Literature review on risk assessment – First results

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Co-Design Workshop of SEAWave
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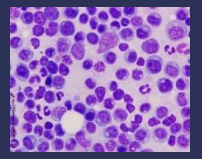
From Understanding …

Hazard / Carcinogenicity



Individual Risk

Population Risk

… to Prevention

From Understanding …

Hazard / Carcinogenicity

Artificial UV from sunbed use is carcinogenic to humans

Individual Risk

1.8% increase in melanoma risk with each session of sunbed use per year

Population Risk

For France in 2015, 382 cases of melanoma were estimated to be attributable to use of sunbeds and could have been prevented

… to Prevention

Boniol et al., BMJ, 2012

Arnold et al., J Eur Acad Dermatol Venerol, 2018

International Agency for Research on Cancer

World Health Organization

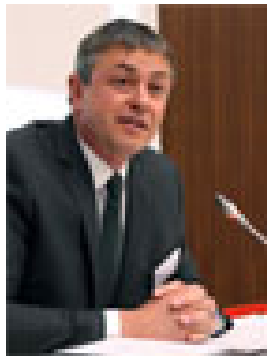
PRESS RELEASE
N° 208

31 May 2011

IARC CLASSIFIES RADIOFREQUENCY ELECTROMAGNETIC FIELDS AS POSSIBLY CARCINOGENIC TO HUMANS

Lyon, France, May 31, 2011 -- The WHO/International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as **possibly carcinogenic to humans (Group 2B)**, based on an increased risk for **glioma**, a malignant type of brain cancer[1], associated with wireless phone use.

Monograph Meeting - Volume 102



24/05/2011 -
Dr Christopher Wild, Director, IARC, opens Monograph meeting on *Non-Ionizing Radiation, Part II: Radiofrequency Electromagnetic Fields [includes mobile telephones]*

Listen to Podcast , Read Introduction to the IARC Monographs Volume 102

European Commission

Scientific Committee on Emerging and Newly Identified Health Risks

SCENIHR

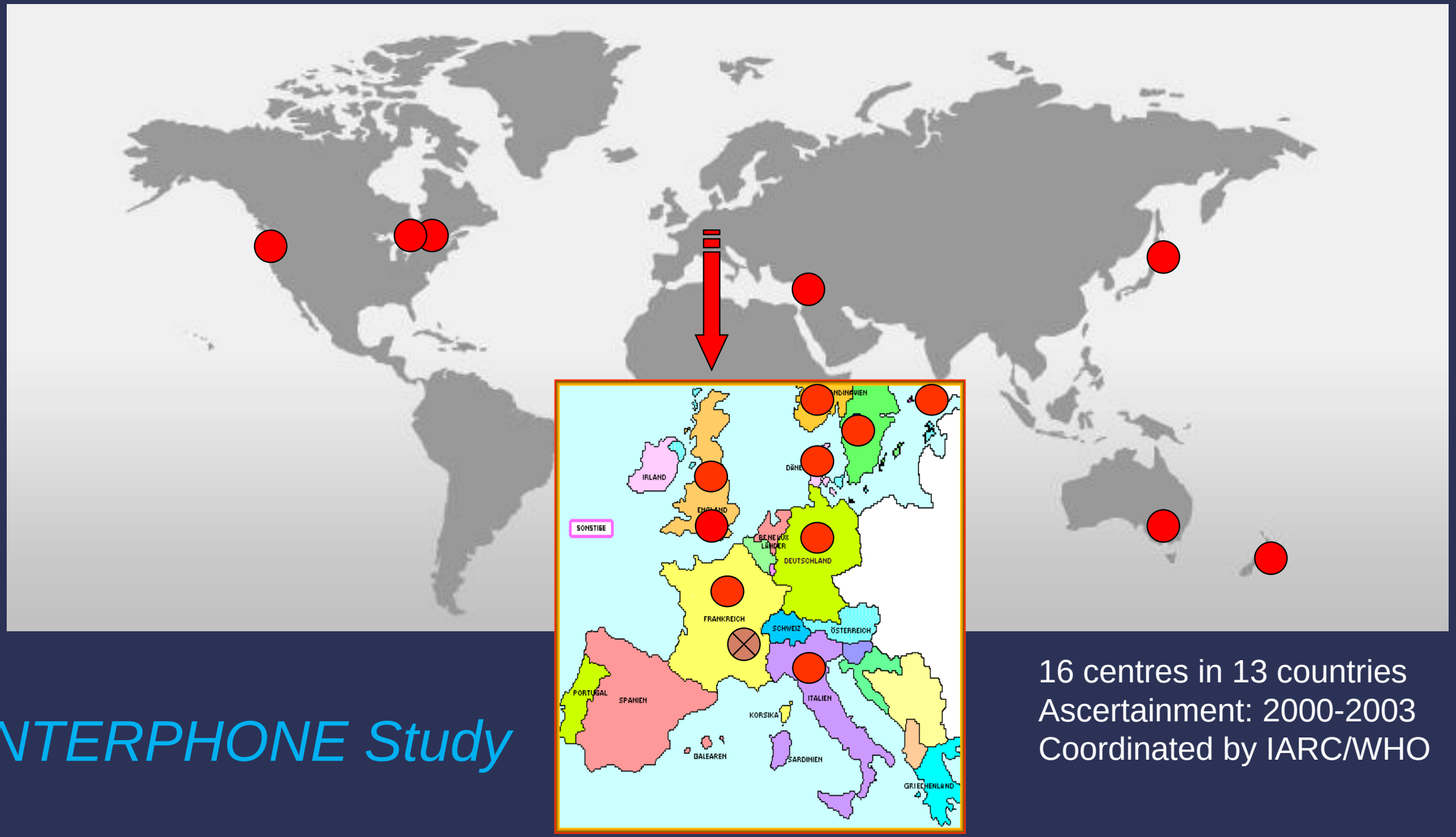
Opinion on

Potential health effects of exposure to electromagnetic fields (EMF)

Scientific Committees
on consumer safety
on emerging and newly identified health risks
on health and environmental risks

SCENIHR adopted this Opinion at the 9th plenary meeting on 27 January 2015

Overall, the epidemiological studies on mobile phone RF EMF exposure do not show an increased risk of brain tumours. Furthermore, they do not indicate an increased risk for other cancers of the head and neck region. Some studies raised questions regarding an increased risk of glioma and acoustic neuroma in heavy users of mobile phones. The results of cohort and incidence time trend studies do not support an increased risk for glioma while the possibility of an association with acoustic neuroma remains open. Epidemiological studies do not indicate increased risk for other malignant diseases, including childhood cancer.

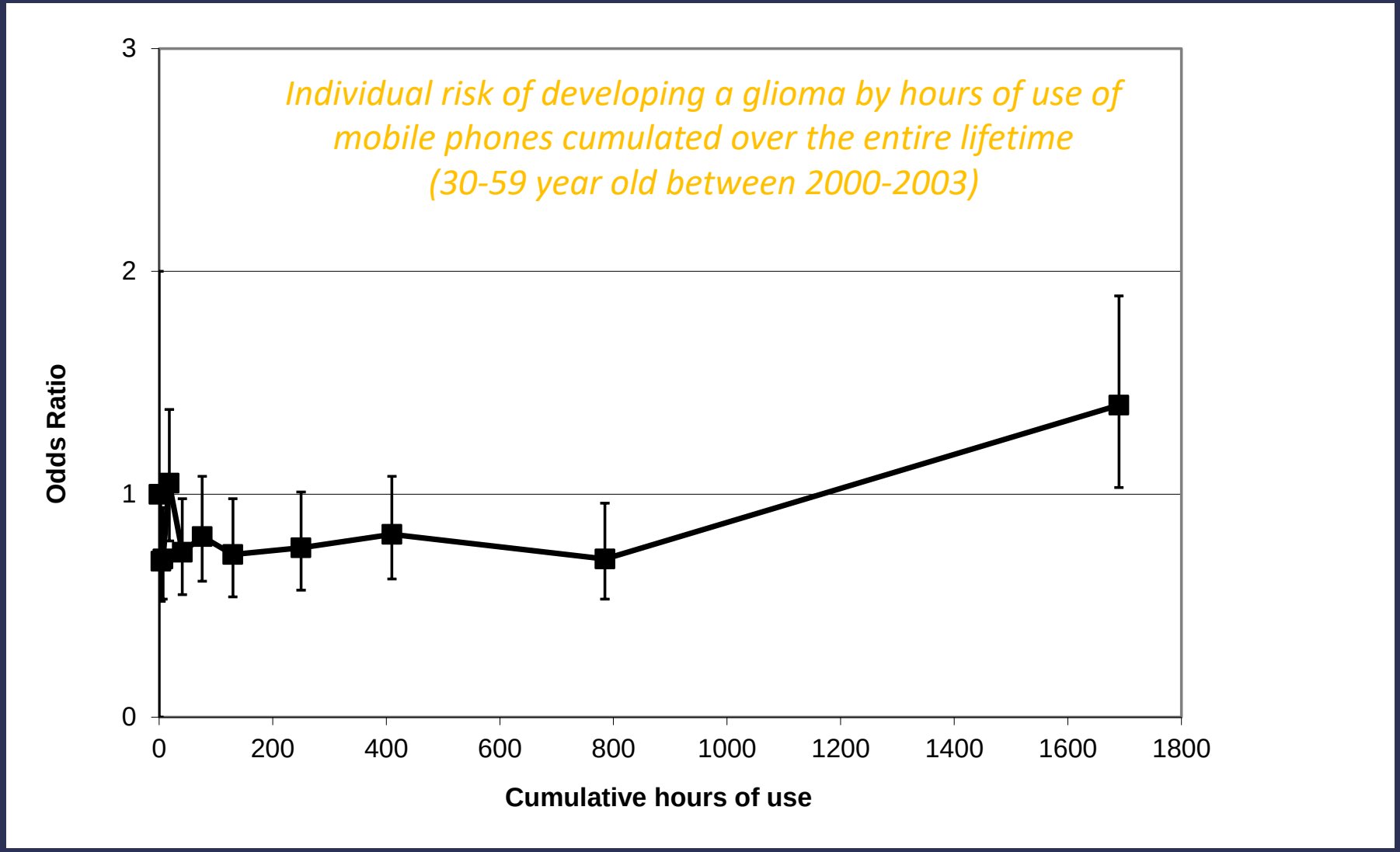


INTERPHONE Study

16 centres in 13 countries
Ascertainment: 2000-2003
Coordinated by IARC/WHO

Interphone Study Group, Int J Epidemiol, 2010

Interphone Study Group, Cancer Epidemiol, 2011

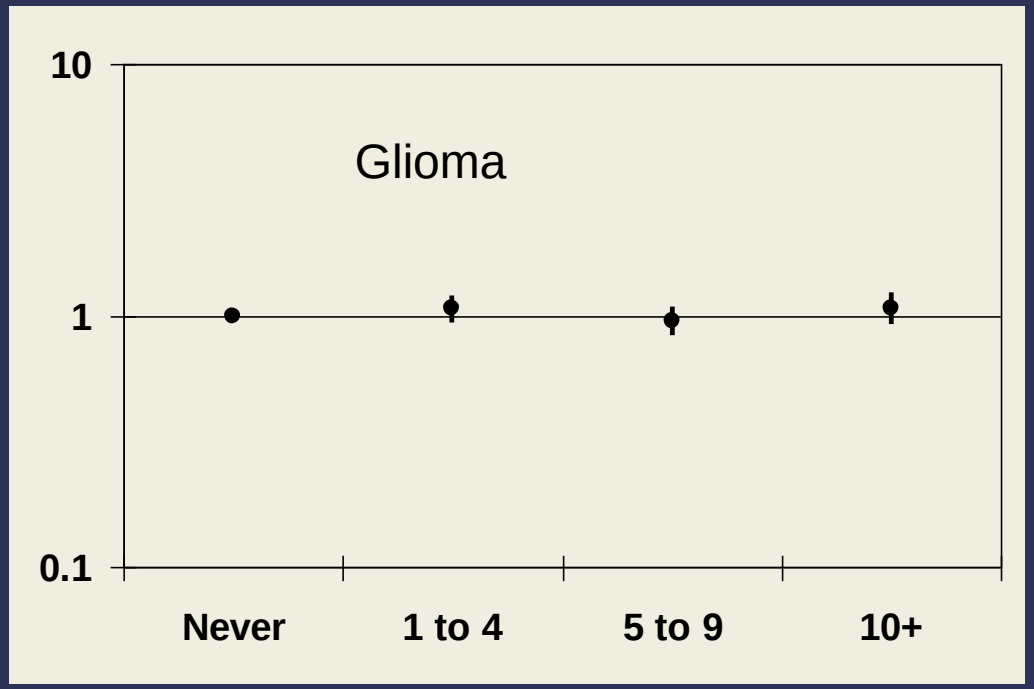


Population risk: *- about half of the population were never regular users of a mobile phone (reference group)*
- almost half of the population had no increased or slightly decreased risk
- about 5% of the heaviest lifetime mobile phone users had moderately increased risk

Interphone Study Group, Int J Epidemiol, 2010

Cohort Studies (Denmark, UK (Women))

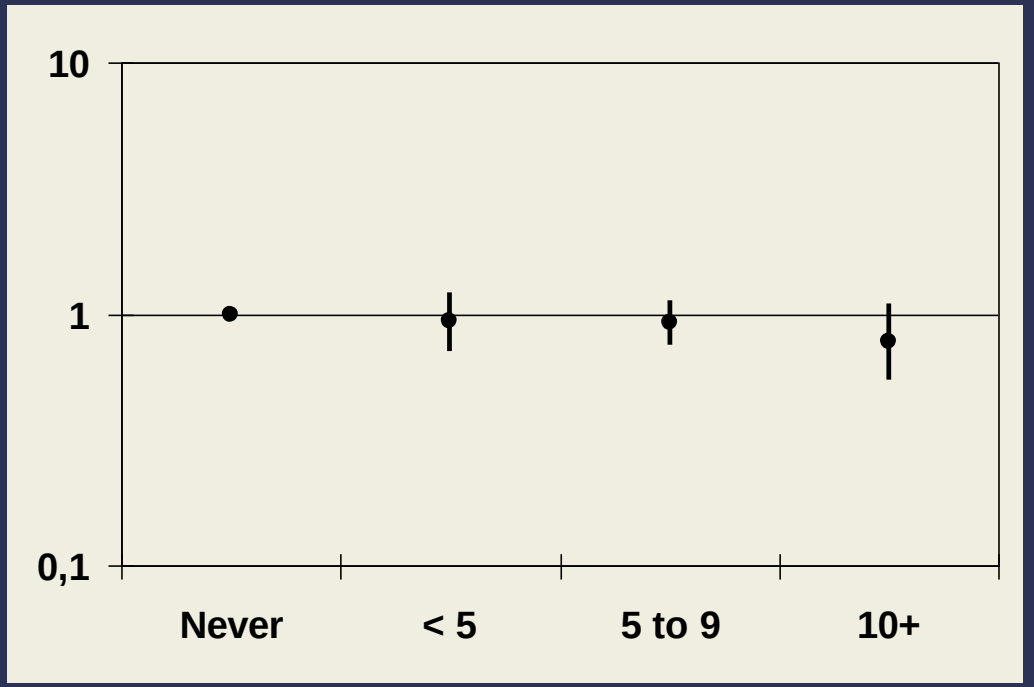
Individual risk from comparing the earliest subscribers for a mobile phone in Denmark (before 1995) with the rest of the Danish adult population



Years of subscription

Frei et al., BMJ, 2011

Individual risk from comparing never mobile phone users with mobile phone users by number of years of use within UK Million Women Study



Years of mobile phone use

Benson et al., Int J Epidemiol, 2013

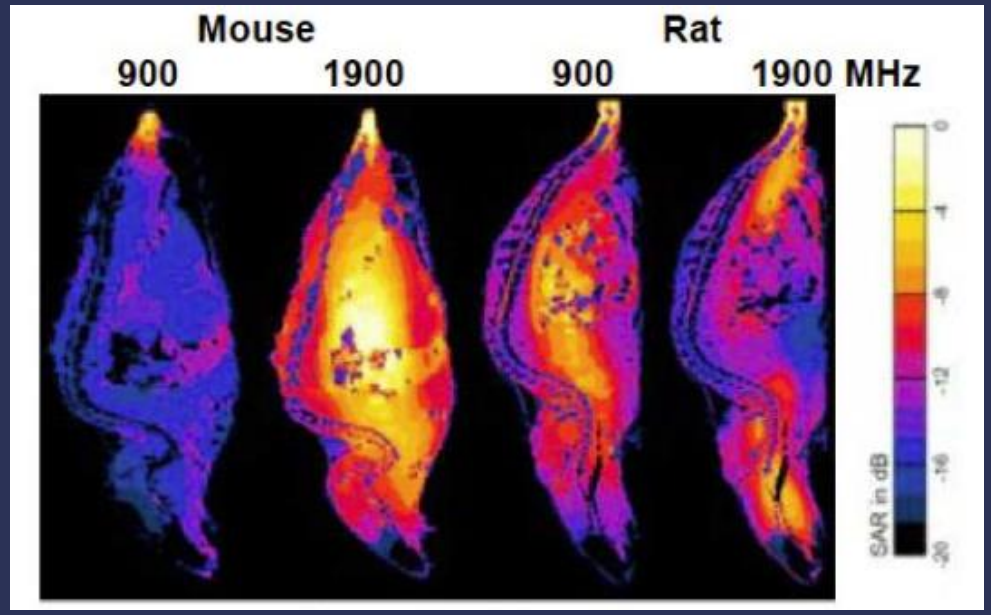
What is new – Animal data?

Carcinogenic hazard in rats (Ramazzini study):
~19 hrs of exposure each day with varying levels 0.001-0.1 W/kg

Increase in heart schwannoma in male rats at highest dose
No increase in female rates

Suggestive evidence for carcinogenicity but unclear what it means for individual risk in humans

Falcioni et al., Environ Res, 2018



Carcinogenic hazard in rodents (NTP Studies):
~9 hrs of exposure each day with varying levels between 1.5 – 6 W/kg

Increase in heart schwannoma in male rats at highest dose – no increase in female rates, in male mice or in female mice
Indications of higher occurrences of tumours of brain and adrenal gland

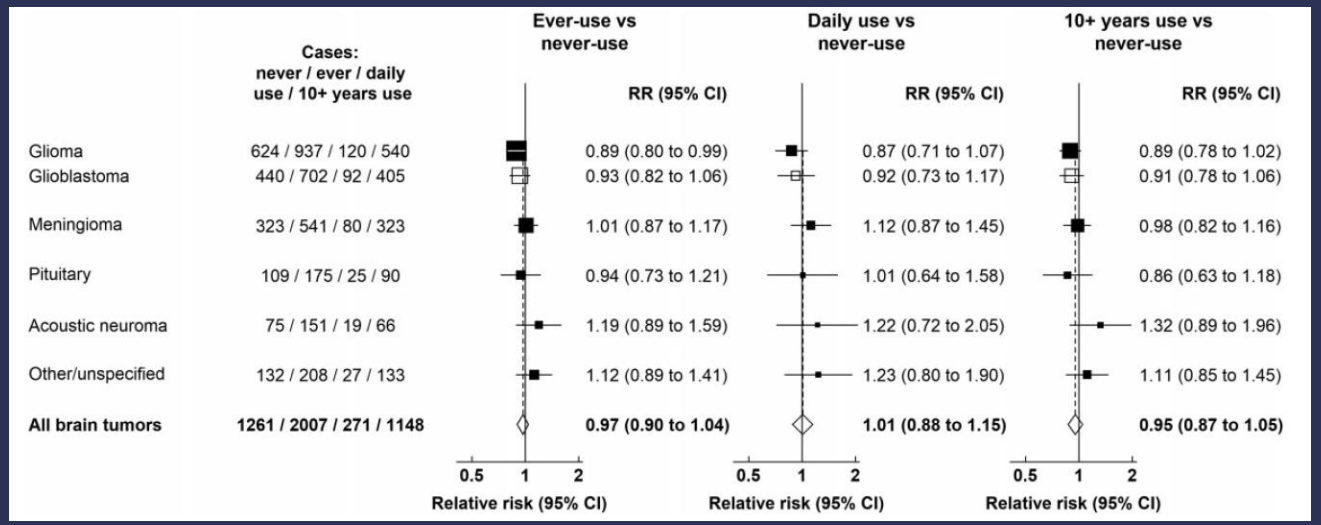
Suggestive evidence for carcinogenicity but unclear what it means for individual risk in humans

National Toxicology Program Reports, 2018

What is new – Human data?

Update of individual risk from comparing never mobile phone users with mobile phone users by number of years of use within UK Million Women Study

No association with ever use, daily use, 10+ years of use or specifically with tumours in the most exposed area of the brain (temporal and parietal)



Schüz et al., J Natl Cancer Inst, 2022

Not „new“ in terms of data

Several reviews & meta-analyses

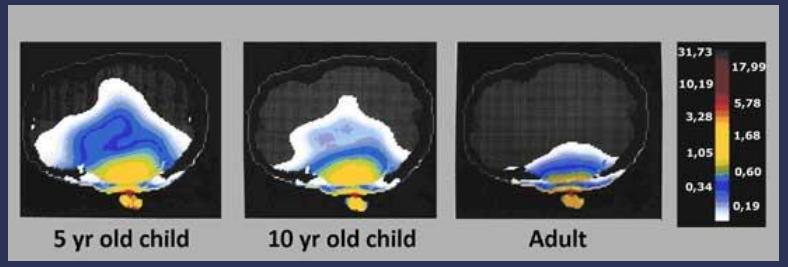
Wang & Guo, J Cancer Res Therap, 2016
Bortkiewicz et al., Int J Occup Med Env Health, 2017
Prasad et al., Neurological Sci, 2017
Yang et al., PLoS ONE, 2017
Wang et al., World Neurosurg, 2018
Röösli et al., Environ Int, 2019
Choi et al., Int J Env Res Publ Health, 2020

Overall confirmation of previous conclusions by the IARC and SCENIHR, as more or less based on same data

Differences mainly due to how the risk of bias was interpreted

Meta-analyses unlikely to reveal new insights

Mobile phone use in children, adolescents and young adults



Cefalo

4 countries, ages 7-19 years
352 cases – 646 controls

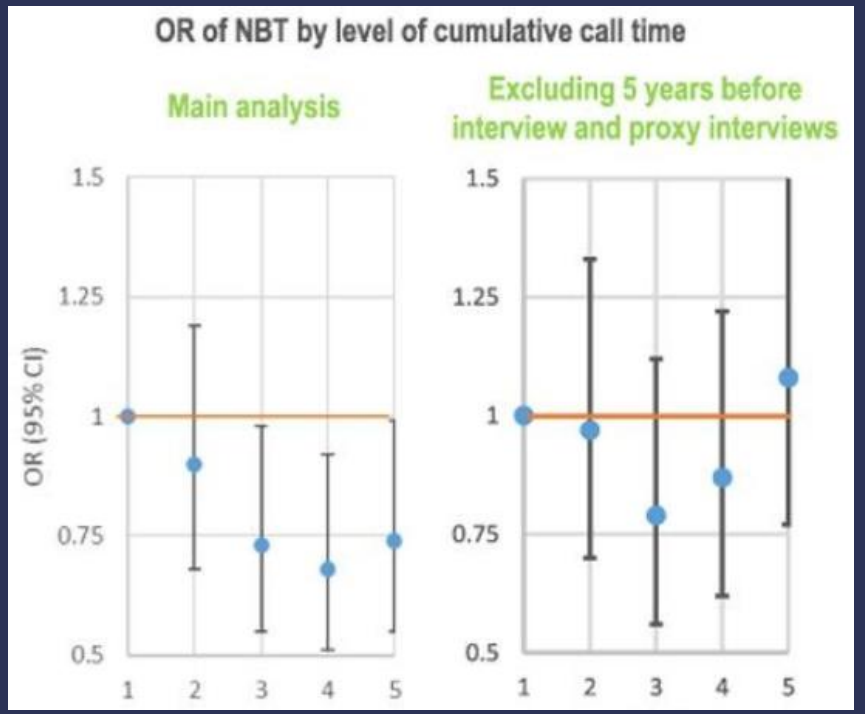
Time since first use, y	
Never regular user	1.0 (referent)
≤3.3	1.35 (0.89 to 2.04)
3.3–5.0	1.47 (0.87 to 2.49)
>5.0	1.26 (0.70 to 2.28)

Cumulative duration of calls, h	
Never regular user	1.0 (referent)
≤35	1.33 (0.89 to 2.01)
36–144	1.44 (0.85 to 2.44)
>144	1.55 (0.86 to 2.82)

Aydin et al., J Natl Cancer Inst, 2011

14 countries, ages 10-24 years
899 cases – 1,910 controls

Mobi-Kids

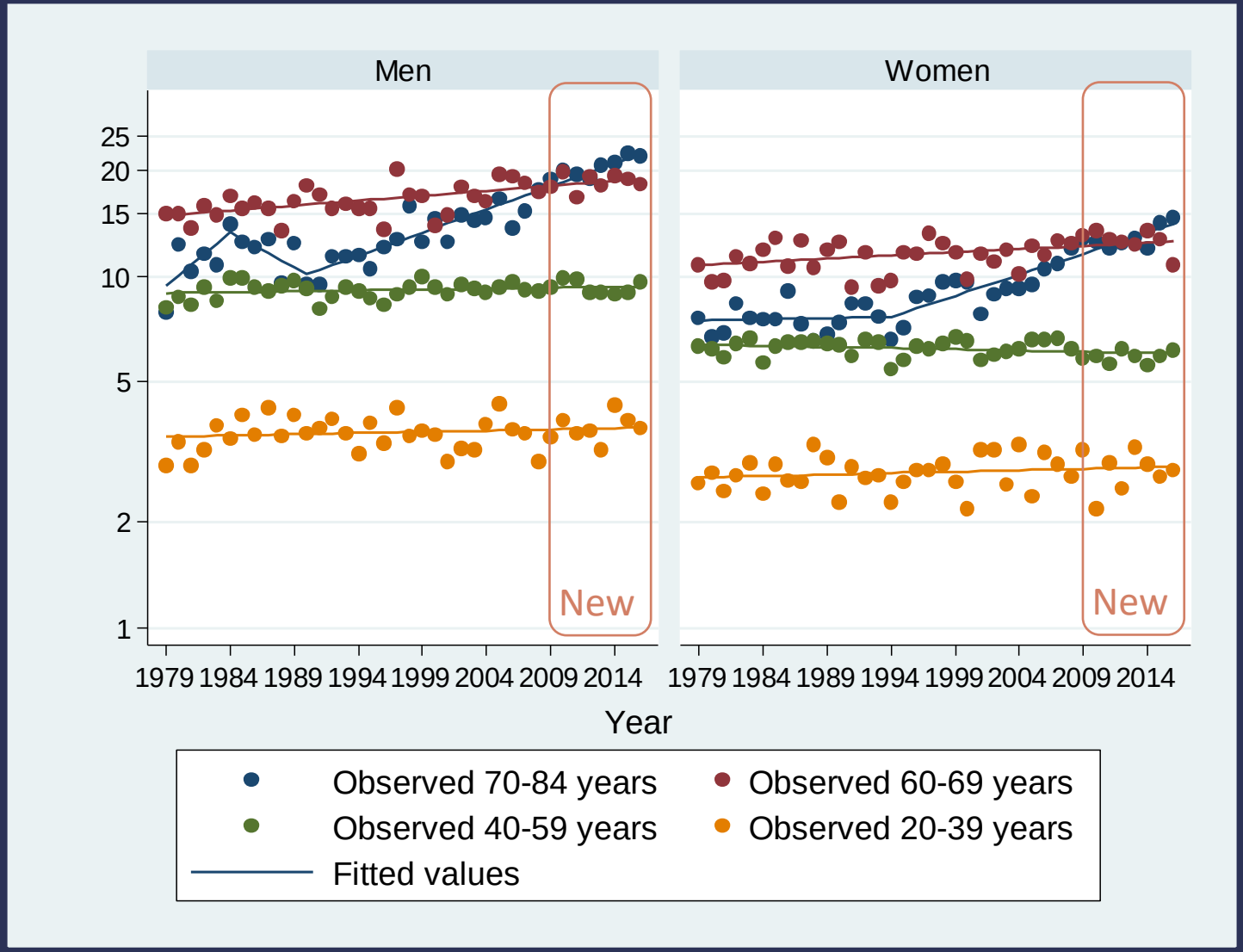


Castano-Vinyals et al., Environ Int, 2022

Glioma Incidence Rate (Nordic Countries)

Population risk:

- *Incompatible with suggestions of increased glioma risk in ordinary mobile phone users*
- *Incompatible with suggestions of increased glioma risk in heavy mobile users other than heavy users of the first two generations*
- *Hypothetical small risks cannot be ruled out*



Deltour et al. (under review), presented at seminar of German Office for Radiation Protection (BfS)

Conclusions

- Hazard Identification:
  Possibility of carcinogenicity confirmed in large animal experiments
  Exposure difficult to “translate” into cumulative lifetime exposure in humans

- Individual risk:
  Possibility of modest risk for glioma in the <5% of heaviest mobile phone users
  Risk can be mitigated by not holding the device directly to the head

- Population risk:
  No evidence of any detectable population risk of any type of brain tumour

- SEAWave Risk Assessment:
  New frequency bands, new type of cancer
  Better mechanistic understanding