National Cancer Advisory Board

The Impact of Occupational and Environmental Epidemiology on Public Policy: Introduction

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President’s Cancer Panel
Series on Environmental Factors in Cancer

DCEG Speakers: Jay Lubin, Mary Ward, Kenneth Cantor, Martha Linet, Laura Beane Freeman, Michael Alavanja
Methodological Challenges in Occupational and Environmental Studies

• **Exposure assessment**
  – Often retrospective with indirect measures
  – Low levels of exposure and risk may be difficult to detect
  – Need for biomarkers of exposure, early effects

• **Interactions**
  – Genetic, epigenetic, lifestyle
  – Metabolic, immunologic

• **Risk assessment and regulatory implications**
Why Study Occupational Cancer?

- Exposures usually greater, more frequent, and longer duration than general population
- Has uncovered many of the established or probable human carcinogens (IARC: group 1 - 54%; group 2A - 61%)
- Opportunities for primary prevention
- Opportunities to discover mechanisms through integration of epidemiology, toxicology, and genetics
- Sentinel for risks in general population
Arsenical Emissions from Copper Smelter (Montana)

Lee and Fraumeni. JNCI 1969; 42: 1045-1052
Elevated Mortality from Lung Cancer among Women in U.S. Counties with Arsenic-emitting Smelters

Shipbuilding in 1943
Working under a cloud of asbestos
NCI Studies of Occupational Exposures

- Benzene
- Formaldehyde
- Diesel exhausts
- Pesticides (Agricultural Health Study)
- Radiological technologists
NCI Studies of Environmental Exposures

- **Indoor air pollution**
  - Coal combustion products
  - Environmental tobacco smoke
  - Radon

- **Radiation (UV, EMF, ionizing including medical)**

- **Water pollution**
  - Disinfection byproducts
  - Nitrates
  - Pesticides
  - Bisphenol A
  - Arsenic
Does arsenic in drinking water explain the New England bladder cancer excess?

Bladder Cancer Mortality, White Women
1970-94

Arsenic in Groundwater
2000

US = 1.87/100,000
2.26-3.14 (highest 10%)
2.15-2.23
1.99-2.09
1.61-1.99
1.78-1.96
1.66-1.77
1.60-1.67
1.48-1.59
1.33-1.47
0.75-1.32 (lowest 10%)
Sparse data (6 SEAs; 0.09% of deaths)
Preparing for Radiation Disasters

- Develop rapid response dosimetry
- Monitor for late effects
- Train dosimetry experts, teach radiation epidemiology
Occupational Benzene Exposure in China
• Effect of low-level population exposures?
• Cohort study of manufacturers/users of formaldehyde
• Cohort study of embalmers
• Biomarker study in China
Indoor Air Pollution
China
In occupational and environmental epidemiology, what should be the role of NCI in:

- Responding to Congressional and other mandates, and in tackling controversial issues?
- Launching international studies that provide unique opportunities for research (natural experiments)?
- The risk assessment process vis-à-vis other federal agencies?