

Risk Factor Information for Mesothelioma

How to Use this Factsheet

This risk factor summary was developed to serve as a general fact sheet. It is an overview and should not be considered exhaustive. For more information on other possible risk factors and health effects being researched, please see the References section.

A risk factor is anything that increases a person's chance of developing cancer. Some risk factors can be controlled while others cannot. Risk factors can include *hereditary conditions, medical conditions or treatments, infections, lifestyle factors, or environmental exposures*. Although risk factors can influence the development of cancer, most do not directly cause cancer. An individual's risk for developing cancer may change over time due to many factors, and it is likely that multiple risk factors influence the development of most cancers. Knowing the risk factors that apply to specific concerns and discussing them with your health care provider can help to make more informed lifestyle and health care decisions.

For those cancer types with environmentally-related risk factors, an important factor in evaluating cancer risk is the route of exposure. This is particularly relevant when considering exposures to chemicals in the environment. For example, a particular chemical may have the potential to cause cancer if it is inhaled, but that same chemical may not increase the risk of cancer through skin contact. In addition, the dose and duration of time one might be exposed to an environmental agent is important in considering whether an adverse health effect could occur.

Gene-environment interactions are another important area of cancer research. An individual's risk of developing cancer may depend on a complex interaction between their genetic makeup and exposure to an environmental agent (for example, a virus or a chemical contaminant). This may explain why some individuals have a fairly low risk of developing cancer as a result of an environmental factor or exposure, while others may be more vulnerable.

Key Statistics

In the United States, an estimated 3,000 individuals are diagnosed with mesothelioma every year. While the incidence of mesothelioma increased steeply in the United States during the 1970s to the mid-1990s, more recent data indicate that incidence rates appear to be slowly decreasing.³ According to the National Cancer Institute's Surveillance, Epidemiology, and End Results Program (SEER) statistics, men are about four times more likely to develop mesothelioma than women and the disease is more common in white and Hispanic/Latinos than African Americans or Asian Americans.^{6, 3} Two out of three individuals diagnosed with mesothelioma are over 65 years of age. Mesothelioma is rare in people under age 45.³

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Types of Mesothelioma

The term "cancer" is used to describe a variety of diseases associated with abnormal cell and tissue growth. Cancers are classified by the location in the body where the disease originated (the primary site) and the tissue or cell type of the cancer (histology).

Malignant mesothelioma is a cancer that starts in cells in the linings of certain parts of the body, especially the chest or abdomen. A layer of specialized cells called mesothelial cells lines the inside of the chest, the abdomen, and the space around your heart. These cells also cover the outer surface of most of your internal organs. The lining formed by these cells is called mesothelium.^{3,5}

Mesothelioma is a tumor arising in the mesothelial cells of the pleura (membranes of the chest), peritoneum (membranes of the abdomen) or pericardium (membranes surrounding the heart) which are tissues that line the internal organs and cavities and can be either malignant (cancerous) or benign (non-cancerous). Seventy-five percent of malignant mesotheliomas start in the pleura, while 10%-20% start in the peritoneum. Very rarely, mesothelioma occurs in the pericardium. Finally, mesotheliomas of the tunica vaginalis are very rare tumors that start in the covering layer of the testicles, which is actually an outpouching of peritoneum into the scrotum. Malignant mesotheliomas can also be classified into 3 types: about 50% to 60% are epithelioid mesotheliomas, 10-20% are sarcomatoid (fibrous) mesotheliomas, and approximately 30-40% are considered mixed (biphasic) mesotheliomas having both epithelioid and sarcomatoid areas.^{3,5}

Established Risk Factors

Environmental Exposures

Asbestos exposure (via inhalation or ingestion) is the most well-established risk factor associated with mesothelioma and accounts for 75% of diagnoses. Most of these exposures occur in the workplace. Asbestos is a naturally occurring fibrous mineral that has been used historically as an insulating material and in other products. In recent years, government regulations have reduced commercial and industrial use of asbestos.^{3,4,5}

People at risk for workplace asbestos exposure include some miners, factory workers, insulation manufacturers and installers, railroad and automotive workers, ship builders, gas mask manufacturers, and construction workers. Family members of people exposed to asbestos at work also have an increased risk of developing mesothelioma because asbestos fibers can be carried home on the clothes of the workers.⁴ If you have questions or concerns regarding workplace exposure to asbestos, please contact the Massachusetts Department of Public Health Occupational Health Surveillance Program at (617) 624-5632.

Exposure to asbestos-containing building material is also a concern, particularly in older buildings. However, the risk of exposure is thought to be much less hazardous unless asbestos is friable (i.e., particles are escaping into the air, such as when building materials

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begin to decompose over time, or during remodeling or removal). People may also be exposed to asbestos through contaminated food or liquids (such as water that flows through asbestos cement pipes).^{3,4}

Mesotheliomas take a long time to develop and typically occur 20 to 50 years after asbestos exposure. It is important to note that increased risk is lifelong and does not diminish after asbestos exposure is reduced or eliminated.^{3, 4} Also, the risk of mesothelioma is dose-dependent; people exposed at an early age, for a long period of time, and at higher levels are more likely to develop this cancer.³

Possible Risk Factors

Medical Conditions and Treatments

Thorium dioxide (Thorotrast), which was used (by injection) in the past to improve the image quality of an x-ray, has been linked to increased risk of mesothelioma. High dose radiotherapy to the chest or abdomen, such as that used for the treatment of other cancers, may also increase risk.³

Infections

Some studies have suggested that infection with the simian virus SV40 may increase risk of mesothelioma but results have been inconsistent. Some injectable polio vaccines given between 1955 and 1963 were contaminated with SV40. Research continues on this virus and its potential role in mesothelioma.³

Lifestyle Factors

Smoking by itself does not increase the risk of mesothelioma, but the combination of smoking and asbestos exposure greatly increases the risk of certain types of cancer in the lung.^{1,5}

Environmental Exposures

Exposure to zeolite, a mineral similar to asbestos which occurs naturally in soil in certain parts of the world, may increase risk of mesothelioma.^{3,5}

The mineral vermiculite, which has been used in construction and consumer materials (for example, loose-fill insulation, potting soil mixes, fireproofing materials), can be contaminated with asbestos. Most vermiculite is not contaminated with asbestos. However, the vermiculite ore mined in Libby, Montana, was contaminated with asbestos. According to the federal Centers for Disease Control and Prevention, this mine accounted for more than half of the worldwide production of vermiculite from 1925 to 1990. Much of the Libby vermiculite was used to produce attic insulation products, often sold under the brand name Zonolite. Exposure to asbestos-containing vermiculite can increase the risk of mesothelioma, with the level of risk dependent on the intensity and duration of

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exposure.^{Error! Reference source not found.} For more information on vermiculite, please visit <http://www.atsdr.cdc.gov/asbestos/vermiculite051603.html> and <http://www.cdc.gov/niosh/docs/2003-141/>.

Mesothelioma in Children

Two out of three individuals diagnosed with mesothelioma are over 65 years of age. Mesothelioma is rare in people under age 45. Mesotheliomas take a long time to develop and typically occur 20 to 50 years after an exposure.³

For More Information/References

Much of the information contained in this summary has been taken directly from the following sources. This material is provided for informational purposes only and should not be considered as medical advice. Persons with questions regarding a specific medical problem or condition should consult their physician.

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1. ATSDR 2006. Cigarette Smoking, Asbestos Exposure, and Your Health.

American Cancer Society (ACS). <http://www.cancer.org>

2. ACS. 2015. Cancer Facts & Figures 2015.
3. ACS. 2013. Detailed Guide: Malignant Mesothelioma.
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American Society of Clinical Oncology (ASCO). <http://www.cancer.net>

5. ASCO. 2014. Guide to Mesothelioma.

National Cancer Institute (NCI). <http://www.cancer.gov>

6. Surveillance, Epidemiology, and End Results Program (SEER). 2014. Interactive Tools: Fast Stats. Statistics by Cancer Site. Incidence of Mesothelioma, Males vs. Females, 1975-2011. Generated at: <http://seer.cancer.gov/faststats/index.php>

National Institute of Occupational Safety and Health (NIOSH). <http://www.cdc.gov/niosh/docs/2003-141/>

7. CDC/NIOSH 2003. NIOSH Recommendations for Limiting Potential Exposures of Workers to Asbestos Associated with Vermiculite from Libby, Montana.

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8. Boffetta P, Stayner LT. 2006. Pleural and Peritoneal Neoplasms. In: Cancer Epidemiology and Prevention. 3rd Ed, edited by Schottenfeld D, Fraumeni JF. New York: Oxford University Press: P. 659-673.

For questions on work-related exposure to asbestos, please contact:

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Occupational Health Surveillance Program
(617) 624-5632