Asbestos Related Health Issues

Learning tasks

- Gain an understanding of the routes-of-entry into the body for asbestos fibers.
- Recognize the major diseases associated with asbestos exposure.
- Understand the relationship between smoking and asbestos exposure in terms of the increased risk of disease.
- Recognize the need for medical surveillance.
Potential Routes of Entry

- **Ingestion**
  - Enters the body through the digestive system
  - Generally non-harmful
  - Drinking water laws allow 7,000,000 fibers/liter

- **Penetration (Absorption)**
  - Enters the body through the skin
  - Causes warts
  - Generally non-harmful

- **Inhalation**
  - Enters the body through the respiratory system
  - Harmful to human health

How Are People Exposed to Asbestos?

The primary route of exposure to asbestos is **inhalation**.

- Dust from construction activity
- Dust from construction cleanup
- Dust from infrastructure modification
- Dust from removal, demolition, or renovation projects
The Human Respiratory System

- **Bronchiole Tubes**
  - Larger air way passages

- **Alveoli**
  - Balloon like air sacks
  - Where Oxygen and Carbon Dioxide transfer occurs

- **Mesothelium**
  - Lining of the pleural cavity
  - Allows the chest cavity to slide
Particulate Defenses

➢ The body’s defenses against inhalation of particulate
  • Nose Hairs
    ✓ Filtering Device, catches particles
  • Cough
    ✓ Least effective defense
  • Mucous Ciliary Escalator
    ✓ Cilia are hair like protrusions that “bounce”
    ✓ Move particles up from lungs to be swallowed
  • Microphages
    ✓ White blood cells that engulf and digest foreign objects

Asbestos Toxicology and Latency

➢ Dose-Response Relationship
  • What amount of asbestos exposure is harmful?
➢ Latency Period
  • Period of time between exposure and development of disease.
➢ Why are asbestos fibers so dangerous?
  • Indestructible
  • Irremovable
  • Irritating to fragile tissue
➢ Bio-persistence
Health Effects

- **Asbestosis** is a dose-related disease where lung capacity is lost due to scarring from asbestos fibers.
- **Mesothelioma** is a rare, but fatal cancer that affects the lining of the lung (mesothelial lining).
- **Lung cancers** develop after heavy asbestos exposure and are indistinguishable to the lung cancers found in cigarette smokers.

Asbestos Toxicology and Latency

- Asbestos fibers are inhaled through successively narrower passages, from the trachea through the bronchial tubes to the bronchioles. Fibers embedded in these airways can cause lung cancer.
- Fibers can reach the clusters of honeycombed air sacs called alveoli, leaving scar tissue. Excessive scarring restricts breathing. This is asbestosis, a condition resulting mainly from occupational exposure.
Asbestos Toxicology and Latency

- Fibers can pass through the alveoli and migrate to the pleura lining of the chest cavity. There, they may injure the mesothelial cells and promote malignant tumors. This is Mesothelioma, a rare cancer that is usually discovered 25 to 40 years after initial exposure. Nearly all victims die within a year of diagnosis.
- There are multiple types of Mesothelioma but it is almost always fatal.

What is Lung Cancer?

- Cancer that invades and blocks the lung's air passages.
- Cigarette smoking greatly increases the likelihood of lung cancer.
- Lung cancer caused by smoking or asbestos looks the same.
### Health Effects

- Smokers have a greater risk of getting asbestos-related cancers (50 to 90 times more likely to contract cancer)
- It is still unknown if there is a “safe” level of exposure
- 15-50 year latency period between exposure and disease, with mesothelioma being the longest

### Asbestosis

**Internal Effects**

- Asbestos fibers are inhaled through successively narrower passages, from the trachea through the bronchial tubes to the bronchioles.
- As fibers reach the clusters of honeycombed air sacs “alveoli”, the fibers leave scar tissue.
- Excessive scarring then restricts breathing. This is asbestosis, a condition resulting mainly from high occupational exposure.
- Asbestosis is defined as the fibrotic scarring of the lungs.
- Is a restrictive lung disease that reduces lung capacity as it progresses.
Asbestosis

- Complications
  - Dangerous complications to health due to the reduction of lung function
    - High Blood Pressure
    - Heart Disease
    - Fluid Build-Up in the Lungs
    - At risk for developing other asbestos-related diseases

The symptoms are very non-specific which leads to misdiagnosis in many cases!!

What is Mesothelioma

- A rare cancer - affects the lining of the lungs or lung cavity or the lining of the abdominal cavity;
- Known asbestos exposure is primary cause of mesothelioma;
- Most cases develop many decades after known exposure;
- Poor prognosis;
- Signature of asbestos exposure.
What are Pleural Changes?

- Pleura = lining of the lungs & lung cavity;
- Thickening & hardening of the pleura;
- Potential higher risk of cancer;
- Role of smoking – not clear;
- Usually, no early symptoms;
- Sometimes observe decreased lung function
Asbestos Workshop

Localized Pleural Thickening

Asbestosis: Age-Adjusted Mortality Rates by County
US Residents age 15 and over, 1983-1992

http://www.cdc.gov/niosh/docs/96-134/pdfs/96-134c.pdf
Potential Health Affects

- Smoking and Asbestos Exposure
  - Smoke paralyzes the cilia
  - Every cigarette paralyzes the cilia for approximately two hours
  - Smoking has a synergistic effect with asbestos exposure
  - A smoker who is exposed to asbestos has a 50-90 times greater chance of coming down with an asbestos disease.

### Potential Health Effects

**Smoking and Asbestos Exposure**

<table>
<thead>
<tr>
<th></th>
<th>Non-smoker</th>
<th>Smoker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Exposed</td>
<td>X (about 10 per million)</td>
<td>10x</td>
</tr>
<tr>
<td>Exposed</td>
<td>5x</td>
<td>50-90x</td>
</tr>
</tbody>
</table>
Potential Health Effects
Smoking and Asbestos Exposure

➢ Tools to aid in Smoking Cessation

• American Cancer Society
  1-800-ACS-2345
  http://www.cancer.org

• American Heart Association
  800-242-1793 (call center) or 800-242-1793 or 214-373-6300
  (administrative offices)
  http://www.americanheart.org

• American Lung Association
  800-586-4872 or 212-315-8700
  http://www.lungusa.org

Potential Health Effects
Smoking and Asbestos Exposure

➢ Tools to aid in Smoking Cessation

• National Cancer Institute, Cancer Information Service
  800-4-CANCER or 800-422-6237

• Nicotine Anonymous
  415-750-0328
  www.nicotine-anonymous.org

• Office on Smoking & Health -- National Center for Disease
  Prevention and Health Promotion
  770-448-5705
  www.cdc.gov/tobacco
Health Questions

➢ Are there short-term effects or symptoms of asbestos exposure? No, there are not. For example, you do not have asthma, allergic reactions, headaches, burning eyes or a sore throat from it.

➢ Are there any tests I can take to determine if I have inhaled asbestos recently? No. Chest X-rays can detect diseases related to exposure to asbestos only after the disease has developed, which could take 15 to 50 years. Best gauge we have today is breathing tests. Must establish a baseline to compare results.

Medical Monitoring/Medical Surveillance

➢ Because of the increased public awareness concerning the hazards associated with exposure to airborne asbestos fibers and because of various regulatory requirements, employers are finding themselves in situations where they must provide regular and periodic medical monitoring for their employees.

➢ Asbestos abatement contractors are required to provide a medical surveillance program for their employees who are exposed to airborne asbestos fibers above the PEL for more than 30 days per year, or if they wear negative pressure air purifying respirators.
Medical Monitoring/Medical Surveillance

- Other employees who should be provided medical monitoring are custodial and maintenance workers who may encounter ACM while performing their normal duties. Examples of these duties might include working above false ceilings with asbestos-containing insulation, installing ceiling tiles, or performing maintenance on pipes or boilers that have asbestos-containing insulation on them.
- By law, any employees working in a building in which the airborne fiber concentrations exceed 0.1 f/cc during an eight-hour time weighted average are required to undergo medical surveillance, with the cost to be borne by the employer.

Medical Monitoring/Medical Surveillance

Pre-Placement Exams

- A comprehensive medical evaluation must be performed within 30 calendar days following the worker's first employment. This should include, minimally, a medical history to determine the presence of any possible respiratory diseases; and pulmonary function tests including forced vital capacity, the maximum amount of air that can be expired from the lungs after full inhalation, and forced expiratory volume after one second, the amount of air forcibly expired in one second after full inhalation.

- An x-ray might be mandatory depending on whether the employee is covered by the Construction or the General Industry Standard.
Medical Monitoring/Medical Surveillance

Pre-Placement Exams

➢ The results of this examination are used as the employee's baseline health status and also to determine whether or not he is capable of wearing a respirator. If an employee requests to see the report, the employer is required to supply him/her with a copy.

➢ It is very important for the employer to be sure the clinic maintains the results of the examination on file. In the event an employee claiming a disability files suit at some future date, the employer will be able to check his records to determine if the condition could have occurred as a result of employment with his company. In addition to the medical reports, the employer/building owner should request that the physician provide a statement indicating whether or not an employee is capable of wearing a respirator and outlining any limitations associated with its use.

Annual Exams

➢ Every employer must provide comprehensive medical evaluations for each employee engaged in occupations which cause exposure to airborne asbestos fibers.

➢ Such annual examinations must include, minimally, a study to determine the presence of any respiratory diseases, and a pulmonary function test which includes Forced Vital Capacity (FVC) and Forced Expiratory Volume (FEV1). This examination is basically the same as the pre-placement evaluation and is used primarily as an ongoing monitoring mechanism.

➢ The physician compares the annual examinations with the pre-placement evaluations to determine if there are any changes in an employee's health status. If there are noticeable changes, the employer and the employee should both be notified since the situation may require immediate action (i.e. transfer to another job, discontinue respirator use, etc.).
Medical Monitoring/Medical Surveillance

Post-Termination Exams

- Within 30 calendar days of the termination of any employee, OSHA requires that each employee exposed to asbestos receive a medical examination.
- This examination must entail the same items as the pre-placement and annual exams.
- There must be a history to determine the presence of any respiratory diseases, and pulmonary function testing including FVC and FEV1.0.
- Records of these exams must be retained by the employer/building owner for a minimum period of 30 years to provide documentation of the health status of the employee.
- The reason for 30-year time span is that the latency period associated with asbestos-related diseases often ranges between 15-30 years. Thus, if any employee files a claim 25 years later, the employer will have records on file for reference.

Medical Monitoring/Medical Surveillance

Reasons For Tests

- Pulmonary Function
  - These tests are conducted to determine if a person’s lungs are expanding normally and if there is adequate air movement in and out of the lungs.
  - The FVC and FEV1.0 are conducted through the use of a spirometer. The purpose to the test is to detect the loss of the lungs' elasticity due to asbestosis.