

Asbestos



Asbestos Disease: An Overview for Clinicians

Asbestos Exposure

Asbestos: A health hazard

Exposure to asbestos was a major occupational health hazard in the United States. The first large-scale use of asbestos in the United States began in 1896. Since 1989, all new uses of asbestos have been banned in the United States by the Environmental Protection Agency.

The adverse effects of asbestos on health have been known for several decades. These effects include mesothelioma, pleural changes, asbestosis, and lung cancer.

Asbestos exposure on the job

Many people have come into contact with asbestos fibers through their jobs (occupational exposure). Some of the work environments or occupations in which workers are now or were exposed in the past include:

- Work Environments
 - Asbestos product manufacturing (insulation, roofing, building materials)
 - Automotive repair (brakes and clutches)
 - Construction sites
 - Maritime operations
 - Mining operations
 - Offshore rust removals
 - Oil refineries
 - Power plants
 - Railroads
 - Sand or abrasive manufacturers
 - Shipyards/ships/shipbuilders
 - Steel mills

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**Asbestos exposure
on the job
(continued)**

- Occupations
 - Asbestos removal workers
 - Workers at exfoliation facilities where vermiculite ore from Libby, Montana, was processed
 - Demolition workers
 - Workers at asbestos product manufacturing plants
 - Auto mechanics
 - Boilermakers
 - Bricklayers
 - Building inspectors
 - Carpenters
 - Drywallers
 - Electricians
 - Floor covering manufacturers or installers
 - Furnace workers
 - Glazers
 - Grinders
 - Hod carriers
 - Insulators
 - Iron workers
 - Laborers
 - Longshoremen
 - Maintenance workers
 - Merchant marines
 - Millwrights
 - Operating engineers
 - Painters
 - Plasterers
 - Plumbers
 - Roofers

Others at Risk

Exposed workers might have brought asbestos fibers home on their clothes, shoes, and bodies, and persons who lived in the same household may have been exposed. Also at risk are people who live near businesses that are likely to have asbestos on their property such as: refineries, power plants, factories, shipyards, steel mills and building demolition.

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Asbestos-Related Disease and Risk

Asbestosis and pleural disease

Asbestosis is a pneumoconiosis caused by the inhalation of asbestos fibers. It is characterized by interstitial pulmonary fibrosis. It may also be accompanied by pleural disease, a thickening of the pleura with or without pleural calcification.

Pleural disease may also occur in the absence of interstitial findings. In more advanced cases there may be dyspnea, dry cough, and rales. Rales are wet and crackling lung noises usually heard at the lung bases and are often called “cellophane” rales because of their crackling nature.

Severe cases of asbestosis may cause clubbing of the fingers. Pulmonary function studies typically show a restrictive pattern. Radiographic changes may include small irregular opacities in the lower and middle lung fields, pleural thickening and pleural plaques, and pleural calcification.

In less advanced cases, radiographic changes may be difficult to interpret. High-resolution CT scanning of the chest may be helpful in evaluating the patient further.

Cancer

All histologic types of lung cancer may be seen. However, some studies have shown a preponderance of adenocarcinoma. Mesothelioma is a rare tumor of the pleura and peritoneum that is associated with asbestos exposure. Studies of mesothelioma have been difficult to conduct because of the long latency between exposure and disease onset. This period may be as long as 30 to 40 years.

The pleural tumor tends to spread along the interlobar fissures and invade the subpleural portion of the lungs. Direct invasion of the tumor into adjacent tissues and organs is common. Smoking is not associated with mesothelioma but has been shown to significantly increase the risk of lung cancer in persons exposed to asbestos or other asbestiform minerals.

Assessing risk

Because asbestos has been used widely in the United States, nearly everyone has been exposed to very low levels of asbestos at some time in their life. However, most people do not become ill from their exposure.

The risk of asbestos-related abnormalities and disease increases with increasing levels and duration of exposure. In some cases, even short-term occupational exposures or secondary household exposures (e.g., household contacts of asbestos workers) have been associated with this disease.

As asbestos exposures have declined in the workplace due to regulatory control, cases of severe interstitial disease have also decreased. Among many recently screened cohorts exposed primarily to amphibole asbestos, pleural changes are more prevalent than interstitial changes. However, in several regions of the world (including the United States), exposures from naturally occurring deposits of asbestos or other asbestiform minerals, or as a result of living near mining operations, have been associated with pleural abnormalities and mesothelioma.

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**Assessing risk
(continued)**

The association between asbestos exposure and health effects, such as asbestos exposure and lung cancer, is well established. In the case of smokers who have had significant asbestos exposure, the risk of lung cancer is extraordinarily high. Lung cancer in asbestos-exposed workers may occur at a slightly earlier age than other lung cancers and may occur more commonly in the lower lobes.

Clinical Evaluation

What to include

Clinical evaluation of an asbestos-exposed worker or others with a history of significant asbestos exposure should include:

- Complete occupational and environmental history
- Chest radiographs
- Pulmonary function studies, and
- Physical examination with special attention to the lungs, heart, and extremities

Physical examination is often unremarkable apart from basal crepitations. A single posterior-anterior film is usually sufficient for screening purposes. In those with suspected asbestos-related disease, a complete pulmonary function test should be performed including lung volume and diffusion capacity.

Asbestos-exposed individuals may give a history of shortness of breath and dry cough. However, in the case of smokers, the presentation of clinical findings and pulmonary function studies may be mixed. Pleural changes are not usually accompanied by changes in pulmonary function; however, some studies have shown mild restrictive changes as a result of advanced pleural disease.

**Radiographic
interpretation**

Radiographic changes secondary to asbestos exposure may be difficult to interpret, even by experienced readers. Consultation may be required with pulmonary and occupational medicine specialists familiar with the diagnosis and evaluation of occupational lung diseases.

In the detection of pneumoconiosis, the National Institute for Occupational Safety and Health (NIOSH) grants B Reader approval to physicians who demonstrate proficiency via the NIOSH B Reader Certification Examination. A list of currently certified readers can be found at www.cdc.gov/niosh/pamphlet.html. High-resolution computed tomography (HRCT) of the chest may be useful in further delineating abnormalities of uncertain significance.

Clinical Evaluation (continued)

Patient advice

Advise patients who smoke to stop. Patients should also be aggressively treated for respiratory infections and maintain routine immunizations for influenza and pneumococcal pneumonia.

Patients may ask if the asbestos can be washed from the lungs. Once inhaled, asbestos cannot be removed from the lungs.

Current evidence is weak that ongoing screening for lung cancer is efficacious.

Advise patients to ask their employer if they are working with materials containing asbestos. If so, the patient should make sure he/she is supplied with proper protective equipment by the employer. All workers exposed to asbestos need to be trained in proper use of personal protective equipment and safety. Patients or employers who have questions about protection guidelines can call NIOSH at 1-800-35-NIOSH (1-800-356-4674) or visit their Web site at www.cdc.gov/niosh.

Workers exposed to asbestos above the Occupational Safety and Health Administration action level are required to be under a medical surveillance program consisting of the following:

- Standardized questionnaire
- Physical examination
- Spirometry
- Chest x-ray to be read by a NIOSH-certified B reader

Patients should also be advised of ways to protect their household contacts from possible asbestos exposure. The following are some recommendations:

- Change clothes before leaving work
- If possible, shower before leaving work
- Leave soiled clothes at work
- Store nonwork clothes separately from work clothes
- Wash work clothes separately from nonwork clothes and family clothes
- Do not take tools, scrap, packaging, and similar items home
- Prevent family members from visiting the work area

For more information

For more information, visit the Agency for Toxic Substances and Disease Registry (ATSDR) Web site at www.atsdr.cdc.gov.

Some of the information is from the Minnesota Department of Health's *Asbestos Disease: An Overview for Clinicians*