ASBESTOS EXPOSURE

A Desk Reference for Communicators

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
National Institutes of Health

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A Desk Reference for Communicators

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

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Section 1: Risks in the Workplace

1. Who may be at risk of developing asbestos-related diseases?

Workers in many occupations, particularly in asbestos mining and processing, shipyards, construction, and workers in automotive brake lining repair commonly are exposed to asbestos, and may inhale or perhaps swallow dusts contaminated with concentrations of this substance.

Risks of disease due to asbestos exposure have not been defined clearly for all occupational groups known to have significant exposure. Firm scientific data are available only for heavily exposed workers employed in asbestos mining, manufacture and insulation. Over the past several years, evidence has accumulated that asbestos insulation workers previously employed in shipyards and elsewhere are experiencing asbestosis, a progressive and disabling lung disease, and markedly increased rates of cancer. Workers who manufactured the asbestos insulation materials used in shipyards also have increased asbestos-related disease.

There is evidence that the problem may be more widespread than previously believed. Workers from a variety of trades who have been employed in shipyards, presumably in or near areas contaminated by asbestos dust, are now beginning to show signs of X-ray abnormalities in the lungs typical of asbestos exposure. These include painters, electricians, carpenters, machinists, boilermakers, and welders who may not realize they were exposed.

Large numbers of persons worked around asbestos in shipyards during and since World War II. During the peak war years, 1940-44, an estimated 4.5 million persons worked in shipyards in the United States, and even those not directly exposed to asbestos dust may have a higher risk of asbestos-related disease. In the last 15 years, the number of shipyard workers has stabilized to an annual workforce of approximately 200,000. Because of the high turnover in jobs during the war and afterward, no one really knows how many people experienced significant asbestos exposure in their work in the shipyards.

The total number of workers exposed to asbestos since the beginning of World War II, including shipyard workers, is estimated at between 8 and 11 million.

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2. What diseases may be caused by asbestos?

Asbestos can cause asbestosis and certain forms of cancer. Among some groups of workers who were heavily exposed to asbestos, as much as 20–25 percent of all deaths are due to lung cancer. This rate is much higher than would be expected from the effects of cigarette smoking alone. In the general adult population, about 4-5 percent of all deaths are due to lung cancer. In addition, asbestos workers are at increased risk of mesothelioma, an otherwise uncommon type of cancer not associated with smoking and rarely observed in the general population. Above-average rates of cancers of the digestive system (esophagus, stomach, colon, rectum) have been found in groups of asbestos workers. Cancers of a number of other body sites also are thought to be associated with occupational exposure to asbestos, but these are less common.

3. What is the role of cigarette smoking?

Asbestos and cigarette smoking together produce more lung cancer than either factor acting alone. For example, investigators at the Mt. Sinai School of Medicine in New York City, together with epidemiologists at the American Cancer Society, have found that asbestos workers who smoke have a risk of lung cancer 5 times that of smokers in the general population. Cigarette smoking also increases the risk of other types of cancer and disabling lung diseases (emphysema, bronchitis).

Some information suggests that quitting smoking can reduce this extremely high risk in asbestos workers.

Although nonsmoking asbestos workers have more lung cancer than nonsmokers in general, they do not experience the extremely high risk of lung cancer of asbestos workers who smoke. However, they still are at increased risk of other asbestos-induced diseases, including asbestosis, mesothelioma and gastrointestinal cancers.

4. Are there other work-related exposures that may aggravate risk?

There are other work-related exposures that are associated with respiratory disease and cancer. Workers should be aware that some of these exposures may aggravate respiratory ailments. Additional information on medical problems associated with occupational exposures may be obtained from the Clearinghouse for Occupational Safety and Health Information, 4667 Columbia Parkway, Cincinnati, Ohio 45226.

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5. How does asbestos cause disease?

The answer is not known. Asbestos fibers too fine to be seen by the human eye become airborne during various industrial processes and are inhaled and subsequently may be swallowed. Scientists believe the most harmful fibers are so fine that an electron microscope is needed to see them. Because of their size and shape, asbestos fibers can penetrate body tissues. Because of their durability, they remain in the body for many years after entry.

6. How much asbestos exposure is hazardous?

The answer is not known. In the case of asbestosis and lung cancer, the risk increases with increasing amount of exposure. Asbestos-induced disease is not likely to appear until 15 to 35 or more years after first exposure. The time between first exposure and the appearance of disease appears related both to the amount and duration of exposure: more intense exposure sometimes results in asbestos-related disease within 15 years. However, one study of workers in an asbestos plant showed that some workers who were exposed only a month or two have developed asbestos-related diseases many years later.

Typically, the first 10 to 15 years after initial exposure are free of signs or symptoms. Early X-ray changes may appear in lung tissue after 10 to 15 years, but may not be accompanied by other significant symptoms. Some investigators have reported evidence of impaired lung function in workers with less than 10 years of exposure to asbestos.

Section 2: Nature of Asbestos

7. What is asbestos?

Asbestos is the common name for a group of natural minerals that occur as masses of compact or relatively long, silky fibers. Six fibrous minerals, members of a family called silicates, are recognized as asbestos: chrysotile (white asbestos), actinolite, amosite (brown asbestos), anthophyllite, crocidolite (blue asbestos) and tremolite.

Commercially, chrysotile is the most important form of asbestos, with most chrysotile used in the United States being imported from Canada. All forms have a tendency to break into a dust of tiny fibers that can float in the air and be inhaled or swallowed.

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8. How much is used?

Asbestos has been used in small amounts for thousands of years. Modern industrial use in the United States dates from about 1880, when mining of the Quebec chrysotile deposits began. Gradual increases in production and use occurred during the next 50 years, followed by accelerated use more recently. From 1970-75, the amount of asbestos fiber used in the United States averaged some 800,000 tons annually, according to the U.S. Bureau of Mines.

Amosite from South Africa has been used in the U.S. in smaller quantities in industries such as shipbuilding.

9. How is it used?

Asbestos has about 3,000 different uses, with about two-thirds being used in the construction industry in building products, insulation, friction materials and textiles. Manufactured products have included reinforced asbestos cement sheets and pipes, patching and taping compounds, floor and ceiling tiles, as well as paints, coatings and sealants containing asbestos as reinforcing fillers, pipe linings and fillers for various liquids.

Friction products include clutch facings and brake linings for automobiles, railroad cars, airplanes, and industrial machinery. A variety of other uses are known, including theater curtains, fireproof "blankets," filtration materials, and until recently, artificial ashes in false fireplaces and dry-wall patching compounds.

Once incorporated into manufactured items, the hazard resulting from asbestos is less serious, as long as the substance is not disrupted in any way. However, the fibers are nearly indestructible. A potential health risk arises whenever asbestos fibers are set free, resulting in asbestos dust.

10. How has asbestos been used in shipyards?

Asbestos has been used extensively in shipyards to cover pipes and surfaces in new construction, repair and refitting. Major sources of exposure to asbestos in shipyards have been in fabrication of asbestos materials (such as pipe-coverings), their installation, and their removal during repair and refitting work.

Asbestos has been included in insulation materials such as boards, mattresses, and cloth for engines, hulls, and decks; covering of ventilation and water pipes; coatings for cables and electric wires, wall boards and tiles; and putties, caulks, paints, joint fillers, and cement products. It may also be present in construction materials such as gaskets, rings, tape, tubing, twine, webbing, washers and coated electric wires.

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Asbestos exposure in shipbuilding probably is now far less than it was in the past, due largely to improvements in engineering and industrial hygiene methods and the introduction of other insulation materials into construction.

Section 3: Disease Recognition

11. What are the signs and symptoms of asbestosis?

Asbestosis is a chronic lung disease whose signs and symptoms result from permanent changes in lung tissue due to asbestos exposure. The earliest and most prominent sign is shortness of breath on exertion. It rarely becomes apparent until at least a decade after first exposure. The disease process usually has to be rather advanced to produce shortness of breath, however.

A dry, crackling sound (rales), coming from the lungs during inhalation, is the most characteristic physical sign of asbestosis. Clubbing of the fingers is sometimes found, usually late in the disease. A bluish discoloration of the skin and the lining of the mouth and of the tongue also may occur in the later stages of the disease. A physical exam with X-rays will show diffuse scarring of the lungs as asbestosis develops, and lung function tests will show impairment of the maximum volume of air a worker can inhale.

12. Does asbestosis lead to lung cancer?

Scientists do not believe asbestosis necessarily leads to lung cancer, but the presence of this disease does indicate that a worker received considerable asbestos exposure and has a greater risk of developing asbestos-associated cancers than an unexposed person.

Both types of disease can be caused by the same environmental agent, and the development of each may be independent of the other.

13. What are the symptoms of lung cancer?

A cough, or a change in cough habit, is found in most lung cancer patients. Chest pain is the second most common symptom. It usually is felt as a persistent ache unrelated to cough and is commonly experienced on the side on which the tumor is located. Blood-streaked sputum, coughed up from the lungs, is the initial symptom of a small percent of lung cancers.

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14. How is lung cancer diagnosed?

Initial diagnosis is by chest X-ray examination. Confirmation is by means of medical procedures such as sputum cytology, or biopsy by means of fiberoptic bronchoscopy, mediastinoscopy or by thoracotomy.*

15. What is mesothelioma?

Mesothelioma is an extremely rare cancer in the general population, but is more common among asbestos workers. It affects the pleura, a membrane lining the chest cavity, or the peritoneum, a similar membrane lining the abdominal cavity. A large proportion of mesothelioma cases can be traced to prior asbestos exposure.

Only 120 cases of mesothelioma of the pleura and peritoneum were reported in the National Cancer Institute's Third National Cancer Survey of 1969-71, compared to 24,049 cases of lung cancer. The nine areas surveyed represented approximately 10 percent of the United States population. There is some indication from recent scientific reports that mesothelioma is becoming a more common diagnosis.

16. How is mesothelioma detected and diagnosed?

The most common first symptoms may be shortness of breath or pain in the wall of the chest, aggravated by deep breathing; or abdominal pain, which may vary from vague discomfort to severe spasms. These spasms are sometimes located in the upper right region of the abdomen. Occasionally, this pain is accompanied by a need to urinate or defecate. Although chest X-ray is of some help in diagnosing mesothelioma when it occurs in the lining of the lung, precise diagnosis of this unusual cancer is difficult and requires an exploratory operation of the chest or abdomen, depending on the patient's symptoms, to provide tissue for microscopic examination.

**More information is available in a brochure, "Progress against Cancer of the Lung," available from the Office of Cancer Communications, National Cancer Institute, Bethesda, Maryland 20014. Living with Lung Cancer, a book in paperback form for patients, also may be helpful, and is available at nominal cost from Schmidt Printing, Inc., P.O. Box 6006, Rochester, Minnesota 55901.*

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Section 4: Control of Exposure

17. How can a worker protect himself in the workplace?

He can take steps to make sure his employer is aware of and following the asbestos exposure and related industrial exposures regulations of the Occupational Safety and Health Administration (OSHA). First, he can request a copy of the Standard on Worker Exposure to Asbestos from the Office of Information, OSHA, Washington, D.C. 20210 or from regional offices in Boston, New York, Philadelphia, Atlanta, Chicago, Kansas City (Mo.), Dallas, Denver, San Francisco and Seattle.

After studying the standard, a worker may wish to discuss apparent shortcomings with his employer or union representative to try to get them corrected. He also may initiate a complaint of workplace hazards with OSHA for investigation.

A booklet, Good Practices Manual for Insulation Installers, also is available and may be ordered from the Clearinghouse for Occupational Safety and Health Information, National Institute for Occupational Safety and Health.* This publication describes recommended procedures for working with asbestos.

Recommended practices for demolition operations have been published by the EPA. "Sprayed Asbestos-Containing Materials in Buildings: A Guidance Document" is available from the Standards Development Branch, U.S. Environmental Protection Agency, Research Triangle Park, N.C. 27711.

18. What else should a worker do if exposed?

First, if still working around asbestos, he should take immediate steps to avoid additional exposure.

Second, if he hasn't smoked cigarettes he should never start. If he has, he should quit. This will reduce the risk of lung cancer, no matter how many years he has smoked. He should also be alert to other potential health hazards in the workplace.

Third, he should get regular health check-ups. His doctor should be made aware of his occupational history (for example, that he once worked in a shipyard), and provide a physical examination that includes a chest X-ray, a lung function test, a rectal examination, and possibly a sputum analysis. Sputum cytology, the examination of cells in deep cough sputum samples, is a procedure still under study as a diagnostic method for lung cancer and is not widely available. However, it has shown some usefulness in studies of asbestos workers as an aid in identifying exposure.

**Address is in question #4.*

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Lung cancer, mesothelioma, asbestosis and other serious complications of asbestos exposure are late results of asbestos-induced disease. Early X-ray changes often precede these serious consequences.

Absence of X-ray change is no guarantee of future safety. Some workers have had enough asbestos exposure to cause mesothelioma without showing earlier X-ray changes. However, in general, absence of X-ray change many years after initial exposure provides evidence of limited exposure.

Section 5: Treatment

19. What can be done to treat asbestos-related diseases?

Asbestosis: Most deaths from asbestosis are due to superimposed respiratory infections such as pneumonia and bronchitis, rather than to direct effects of the disease itself. These infections usually can be treated, but it is important to get medical attention early.

Lung and Esophageal Cancer: Treatment of these cancers depends on the type and amount of tissue affected. Lung cancer may be treated by surgery, drugs, radiation, or combinations of these treatments. Esophageal cancer is treated most often with radiation. As with most cancers, the treatment must be tailored to the individual patient.

Cancer of the Colon and Rectum: Surgery is curative in many cases and early diagnosis increases the likelihood of cure. Methods are available to improve the frequency of early diagnosis.

Mesothelioma of the Pleura or Peritoneum: Effective treatment is not yet available. Research is underway in the United States, Great Britain, and France to improve the treatment.

Cancer of the Stomach: Detection has been improved by development of the flexible gastroscope and gastric camera. Treatment is usually by surgery. New treatment regimens using drugs are improving the outlook for patients with this cancer.

Cancers of the Kidney, Larynx, and Oropharynx: Physician awareness of the possibility of occurrence improves chances for early diagnosis. These cancers often can be treated effectively by surgery and/or radiation therapy.

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Section 6: Federal Efforts

20. What Federal agencies are concerned with the effects of asbestos exposure?

The National Cancer Institute (NCI) and National Institute of Environmental Health Sciences (NIEHS) are conducting or sponsoring research on the health hazards of asbestos. The National Institute for Occupational Safety and Health (NIOSH) also is responsible for research on the documentation of hazards, and operates an information service to answer workers' questions about occupational safety.*

The Occupational Safety and Health Administration (OSHA) regulates worker exposures. This Agency is part of the U.S. Department of Labor. The Environmental Protection Agency (EPA) is charged with monitoring levels of asbestos in air and water. The Food and Drug Administration (FDA), a part of the U.S. Department of Health, Education and Welfare, is concerned with asbestos contamination of foods, drugs, and cosmetics, such as might occur during the manufacturing process.

The Consumer Product Safety Commission (CPSC) recently has banned the use of asbestos as artificial ash for ceramic logs in gas-burning fireplaces, consumer clothing made of asbestos, and the manufacture of dry-wall patching compounds containing asbestos.

21. What are some current Federal activities on this problem?

An Asbestos Subcommittee of the Armed Forces Epidemiology Board has been established and currently is reviewing programs which might be recommended to the Secretary of Defense concerning asbestos-related disease among civilian employees of the Armed Forces, as well as veterans and men and women currently in service. At the request of this Subcommittee, additional information is being gathered to assess the health risks of shipyard workers in various U.S. locations.

Investigators of the Environmental Sciences Laboratory, Mount Sinai School of Medicine of the City University of New York and the American Cancer Society, are collaborating in a number of studies of shipyard workers, funded partly by the National Institute of Environmental Health Sciences, Research Triangle Park, North Carolina. NIEHS also is sponsoring a study, with partial support from the EPA, in rodents on ingestion of asbestos minerals.

**Address is in question #4.*

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The National Cancer Institute (NCI) has planned an analysis of respiratory cancer in several shipbuilding areas along the east coast of the United States. Currently, NCI is completing an interview analysis of lung cancer cases and controls along the southeastern Atlantic seacoast where elevated lung cancer death rates were found in a nationwide study of geographic cancer patterns.

An educational program for physicians and the public is being developed by DHEW in cooperation with the voluntary health agencies, concerned unions, and the asbestos industry.

Section 7: Other Sources of Information

22. Where can a worker go for more information?

(a) Sixteen Cancer Information Service (CIS) offices provide toll-free telephone sources of information. These offices can help with a variety of questions about cancer, including causes, prevention, detection, diagnosis, treatment, rehabilitation assistance, medical facilities available in a particular region, home-care assistance programs, financial assistance for cancer care, emotional counseling services, and patient referrals. These offices also can provide information about local smoking cessation clinics.

CIS offices do not diagnose cancer or recommend treatment for individual cases. They do provide facts, understanding and rapid access to the latest information on cancer and local resources. The locations of the CIS offices are indicated at the back of this brochure.

(b) Workers may wish to contact their international unions or the Industrial Union or Metal Trades Departments of the AFL-CIO, 815-16th Street, N.W., Washington, D.C. 20006 for specific sources of medical help, information on asbestos control, and insurance matters.

(c) Individuals who once worked in the Navy shipyards may wish to contact the Department of Defense, Public Correspondence, Directorate for Management, Washington, D.C. 20301.

(d) Inquiries concerning environmental exposures such as those occurring during building demolition, or other air and water concerns may be answered by the Public Information Center,

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PM-215, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

(e) The Consumer Product Safety Commission (CPSC) operates a "hot-line" for answering questions about potential hazards of commercial products: (800) 638-2666, except Maryland residents, who should call (800) 492-2937.

(f) For information on current Federal regulations concerning the workplace, workers may contact the Occupational Safety and Health Administration, Office of Information, Washington, D.C. 20210.

(g) The National Cancer Institute will answer questions about health risks associated with asbestos exposures. Write to Asbestos, National Cancer Institute, Bethesda, Maryland 20014.

(h) For specific information on how to quit smoking, a worker may contact the Office on Smoking and Health, Room 622E Humphrey Building, 200 Independence Avenue, S.W., Washington, D.C. 20201.

(i) Compensation: Individuals who suffer asbestos-related diseases as a result of employment may have a right to assistance under a worker compensation law. Those who were exposed to asbestos during the course of Federal employment may be covered by the Federal Employee Compensation Act. Those presently employed in shipyards by private employers may be covered under the Longshoremen and Harbor Workers Compensation Act. For information about eligibility for these two compensation programs, contact the Office of Workers Compensation Programs of the Department of Labor, Employment Standards Administration, 200 Constitution Avenue, N.W., Room S3524, Washington, D.C. 20210.

Former or retired military personnel should contact the Veterans Administration for information.

Those exposed while working for private employers should contact their state worker compensation programs in the state where last exposure occurred. Worker compensation laws and the benefits they provide vary widely. If compensation is offered in a particular state, the law generally will provide some benefits for medical care expenses, permanent disability, and care of survivors to those who can demonstrate their eligibility.

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(j) Workers may be interested in ordering a new publication, Cancer and the Worker, for $2.00 from the New York Academy of Sciences, 2 East 63rd Street, New York, New York 10021. This book was written to inform workers and plant managers about what we know—and do not know—about cancer risks in the workplace. It is based on a March 1975 symposium on "Occupational Carcinogenesis" sponsored by the Academy.

(k) Other information on how to quit smoking, lung diseases, and cancer is provided by local offices of the American Lung Association and the American Cancer Society. These organizations have local offices throughout the United States that may be identified from the telephone book.

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Cancer Information Services:

CALIFORNIA
LAC-USC Cancer Center
From Area Codes (213), (714) and (805): 1-800-252-9066
Rest of California: (213) 226-2374

COLORADO
Colorado Regional Cancer Center
1-800-332-1850

CONNECTICUT
Yale University
Comprehensive Cancer Center
1-800-922-0824

DELAWARE
Fox Chase Cancer Center
800-523-3586

DISTRICT OF COLUMBIA
(Includes suburban Maryland and Northern Virginia)
Cancer Communications for Metropolitan Washington
(202) 232-2833

FLORIDA
Comprehensive Cancer Center for the State of Florida
Florida: 1-800-432-5953
Dade County: (305) 547-6920

ILLINOIS
Illinois Cancer Council
Illinois: 800-972-0586
Chicago: (312) 346-9813

MAINE
Maine Cancer Information Service
1-800-225-7034

MARYLAND
The Johns Hopkins Oncology Center
800-492-1444

MASSACHUSETTS
Massachusetts Cancer Information Service
1-800-952-7420

MINNESOTA
Minnesota Cancer Council
1-800-582-5262

MONTANA
Montana Cancer Information Service
1-800-525-0231

NEW JERSEY
Fox Chase Cancer Center
800-523-3586

NEW MEXICO
New Mexico Cancer Information Service
1-800-525-0231

NEW YORK
Roswell Park Memorial Institute
New York State: 1-800-462-7255
Erie County: (716) 845-4400

NEW YORK CITY
Memorial Sloan-Kettering Cancer Center
(212) 794-7982

NORTH CAROLINA
Duke Comprehensive Cancer Center
North Carolina: 800-672-0943
Durham County: (919) 286-2266

PENNSYLVANIA
Fox Chase Cancer Center
800-822-3963

TEXAS
M.D. Anderson Hospital and Tumor Institute
Texas: 1-800-392-2040
Houston: (713) 792-3245

WASHINGTON
Fred Hutchinson Cancer Research Center
Washington: 1-800-562-2875
Seattle Metro: (206) 284-7263

WISCONSIN
Wisconsin Clinical Cancer Center
University of Wisconsin
800-362-8038

WYOMING
Wyoming Cancer Information Service
1-800-525-0231

Other States:
800-638-6694

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