



Umwelt und Krebs: Eine vielschichtige Beziehung

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International Agency for Research on Cancer



Cancer research for cancer prevention

To provide the scientific evidence-base for prevention



“A catalyst to progress”

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Cancer research agency
of the
World Health Organisation
(WHO)



The need for cancer prevention in Europe facing the projected cancer burden 2018-2040

Europe

New cases every year

2018: 4.1 million

To

2040: 5.1 million

Cancer deaths every year

2018: 1.5 million

To

2040: 2.57 million

More than 100 million new cases of cancer in Europe over the next 20-25 years

(Not a worst case scenario but a projection)

Number of new cases / deaths (Thousands)



Incidence



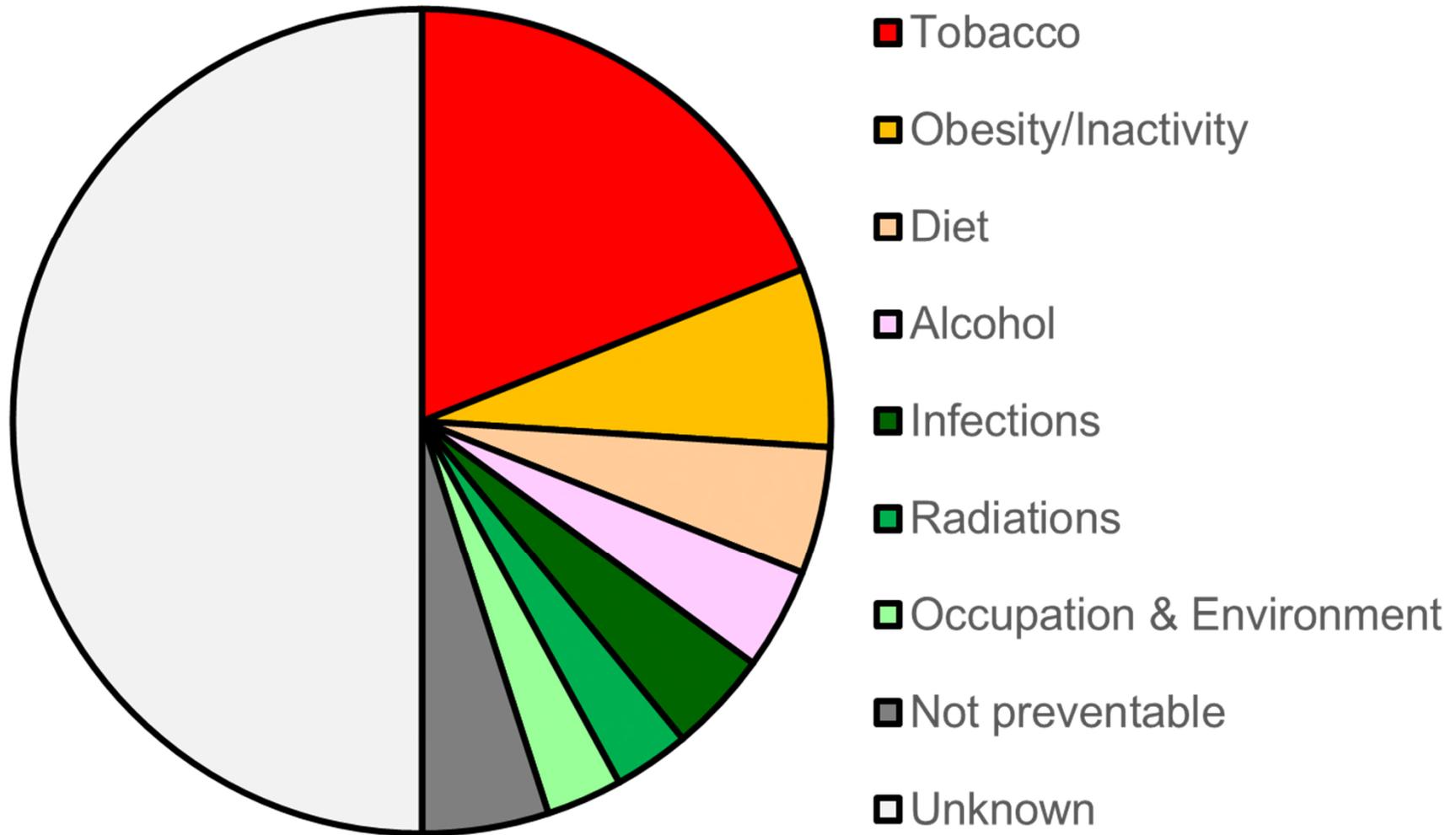
Mortality

Including non-melanoma skin cancer

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Potential for primary prevention in Europe



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Schüz et al., Mol Oncol 2019

4th Edition European Code Against Cancer

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European Code Against Cancer



HOME

12 WAYS

ABOUT CANCER

SCIENTIFIC JUSTIFICATION

ABOUT THE CODE

European Code Against Cancer

12 WAYS TO REDUCE YOUR CANCER RISK

You are here: 12 ways



FIND OUT MORE ABOUT THE 12 RECOMMENDATIONS:



TOBACCO



SUN/UV EXPOSURE



SECOND-HAND SMOKE



POLLUTANTS



HEALTHY BODY WEIGHT



RADIATION



PHYSICAL ACTIVITY



BREASTFEEDING



DIET



HORMONAL THERAPY



ALCOHOL



VACCINATION AND INFECTIONS



SCREENING

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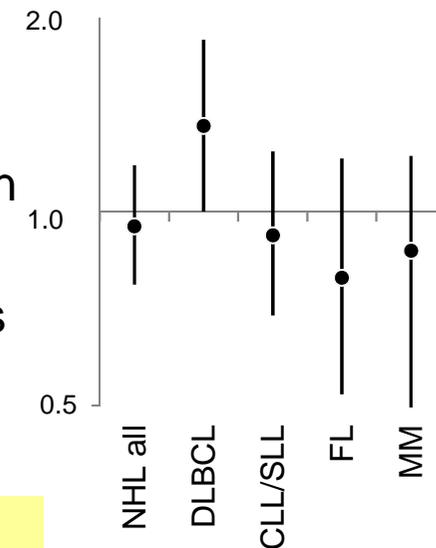


<http://cancer-code-europe.iarc.fr/index.php/en/>

Pesticide use and risk of lymphoid malignancies (from the AGRICOH consortium)



- Pooling project of 3 large cohorts from France, Norway and the US combining >300,000 farmers or agricultural workers accumulating >3.5 million PYRS, estimating exposure to 14 selected pesticide groups and 33 individual active ingredients and studying the risk of NHL overall and its four major subtypes
- Mostly no associations seen when comparing ever to never use of each pesticide,
- Positive modest associations seen for terbufos and deltamethrin
- Inverse associations seen with the organochlorine insecticide group (including lindane and DDT) and with phenoxy herbicides
- Glyphosate – see Figure



Chrysotile Asbest Cohort



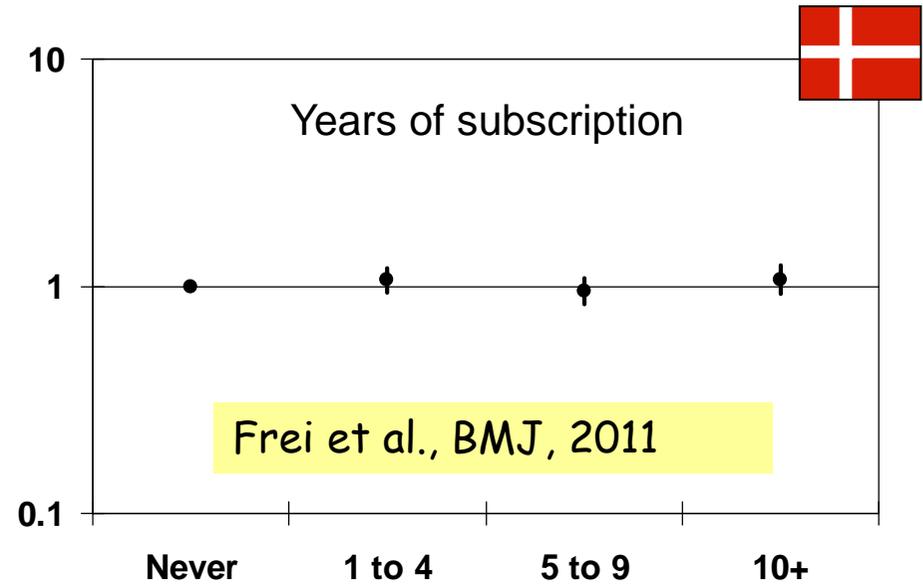
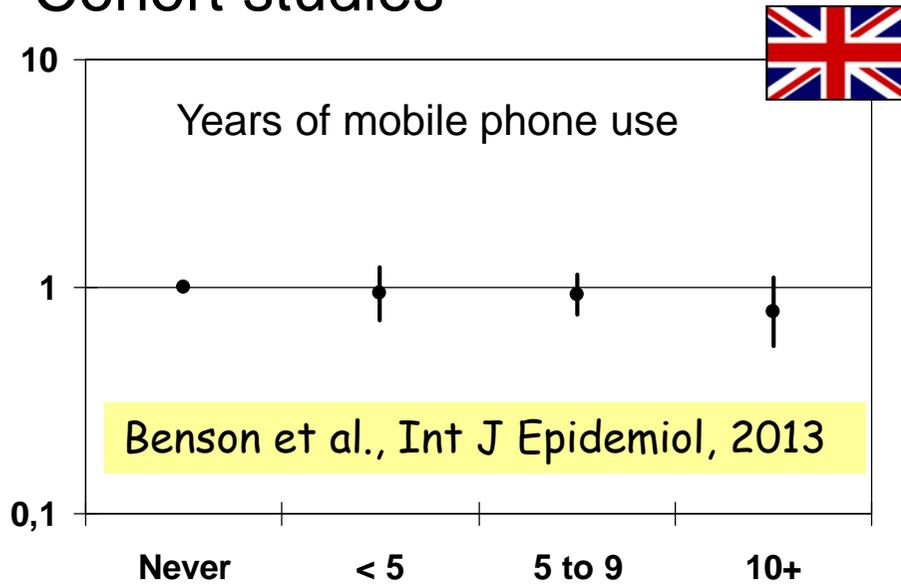
- 35,837 workers active in 1975 or later
 - Occupational histories back to 1950s
 - 37% are women
 - 53% worked more than 10 years
 - 30% worked more than 20 years
 - 12,728 deaths
 - Lung cancer: 70% of men are smokers
- Trend with time in women: few % to 30%



Schüz et al., PLoS ONE 2020

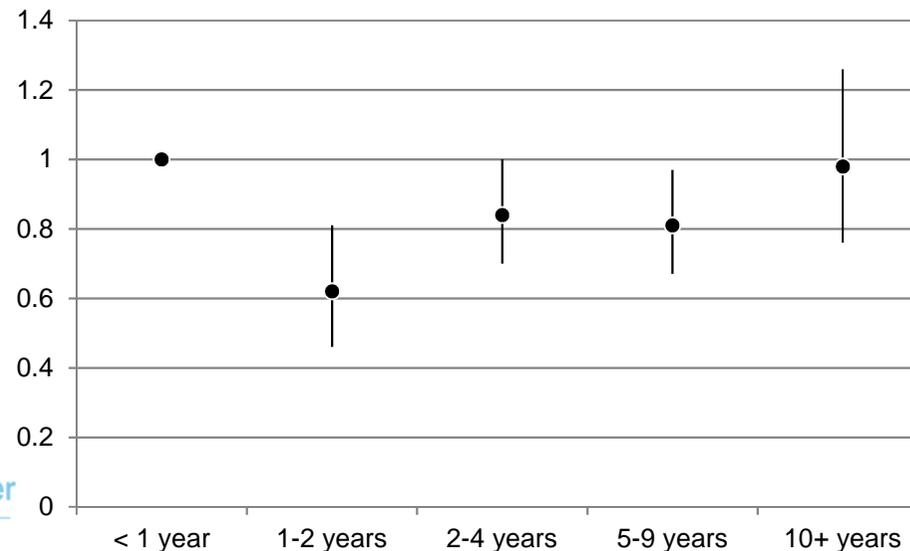
Mobile phone use and glioma risk (1)

Cohort studies



Time after first regular use [years]

Interphone Case-control study

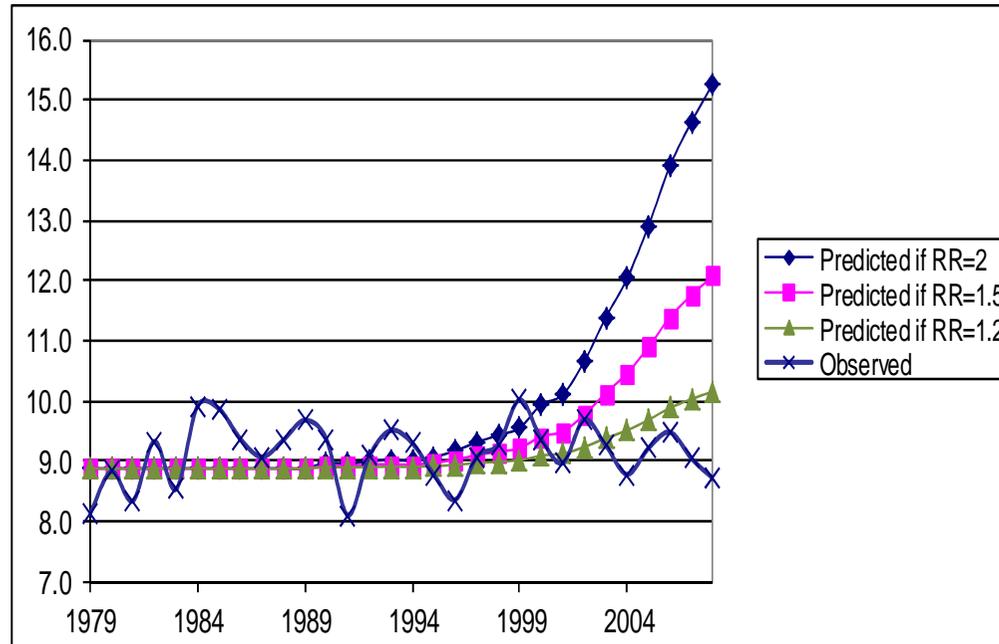


Interphone Study Group, Int J Epidemiol, 2010

Mobile phone use and glioma risk (2)

All users at increased risk after 10 years

Glioma (in men 40-59 years)



Deltour et al., Epidemiology, 2012

Interphone Study Group, Int J Epidemiol, 2010

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NOTES:

Incidence rates not to be used to dismiss any association but consistency check of risks observed in other studies

Incidence rates are compatible with:

- Danish/UK cohorts and with Interphone in not seeing any general increase in risk after 10 years of use

- Interphone Study of seeing a possible modest risk increase among the ~5% heaviest users

Incidence rates are NOT compatible with:

- Interphone seeing risk reductions
- Any study seeing general risks

Environment and Cancer: a complex relationship

Inherent in the approach, even well-designed human observational studies do not necessarily yield conclusive („black or white“) results, because real life doesn't follow „controlled experimental conditions“

Study results are normally only expressed with their statistical uncertainty, with conceptual or conduct-related uncertainty not being quantified

Distinction between hazard (evidence of human carcinogenicity in general), individual risk (magnitude of risk in relation to an individual's exposure) and public health relevance (preventable fraction on population level)

Chemicals at environmental levels (including for agents known/suspected in occupations), i.e. low dose protracted exposure, need better studies (e.g. there is even uncertainty on magnitude of risk for well established carcinogens such as ionizing radiation) – „Elephant in the room?“

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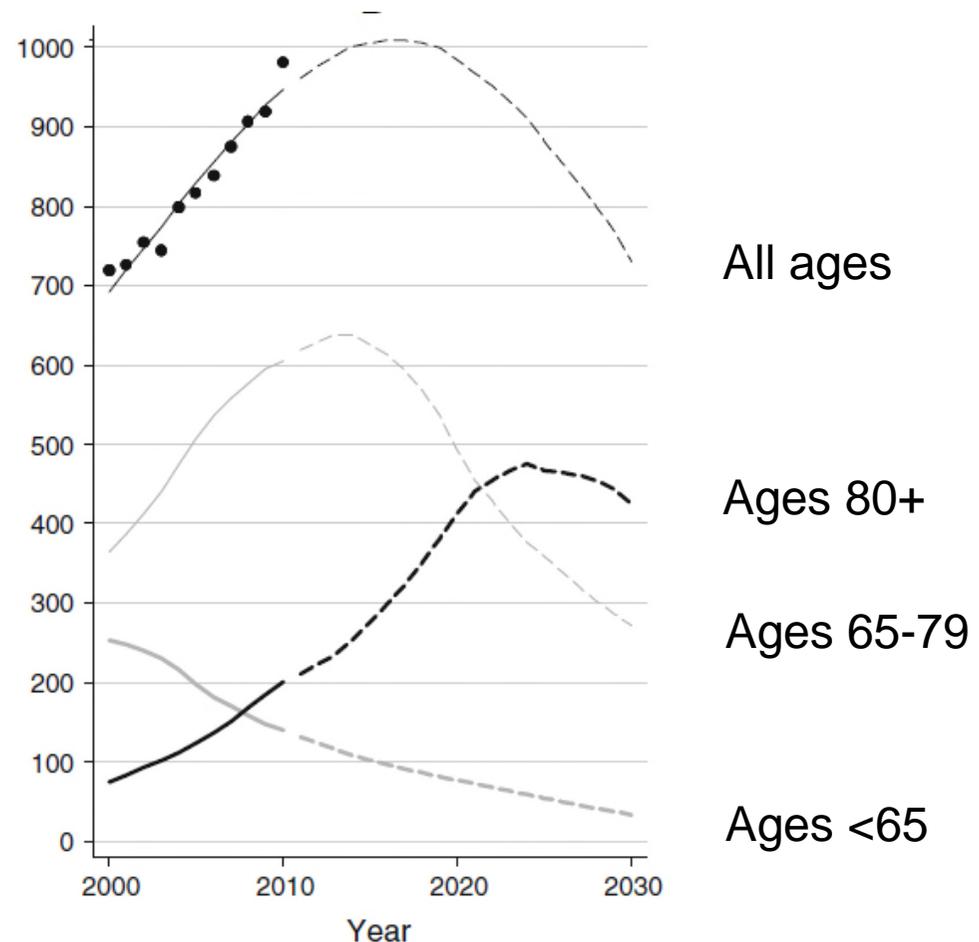


Challenge Implementation #1: Long time until prevention effect is measurable

Long duration between exposure and detection of cancer

Reversing trends likely to take decades

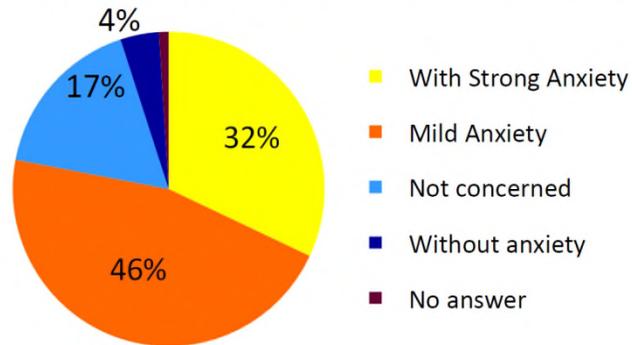
Success of primary prevention to be measured in reduction of exposure and changes in the projection of future cancers



Mesothelioma mortality in former West Germany

Challenge Implementation #2: Risk perception – acceptance of preventive measures

Radiation Anxiety of Fukushima Residents



(Data from 6 Mar, 2012, Asahi Newspaper)

Prevent cancer epidemic due to behavioural changes related to the accident

Attention on:

Radiation exposure and thyroid screening

Primary prevention required:

Address reactions to anxiety, fear and social and economic stress:

Less physical activity

Weight gain

Behaviour changes in eating and drinking habits, alcohol, smoking

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Togawa et al., Lancet Oncol 2018

General Conclusions on Prevention

For up to 40% of cancers it is known how they can be prevented – this can be implemented in a national cancer control plan

Recommendations have to be tailored to the local population

Research has to continue to identify the remaining causes of cancer

Prevention takes long duration before the effect becomes measurable



Espina et al., J Glob Oncol 2018

Conclusions on Environment and Cancer

At present, for Europe, around 3-5% of the total burden of cancer is estimated to be attributable to occupational exposures, around 3-5% to natural radiations (mainly UV, also radon), and <1% to other environmental factors (including air pollution, chemicals)

Some cancer incidence patterns suggest that among the 50% of the total cancer burden with unknown causes some portion is due to environmental factors

Risk communication is an essential element for reducing the gap between risk perception and established environmental causes of cancer

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