Disease caused by inhalation of asbestos dust

Diploma paper in preventive medicine

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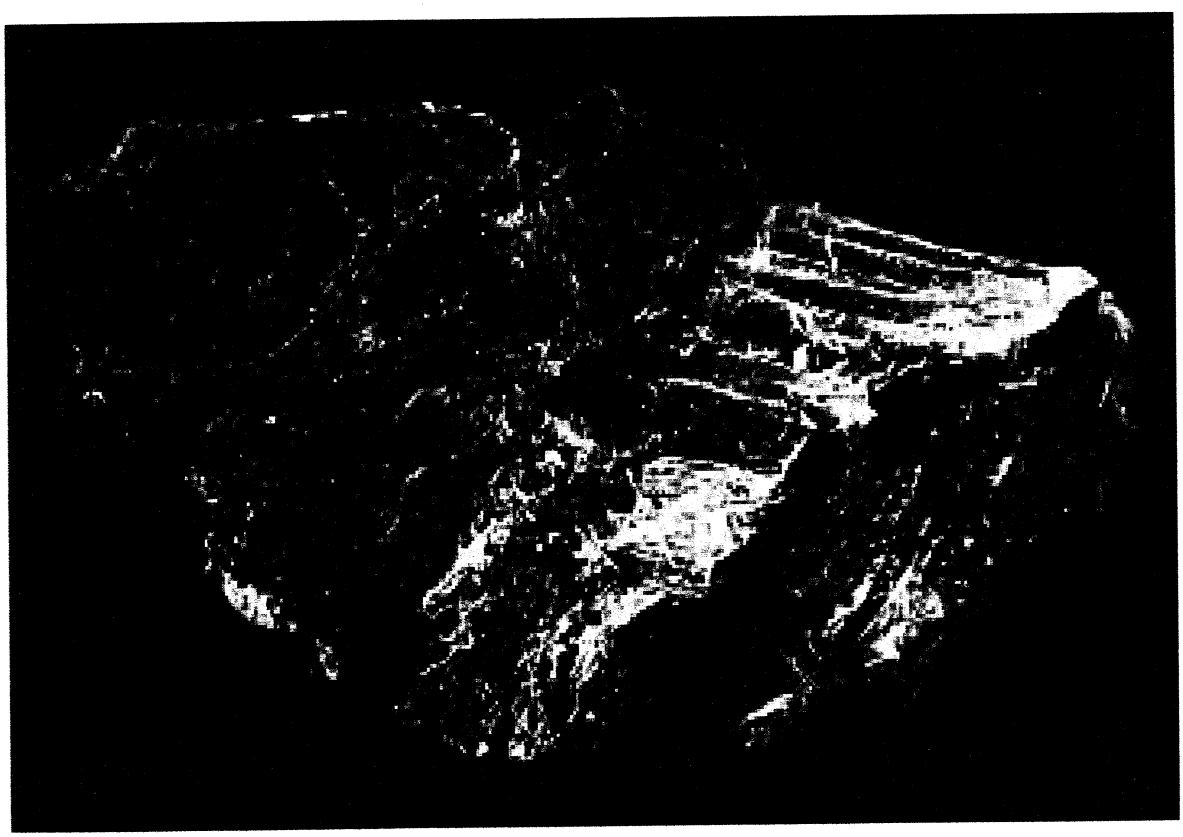


Asbestos may create serious health hazards such as coughing, lung damage, shortness of breath, and lung cancer. Most people do not become sick in the early stages of development, but usually need continued exposure, often on jobs such as mining, milling, manufacturing asbestos products, and building construction. Firemen, demolition workers, drywall removers, and any other workers in trades that involve destruction of buildings, ships, and automobiles are also exposed to the hazards and risks of asbestos. Over a period of years continual exposure to asbestos can cause very serious health problems, such as mesothelioma. Mesothelioma is a rare type of carcinoma of the membrane that lines numerous cavities of the body, including the lungs, abdomen and heart, and has been associated with exposure to asbestos dust. In mesothelioma, the cells of the mesothelioma metastasize and damage adjacent organs and tissues. Risk of developing mesothelioma takes a long period of time, often as long as twenty or forty years before full blown symptoms appear. Not all workers who have been exposed will develop diseases caused by asbestos, but workers who have been exposed to it may bring fibers on their clothing, hair, shoes, and skin home to their families. To circumvent this risk, most industries require workers to bathe and change their clothing before they leave work. Many studies have been conducted involving the risks of diseases caused by exposure to asbestos. The results of one such study involving the risks of smoking and exposure to asbestos proved extremely hazardous.

The word asbestos comes from the Greek word meaning "inextinguishable" or "indestructible." However, asbestos has been known by many other names including: "mountain leather," "incombustible linen," and "rock floss." The name of chrysotile, one of the most common forms of asbestos, is derived from the Greek words "chrysos" (gold) and "tilos" (fiber) or "gold fiber."

It is possible to trace written documentation of the use of asbestos back to the days of the Roman Empire. However, evidence of the use of asbestos in pottery and chinking of log homes dating back 3000 BC has been found archaeological digs in Scandinavia.
The geographer in the first century identified what was believed to be the first asbestos quarry on the Greek island of Evvoia. In early Greek and Roman times, it was used for flame retardant cloth, building materials and women's clothing. Roman restaurants used tablecloths made of asbestos. These tablecloths were flame retardant and could be thrown into the fire to remove food and other debris, and placed back on the table for the next customer. Romans also used asbestos in their building materials. Historian Pliny the Elder went so far as to note that asbestos "affords protection against all spells, particularly that of the Magi."

Asbestos was used by many different cultures for hundreds of purposes. The Egyptians embalmed pharaohs with asbestos and the Persians imported asbestos from India for wrapping their dead. In medieval times asbestos was used extensively as insulation in suits of armor. And unscrupulous merchants made it into crosses that they advertised as having been made from "the true cross." Some forms of asbestos look like old wood, and merchants claimed that their resistance to fire was proof that these "wooden crosses" came from cross on which Christ was hung.

During World War II asbestos was hailed by many as a miracle mineral. Almost anything could be built or manufactured from this mineral. The building and construction industries used it as an additive to strengthen cement and plastics. Asbestos fibers can be separated into thin threads which do not conduct electricity and are not affected by heat or chemicals. Shipbuilding used asbestos extensively in freighters and support vessels to insulate boilers, steam pipes and hot water pipes. Asbestos became the miracle construction material as it was easily obtained, processed, and transported. After WWII cars used asbestos in break shoes and clutch pads. Asbestos found its way into residential and industrial building materials, water supply, sewage materials, ceiling and floor tiles, and vermiculite garden materials to name a few products.

According FNs International Labour Organization, ILO, almost 100.000 people die each year from job-related asbestos exposure. Despite this high number there is still a long way before the use of asbestos is banned on the global marked. In Norway the use of asbestos where banned in 1980, but still there are patients coming with symptoms which appears to be asbestos-disease related. At a global perspective there are today total ban against asbestos use in 25 countries and another 27 have ratified the ILO convention according safety of asbestos use. Because of this the global production of asbestos decreased with 50% since the 1990 until 2000, but now it seems that both production and demands of asbestos are on the rise. This most of all in under developed countries. The global production in 2002 and 2003 increased with 5.4 %. Russia, which is the larges asbestos producing country followed by China and Canada, produced 870.000 ton in 2003, which shows an increase of 16% compared with the year before. India is the largest asbestos consumers with about 125.000 ton each year. Most of which are imported.

What is asbestos?

Asbestos is a mineral that is mined similarly to other minerals, such as iron, lead, and copper. There are many varieties of asbestos: the three most common are chrysotile asbestos, amosite asbestos, and crocidolite asbestos. Unlike most minerals, which turn into dust particles when crushed, asbestos breaks up into fine fibers that are too small to be seen by the human eye. Often, individual fibers are mixed with a material that binds them together, producing asbestos containing material. When asbestos is not friable, such as when embedded in ceiling tiles or completely encased in pipe coverings it cannot be inhaled and cause damage. In its raw state asbestos is friable meaning easily broken into microscopically small pieces by ordinary hand action, by machines, cut, scraped, or sanded. Asbestos can be inhaled into the lungs and are linked to the development of malignant and fibrotic diseases of the lung and pleura. These diseases may be initiated by injury to epithelial cells and mesothelial cells by asbestos fibers through the formation of reactive oxygen intermediates. Elaboration of oxidants is also a consequence of inflammation, a hallmark of exposure to asbestos after inhalation of asbestos. The type, size, and durability of asbestos fibers have shown to be important in toxicity and pathogenicity of asbestos types. If you breathe asbestos fibers into your lungs, some of the fibers will be deposited in the air passages and on the cells that make up your lungs. Most fibers are removed from your lungs by being carried away or coughed up in a layer of mucus to the throat, where they are swallowed into the stomach. This usually takes place within a few hours. Fibers that are deposited in the deepest parts of the lung are removed more slowly. In fact, some fibers may move through your lungs and can remain in place for many years and may never be removed from your body. Amphibole asbestos fibers are retained in the lung longer than chrysotile asbestos fibers.

Chrysotile asbestos, a serpentine mineral, has been shown to be notably different from amphibole asbestos such as amosite, crocidolite, and tremolite in that chrysotile once inhaled is rapidly removed from the lung while the amphiboles persist. A study shows that chrysotile is cleared from the lung with a clearance half-time of 11.4 days for the fibers longer than 20 microm. Chrysotile clears in a range similar to that of glass and stone wools. It remains less biopersistent than ceramic and special purpose glasses and considerably less biopersistent than amphibole asbestos. At 1 year after cessation of exposure, no long (L>20 microm) chrysotile fibers remained in the lung. In contrast, with amosite asbestos there were 4 x 10 long fibers (L>20 microm) remaining in the lungs at one year after cessation of exposure.

These results fully support the differentiation of chrysotile from amphiboles reported in recent evaluations of available epidemiological studies

The most common types of asbestos fibers in lung were either an admixture of chrysotile with amphiboles, amphibole alone, and occasionally chrysotile alone. In lung, amosite fibers were greatest in number followed by chrysotile, crocidolite, tremolite/actinolite, and anthophyllite. In mesothelial tissues, most asbestos fibers were chrysotile. In any case of suspicion of exposure a fiber analysis of both lung and mesothelial tissues must be done to determine the types of asbestos fibers associated with the induction of human malignant mesothelioma. Short, thin asbestos fibers should be included in the list of fiber types contributing to the induction of human malignant mesothelioma.

If you swallow asbestos fibers, either those present in water or those that are moved to your throat from your lungs, nearly all of the fibers pass along your intestines within a few days and are excreted in the feces. A small number of fibers may penetrate into cells that line your stomach or intestines, and a few penetrate all the way through and get into your blood. Some of these become trapped in other tissues, and some are removed in your urine.

If you get asbestos fibers on your skin, very few of these fibers, if any, pass through the skin into your body.

Types of Asbestos

There are two main varieties of asbestos: serpentine and amphibole.

Serpentine Asbestos

Known for its snake-like, curly appearance, this soft, flexible serpentine type of asbestos can be mixed and woven into products that require high-tensile strength and flexibility. Chrysotile is the form of asbestos from the serpentine group that has been used commercially. On a global view, chrysotile has been the most commonly used type of asbestos

Chrysotile is often present in a wide variety of materials, including but not limited to:

- sheetrock taping
- mud and texture coats
- vinyl floor tiles, sheeting, adhesives and ceiling tiles
- plasters and stuccos
- roofing tars, felts, and shingles
- "transite" panels, siding, countertops, and pipes
- acoustical ceilings
- fireproofing
- putty
- caulk
- gaskets
- brake pads and shoes
- clutch plates
- stage curtains
- fire blankets

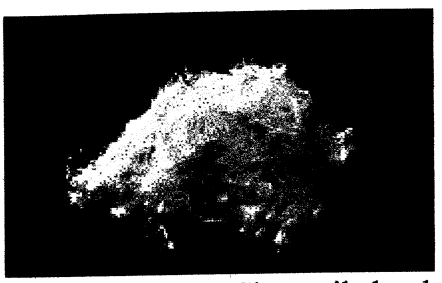
Amphibole Asbestos

A second form of commercial asbestos, amphiboles, have a needle-like shape and a harder composition. Amosite and crocidolite were used in many products until the early 1980s. The use of all types of asbestos in the amphibole group was banned in the mid-1980s. These products were mainly:

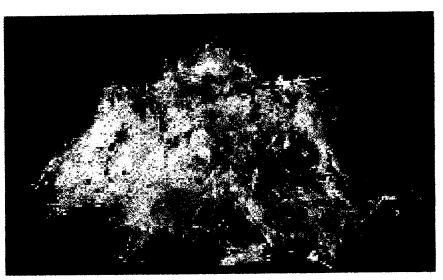
- Low density insulation board and ceiling tiles
- asbestos cement sheets and pipes for construction, casing for water and electrical/telecommunication services
- thermal and chemical insulation (*i.e.*, fire rated doors, limpet spray, lagging and gaskets)

Common Asbestos Fibers

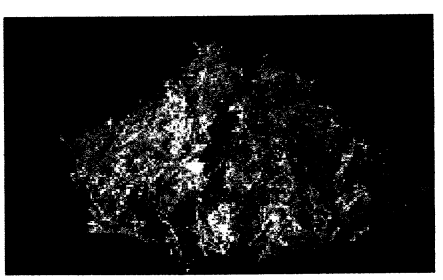
The most common types of asbestos fibers are chrysotile, also known as white asbestos; amosite, also known as brown asbestos; and crocidolite, also known as blue asbestos. The colors refer to the minerals in their raw state.



Chrysotile is the most common type of asbestos, comprising approximately 90 to 95 percent of all asbestos found in the United States. Also known as "white asbestos", Chrysotile is made of minerals that crystallize in the serpentine pattern, which means its crystals are formed in sheets. Chrysotile has been linked with all asbestos-related diseases, including asbestosis, lung cancer and mesothelioma.



Amosite is an amphibole type of asbestos made of mineral fibers formed by crystals in a chain-like structure. Amosite is also called "brown asbestos" and comes from the asbestos mines of South Africa. Mesothelioma has been observed after occupational exposure to amosite asbestos.



Crocidolite is one of the five types of Amphibole asbestos whose mineral crystals are structured like a chain. Crocidolite is often called "blue asbestos," and it is mined in Australia, South Africa, the former Soviet Union and Canada.

Today chrysotile is the only type of asbestos mined on a large scale and incorporated into products. However, since asbestos is indestructible, older buildings and products from earlier periods may also contain some amosite or crocidolite asbestos. Small amounts of tremolite asbestos are still mined in India. Commercial production of crocidolite and amosite ended about four years ago in South Africa

How Are People Exposed to Asbestos?

People are exposed to asbestos mainly through inhaling fibers in the air they breathe. This may occur when mining and processing asbestos, producing asbestos-containing products, or installing asbestos insulation. It may also occur when older asbestos-containing materials begin to break down. In any of these situations, asbestos fibers tend to create a dust composed of tiny particles that can float in the air. In addition, asbestos can enter the body through ingestion. This may occur when people consume contaminated food or liquids such as water that flows through asbestos cement pipes. It may also occur when people cough up asbestos they have inhaled, and then swallow their saliva.

Many people are exposed to very low levels of naturally occurring asbestos in outdoor air as a result of erosion of asbestos-bearing rocks. The potential for such exposure is higher in areas where rocks have higher asbestos content. After the collapse of the World Trade Center in 2001, there was concern about the presence of asbestos in the dust. Recommendations were made for testing and cleaning of residences in Lower Manhattan to minimize any health risks from such exposures.

However, the people with the heaviest exposure were those who worked in asbestos industries, such as shipbuilding and insulating. Many of these people recall working in thick clouds of asbestos dust, day after day.

Family members of asbestos workers are also potentially exposed to higher levels of asbestos because the fibers are carried home on the workers' clothing, and can then be inhaled by others in the household. Removing asbestos from homes and other buildings can cause some exposure, although modern asbestos abatement workers are trained to use appropriate protective equipment to minimize exposure.

Exposure to asbestos-containing building material is also a concern, particularly in older buildings. If building materials like insulation and ceiling and floor tiles begin to decompose over time, asbestos fibers can be found in indoor air and may pose a threat to human health. There is no risk to human health if the asbestos is bonded into intact finished products, such as walls and tiles. As long as the material is not damaged or disturbed, for example by drilling or remodeling, there is no way for the fibers to be released into the air and inhaled. Maintenance workers who sweep up and dispose of the asbestos dust or handle damaged asbestos-containing building materials are often exposed to higher levels than other occupants of these buildings.

Asbestos may be detected in the water supply as well as in the air. It may be released

into the water through several sources, such as erosion or natural deposits, corrosion from asbestos-cement pipes, and the break down of roofing materials containing asbestos that are then transported into sewers.

Examples of workers at risk are:

- Miners of asbestos
- Shipyard workers
- Powerplant workers
- Brake lining workers
- Pipe fitters
- Insulators
- Boiler makers and repairers
- Maintenance workers who worked in areas of the factory where friable asbestos was present

Asbestos-related diseases

There are several diseases associated with asbestos exposure. Not all of them are fatal, but all damage the health and quality of life of those who suffer them. All of them were, and are, predictable and preventable at the time of exposure. Exposure to asbestos dust does not mean anyone will definitely become ill. However, the only sure way to protect against anyone becoming ill is to prevent all exposure.

Because friable asbestos can be inhaled, the main medical concern is lung or respiratory disease. Disease can come about because of the body's reaction to the inhaled asbestos, which than can result in formation of scar tissue. When scar tissue forms it replaces normal lung tissue and extensive amounts of scar tissue in the lungs can interfere with breathing. In addition, asbestos scar tissue in the lungs can lead to lung cancer. Generally, asbestos respiratory diseases take two or more decades to develop from the time of exposure, and then only after extensive and long term exposure to friable asbestos. The more extensive and longer the exposure, the more risk an individual has for developing asbestos-related disease years later.

On the basis of epidemiologic studies, occupational exposure to asbestos is linked to 1) asbestosis, also known as parenchymal interstitial fibrosis; 2) bronchogenic carcinoma; 3)

pleural effusions; 4) Pleural plaques and pleural fibrosis; 5) malingnant pleural mesotheliomas.

Asbestosis

Asbestosis is a form of pneumoconiosis, a general term for a type of damage done to the interior of the lung by inhaled dust. Lung tissue is very thin, delicate tissue that consists of millions of air sacs, alveoli, surrounded by blood vessels and connective tissue. The portion of the lungs surrounding the alveoli is collectively called the interstitium. If scarring occurs in the interstitium it is called interstitial fibrosis. If thin asbestos fibers are inhaled and get into the interstitium they can be a cause of this fibrosis. When this occurs the patient has asbestosis, i.e., interstitial fibrosis from inhaled asbestos. Like any case of interstitial fibrosis, asbestosis can lead to shortness of breath and ultimately be fatal.

Alveoli are where oxygen and carbon dioxide are transferred to and from the blood. Microscopic dust that reaches the alveoli and damage the alveoli walls, cause scar tissue which then puts pressure on the neighbouring alveoli which break and scar. Over time this reduces the lung's ability to get oxygen into the blood and the result is shortness of breath, which can be extreme. To compensate for this the heart works harder and in the worst cases death comes because of heart failure. Mild asbestosis may not cause any noticeable symptoms but once scarring has taken hold the disease will get worse.

It often takes decades between the patient's asbestos exposure and the appearance of early symptoms. Common symptoms beside shortness of breath are persistent productive cough, chest tightness and pain, general ill feeling, fitful sleep and appetite loss.

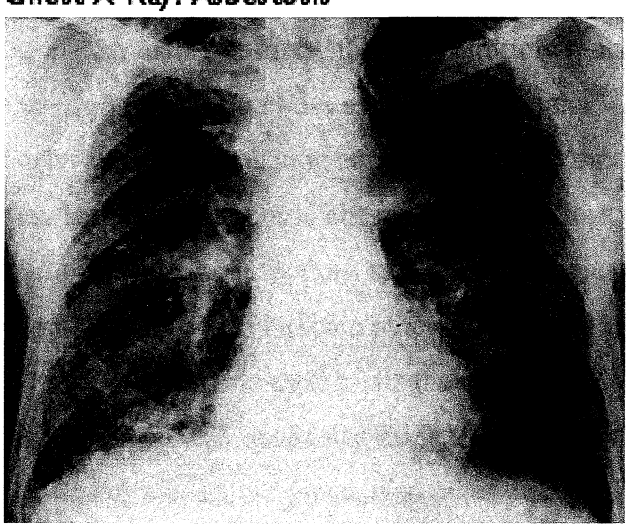
To diagnose asbestosis an experienced physician may use a simple method as stethoscope to listen for basal crackles or persistent high–pitched sounds that are characteristic of the disease. An x–ray may show small irregular opaque areas, usually in the lower lobes of the lungs. However, x–rays are limited in detecting early asbestos disease, sometime yielding false positives for smokers as well as false negatives. A computed tomography may be more useful in indicating asbestosis and asbestos–related pleural disease than the chest x–ray, particularly in those cases in which the chest x–ray is ambiguous or in asbestos–exposed patients who have normal chest x–rays. Sometimes the patient's x–ray or CT scan shows a pulmonary nodule or lesion. The doctor may not be able to determine, based on the x–ray or CT alone, whether the nodule is cancerous. Because those with asbestosis disease have an increased chance of developing asbestos lung cancer or

mesothelioma, a biopsy may be performed on the nodule.

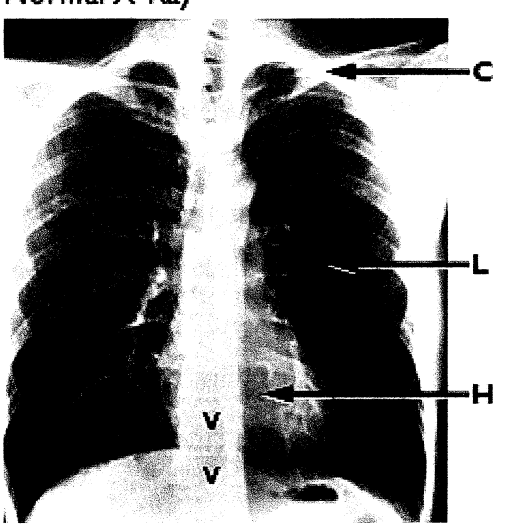
Pulmonary function test may also be used to measure lung capacity and lung and chest wall mechanics. Measurements include the amount of air the lungs can hold (total lung capacity), how quickly air is moved in and out of the lung, and how well the lungs can transfer oxygen from the air into the blood. As the lungs become scarred/fibrostic, these functions are reduced. These patients have reduced forced vital capacity (FVC) with proportionate reduction of forced expiratory volume (FEV1) and hence, unlike in obstructive lung disease, the FEV1 to FVC ratio is not reduced. This indicates a restrictive form of lung disease.

Asbestosis may be treated, but not cured. Stopping further exposure to asbestos and to quit smoking is essential. Supportive treatment of symptoms includes respiratory treatments to remove secretions from the lungs by postural drainage, chest percussion, and vibration. Shortness of breath can be treated with bronchodilators, inhaled or oral medications that open up the bronchial tubes and allow the passage of air. In more severe cases, supplemental oxygen may be required. Productive cough is treated with humidifiers and chest percussion. For minor discomfort, you can take over-the–counter drugs such as acetaminophen or ibuprofen to reduce chest pain.

Chest X-Ray: Asbestosis



Normal X-Ray



An abnormal chest x-ray shows extensive scarring of tissue in the lungs. This finding is typical of severe asbestosis. A normal chest x-ray is shown on the right for comparison; the heart (H), lungs (L), vertebrae (v), and collarbone (C) can be seen.

Bronchogenic carcinoma

Bronchogenic carcinoma is without doubt the number one cause of cancer-related deaths in industrialized countries. It accounts for about one third of cancer deaths in men, and has become the leading cause of cancer in women as well. The peak incidence is between ages 55 and 65 with a male to female ratio about 2:1. At diagnosis, greater than 50% of patients already have distant metastatic disease; while a fourth have regional lymph nodes. The 5-year survival rate for all stages is about 14% and 45% with localized carcinoma.
Studies show an increase in bronchogenic carcinoma among workers exposed to asbestos. This increase is particularly significant among asbestos–exposed workers who smoke. A dose–response relationship exists both for the degree of asbestos exposure and the amount of cigarette smoking. Most asbestos lung cancer starts in the lining of the bronchi. However, it can also begin in other areas such as the trachea, bronchioles or alveoli. Although lung cancer usually develops slowly, once it occurs, cancer cells can break away and spread to other parts of the body.

The two most common types of lung cancer are small cell lung cancer (SCLC), in which the cancer cells are small and round, and non–small cell lung cancer (NSCLC), in which the cancer cells are larger. Sometimes a cancer has features of both types, and is called mixed small cell/large cell cancer. Non–small cell lung cancer accounts for almost 80% of lung cancers. Small cell lung cancer accounts for about 20% of all lung cancers. Although the cancer cells are small, they can multiply quickly and form large tumors. The tumors can spread to the lymph nodes and to other organs.
Early–stage asbestos lung cancer may be asymptomatic, but some early present symptoms may be persistent cough, chest pain, weight loss, loss of appetite, bloody or rust-coloured sputum, recurring infections such as bronchitis and pneumonia and wheezing, but these symptoms may also indicate other diseases, so a thorough investigation must be done.

The methods used to diagnose asbestos lung cancer include imaging tests like x-ray, CT, MRI and PET scans. By using the imaging methods on can also determine how far the cancer has spread, (staging), if to other organs like the liver i.e. By performing a bone scan on can also find out if the cancer has spread to the bones. Other methods are biopsies and taking sputum samples which will be examined under microscope to se if cancer cells are present.

The treatment of asbestos lung cancer depends upon the patient's health, preferences and the type of lung cancer (non–small or small cell lung cancer). It also takes into account

the size, location, and extent of the tumor. Often, treatments are combined to improve longevity and quality of life. Options include surgery, chemotherapy, radiation, and photodynamic therapy, which still is in it experimental phase. (16,17, 18)

Pleural effusion

Pleural effusion is a collection of fluid, either transudate or exudates, around the lung and is a very common medical problem. There are many potential causes like pneumonia, congestive heart failure, cancer, kidney disease, rheumatoid arthritis and tuberculosis. Asbestos can cause two very different types of pleural effusion, benign or malignant. Benign pleural effusion is a frequent condition, but is only rarely from asbestos. Malignant pleural effusion can be due to either lung cancer or mesothelioma. Benign pleural effusion, when attributable to asbestos, is presumably due to inflammation generated by reaction to asbestos fibers.

When the pleural fluid becomes substantial the patient may have symptoms like shortness of breath and the chest x-ray will show the fluid collection. Asbestos is actually a rare cause of pleural effusion. Pleural scarring and pleural plaques are a much more common result of asbestos inhalation.

The only way to reliably diagnose most causes of pleural effusion is to sample the fluid via a needle in the pleural space, and examine it in the laboratory. This is an invasive procedure called thoracentesis, and is routinely performed in hospitals.

The management depends on the underlying cause. Exudates are usually drained and transudates are managed by treatment of underlying cause. Malignant effusions usually reaccumulate after drainage and can be treated by aspiration to dryness followed by instillation into pleural space of a sclerosing agent such as tetracycline or bleomycin.

Pleural plaque and Pleural fibrosis

Sometimes the scarring is not in the lung tissue itself, but in the outside linings of the lung, called the pleura. These are thin, glistening membranes that completely cover the lungs. When visible on a chest x-ray, this scarring is termed pleural plaques or pleural fibrosis. However, they are often difficult to discern on plain chest x-ray, and are much better visualized on a chest CT scan. Asbestos related pleural fibrosis occurs when the pleura, hardens as a reaction to asbestos fibres in the lung. It can develop on one or both of the lungs. In severe cases it can restrict breathing. There is no cure for pleural thickening and it can

reduce the quality of life with extreme cases being potentially life threatening.

Asbestos related pleural plaques are small areas of localised thickening or scarring of the pleura. Generally they are not regarded as causing any disability or symptoms but calcified plaques are regularly reported by sufferers as causing discomfort and considerable pain. There are not cure for this condition. Both pleural fibrosis and pleural plaques are indicators of previous asbestos exposure and may be precursors to other asbestos diseases.

Mesothelioma

Malignant mesothelioma is a rare cancer of mesothelial cells, usually arising in the parietal or visceral pleura but less commonly in the peritoneum and rarely elsewhere. It has assumed great importance because it is related to occupational exposure to asbestos in the air. Approximately 50% of patients have a history of exposure to asbestos. Those who work directly with asbestos like shipyard workers, miners and insolators are at greatest risk, but malignant mesotheliomas have appeared in persons whose only exposure was living in proximity to an asbestos factory or being a relative of an asbestos worker. The latent period for developing mesothelioma is long, often 20 – 40 years. The combination of cigarette smoking and asbestos exposure greatly increases the risk of bronchogenic carcinoma, but it does not increase the risk of developing mesothelioma.

The basis for the carcinogenicity of asbestos is still a mystery. Clearly, the physical form of the asbestos is critical. Nearly all cases are related to exposure to amphibole asbestos and not to serpentine chrysotile. Asbestos are not removed or metabolized, and hence the fibers remain in the body for life. Thus, there is a lifetime risk after exposure that does not diminish with time, unlike smoking, in which the risk decreases after cessation. It has been hypothesized that asbestos fibers gather near the mesothelial cell layer, where they generate reactive oxygen species that cause DNA damage and potentially oncogenic mutation. Recent work has demonstrated the presence of a virus called SV40 in 60 % to 80 % of pleural malignant mesotheliomas and in a smaller fraction of peritoneal cases. The SV40 T-antigen is a potent carcinogen that binds to and inactivates several critical regulators of growth. Currently, the interaction of asbestos and SV40 in mesothelioma pathogenesis is an area of active investigation.

An individual with mesothelioma experiences chest pain usually caused by a build-up of fluid in the pleural space called an effusion and shortness of breath. Other symptoms present may be hoarseness, dysphagia and coughing of blood. These symptoms are often

believed, at first, to be associated to other medical problems so biopsy of the pleural tissue or fluid may reveal the cancer of the mesothelial cells and a proper diagnosis can thus be established. Imaging methods like x-ray, CT scan, MRI and PET may also be used. A history of the individual's occupational exposure shall be taken. Since there is no "safe" level of exposure to asbestos, even brief, low level exposures may be enough to cause mesothelioma.

The mesothelioma treatment method that is chosen will depend on how advanced the disease is and on the patient's overall physical health and personal preferences. These include surgery, chemotherpy and radiation. Mesothelioma is not resectable, since it involves the lining of the lung and the adjacent chest wall. Rarely, in highly selected cases, a few surgeons will attempt to remove the entire lung with its lining and parts of the chest wall; this procedure, called "radical pneumonectomy", might prolong survival in a few individuals but is not an option for most patients. Radiation and chemotherapy are not effective for mesothelioma, but are used as palliative treatment. The combination of pemetrexed and cisplatin has shown to increase the survival for 3 months than using cisplatin alone. Most patients will die within 12 months of the diagnosis.

Fig.1.Lung, mesothelioma, high power microscopic Mesotheliomas have either spindle cells or plump rounded cells forming gland-like configurations, as seen here at high power microscopically. They are very difficult to diagnose cytologically

Fig.2 Pleural mesothelioma is a malignant tumour that develops in the pleura. The pleura are a very thin layer of tissue that wraps itself around the lung and lines the inside of the chest wall. Mesothelioma may occur with very little asbestos exposure. Mesothelioma tends to grow into the tissues of the chest wall, interfere with nerves and may produce fluid that can compress the lung.

Asbestos and Smoking

Smoking does not cause asbestosis, pleural scarring, pleural effusion or mesothelioma. However, there is some evidence that smoking, since it affects the lungs' natural protective mechanisms, makes people more vulnerable to inhaled asbestos and more likely to develop asbestosis. Also, a patient with any asbestos-related disease might have shortness of breath due to mainly or exclusively from his smoking-related disease.

Many workers who were exposed to asbestos were also heavy cigarette smokers. Because the latency of asbestos-related diseases is 20 years or more, by the time these workers are checked for asbestos diseases they often have a very long smoking history and therefore smoking-related disease as chronic obstructive pulmonary disease (COPD). COPD includes two separate pulmonary diseases, which commonly overlap in a given patient - chronic bronchitis and emphysema. Chronic bronchitis and emphysema are just different manifestations of lung damage from smoking. Smoking is also the major cause of lung cancer. Since both asbestos and smoking can independently cause lung cancer, it is obviously important that anyone who might have been exposed to friable asbestos never smoke. Smoking not only adds to lung cancer risk in some asbestos workers, it also increases the risk, a process known as synergism. This has been demonstrated with certainty only if the worker has lung scarring from asbestosis. Synergism means that if, for example, the risk of developing lung cancer from asbestosis is 1% and the risk from smoking is 2%, that the risk in the smoking asbestosis patient is significantly higher than 3%.

Asbestos is well recognized as a carcinogen. It causes bronchogenic carcinoma, mesothelioma and also cancer of the larynx has been detected in connection with asbestos dust inhalation. Other diseases like pleural effusion, pleural plaques and fibrosis are also seen. The people at highest risk are those with very heavy exposure, usually over many years on the job. Smoking acts together with asbestos to greatly increase the risk of lung cancer. While asbestos use is much less common now than it was years ago, there is still a potential for exposure in older buildings and products. The best prevention of is to avoid any future exposure to asbestos. If there is on-the-job exposure, like renovating old buildings for example, then one should use all protective equipment, work practices, and safety procedures designed for working around asbestos. If living in older houses, there may be asbestos-containing insulation or other materials. A knowledgeable expert can check your home to determine if there is any asbestos and if it poses any risk of exposure. This may involve testing the air for asbestos levels. You may then decide to have the asbestos removed from

your home. You should hire a qualified contractor to perform this job to avoid contaminating your home further or causing any exposure to the workers. You should not attempt do remove asbestos-containing material yourself. Even if the workers are protected, fibers may be release into the air, which may be inhaled by other users later. As a consequence, interventions in areas where asbestos is present often have to follow stringent procedures. The removal of asbestos from a building is quite difficult. If removal is to be performed when users are still present in the building, it is usually necessary to relocate some of them temporarily. Typically, the part of the building from which asbestos is being removed has to be sealed off in order to prevent contamination of the other areas. Even if the building is closed to normal users, it is necessary to seal it off from outside atmosphere so that no accessible air is contaminated. Accordingly, asbestos removal projects are long and costly.

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