Non-cancer EMF effects related to children

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EMF - exposure

- Developmental effects
  - pregnancy outcomes
  - effects in young children
- Long exposure duration
  - effects on disease later in life

ELF - RF
ELF - Pregnancy outcomes

- Spontaneous abortion
- Congenital malformations
- Intrauterine growth retardation
- Preterm delivery
- Birth weight
- Stillbirth
- Sex ratio
ELF exposure sources

- Video-display terminal use (VDT)
  - Number of hours of use
  - Measurements in one study
- Overall no association with spontaneous abortion, malformations, or other
  - Study with high measured fields found increased risk of spontaneous abortion
- Probably low ELF fields in most studies
ELF exposure sources

- Paternal or maternal occupation
  - From census data, often very crude or
  - Small sample size

- Overall no association with spontaneous abortion, malformations, or other outcomes (sex ratio, birth weight, stillbirth etc)
ELF exposure sources

- Residential exposure
  - Electric blanket use
  - Water bed, electric bed heater
  - Wire codes
  - Spot measurements

- No consistent findings
  - No dose response, statistically unstable estimates
ELF exposure sources

- **Residential exposure**
  - 24 h personal measurements, only two studies

- **Maximum exposure:**
  - Increased risk of spontaneous abortion

- **TWA**
  - No consistent risk increases
  - Very low exposure levels (quartiles used)
Comments: ELF - pregnancy outcomes

- **Malformations and other outcomes**
  - Often rare outcomes
  - Register based studies with crude exposure assessment
  - Available studies do not provide useful information

- **Spontaneous abortion**
  - Occupational exposure mostly VDT, low ELF
  - Residential exposure: highest exposure category too low - rare exposure
Spontaneous abortion
- Maximum exposure - if it does not reflect generally very high exposure levels:
  - how can 24 h measurements correctly identify highly exposed?
    • Misclassification must be considerable, and if true, the true risk must be very high
  - Is some kind of bias more likely?
RF - pregnancy outcomes

- **Occupational studies - physiotherapists**
  - Increased risks of congenital malformations reported
  - No specific type of malformation have been consistently reported
  - Recall bias possible

- **Exposure to general population**
  - Mobile phone use, base stations
  - No studies available
Pregnancy outcomes - conclusions

- **ELF**
  - Most studies report no effects, but
  - Studies of maximum exposures need to be confirmed
  - Most studies have used very crude exposure assessment methods or low exposure levels
  - Effects would not have been detected, unless very high risk increase

- No known biological mechanism
Pregnancy outcomes - conclusions

- RF
  - Little information available from epidemiological studies
- No known biological mechanism
Other outcomes

- Electrical hypersensitivity in adults reported
  - Causality has not been established

- Effects on cognitive function in adults
  - Studies from UK, Finland, Holland
  - Need to be confirmed
  - Finnish results not confirmed in better designed study
Other outcomes

- Few studies on children available
  - One study reports that mobile phones facilitates cognitive processing in teenagers
    - Cross-sectional study, selection bias and confounding may explain the results

- More information about children needed, but difficult for ethical reasons?
Other outcomes

- Early start and prolonged duration of exposure may affect health later in life?

- Effects on blood-brain barrier
  - Controversial results but, may have implications for long-term health if confirmed.
  - Alzheimer’s disease, ALS, other?
Other outcomes

- Evidence that exposure in utero may affect outcomes later in life
- Diethylstilbestrol - cancer in genital organs
- Malnutrition - subsequent breast cancer risk
- Smoking during pregnancy - appetite in offspring at age 40
- Low birthweight - coronary heart disease and stroke in adults
Other outcomes

- Evidence that exposure during early life may affect outcomes in adults
  - Low doses ionizing radiation in infancy affects cognitive function in adulthood
  - Radiation treatment during childhood - increase cancer risk in adulthood