



This fact sheet was written by the **Agency for Toxic Substances and Disease Registry (ATSDR)**, a federal public health agency. ATSDR's mission is to serve the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposure and disease related to toxic substances.

Asbestos

Asbestos Related Disease: *An Overview for Clinicians*



Magnification of Asbestos Fibers

Asbestos Exposure and Naturally Occurring Asbestos

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 pleural changes, asbestosis, lung cancer, and mesothelioma.

Naturally occurring asbestos

Asbestos is the name given to a group of six different fibrous minerals. Naturally occurring asbestos refers to those fibrous minerals that are found in the rocks or soil in an area and released into the air by routine human activities or weathering processes.

Asbestos is used in many commercial products, including insulation, brake linings, and roofing shingles.

Classes of asbestos

The two general classes of asbestos are **amphibole** and **chrysotile (fibrous serpentine)**. It has been suggested that amphibole asbestos is more toxic than chrysotile asbestos, mainly because physical differences enable chrysotile to

break down and to be cleared from the lungs, whereas amphibole is not removed and is retained in lung tissue. Some researchers believe the resulting increased duration of exposure to amphibole asbestos significantly increases the risk for mesothelioma and, to a lesser extent, asbestosis and lung cancer compared with chrysotile.

Exposure to naturally occurring asbestos

If people live in areas where naturally occurring asbestos is present, they can be exposed to asbestos through routine activities that crush asbestos-containing rock or that stir up dust in soils containing asbestos fibers. Some examples of these activities are as follows:

- Working in the yard or garden
- Digging or shoveling dirt
- Riding bicycles on unpaved surfaces
- Riding off-road vehicles such as four wheelers and dirt bikes
- Running and hiking on unpaved surfaces
- Driving over unpaved surfaces

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. Smoking inhibits ciliary function and consequently enhances fiber retention in the lungs; thus smoking can increase the risk for asbestosis. In more advanced cases there may be progressive dyspnea, dry cough, and rales. Severe cases of asbestosis may cause clubbing of the fingers. Pulmonary function studies typically show a restrictive or mixed pattern. Asbestosis may also be accompanied by pleural disease, a thickening of the pleura with or without pleural calcification. Radiographic changes may include small irregular opacities in both lung fields with a nodular or reticular pattern or both. Asbestosis is often characterized by a diffuse, bilateral interstitial fibrosis.

Pleural disease may also occur in the absence of interstitial findings. Pleural diseases include: pleural plaques (with or without calcification), pleural effusions, pleural thickening, and rounded atelectasis. The presence of pleural plaques is considered to be a marker of asbestos exposure and may be associated with an increased risk of asbestos-related malignancies. 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. On radiograph, pleural plaques are usually discrete and circumscribed, sometimes calcified, often bilateral and symmetric.

Cancer

Lung cancer related to asbestos exposure appears to be histologically the same as lung cancer caused by radiation, cigarette smoking, or other carcinogens. The presence of parenchymal asbestosis is an indicator of high level asbestos exposure, but lung cancer can occur in the absence of asbestosis as well. Smoking has been shown to significantly increase the risk of lung cancer in persons exposed to asbestos.

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 asbestos exposure and disease onset. The latency period may be as long as 30 to 40 years. Smoking has not been associated with increased risk of mesothelioma.

Other extrathoracic cancers mentioned as being possibly associated with asbestos exposure include cancer of the larynx, stomach, pancreas, colon and esophagus. Currently, available evidence for asbestos-related cancer at extrathoracic sites is not strong.

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 for asbestos-related abnormalities is associated with the following factors:

- Duration, concentration and frequency of exposure
- Type and dimension of asbestos fibers
- Smoking history
- Time since first exposure

In general, the risk for asbestos-related 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.

In addition, in specific areas of the world, exposures from naturally occurring deposits of asbestos or other asbestiform minerals, or from living near mining operations, have been associated with pleural abnormalities and mesothelioma. In general, exposures to naturally occurring asbestos in these areas were long-term (i.e. lifetime) exposures. Such exposures often involved asbestos exposure in daily life such as from stoves made of asbestos material or from walls white-washed with asbestos-containing material.

Clinical Evaluation

What to include

Clinical evaluation of patients with a history of significant asbestos exposure should include the following:

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

Physical examination is often unremarkable apart from basal crepitations. Three views of a chest radiograph (posterior-anterior, lateral and oblique) are recommended. For those patients with suspected asbestos-related disease, a complete pulmonary function test should be performed including lung volume and diffusion capacity.

Asbestos-exposed patients 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.

Radiographic interpretation

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

A computed tomography (CT) scan is not recommended as a screening tool. A CT scan is recommended when the physical examination and other diagnostic studies suggest disease, but chest radiograph findings do not correlate or are inconclusive. High-resolution computed tomography (HRCT) of the chest may be useful in further delineating abnormalities of uncertain significance. Specifically, HRCT can be helpful in identifying the following:

- Early parenchymal asbestosis
- Differentiating between asbestos-associated pleural plaques and soft tissue densities
- Pleural abnormalities
 - Plaques
 - Rounded atelectasis
- Mesothelioma

Patient Advice

Advise patients who smoke to stop.

Patients should also be aggressively treated for respiratory infections and should 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.

Limiting exposure in an area with naturally occurring asbestos

Advise patients to limit exposure in an area where naturally occurring asbestos may be a concern. The following actions are recommended:

- Walk, run, hike, and bike only on paved trails.
- Play only in outdoor areas with a ground covering such as wood chips, mulch, sand, grass, pea gravel, asphalt, shredded rubber, or rubber mats.
- Pave over unpaved walkways, driveways, or roadways that may have asbestos-containing rock or soil.
- Cover asbestos-containing rock or soil in gardens and yards with asbestos-free soil or landscape covering.
- Pre-wet garden areas before digging or shoveling soil.
- Keep pets from carrying dust or dirt on their fur or feet into the home.
- Remove shoes before entering your home to prevent tracking in dirt.
- Use doormats to lower the amount of soil that is tracked into the home.
- Keep windows and doors closed on windy days and during times when construction is taking place nearby.
- Drive slowly over unpaved roads.
- Use a wet rag instead of a dry rag or duster to dust.
- Use a wet mop on non-carpeted floors.

- Use washable area rugs on your floors and wash them regularly.
- Vacuum carpet often using a vacuum with a high-efficiency HEPA filter.
- Inspect your home for deteriorating asbestos-containing insulation, ceiling or floor tiles.
- Do not disturb asbestos-containing insulation, ceiling or floor tiles; hire a trained and certified asbestos contractor to remove the materials.
- Ask your employer if you are working with materials or in an environment containing asbestos. If you are, make sure you are properly protected from asbestos exposure.

Suggested Reading

American Thoracic Society. 2004. Diagnosis and initial management of nonmalignant diseases related to asbestos. *American Journal of Respiratory and Critical Care Medicine*. 170: 691-715.

British Thoracic Society Standards of Care Committee. 2001. Statement on malignant mesothelioma in the United Kingdom. *Thorax* 56: 250-65.

Chapman S, Cookson WOC, Musk AW, Lee YCG. 2003. Benign asbestos pleural diseases. *Current Opinion in Pulmonary Medicine*. 9:266-71

Hillderdal G. 1999. Mesothelioma: cases associated with non-occupational and low dose exposures. *Occupational Environmental Medicine*. 56: 505-13.

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

