Community and 21st Century Asbestos Exposure and Disease

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Waves of Asbestos Related Disease

1st Wave: Mining, Occupational
2nd Wave: Industrial Use, Occupational
3rd Wave: Asbestos in place, natural asbestos, high-risk communities
Asbestos-Related Diseases (ARD)

♦ Major Fatal Diseases
  • Asbestosis
  • Lung Cancer
    – Multiplicative risk from smoking
  • Mesothelioma
    – Pathognomonic for Asbestos
    – No association with smoking

♦ Variants Associated with Different Fiber types?
Epidemiology of Non-Occupational ARD

- Mesothelioma most apparent, increases in asbestosis and lung cancer infrequent

- Indicators of non-occupational mesothelioma
  - Increased risk in women
  - Younger age distribution

- Latent period for Mesothelioma
  - Risk increases for 45 years after first exposure, then starts to plateau (Reid et al. 2014), no one survives long enough for risk to disappear
  - Short Life expectancy (~9 mo.) post diagnosis
Communities at High Risk for ARD

Sources of Asbestos Exposure

- Occupational
- Paraoccupational / Familial
  - Resident in same household as worker
  - With some genetic component*
- Residential Environment
- Lifestyle

* DeKlerk et al, 2013
The Community of Ambler, PA

- Suburban Philadelphia, 18 Miles from City
- 1897- Discovers insulating and strength properties of dried Milk of Magnesia + Asbestos- Sectional Pipe Coverings containing asbestos
- 1910-1920- Worlds largest producer of asbestos products “The BEST in asBESTos”
- 1930s-1984- asbestos contamination and waste sites
- 1970s-1980s- plants close, leads to urban decay
- 1990s- renaissance, art and restaurant scene, family friendly community, top schools
Ambler, PA - the Asbestos Legacy

Ambler South
- Asbestos piles, the “White Mountains”
24 acres, 30 meters high, ~800,000 cubic meters of ACM & other wastes

1984-1996 - Declared an EPA “Superfund Site” capping, slopes graded, hydroseeded, fencing and signs, dismantled playground
- Subsequent erosion, uprooted trees, animal burrows, unauthorized access

Current - Remains fenced off
The Asbestos Legacy: Family Photo - Ambler 1960s
Credit: Joe Marincola
Playground after fence c.1984 adjacent to the White Hills of Ambler
Ambler, PA – The Mesothelioma Legacy

Results:

- 2.7x higher incidence in men
- 4.5x higher incidence in women
- No elevation in neighboring post-codes
- Rates for all cancers combined and lung cancer lower in all three locations vs PA

[Graph showing observed vs. expected number of cases]
Lifestyle/behavioral Exposures in Ambler PA

- Socialization in public venues after work (wearing dusty clothing, no hair washing or showering)
- Playing on asbestos waste piles as a child and particularly as an adolescent
- Picnicking or spending time near asbestos piles as an adult
- Outdoor sports
- Gardening
- Using asbestos waste for cooking (e.g. putting potatoes into asbestos laden pipes for cooking)
- Flooding into basements
- Flooding into gardens then eating produce from gardens
Ambler and Bo-Rit Superfund Sites

♦ Sources of Continuing Exposure - U-Tube

How to Access the Fenced-off Superfund Site Undetected

Paintball fights in the old factory  Source: http://www.youtube.com/watch?v=lH-SsjoDFuw
Asbestos Exposures in High Risk Italian Communities
-- Previous Manufacturing Sites using Asbestos
Identified from Italian Mbesothelioma Registry

Stradella (15 cases):
- 60% environmental
- 13% familial
- 27% leisure-related

Casale Monferrato (164):
- 56% environmental
- 42% familial
- 2% leisure-related

Broni (33):
- 79% environmental
- 21% familial
- 0% leisure-related

After Marinaccio et al., 2015
Other High-Risk Communities

Karain, Turkey
- Erionite in native rock
- Houses made of rock

Genetic Vulnerability
- families with 50% mesothelioma incidence/fatality rates
More Well-Studied High-Risk Communities

- Wittenoom, Western Australia.
  Former Asbestos Mining and Milling Site
- Libby, Montana.
  Former vermiculite mining and processing site.....

Many more unstudied?
Selected Other Non-occupational Asbestos Exposures

- **Do-it-yourself Home Renovators**
  - Significant increase in mesothelioma from Australian mesothelioma registry studies (Olsen et al 2011).

- **Natural Asbestiform Fibers**

- **Disasters and Exposures**
  - Asbestos & 9/11 World Trade Center disaster
  - Asbestos Exposures from Weather-related events
Selected Issues with Non-Occupational Asbestos

- Banning the use and import of asbestos will not effect asbestos in place
- Non-regulated forms of asbestos cause ARD in non-occupational situations
- Responsibility for exposure control is much more diffuse than in occupational settings
- Mesothelioma registries (e.g. Italy, Australia) very helpful in establishing sources of risk
- Legal responsibility for exposure may not always be as clear as in occupational settings
- Vulnerabilities of groups in communities may include
  - Genetic predispositions
  - Social- Environmental justice and indigenous, ignorance of risks, non-English speaking
  - Behavioral –adolescents, home-renovators
  - Associated with Adverse events including weather related
- Very Diverse attitudes and perceptions of risk amongst communities
- Medical surveillance, diagnosis and treatment, social support, prophylaxis - needs of high-risk communities