ATSDR Agency for Toxic Substances & Disease Registry

Historical Document

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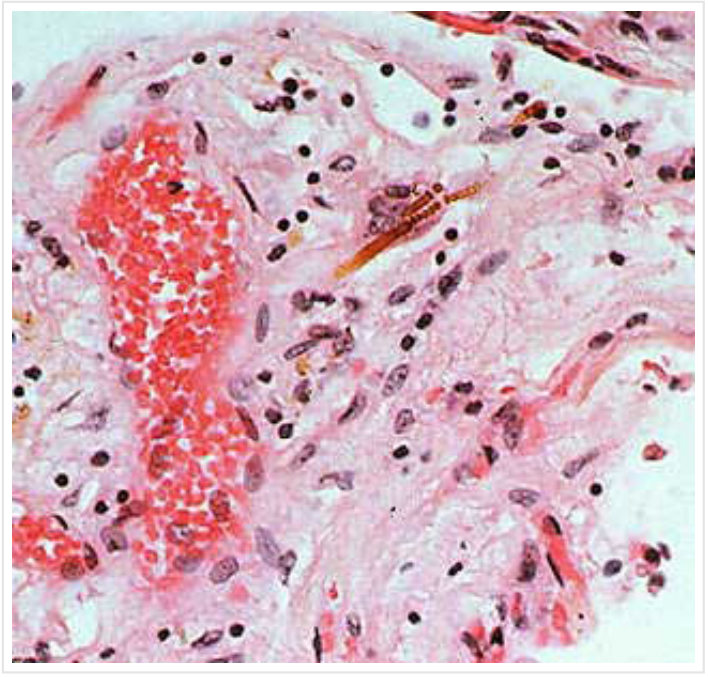
Health Effects

General Information

Significant exposure to any type of asbestos (/asbestos/more_about_asbestos/what_is_asbestos/) will increase the risk of lung cancer (#lungcancer), mesothelioma (#mesothelioma) and nonmalignant lung and pleural disorders, including asbestosis (#asbestosis), pleural plaques, pleural thickening, and pleural effusions. This conclusion is based on observations of these diseases in groups of workers with cumulative exposures ranging from about 5 to 1,200 fiber-year/mL. Such exposures would result from 40 years of occupational exposure to air concentrations of 0.125 to 30 fiber/mL. See Detecting Asbestos (/asbestos/more_about_asbestos/what_is_asbestos/index.html#detecting), for typical levels of concentration. The conclusion is supported by results from animal and mechanistic studies.



Asbestos fibers lodged in the lungs. Asbestos-related conditions affect the lungs and surrounding tissues

Diseases from asbestos exposure take a long time to develop. Most cases of lung cancer or asbestosis in asbestos workers occur 15 or more years after initial exposure to asbestos. Tobacco smokers who have been exposed to asbestos have a "far greater-than-additive" risk for lung cancer than do nonsmokers who have been exposed, meaning the risk is greater than the individual risks from asbestos and smoking added together. The time between diagnosis of mesothelioma and the time of initial occupational exposure to asbestos commonly has been 30 years or more. Cases of mesotheliomas have been reported after household exposure of family members of asbestos workers and in individuals without occupational exposure who live close to asbestos mines.

Asbestos Facts

- When asbestos fibers are inhaled, most fibers are expelled, but some can become lodged in the lungs and remain there throughout life. Fibers can accumulate and cause scarring and inflammation. Enough scarring and inflammation can affect breathing, leading to disease.
- The term “naturally occurring asbestos” refers to the mineral as a natural component of soils or rocks as opposed to asbestos in commercial products, mining or processing operations. Naturally occurring asbestos can be released from rocks or soils by routine human activities, such as construction, or natural weathering processes. If naturally occurring asbestos is not disturbed and fibers are not released into the air, then it is not a health risk.
- People are more likely to experience asbestos-related disorders when they are exposed to high concentrations of asbestos, are exposed for longer periods of time, and/or are exposed more often.
- Inhaling longer, more durable asbestos fibers (such as tremolite and other amphiboles) contributes to the severity of asbestos-related disorders.
- Exposure to asbestos can increase the likelihood of lung cancer, mesothelioma, and non-malignant lung conditions such as asbestosis (restricted use of the lungs due to retained asbestos fibers) and changes in the pleura (lining of the chest cavity, outside the lung).
- Changes in pleura such as thickening, plaques, calcification, and fluid around the lungs (pleural effusion) may be early signs of asbestos exposure. These changes can affect breathing more than previously thought. Pleural effusion can be an early warning sign for mesothelioma (cancer of the lining of the lungs).
- Most cases of asbestosis or lung cancer in workers occurred 15 years or more after the person was first exposed to asbestos.
- Most cases of mesothelioma are diagnosed 30 years or more after the first exposure to asbestos.
- Asbestos-related disease has been diagnosed in asbestos workers, family members, and residents who live close to asbestos mines or processing plants.
- Health effects from asbestos exposure may continue to progress even after exposure is stopped.
- Smoking or cigarette smoke, together with exposure to asbestos, greatly increases the likelihood of lung cancer. See Cigarette Smoking, Asbestos Exposure, and your Health (/asbestos/site-kit/healthprofessional.html#handouts) .

Health Risks of Asbestos Exposure

Chronic exposure to asbestos may increase the risk of lung cancer, mesothelioma, and nonmalignant lung and pleural disorders. Evidence in humans comes from epidemiologic studies as well as numerous studies of workers exposed to asbestos in a variety of occupational settings. Tremolite asbestos exposure has been associated with an increased incidence of disease in vermiculite miners and millers from Libby, Montana. This evidence is supported by reports of increased incidences of nonmalignant respiratory diseases, lung cancer, and mesothelioma in villages in various regions of the world that have traditionally used tremolite-asbestos whitewashes in homes or have high surface deposits of tremolite asbestos and by results from animal studies.

Risk Factors

Various factors determine how exposure to asbestos affects an individual:

- Exposure concentration - what was the concentration of asbestos fibers?
- Exposure duration - how long did the exposure time period last?
- Exposure frequency - how often during that time period was the person exposed?

- Size, shape and chemical makeup of asbestos fibers:

Long and thin fibers are expected to reach the lower airways and alveolar regions of the lung, to be retained in the lung longer, and to be more toxic than short and wide fibers or particles. Wide particles are expected to be deposited in the upper respiratory tract and not to reach the lung and pleura, the sites of asbestos-induced toxicity. Short, thin fibers, however, may also play a role in asbestos pathogenesis. Fibers of amphibole (/asbestos/more_about_asbestos/what_is_asbestos/) asbestos such as tremolite asbestos, actinolite asbestos, and crocidolite asbestos are retained longer in the lower respiratory tract than chrysotile fibers of similar dimension.

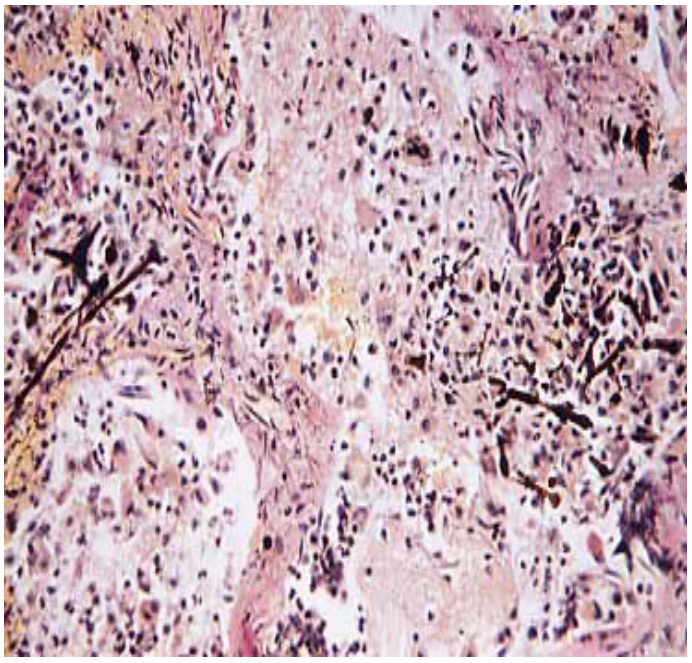
- Individual risk factors, such as a person's history of tobacco use (smoking) and other pre-existing lung disease, etc.

Note, cigarette smoke and asbestos together significantly increase your chances of getting lung cancer. Therefore, if you have been exposed to asbestos you should stop smoking. This may be the most important action that you can take to improve your health and decrease your risk of cancer.

Conditions Associated with Asbestos

Asbestosis

Asbestosis is a serious, progressive, long-term disease of the lungs. Asbestosis is not a cancer. Inhaling asbestos fibers that irritate and inflame lung tissues, causing the lung tissues to scar, causes asbestosis. The scarring makes it hard to breathe and difficult for oxygen and carbon dioxide pass through the lungs. Asbestosis generally progresses slowly. The latency period for the onset of asbestosis is typically 10-20 years after the initial exposure. The disease can vary from asymptomatic (no symptoms) to disabling and potentially fatal.



Microscopic view of lung tissue with asbestosis.

Signs and Symptoms of asbestosis can include:

- Shortness of breath is the primary symptom
- A persistent and productive cough (a cough that expels mucus)
- Chest tightness

- Chest pain
- Loss of appetite
- A dry, crackling sound in the lungs while inhaling.

Pleural Abnormalities

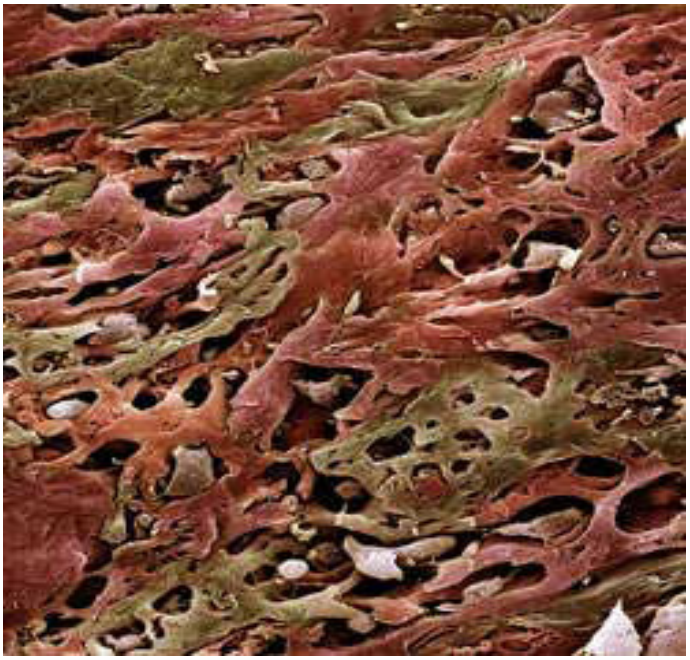
Persons with significant exposure to asbestos are at risk for developing various types of pleural (lining of the chest cavity, outside the lungs) abnormalities. These abnormalities include pleural plaques, pleural thickening, pleural calcification, and pleural mesothelioma.

Mesothelioma

Mesothelioma is a rare cancer, which may affect the lining of the chest cavity, outside the lung (pleura) or the abdominal contents (peritoneum). Most mesotheliomas are caused by exposure to asbestos.

Lung Cancer

Lung cancer is a malignant tumor that invades and obstructs the lung's air passages. Cigarette smoking greatly increases the likelihood of a person developing lung cancer as the result of asbestos exposure. The most common symptoms of lung cancer are cough, wheezing, unexplained weight loss, coughing up blood, and labored breathing. Other symptoms of lung cancer include shortness of breath, persistent chest pain, hoarseness, and anemia. People who develop these symptoms do not necessarily have lung cancer, but they should consult a physician for advice.



Scanning Electron Micrograph of Lung Cancer Cells.

The Incidence of Nonrespiratory Cancers And Exposure to Asbestos

Summary

Research has shown a clear link between exposure to asbestos and respiratory cancers (cancer of the lungs and mesothelioma) in humans. However, the link between exposure to asbestos and other types of cancers is less clear.

Some epidemiologic studies suggest an association between gastrointestinal and colorectal cancers and asbestos exposure. However, very few studies suggest an elevated risk for cancers of the kidney, brain, larynx, and bladder and asbestos exposure.

Epidemiologic studies do not clearly support a consistent relationship between nonrespiratory cancers and asbestos exposure.

Introduction

Medical research has shown that people who are exposed to asbestos (through breathing in the asbestos fibers) have an increased risk of developing respiratory cancers such as lung cancer and mesothelioma (a rare form of lung cancer).

Some research suggests that exposure to asbestos also increases the risk of nonrespiratory cancers. However, despite a few studies reporting these associations, most studies do not show a consistent relationship between asbestos exposure and nonrespiratory cancers.

Following is an overview of studies on asbestos exposure and nonrespiratory cancers.

Gastrointestinal and Colorectal Cancers

Studies of asbestos workers suggest that asbestos exposure might be associated with gastrointestinal (esophagus and stomach) and colorectal (colon and rectum) cancers. However, the evidence is unclear.

These studies showed small increases in the number of deaths from gastrointestinal and colorectal cancers. For example, among 17,800 insulation workers, 99 people died from these cancers, even though the rate in the general population is expected to be 59.4 deaths. Among 2,500 asbestos textile workers, 26 people died from these cancers, but 17.1 deaths were expected. Several other studies have shown similar patterns.

However, other mortality studies of asbestos workers found no significantly increased risk for gastrointestinal or colorectal cancers. Other reviewers found no causal relationship between workers' exposure to asbestos and gastrointestinal cancer.

Some evidence shows that short-term (acute) oral exposure to asbestos might bring on precursor lesions of colon cancer, and that long-term (chronic) oral exposure might increase the incidence of gastrointestinal tumors.

Most epidemiologic studies to see if cancer incidence is higher than expected in places with high levels of asbestos in drinking water detected increases in cancer deaths or incidence rates at one or more tissue sites (mostly in the gastrointestinal tract).

Some of these increases were statistically significant. However, the magnitudes of increases in cancer incidence tended to be rather small and might be related to other risk factors such as smoking. Also, these studies were conducted on worker populations, with generally higher exposures; still, only small and inconsistent elevations have been reported.

There is relatively little consistency in the observed increases across studies.

Kidney, Brain, Bladder, Laryngeal, and Other Cancers

Results of studies of cancers at other sites are also inconclusive. One reason is that relatively few studies have tried to evaluate the relation between asbestos exposure and nonrespiratory cancers.

Some studies have noted excess deaths from, or reported cases, of certain cancers such as the kidneys (two studies), brain (one study), and bladder (one study). Several epidemiologic studies have reported an increased risk of laryngeal cancer in workers exposed to asbestos.

In contrast, other epidemiologic studies have not found a strong link between increased risk of cancers and asbestos exposure (except for cancers of the lungs and surrounding areas). For example, one analysis concluded that misdiagnosis or chance may be the best explanation for asbestos-related cancer at any other site than the lungs or surrounding areas.

Another combined analysis of 55 studies did not find a significant association between occupational exposure to asbestos and laryngeal cancer and concluded that the evidence of a causal relationship was weak.

Another combined study of asbestos-exposed workers suggested a possible association between asbestos and laryngeal cancer. This same study found no clear association of asbestos exposure and urinary, reproductive, lymphatic, or hematopoietic cancers.

Conclusions

Studies show a strong link between respiratory cancers (cancers of the lung and mesothelioma) and exposure to asbestos in humans.

However, epidemiologic studies do not clearly or consistently show a strong link between cancers at other sites and exposure to asbestos in humans.

- Some epidemiologic studies suggest an association between gastrointestinal and colorectal cancers and asbestos exposure.
- Very few studies suggest elevated rates of cancers of the kidney, brain, larynx, and bladder and asbestos exposure.
- Although some evidence suggests that exposure to asbestos also increases the risk of nonrespiratory cancers, the evidence remains weak, compared to that of lung cancer and mesothelioma.

A final combined analysis of studies of asbestos workers providing data on laryngeal disease concluded that there was no evidence of a positive association between asbestos exposure and laryngeal cancer.

Living with Asbestos-Related Illness [HTML Version (/asbestos/living_asbestos/index.html)]

Topics covered in the guide include characteristics of asbestos, asbestos-related illness, the respiratory system, treatment methods, preventive care, traveling tips, pulmonary rehabilitation, and relaxation and breathing techniques.

For more information, contact **ATSDR**'s toll-free information line:
(888) 42-ATSDR. . . that's **(888) 422-8737**
ATSDR's Internet address is http://www.atsdr.cdc.gov (http://www.atsdr.cdc.gov/)

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