Swiss TPH

Swiss Tropical and Public Health Institute
Schweizerisches Tropen- und Public Health-Institut
Institut Tropical et de Santé Publique Suisse

Environmental Epidemiology and Risk Assessment

Exposure to radiofrequency electromagnetic fields from broadcast transmitters and risk of childhood cancer: a census-based cohort study from Switzerland

D. D. Hauri[1,2], B. Spycher[3], A. Huss[4], F. Zimmermann[5], M. Grotzer[6], N. von der Weid[7], C. E. Kuehni[3], M. Röösli[1,2]

(1) Swiss Tropical and Public Health Institute, Basel, Switzerland
(2) University of Basel, Basel, Switzerland
(3) Institute of Social and Preventive Medicine, Bern, Switzerland
(4) Institut for Risk Assessment Sciences, University of Utrecht, The Netherlands
(5) Department of Radiation Oncology, University Hospital, Basel, Switzerland
(6) Neuro-Oncology, Children's Hospital, Zurich, Switzerland
(7) Pediatric Hematology and Oncology, University Children's Hospital Basel (UKBB), Basel, Switzerland

Childhood cancer

Childhood cancer

- second most common cause of death in children after accidents in developed countries
- many different environmental factors: suspected to cause childhood cancer

Non-ionizing radiation

differed between

- optical radiation
- radiation from electro-magnetic fields (EMF)

Electro-magnetic fields: differed between

- extremely low-frequency electromagentic fields (ELF-EMF)

- radiofrequency electromagnetic fields (RF-EMF)

Background

so far:

- ecological studies on childhood leukaemia
  - most ecologic studies found increased risk

    (eg. Dolk et al., 1997, Hocking et al., 1996, Michelozzi et al., 2002)

- case-control studies: inconsistent results:
  - no association between RF-EMF exposure and leukaemias (Merzenich et al., 2008)
  - association between residential RF-EMF exposure and leukaemias (Ha et al., 2007)

- IARC working group (monograph 102, 2013): “available evidence insufficient to draw conclusion”

Aims

- census based cohort study at national level

  Assessment of association between non-ionizing radiation from broadcast transmitters and childhood cancer:
  - childhood cancer in general

  in particular:
  - leukaemia
  - acute lymphoblastic leukaemia (ALL)
  - central nervous system tumour (CNS-tumour)

Study design

Inclusion criteria

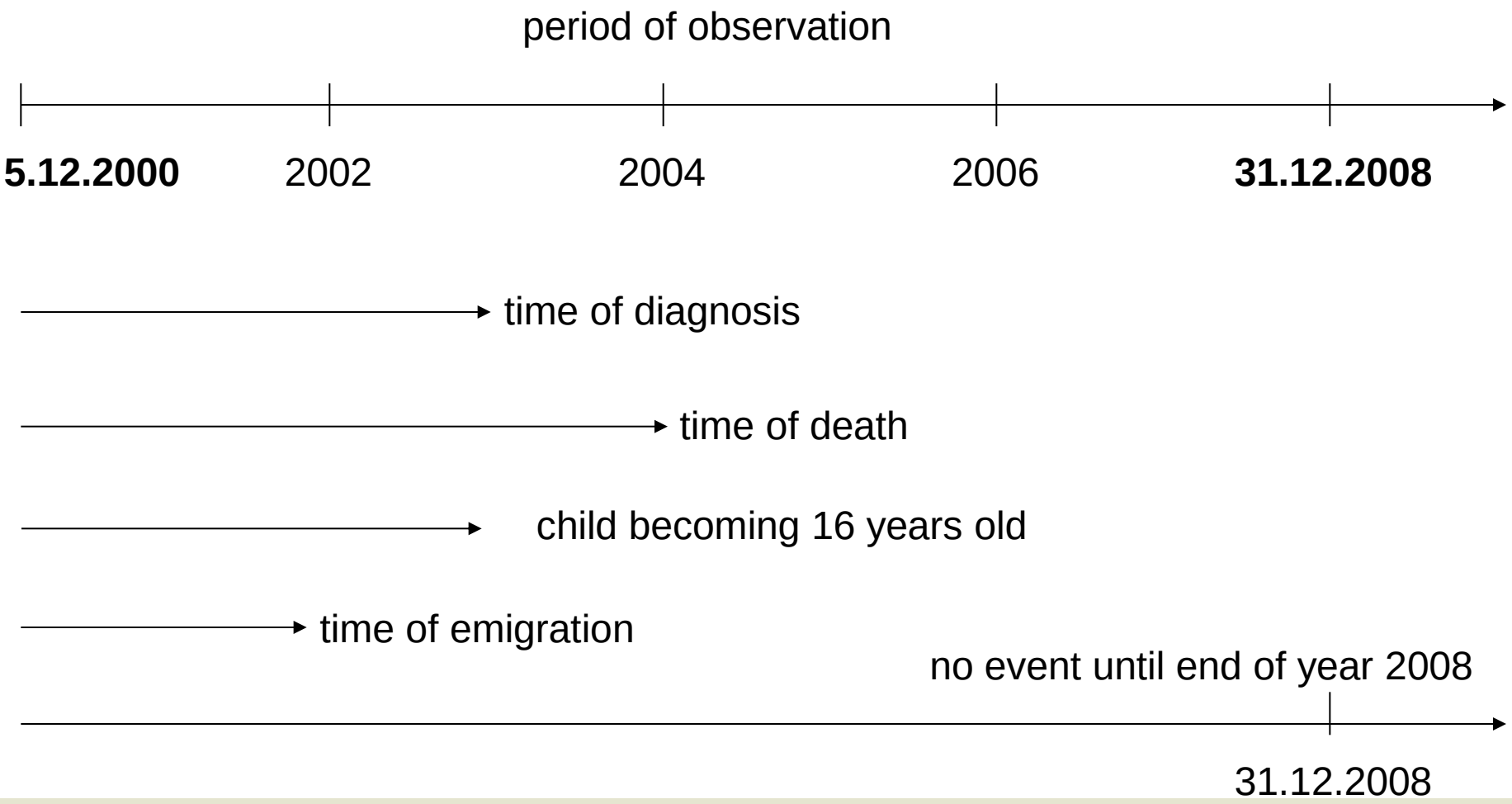
- children between 0 to 15 years of age at date of census 2000
- cancer cases, diagnosed between the date of census 2000 and end of year 2008

➔ databases:

- Swiss National Cohort (SNC): data on mortality, emigration
- Swiss Childhood Cancer Registry (SCCR): data on cancer outcomes, time of diagnosis

Study design

- census based cohort studies on national level



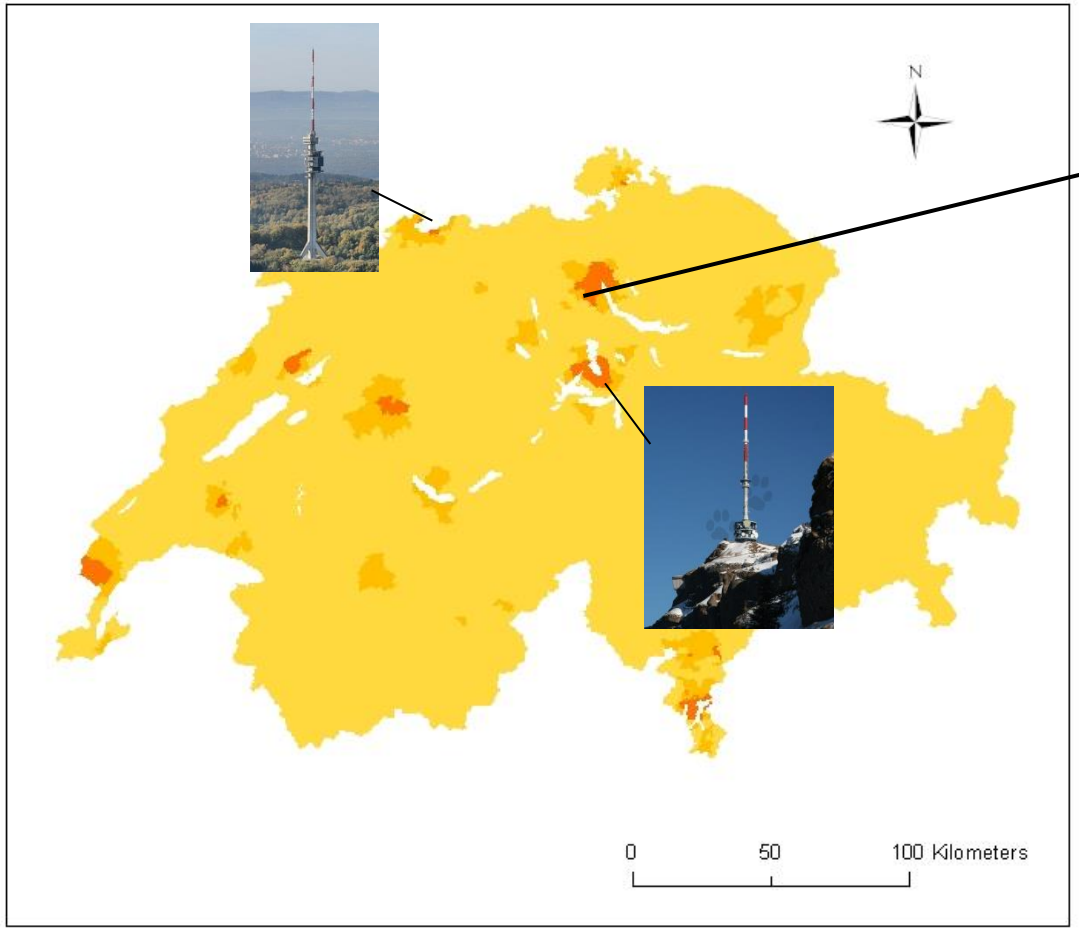
Statistical analysis

Cox regression model for time-to-event analysis

Considered confounders:

- age
- gender
- period effects
- low-dose ionizing gamma radiation
- benzene exposure
- proximity to power lines

RF-EMF exposure from broadcast transmitters



RF_EMF from radio and TV transmitters

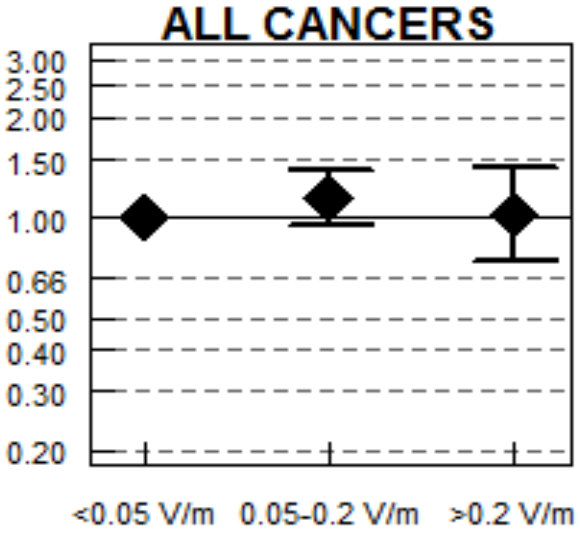
- <0.05 V/m
- 0.05-0.2 V/m
- >0.2 V/m

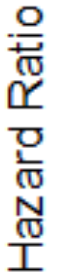
Number of children considered for the analysis

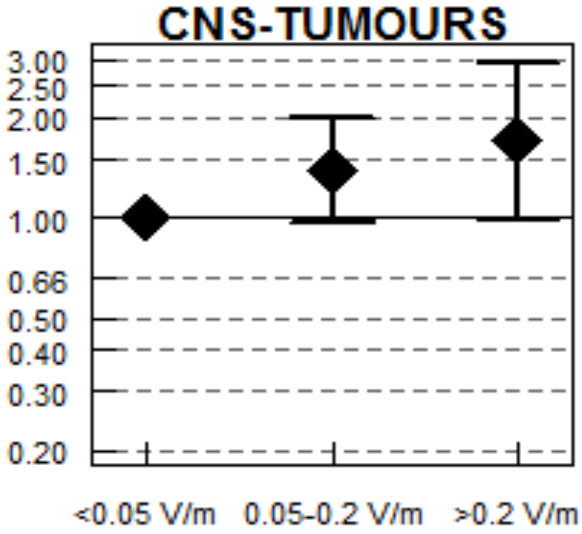
Total: 1,287,354

Cancer cases	All cancers	Leukaemia	Acute lymphoblastic leukaemia (ALL)	Central nervous system tumours (CNS)
Identified in SCCR	1127	317	253	285
Included	997	283	225	258

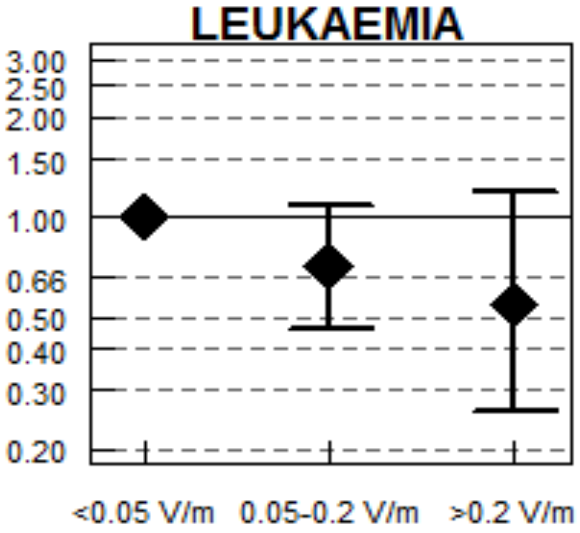
Results: RF-EMF exposure from broadcast transmitters

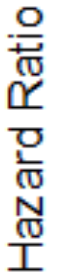


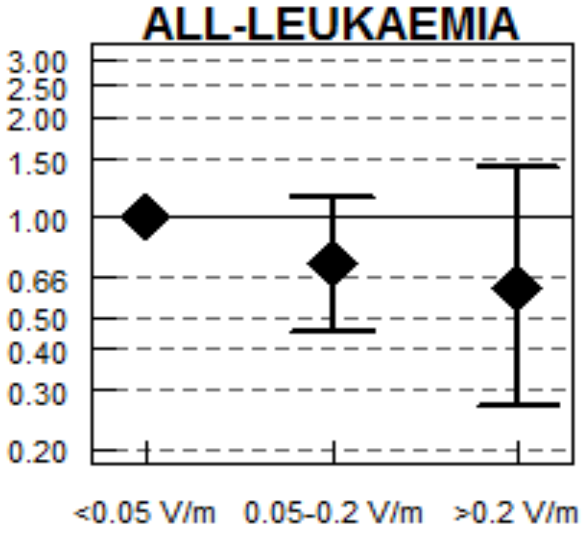




All type of transmitters







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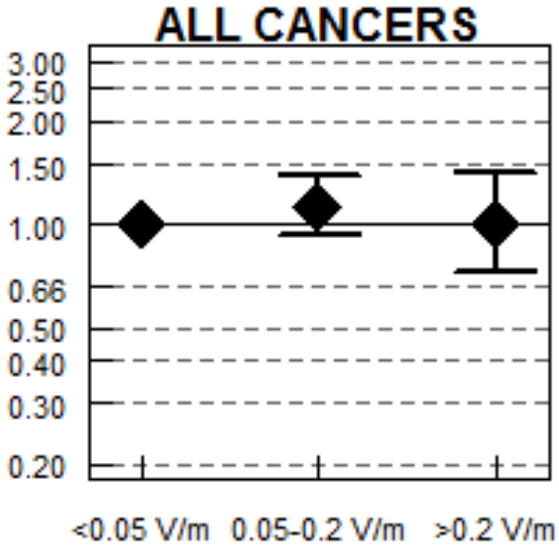
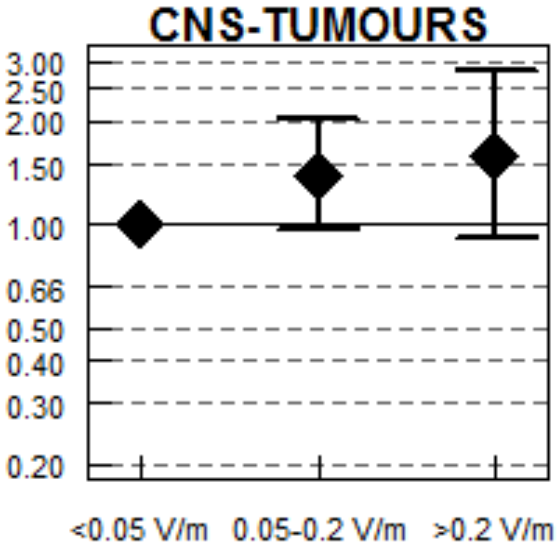
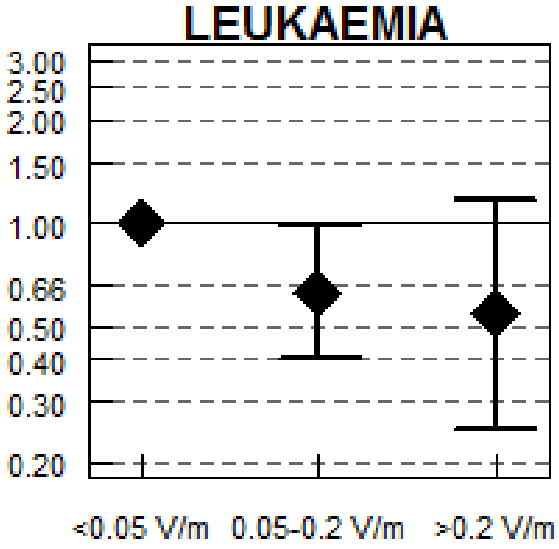
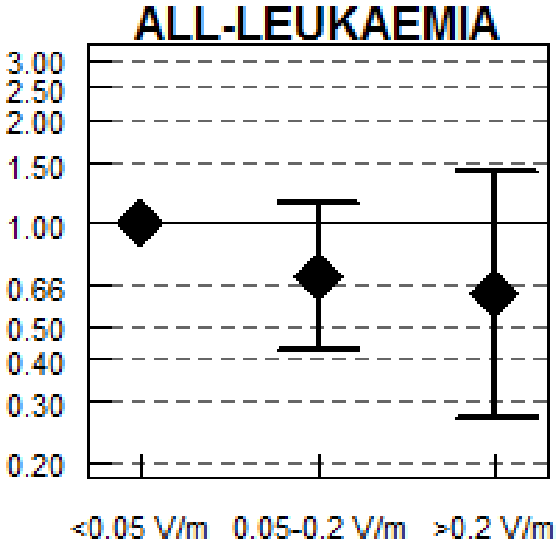




Hazard Ratio

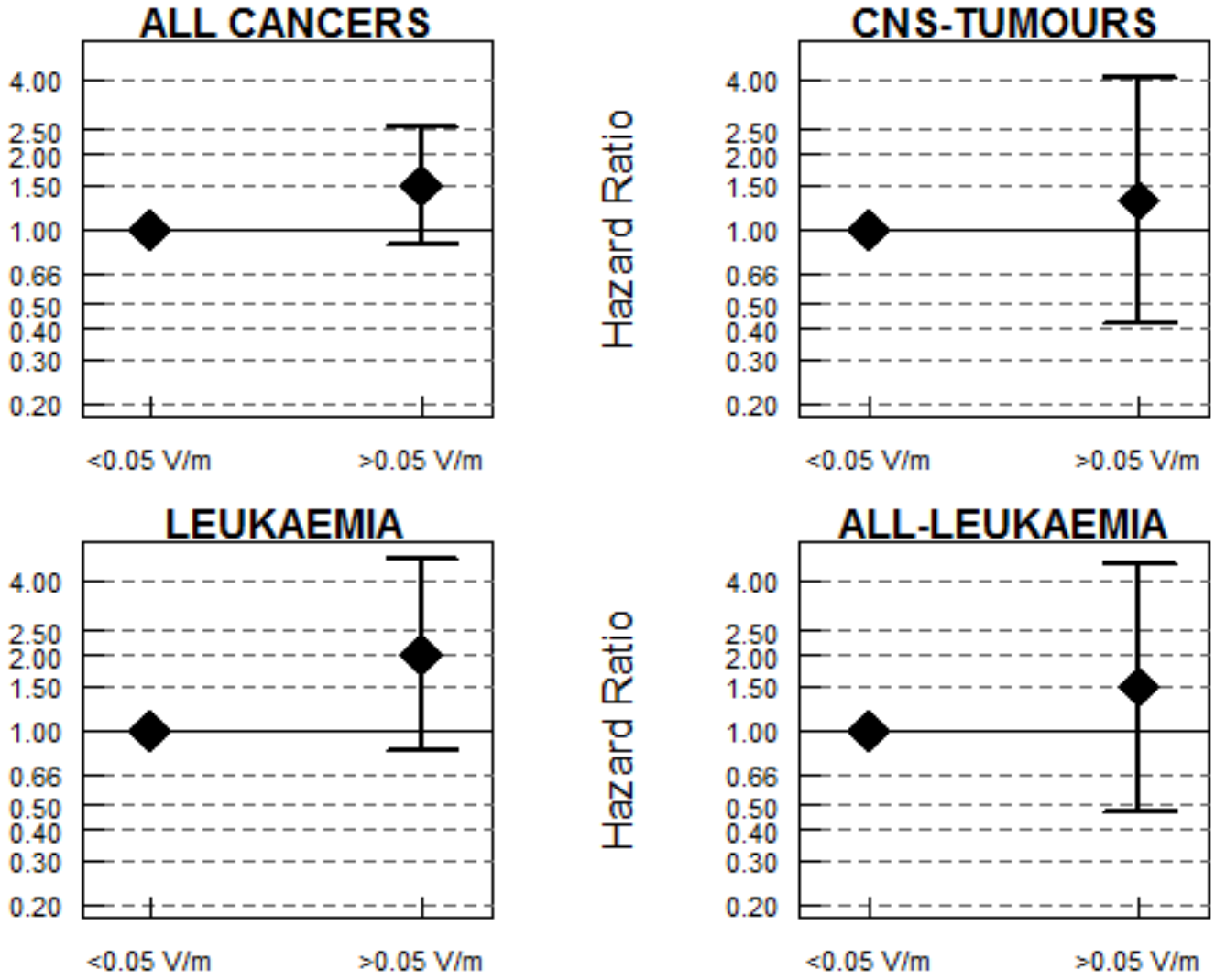




Hazard Ratio

VHF- and UHF transmitters

Results: RF-EMF exposure from broadcast transmitters



Short and medium wave transmitters

Discussion

RF-EMF exposure and childhood cancer risk

- no association with childhood cancer in general
- no relationship with childhood leukaemias
- elevated risks for CNS tumours

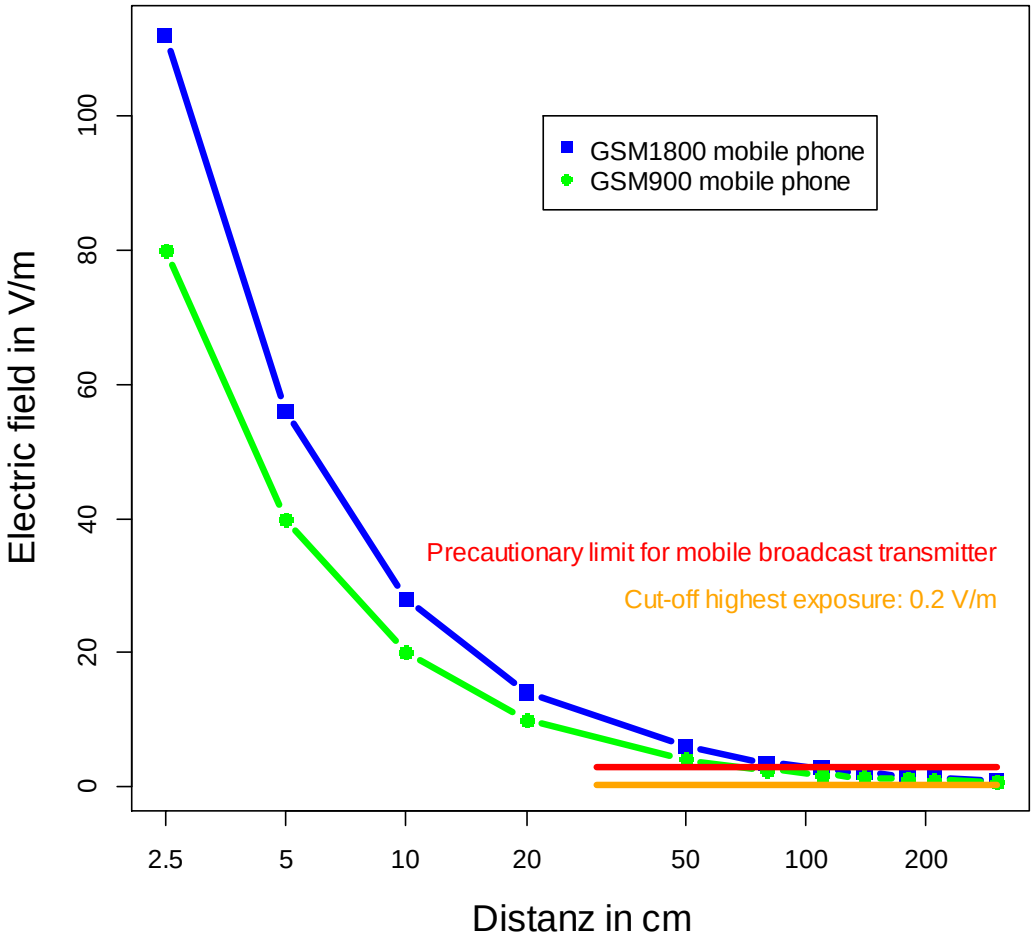
strengths

- large sample size
- minimal selection bias
- modeling of exposure

limitations

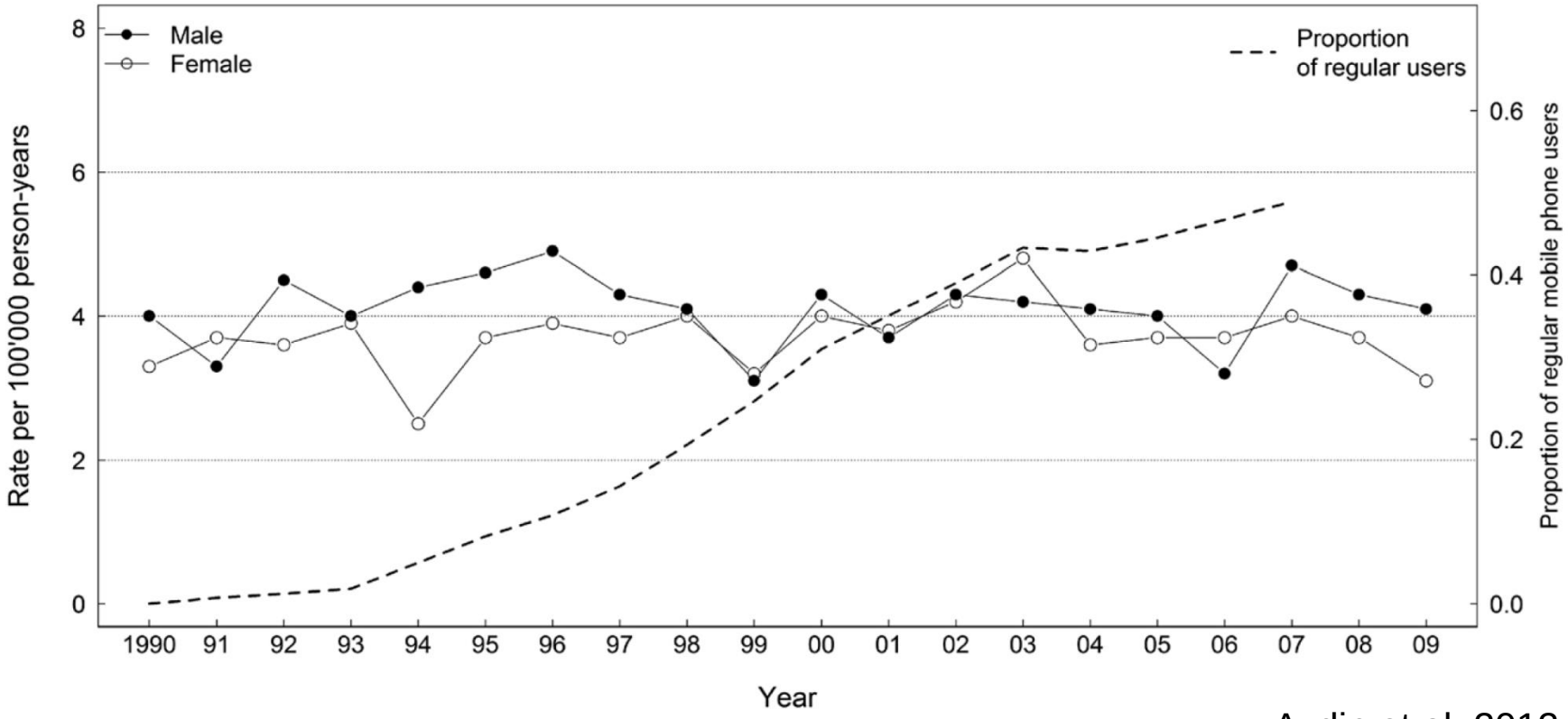
- small exposure range
- few highly exposed cases
- exposure to other RF-EMF sources not available

CNS results in a wider context: comparing mobile phone and broadcast transmitter exposure



CNS results in a wider context

Age-standardized incidence rates for brain and central nervous system tumours in Nordic Countries for the age group 5–19 years



Aydin et al, 2012

Discussion

RF-EMF exposure and childhood cancer risk

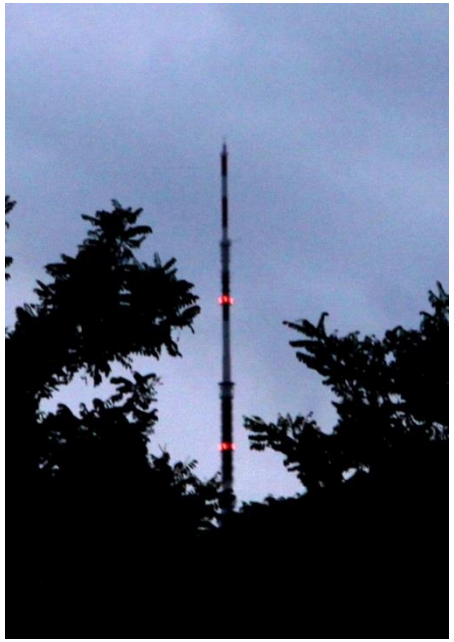
results on CNS tumours:

- Not consistent with increased use of wireless phones while incidence time trends for brain tumours remained stable in children (Aydin et al., 2012)
- Not consistent with results on mobile phone use and brain tumours in children (Aydine et al, 2011)
- Not in line with past case-control studies on broadcast transmitters and mobile phone base stations (but only a few studies available)
- contradict results from animal, in-vivo and in-vitro studies

- results concerning childhood leukaemia in line with animal, in-vivo and in-vitro studies

➔ no firm conclusions can be drawn at that stage

Thanks for your attention!



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