The Unhealthy Secrets of Coal

Michele Prevost, MD
Why is Coal Toxic?

- Toxic metals
- Radioactive elements (decays to Radon)
- Even “low-sulfur” coal produces bio-toxic sulfur and acidifies water
- Benzene derivatives (carcinogenic)
Why is Coal Toxic?

- Arsenic – known poison; various cancer & lymphoma
- Lead – effects almost every body system
- Mercury – Irreversible damage to nervous system
- Cadmium – High Blood Pressure; kidney damage
- Vanadium – Lung damage; birth defects
- Selenium – Cirrhosis (liver failure); pulmonary edema (fluid in lungs); death
- Others not as well studied
Adverse Health Effects of Coal
A 15 Minute Primer

- Coal Mining
  - Dust
  - Water
- Processing
- Transportation
- Combustion
- Combustion Waste
Coal Dust

- PM10 & Smaller Particles
- Black Lung Disease (pneumoconiosis)
- Childhood Asthma
- Linked to Lymphoma
- Greatest impact on young, old & those with other lung or heart disease
Coal Sludge and Water

- Slurry Ponds
  - Concentrated toxic elements – released in large amounts
  - Leach for hundreds of years
- Wells exceed drinking water standard >500%
- Lack of biodiversity & deformed fish
- Stream acidification
What if you live down-wind or down-stream?

- **Common Sense** – pollutants that poison make people sick
- **Growing body of medical studies**
  - Higher rates of premature death, COPD, Lung Cancer, other heart, lung, kidney disease, congenital abnormalities, hospitalizations (after adjusting for other factors)
- **Environmental degradation linked to depression**
Living Near Coal Mining

• Not just occupational injuries & illness
• Higher rates of
  – Lung cancer
  – Hospitalization
  – COPD (Chronic Obstructive Lung Disease)
  – Hypertension (leads to heart, kidney disease)
  – Childhood Asthma
  – Injured by fly rock and trucks
Coal Processing

• Chemical wash to prepare for burning
• 19 are known cancer-causing agents
• Often stored in slurry impoundments
  – Spills and failures
  – Contaminated water, injuries, deaths
• Dried slurry waste extremely high concentration of toxics – dust or water leaching
Coal Transportation

- The Trains and Trucks
  - >600,000 NOx
  - >50,000 tons PM
- Along railway much higher than EPA recommended air toxin levels
- Numerous coal-truck accidents

YES, THAT IS COAL DUST
Coal Combustion

- Most well known / studied polluter
- Particulates, nitrates, sulfates, mercury
- American Lung Association Estimated 24,000 deaths /year directly related
- Nitrous Oxide, Sulfur Dioxides $\rightarrow$ acid rain
- Acidification water increases metal leaching into waterways (vicious cycle)
Mercury

• #1 source in US – coal fired power plants
• Methylmercury builds up in fish, wildlife, then people
• Potent neurotoxin
• Disrupts fetal development
Mercury

- 48 tons emitted 2005
- High amounts in predatory fish
- 600,000 infants at risk annually
- No safe level of exposure
Coal Combustion Waste

- "Coal Ash" or CCW
- 141 million tons annually in US
- Kingston Dam Slurry disaster brought attention
- Water in area >100x allowable levels toxic heavy metals
- Widespread ground water contamination around mines & power plants in lower 48
Coal Ash - Alaska

- USGS & Independent Testing of Soils in Fairbanks:
  - Arsenic
  - Vanadium
  - Mercury
Coal Ash - Arsenic

- Primary threat to human health?
- >100x allowable soil levels in AK tests
- EPA: 2000x increased cancer risk living @ coal ash ponds
Conclusion

• Once soils / water contaminated, may be for centuries
• Cumulative public health impacts of coal extensive
• Our dependence on coal not sustainable
• **Move beyond the industrial revolution – need a future without coal**
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