Effect of Exposure to Magnetic Fields on Pregnancy Outcomes, Health of Offspring, and Male Fertility

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Story of EMF Health Effect

• Discovery in 1979:
  – Findings by Nancy Wertheimer and Ed Leeper
  – Their incredible luck
  – Their two legacies
    • Poor EMF measurements
    • Outcome inefficient to study
History of EMF Research

• Evolution of EMF measurements:
  – Wire codes
  – Interview about occupational history
  – Distance from power lines or power stations
  – Home spot measurement
  – Personal EMF measurements (24 hours)
History of EMF Research

• Inefficient outcomes being studied:
  – Cancers
    • Childhood leukemia
    • Brain tumors
    • Other cancers including breast cancer
  – Long latency
  – Exacerbate the problem of EMF exposure misclassification
Problems with EMF Research

• Crude measure of EMF exposure
• Outcomes inefficient to study
• Mostly retrospective studies (case-control studies with surrogate measures of EMF)
• Physicists’ involvement_ a mistake
  – Focus on energy
  – Other mechanisms: cell-to-cell communications
• Lack of extensive research
Misconception about EMF Health Effect

• Most studies were negative
• It has been proven safe
• Power line EMF
  – Low frequency 50-1000 Hz
• Wireless (cell phone) EMF
  – High frequencies > 1 MHz
• Power line EMF and wireless EMF different
Findings on *In-utero* EMF Exposure

- Exposure to high level of magnetic fields during pregnancy is associated with an increased risk of:
  - Miscarriage
  - Asthma in offspring
- Prospective design
- Dose-response relationship
- Synergistic effect with known risk factors
  - For miscarriage: a history of miscarriage
  - For asthma in children: maternal history of asthma and firstborn child
- Typical day: stronger association
Findings on EMF Exposure Effects on Men

- Exposure to high level of magnetic fields is associated with an increased risk of
  - Poor semen quality (abnormal motility and morphology)
- A dose-response relationship
- Typical day: stronger association