

Health Effects of Asbestos Exposure

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Agency for Toxic Substances and Disease Registry (ATSDR)

- Is an independent, advisory agency
- Was created in 1980
- Was created to look at **public health impacts** of releases of hazardous substances to the environment
- Is associated with the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia
- Works closely with EPA on hazardous waste issues

Types of Asbestos* Fibers

Serpentine

- Chrysotile



Amphibole

- Actinolite
- Tremolite
- Anthophyllite
- Crocidolite
- Amosite



* Note: OSHA definition does not include other toxic fibrous mineral types.

Asbestos Health Effects

Result from inhaling asbestos fibers into the lungs

- Fibers become trapped in the lungs
- Chrysotile fibers are cleared from the lungs faster than amphibole fibers

Health Effects Associated With Asbestos Inhalation

- **Noncancer**
 - Asbestosis
 - Pleural changes
- **Cancer**
 - Lung cancer
 - Mesothelioma

What Is Asbestosis?

- Scarring of lungs caused by very high exposure to asbestos; decreased elasticity of the lungs
- Smoking decreases ability to clear asbestos fibers and may increase risk of asbestosis
- A disease that progresses slowly; it takes decades to develop signs and symptoms

Treatment: prevent complications and treat symptoms; disease rarely gets better

What Are Pleural Changes?

- Thickening and hardening of the lining of the lungs (pleura)
- Usually, no early symptoms
- Potential for decreased lung function; potential higher risk of cancer
- Role of smoking – not clear

Treatment: prevent complications and maintain general health

What Is Lung Cancer?

- Cancer that invades and blocks the lung's air passages
- Smoking plus asbestos exposure greatly increases the likelihood of lung cancer (more than smoking or asbestos exposure alone)

Treatment: remove diseased part of lung; chemotherapy; radiation; or combination

What Is Mesothelioma?

- A rare cancer - affects the lining of the lungs or the lining of the abdominal cavity
- Known asbestos exposure is primary cause; in some cases exposure history is not known
- Most cases are diagnosed many decades after known exposure
- Poor prognosis

Treatment: surgery, chemotherapy, and radiation are options depending on stage of disease; no good treatment

How Common Are Lung Cancer and Mesothelioma?

Cancer Type	New cases in 2001 in US (out of 100,000 people)
Breast Cancer	135
Prostate Cancer	177
Lung Cancer	61
Mesothelioma	1

- All races; age-adjusted
- Nine areas around country

Source: SEER Incidence Rates for Individual Years
<http://seer.cancer.gov/faststats/>

- We've reviewed health effects from asbestos exposure.
- Most medical information was obtained from people who worked directly with asbestos materials.

Have these health effects been seen in people who were exposed nonoccupationally?

Epidemiologic Studies

- Study of disease or death rates in human populations
- Attempt to link exposure with disease

Several nonoccupational epidemiologic studies have been conducted in areas of asbestos outcrops or near mines.

Amphibole Asbestos Epidemiologic Studies

- Cyprus
 - Chrysotile and tremolite in stucco materials
 - Elevated mesothelioma rate

(McConnochie et al. *IARC Sci Publ.* 1989; 90:411-419; McConnochie et al. *Thorax* 1987; 42(5):342-347.)

Amphibole Asbestos Epidemiologic Studies

(continued)

- Corsica
 - Chrysotile and tremolite surface deposits
 - Roads paved with crushed serpentinite
 - Pleural changes, increased rate of mesothelioma

(Magee et al. *Am J Ind Med* 1986; 9:529-533; Viallat et al. *Ann NY Acad Sci* 1991; 643:438-443; Rey et al. *Eur Respir J* 1993; 6:978-982; Dumortier et al.; *Occup Environ Med* 2002; 59:643-646.)

Amphibole Asbestos Epidemiologic Studies

(continued)

- Biancaville, Eastern Sicily
 - Quarry materials containing tremolite used in local building industry
 - Annual mesothelioma incidence rate about 7 per 100,000

(Paoletti, Batistia, Domenico, Caterina, Di Paola, Gianfagna, et al.; *Arch Environ Health* 2000; 55(6):392-398.)

Amphibole Asbestos Epidemiologic Studies

(continued)

- Da-Yao County in SW China
 - Crocidolite amphibole “blue clay” prevalent
 - Lifetime exposures from road dust, stucco on houses, stove use
 - Pleural changes, asbestosis, mesothelioma, and lung cancer significantly elevated
 - Average annual mesothelioma incidence rates 8.5-36.5 per 100,000

(Luo, Liu, Tsai, and Wen; *Occup Environ Med* 2003; 60:35-42.)

Amphibole Asbestos Epidemiologic Studies

(continued)

- New Caledonia
 - Tremolite whitewash used in villages
 - High incidence of lung cancer, mesothelioma (mesothelioma incidence rate about 12.5 per 100,000)

(Luce, Bugel, Goldberg, Goldberg, Salomon, Billon-Galland, et al.; *Am J Epidemiol* 2000; 151(3):259-265.)

Amphibole Asbestos Epidemiologic Studies

(continued)

- Anatolia, Turkey
 - White soil containing amphibole asbestos used as whitewash, baby powder, etc.
 - Lifetime exposures in rural villages
 - Average annual mesothelioma incidence rates 115-160 per 100,000
 - Fiber levels measured outdoors up to 0.04 f/cc; indoors up to 0.28 f/cc

(Metintas, Metintas, Ucgun, and Oner; *Chest* 2002; 122:224-2229.)

What Happened in These Locations?

- Authorities provided public health education
- People stopped activities that resulted in exposure
- Investigators continued monitoring in the area

These actions will result in reduced risk for future asbestos-related disease in these areas.

Potential for Exposure in California

- Local deposits of chrysotile and amphibole (actinolite, tremolite) asbestos
- Some activities could release airborne fibers
 - Construction
 - Sports activities (dirt-biking, organized sports)
 - Gardening
 - Other

Potential for Exposure in California

(continued)

- Exposure here may be different from epidemiologic studies
 - Exposure data in epidemiologic studies is limited
 - Most people in studies used asbestos regularly in everyday life
 - People in the studies populations rarely moved
- The best way to evaluate how people are exposed here is activity-based sampling

Summary

- Inhaling chrysotile or amphibole asbestos can result in asbestosis, pleural changes, mesothelioma, or lung cancer. Risk for cancer is probably higher for amphibole exposure, especially mesothelioma.
- Asbestos diseases can result from noncommercial uses - fibers are of concern regardless of the source.
- Comparisons between exposure in California and other locations described in the literature are difficult to make.
- Activity-based sampling will give a better estimate of actual exposure than other methods.

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