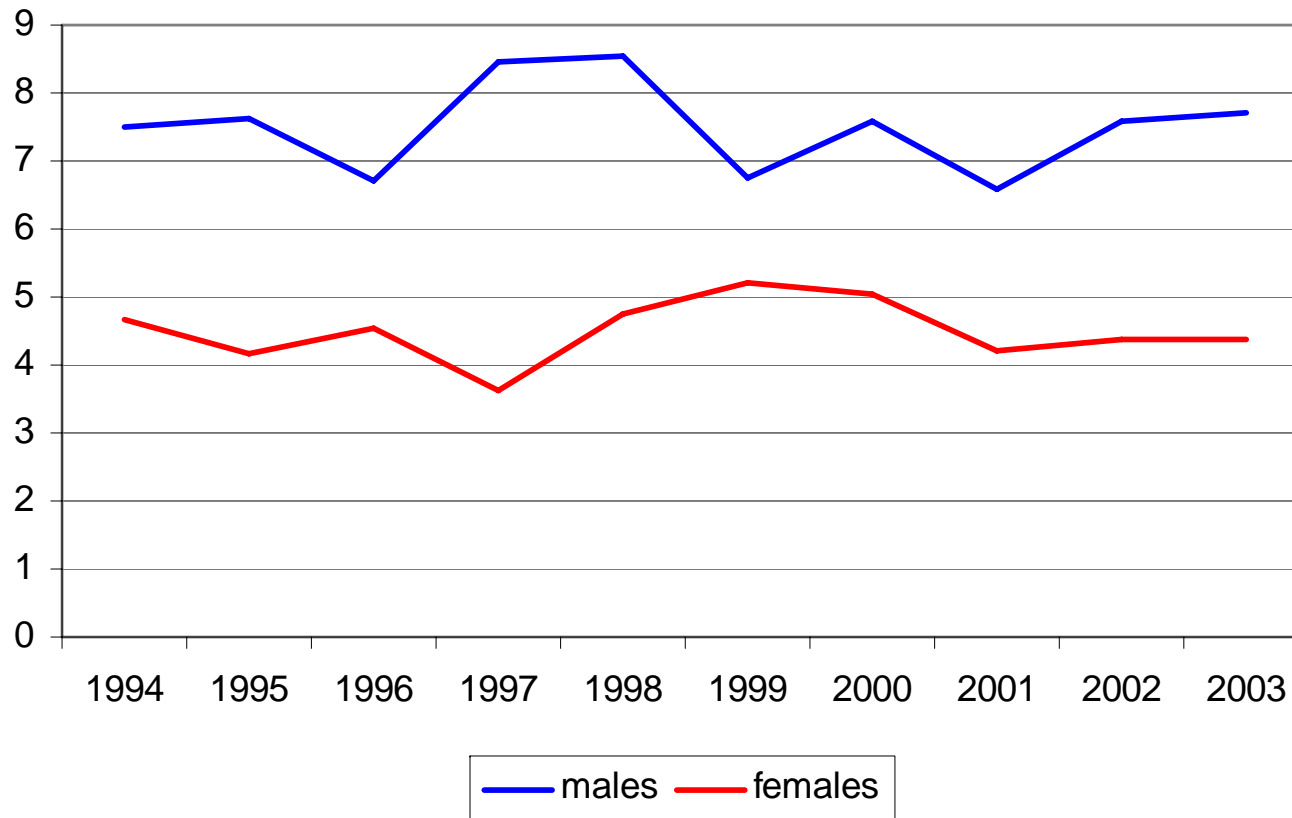


Time trends in the incidence rate



Time trends in the incidence rate

Glioma among **men** and **women**, Denmark, 1994-2003, aged 30-59 years

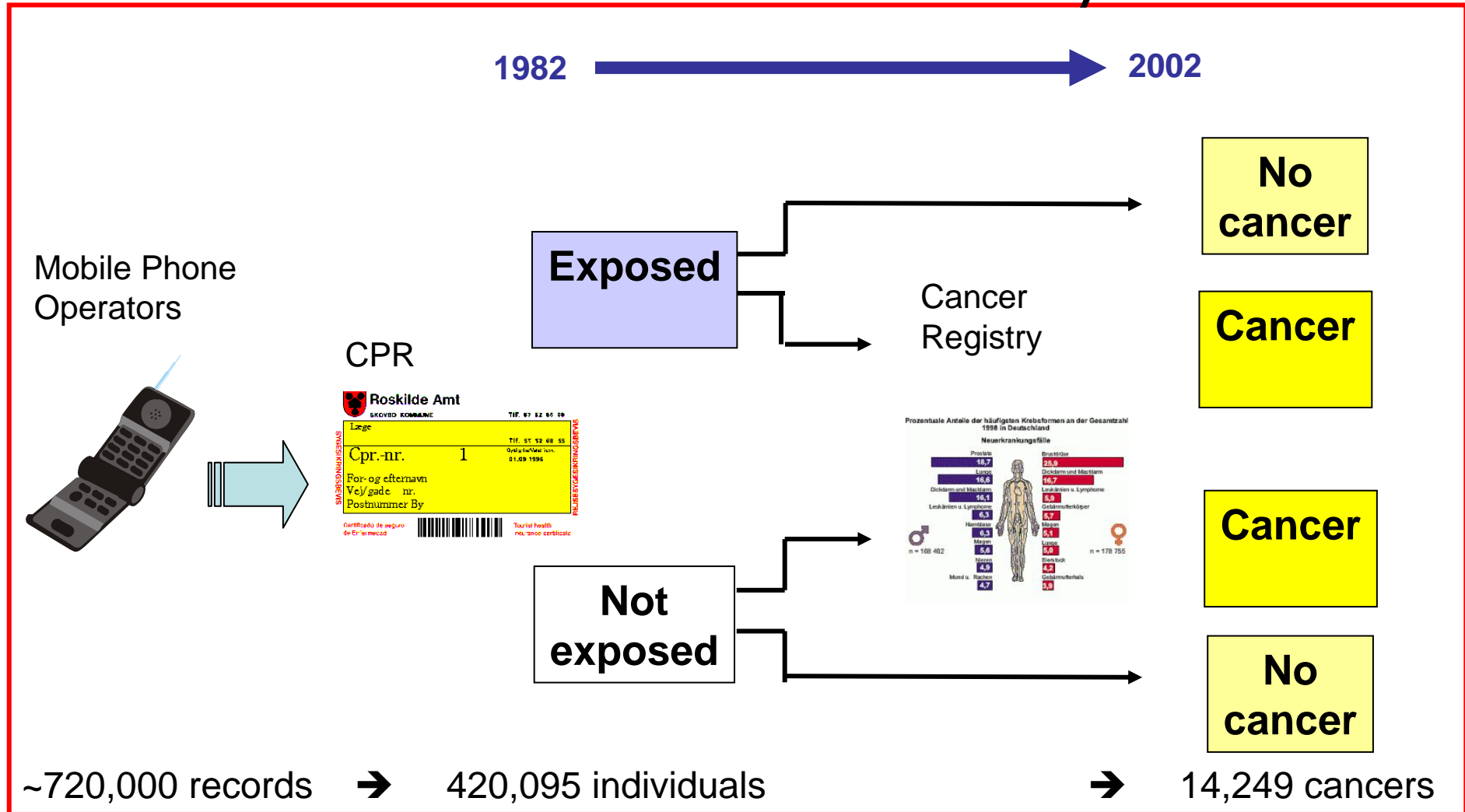


Ratio men / women: 1.64

1.73

1.68

Danish nationwide cohort study



Cohort Study & Time trends in incidence

- No association reported
- Only possible to identify major effects until now

Interphone Case-control study

- No association reported
- Possibility of an increased risk after long-term use still open
- Susceptibility to various forms of bias has been demonstrated
- Analyses of tumour localisation of particular importance

Other Case-control studies

- US, Finland: Only after short-term use: no association
- Sweden: Risk increase reported, both short- and long-term
Not compatible with incidence rates / cohort study

All studies:

- Low power for induction periods 10-15 years
- Not designed for induction periods > 15 years

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