What is Mesothelioma?

Mesothelioma is a rare type of cancer that develops in the mesothelial cells found in one’s body. These cells form membranous linings that surround and protect the body’s organs and line body cavities such as the chest and abdomen.

Approximately 2,000 to 3,000 cases of mesothelioma are diagnosed each year in the United States, comprising around 3% of all cancer diagnoses. All forms of mesothelioma, except for benign mesothelioma, are invariably fatal. Mesothelioma is a very aggressive form of cancer that is difficult to diagnose and highly resistant to treatment; full recovery is extremely rare.

Causes of Mesothelioma

Mesothelioma is caused by asbestos exposure. Asbestos is a naturally occurring fibrous substance that was widely used in the 20th century in a number of different industries. Popular because of its durability, fire resistance, and insulating properties, it was regularly used in the manufacture of several thousand different products, up until the time that asbestos warnings were issued in the mid 1970s.

The exact way in which asbestos causes mesothelioma is not well understood, though doctors and researchers have put forth many hypotheses. What is apparent, however, is that any length of exposure to asbestos can be hazardous and may result in the development of asbestos-related diseases later in life.

Types of Mesothelioma

There are five known types of mesothelioma. Four of these are malignant cancers, and one is a benign condition.

Pleural Mesothelioma: This type of mesothelioma develops in the lining of the lungs, known as the pleura. It is the most common form of malignant mesothelioma, with around 70% of cases being pleural in origin.

Peritoneal Mesothelioma: This form of mesothelioma develops in the lining of the abdominal cavity, known as the peritoneal membrane. Approximately 25% of mesothelioma are of this type.
Pericardial Mesothelioma: This form of mesothelioma develops in the lining of the heart, known as the pericardium. About 5% of all mesothelioma cases are pericardial.

Testicular Mesothelioma: This is the rarest type of malignant mesothelioma; to date, there have been less than 100 recorded cases. Testicular mesothelioma develops in the tunica vaginalis of the testicles.

Benign Mesothelioma: The benign form of mesothelioma most commonly develops in the pleura. This is the only form of mesothelioma for which full cure and recovery is the probable outcome, though it may be a precursor of future asbestos-related problems.

Mesothelioma Symptoms and Diagnosis
Mesothelioma is difficult to treat, largely due to the fact that it remains latent in the body for up to five decades and is usually not diagnosed until its late stages. Also, diagnosis may be difficult due to the non-specific nature of most mesothelioma symptoms, which often resemble symptoms of less serious diseases.

The process for diagnosis usually begins with a compilation of the patient’s full medical and work history including any exposure to asbestos. A medical examination is performed and if a problem is suspected, one or more diagnostic tests are ordered. These typically include medical imaging tests such as x-ray or CT and MRI scans, as well as biopsy procedures that test samples of fluid and tissue for the presence of cancer cells. Diagnostic tests are also used to determine how far the cancer has advanced and whether it has spread to other locations in the body.

Mesothelioma Treatment
Mesothelioma treatments can be divided into two main categories: curative treatments and palliative treatments. Curative treatments are those carried out in an attempt to remove all cancer cells and cure the disease. Palliative treatments are designed to ease pain and make a patient more comfortable.

Treatments for mesothelioma include conventional treatments such as surgery, chemotherapy, and radiation therapy, as well as experimental procedures, including immunotherapy and gene therapy.

Generally, a patient with mesothelioma will receive more than one type of conventional treatment. For example, he or she may undergo surgery to remove the bulk of cancerous tissue, and then receive chemotherapy or radiation therapy to kill any remaining cancer cells.

Experimental treatments are typically available only to patients who agree to enter clinical trials. In these cases, patients must fit certain criteria to be eligible.

Legal Issues
The dangers of asbestos exposure were known long before any efforts were made to protect workers. Many thousands of American workers were exposed to asbestos during the 20th century, with no indication as to the risks that they were facing.

Companies that produced asbestos-containing products or used these products on a daily basis are liable for their negligence in failing to protect their workers. If you or a loved one has developed mesothelioma or another asbestos-related disease as a result of asbestos exposure, it’s important to know that you can talk to an attorney about seeking compensation for pain and suffering as well as reimbursement for medical expenses and lost income.

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Mesothelioma — Symptoms — Overview

Mesothelioma has earned a reputation as a cancer that is very difficult to treat effectively. This reputation is partly due to the fact that in its early stages, mesothelioma symptoms are quite non-specific, making early diagnosis quite difficult. In addition, the disease usually lays dormant for up to five decades, and symptoms don’t appear until the cancer has reached its late stages.

Non-Specificity of Mesothelioma Symptoms

The first symptoms of mesothelioma are often similar to symptoms of other diseases that are much less serious. For example, early symptoms of pleural mesothelioma (which develops in the pleural lining of the lungs) often resemble symptoms of influenza or pneumonia. Similarly, symptoms of pericardial mesothelioma (which develops in the pericardial lining of the heart) are similar to symptoms of other cardiac conditions.

If you have a history of asbestos exposure and experience any of the following symptoms, it is best to seek immediate medical advice. Also, in the interest of early detection, those who know they were exposed but have not yet exhibited symptoms should undergo regular chest X-rays or pulmonary function tests to monitor any adverse affects of asbestos inhalation.

Symptoms — Pleural Mesothelioma

Pleural mesothelioma is the most common form of the cancer. Approximately two-thirds of mesothelioma cases originate in the pleural lining of the lungs.

Known symptoms of pleural mesothelioma include:

- Persistent dry or raspy cough (typically non-productive, meaning there is little or no phlegm)
- Coughing up blood
- Difficulty in swallowing
- Night sweats or fever
- Unexplained weight loss of 10% or more
- Fatigue
- Persistent pain in the chest or rib area or painful breathing
- Shortness of breath that occurs even when at rest
- The appearance of lumps under the skin on the chest

Symptoms of pleural mesothelioma occur as a result of thickening of the pleural membrane and the build-up of fluid between membrane layers. Tissue thickening and fluid build-up put pressure on the lungs, leading to reduced respiratory function.

Causes of Mesothelioma

Mesothelioma is a highly aggressive cancer that is difficult both to diagnose and to treat. Between 2,000 and 3,000 cases of malignant mesothelioma are diagnosed each year in America, and the incidence of mesothelioma cancers is projected to increase during the next decade.
What Causes Mesothelioma?

An overwhelming body of scientific and medical evidence points to the fact that malignant mesothelioma is caused by asbestos exposure. Currently, there is no other known cause for the disease.

Asbestos is a naturally occurring fibrous substance that was very widely used in the construction and shipbuilding industries during the first three-quarters of the 20th century. Asbestos was touted for its durability, fire resistance, and excellent insulating properties, and was used in several thousand different manufactured products, including construction materials, household appliances, and brake linings.

How Does Asbestos Cause Mesothelioma?

Internal organs and body cavities are covered by a thin tissue membrane called mesothelium. This lining covers the lungs (where it is called the pleura), the heart (where it is known as the pericardium), and body cavities such as the abdominal cavity (where it is called the peritoneum). The mesothelium provides both support and protection for organs and body cavities, as well as serves as a source of lubrication that helps support organ function and health.

Mesothelioma develops in the linings of organs and body cavities, typically in the pleura, pericardium, or peritoneum. In very rare cases, mesothelioma may develop in the lining of the testicles, known as the tunica vaginalis.

The exact method by which asbestos causes mesothelioma is still being researched, but medical professionals offer four different theories:

- Asbestos causes irritation and inflammation of mesothelial cells, eventually leading to irreversible scarring, cellular damage, and eventually cancer.
- Asbestos fibers enter cells and disrupt the function of cellular structures that are essential for normal cell division, causing cellular changes that lead to cancer.
- Asbestos causes the production of oxygen “free radicals.” These molecules damage cellular DNA and cause cells to mutate and become cancerous.
- The presence of asbestos causes cells to produce oncoproteins. These molecules cause mesothelial cells to ignore normal cellular division restraints, leading to cancer.

The element that ties each theory together states that asbestos induces cellular damage, which causes cells to lose control over their own cycles of normal division and begin dividing uncontrollably. Healthy cells follow cycles of cell division that ensure tissues and organs do not grow beyond normal size; in cancer cells, these restraints are lost.

In cases of mesothelioma, the result is that membranes in the affected location begin to thicken, and fluid builds up in the spaces between membrane layers. As cancer cells continue to divide and pile on top of one another, tumors begin to form. The end result of uncontrolled division of cancer cells is that the function of the body’s organs and systems are impaired, due to factors such as internal pressure caused by the growth of tumors, and the reduction of availability of essential nutrients for organs.

Are There Any Other Causes of Mesothelioma?

The answer to this question is a simple “no.” Doctors and research scientists have not been able to determine any other causes of mesothelioma other than asbestos exposure. They do know, however, that smoking can aggravate a less serious asbestos-related disease, such as asbestosis, and prompt the formation of tumors and the onset of mesothelioma. Those who have been exposed to asbestos on a regular basis are advised not to smoke.

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Mesothelioma — Diagnosis

Mesothelioma is a serious cancer that advances quickly and aggressively. Historically, diagnosis of this disease does not happen until it reaches the later stages. This occurs because mesothelioma has a very long latency period. In a typical case, at least two to three decades elapse between asbestos exposure and the onset of the first symptoms of mesothelioma. In some cases, 50 or more years may pass before symptoms appear.

The second reason that mesothelioma is so difficult to diagnose is that the early symptoms and warning signs of the disease are highly non-specific and very often resemble the symptoms of other conditions that are much less serious. For example, the early symptoms of pleural mesothelioma may be mistaken for influenza or pneumonia and further testing may be required to recognize that it is indeed something more serious.

Initial Stages of Diagnosis

Studies show that mesothelioma patients are typically diagnosed within three to six months of their first visit to a doctor with complaints about breathing problems and chest pain.

The first step involved in diagnosis is providing a full and accurate medical history to your doctor, including details about current and past health concerns and the types of symptoms you are currently experiencing. A mention of any exposure to asbestos is essential. Without revealing this fact, your doctor may not consider asbestos-related diseases in his/her diagnosis.

Next, patients will undergo a physical examination, where a doctor will examine causes for any types of symptoms you may be displaying. Most likely, his next step will be to recommend further testing.

Diagnostic Tests

If your doctor suspects an asbestos-related disease, the next step in diagnosis will be tests to confirm the presence of mesothelioma; determine the location, size, and type of cancer involved; and determine whether the cancer has spread to other parts of the body. This will often involve imaging tests such as:

Chest X-ray: This is the most commonly used imaging test for the diagnosis of mesothelioma — almost all diagnoses will involve an X-ray, but a more sophisticated test may follow.

CT Scan: An X-ray-like procedure in which several pictures are taken and combined via computer to produce a detailed image of body tissues. If you undergo a CT scan, you may be given an intravenous injection of dye that helps produce more detailed images.

PET Scan: Glucose solution is administered via intravenous injection, and a scanner is used to spot deposits of cancer cells. Malignant cells take up and use sugars more quickly than normal cells, so they can be easily distinguished using this procedure.

MRI Scan: A combination of radio waves and a strong magnetic field is used to create detailed three-dimensional images that can be carefully examined by a radiologist.

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Fluid and Tissue Tests

These tests, also known as biopsy tests, involve collecting small samples of fluid or tissue and checking them for the presence of cancer cells. Such tests include:

**Fine Needle Aspiration:** Mesothelioma cancers cause fluid to build up in affected locations, such as in the pleural membranes of the lungs. During a fine needle aspiration, your doctor will remove a fluid sample using a very long, thin, and hollow needle.

**Thoracoscopy:** Thoracoscopy is used in cases where pleural or pericardial mesothelioma is suspected. During this procedure, a very small incision is made in the chest wall, through which a sample of tissue is removed.

**Bronchoscopy and Laparoscopy:** These procedures are similar to the thoracoscopy, but are performed on different parts of the body. The bronchoscopy is used to view the trachea and airway, while the laparoscopy is used to remove samples of peritoneal tissue.

**Mediastinoscopy:** This procedure is used to view lymph nodes in the chest and neck, to determine if cancer has spread from its point of origin.

**After Diagnosis**

If you are indeed diagnosed with mesothelioma, your doctor will recommend an oncologist who is well-versed in treating the disease. This cancer specialist will meet with you to determine your options for treatment.

**Types of Mesothelioma**

Mesothelioma is caused by long-term, repeated exposure to asbestos fibers. The disease is generally found in four different forms – pleural, peritoneal, pericardial, and testicular. In each case, the cancer develops in mesothelial cells, which form the membranous linings that surround and protect organs. The different names for each type of mesothelioma refer to the point of origin of the cancer.

Mesothelial membranes are made up of two different layers — the parietal layer and the visceral layer. Parietal layers are outer layers, and these typically cover large areas such as the chest cavity (in the case of pleural and pericardial membranes) and the abdominal cavity (as in the case of peritoneal membranes). Visceral layers are those that cover organs such as the lungs and heart. Mesothelioma develops in these membranes when asbestos fibers become trapped in the spaces between mesothelial cells.

Mesothelioma is a particularly aggressive type of cancer and is highly resistant to treatment, resulting in very high mortality rates and poor prognosis for people diagnosed with the disease. In general, pleural mesothelioma responds more positively to treatment, particularly if the disease is diagnosed early. However, all forms of mesothelioma are difficult to diagnose, and unfortunately, it is common for the disease to be diagnosed too late for treatment to be effective.
Pleural Mesothelioma

Pleural mesothelioma develops in the mesothelial lining of the lungs, which is known as the pleura. About 70% of all mesothelioma cases are pleural.

Symptoms of pleural mesothelioma include difficulty swallowing, a persistent dry cough, persistent chest pain or pain when breathing, and difficulty breathing even when resting. These symptoms result from pressure on the lungs and respiratory system, caused by thickening of the pleural membrane and fluid build-up between membrane layers. As the cancer advances, lumps may develop under the skin of the chest.

Diagnosis of pleural mesothelioma involves imaging tests such as chest X-rays, MRIs, and CT scans, and may also include biopsies that remove tissue and fluid to test for the presence of cancer cells. These tests also help determine the stage of the cancer and the options available for treatment. Generally, patients in Stage I and II mesothelioma are good candidates for surgery, whereas patients in Stages III and IV have more limited treatment options, and may only be able to receive palliative treatments.

Peritoneal Mesothelioma

Peritoneal mesothelioma develops in the peritoneal lining of the abdominal cavity. This is a relatively rare form of mesothelioma; about 25% of all mesothelioma cases are peritoneal in nature.

Symptoms of peritoneal mesothelioma include pain or swelling of the abdomen, changes in bowel habits (such as constipation or diarrhea), unexplained weight loss, and nausea or vomiting. These symptoms are caused by thickening of peritoneal membranes and fluid build-up, which puts pressure on internal organs and prevents normal function of some organs. As the cancer advances, people with peritoneal mesothelioma may notice lumps developing under the skin of the abdomen.

Diagnosis of peritoneal mesothelioma involves imaging tests such as CT scans and MRIs, as well as biopsies of fluid and tissue to detect the presence of mesothelioma cells. There is currently no recognized staging process for peritoneal mesothelioma.

Peritoneal mesothelioma is problematic in terms of treatment because the cancer can spread quickly throughout the peritoneum and often metastasizes more quickly than other types of mesothelioma. In some cases, surgery is possible, but this is typically a palliative treatment option.

Pericardial Mesothelioma

Pericardial mesothelioma develops in the membrane that surrounds the heart, also known as the pericardium. This is a very rare form of mesothelioma, occurring in just 5% of cases. It’s also very difficult to treat.

Symptoms of pericardial mesothelioma include irregular heartbeat or palpitations, chest pain, and difficulty breathing. These are caused by the pressure put on the heart by the build-up of fluid in the spaces between pericardial membrane layers.

It is very rare for pericardial mesothelioma to be diagnosed early enough for any form of treatment to be effective, and pericardial mesothelioma patients typically have an extremely poor prognosis. In very rare cases, the cancer may be diagnosed early enough for surgery to have a positive effect; however, the proximity of this cancer to the heart makes such surgery a high-risk treatment option.

Testicular Mesothelioma

Testicular mesothelioma is the rarest of all mesothelioma cancers, with less than 100 cases ever recorded. This type of mesothelioma develops in the lining that surrounds the testicles, known as the tunica vaginalis.

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Due to the extreme rarity of testicular mesothelioma, very little has been noted about its symptoms and the treatment options available. Often, the disease is not diagnosed until patients notice the appearance of testicular lumps. In some cases, surgery for an unrelated condition such as a hernia leads to the detection of testicular mesothelioma.

If the primary tumor has developed in the testicles, treatment involves removal of part or the entire affected testicle, followed by chemotherapy or radiation therapy. However, often the testicular tumor is secondary, and the primary cancer is located in the peritoneum. In these cases, treatment follows established patterns for peritoneal mesothelioma in addition to removal of testicular tumors.

**Pleural Mesothelioma**

Malignant mesothelioma is a rare form of cancer that can develop in people who are repeatedly exposed to asbestos. About 2,000 to 3,000 Americans are diagnosed with this type of cancer each year. Of those, around two-thirds have the pleural form of mesothelioma.

Pleural mesothelioma develops in the lining of the lungs. This lining is called the pleura, or pleural membrane, and it is made up of mesothelial cells. This pleural membrane consists of two layers — the parietal layer and the visceral layer. The parietal layer is an outer layer that lines the entire chest cavity and diaphragm, while the visceral layer is an inner layer that covers the lungs. Together, these two layers provide support and protection for the lungs and the chest cavity.

**How Does Asbestos Cause Pleural Mesothelioma?**

The method by which asbestos causes pleural mesothelioma is much better understood than that for other types of mesothelioma. In cases of pleural mesothelioma, asbestos exposure occurs via inhalation of asbestos fibers. Once these fibers have entered the lungs, they work their way to the pleural membrane, and the body is not able to expel them. Over a long period of time — typically two decades or more — asbestos fibers cause changes in these pleural cells, which may cause scarring of the lungs and, eventually, the formation of tumors.

When pleural cells become cancerous, they are no longer regulated by the mechanisms that control division of normal healthy cells. They begin to divide continuously; this causes thickening of pleural membranes. As a result, lung capacity is reduced and fluid begins to build up between pleural layers.

**Symptoms of Pleural Mesothelioma**

Thickening of pleural membrane layers and the resulting build-up of fluid (called pleural effusion) begins to put pressure on the lungs and the respiratory system, in general, preventing normal breathing. Symptoms of pleural mesothelioma are largely caused by these developments, and may include the following:

- Persistent dry or raspy cough
- Coughing up blood

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• Difficulty in swallowing
• Shortness of breath that occurs even when at rest
• Persistent pain in the chest or rib area or painful breathing
• Development of lumps under the skin on the chest
• Night sweats or fever
• Unexplained weight loss
• Fatigue

Pleural Mesothelioma Diagnosis

As with other types of mesothelioma, pleural mesothelioma is difficult to diagnose. There are two reasons for this. First, the long latency period of the disease means that often, cancer develops long before the first symptoms are noted. Second, the symptoms of pleural mesothelioma are very non-specific. In the early stages, pleural mesothelioma symptoms are often mistaken for those of less-threatening diseases such as influenza and pneumonia.

Diagnosis of pleural mesothelioma is made partly on the basis of symptoms, but because symptoms are non-specific, additional diagnostic tests are needed to confirm the presence of cancer. Following a medical history and physical examination, patients must typically undergo imaging tests to confirm the location of cancer and fluid and tissue tests to confirm the type of cancer involved.

Treatment for Pleural Mesothelioma

All forms of mesothelioma are very aggressive and often resistant to treatment. In addition, early diagnosis is so rare that mesothelioma treatment is usually unable to provide a complete cure.

However, with the development of new drugs and early detection techniques, the outlook is improving for pleural mesothelioma patients, in particular, because this is the most common form of mesothelioma and there is a much larger body of knowledge and research to draw upon in treating patients. According to some current studies, about 10% of all pleural mesothelioma patients will survive for three to five years following diagnosis, and about 5% will survive five years or more.

In general, pleural mesothelioma patients have three options: surgery, chemotherapy, and radiation therapy. Typically, patients will receive a combination of two or more of these types of treatment.

Early detection of pleural mesothelioma can improve a patient's prognosis considerably, and such patients have more extensive treatment options. If the disease is diagnosed early enough, surgery to remove localized tumors, followed by chemotherapy or radiation therapy to kill any remaining cancer cells, can be an effective treatment. Curative surgery candidates must be in a good general state of health, and their cancer must not have spread beyond localized sections of the lungs.

Pleural mesothelioma patients who are not diagnosed early enough for curative treatment have fewer treatment options, and these are mostly limited to palliative treatments. These types of treatments are designed to relieve pain and discomfort to improve a patient's quality of life rather than to improve their prognosis. Palliative treatments include removal of built-up fluid from the pleural spaces and surgical removal of tumors to relieve pressure on the lungs.
Peritoneal Mesothelioma

Malignant mesothelioma is a relatively rare type of cancer that only develops in people who have experienced long-term or repeated exposure to asbestos. In America, peritoneal mesothelioma cases account for approximately 25% of the 2,000 to 3,000 reported cases of mesothelioma each year.

Peritoneal mesothelioma develops in the abdomen, in the mesothelial cells that form the peritoneum. The peritoneum is a membranous layer that is made up of two sub-layers—the parietal layer and the visceral layer. The parietal layer covers the abdominal cavity, while the visceral layer surrounds abdominal organs. Together, these two layers provide support and protection for abdominal organs and the abdominal cavity as a whole.

How Does Asbestos Cause Peritoneal Mesothelioma?

There are two main theories regarding the method by which asbestos exposure leads to the development of peritoneal mesothelioma:

- Asbestos fibers are ingested, and these fibers work their way from digestive organs into the peritoneal membrane.
- Asbestos fibers are inhaled and then travel to the peritoneal membrane via the lymphatic system.

Regardless of how asbestos fibers actually enter the peritoneal layers, once they do enter the membrane, the body is unable to expel them. The fibers become trapped in the peritoneal membrane, and over a period of two or more decades, they cause certain changes in the mesothelial cells of the peritoneum.

The exact way in which asbestos fibers cause changes in these mesothelial cells is uncertain. One theory is that asbestos fibers provoke long-term inflammation and irritation that eventually causes mesothelial cells to become cancerous. When cells become cancerous, they lose the ability to regulate their own division and growth.

Cancerous mesothelial cells divide and grow without restraint; this uncontrolled cell growth causes thickening of the peritoneum and the build-up of fluid in the peritoneal layers. Over time, as cancerous cells continue to divide, tumors form.

Symptoms of Peritoneal Mesothelioma

Most peritoneal mesothelioma symptoms are caused by membrane thickening, fluid build-up, and eventual tumor development, all of which put pressure on internal organs.

Symptoms of peritoneal mesothelioma include:

- Abdominal pain or swelling
- Changes in bowel habits (such as diarrhea or constipation)
- Development of lumps under the skin on the abdomen
- Night sweats or fever
- Unexplained weight loss
- Nausea or vomiting
- Fatigue

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Peritoneal Mesothelioma Diagnosis

Diagnosis of peritoneal mesothelioma cannot be made on the basis of symptoms alone. The diagnostic process begins with a thorough medical history and physical examination, followed by sophisticated diagnostic testing, such as a CT scan, PET scan, or MRI. These tests can not only confirm a diagnosis of peritoneal mesothelioma, but also provide important information that will help determine the patient’s best treatment options.

Following these imaging tests, a biopsy is usually performed to confirm that the cancer involved is indeed mesothelioma. A biopsy is a minor surgical procedure that involves the removal of fluid or tissue from the peritoneum. After the biopsy, the fluid and tissue is tested in a laboratory for the presence of mesothelioma cells.

Treatment for Peritoneal Mesothelioma

One of the biggest stumbling blocks in treating peritoneal mesothelioma effectively stems from the fact that the disease is very difficult to diagnose in its early stages, therefore providing few treatment options.

Some peritoneal mesothelioma patients can opt for intraperitoneal chemotherapy in which drugs are injected directly into the peritoneum, immediately following surgery. In some cases, patients may undergo radiation therapy first, to shrink tumors, before undergoing surgery.

Most patients, however, are not good candidates for surgery, either because their cancer has spread too extensively or because their general health is not good enough to cope with the stress of surgery. These patients are usually limited to palliative treatment options — treatments designed to relieve symptoms and improve the quality of life for peritoneal mesothelioma patients.

Pericardial Mesothelioma

Pericardial mesothelioma develops in the pericardium, a membrane made up of mesothelial cells that surrounds the heart and provides protection and support to this organ. The membrane is composed of two different layers — an outer layer called the parietal layer, and an inner layer known as the visceral layer. The parietal layer is part of a larger membrane that lines the entire chest cavity, while the visceral layer is the pericardial membrane that lines the heart.

How Does Asbestos Cause Pericardial Mesothelioma?

It has long been known that pleural mesothelioma, which develops in the lining of the lungs, is caused by inhalation of asbestos fibers. However, the way in which asbestos causes the development of pericardial mesothelioma is not very well understood. Some experts believe that inhaled asbestos fibers travel via the bloodstream from the lungs to the heart, although there is no conclusive evidence to support this theory.

What is known is that asbestos fibers somehow become lodged in the pericardial membranes that surround the heart. When this occurs, the body is unable to eliminate the asbestos fibers, and they remain stuck in the membranes. Over a very long period of time — two decades or more — these asbestos fibers cause the cells
of the pericardium to undergo changes that may lead to them becoming cancerous.

Once cells become malignant, or cancerous, they begin to divide continuously, without the restraint that regulates the growth cycles of normal healthy cells. As these malignant pericardial mesothelioma cells continue to grow, they cause thickening of the pericardial membranes, and eventually cause tumors to develop. These changes in the pericardial membrane lead to the build-up of fluid between the pericardial layers, and this, combined with the thickening of the layers, puts pressure on the heart.

**Symptoms of Pericardial Mesothelioma**

Pericardial mesothelioma is a relatively rare form of asbestos-related cancer. For this reason, it has so far been somewhat difficult for mesothelioma specialists to develop a set of recognizable symptoms that can be used to help diagnose the disease. An additional problem is that the symptoms of pericardial mesothelioma resemble symptoms of other heart conditions; this makes the cancer relatively difficult to diagnose quickly. Diagnosing pericardial mesothelioma may require a variety of tests to confirm the presence of cancer.

Most symptoms of pericardial mesothelioma are caused by the build-up of fluid and the thickening of pericardial layers. The following symptoms may indicate pericardial mesothelioma:

- Heart palpitations or irregular heartbeat
- Chest pain
- Difficulty breathing, even when at rest
- Fever or night sweats

**Pericardial Mesothelioma Diagnosis**

A fast and accurate diagnosis of pericardial mesothelioma is difficult, due to the non-specificity of the symptoms of this type of cancer. To diagnose pericardial mesothelioma, a patient’s symptoms, medical history, and current medical condition must all be assessed. The initial stages of diagnosis involve taking a medical history and undergoing a thorough physical examination.

Following these initial steps, a variety of imaging tests may be in order to determine exactly where cancer is located. The final stage of diagnosis typically involves a biopsy to confirm the point of origin of the cancer and a diagnosis of mesothelioma. A biopsy involves the removal of tissue or fluid from the pericardium, followed by laboratory tests on the tissue and fluid to confirm the presence of mesothelioma.

**Treatment for Pericardial Mesothelioma**

Most people diagnosed with this form of mesothelioma are not good candidates for surgery. However, there are rare cases where the cancer is diagnosed early, and surgery can be carried out to remove small, localized pericardial tumors. This type of surgery carries great risk, however, simply due to the proximity of the heart.

Prognosis for those with pericardial mesothelioma is grim and palliative treatment is usually the only option for people diagnosed with pericardial mesothelioma. This type of treatment is performed in order to improve a patient’s quality of life and reduce the severity of symptoms caused by build-up of fluid in the pericardium. Fine needle aspiration may be carried out to remove excess fluid. In some cases, radiation therapy may be an option. However, the proximity of the heart and lungs make this a risky prospect.

**Testicular Mesothelioma**

Malignant mesothelioma is a rare form of cancer that is diagnosed in just 2,000 to 3,000 Americans each year. Testicular mesothelioma, in particular, is the rarest form of the disease — to date, less than 100 cases of this
Asbestos diseases like mesothelioma do not surface for anywhere between 20 and 50 years after exposure.

Testicular mesothelioma develops in the tunica vaginalis. This is a membranous lining that surrounds the testicle, providing protection and support for the organ. This membrane is composed of mesothelial cells, which are present in most of the body's membranous linings. The tunica vaginalis is made up of two layers — the parietal (outer) layer and the visceral (inner) layer.

**How Does Asbestos Cause Testicular Mesothelioma?**

Because testicular mesothelioma is extremely rare, very little is known about how it develops. Most researchers theorize that there are two possible points of origin for testicular mesothelioma. In some cases, patients with testicular mesothelioma have primary tumors in the peritoneal membrane and develop secondary tumors in one or both testicles. In other cases, patients have developed primary tumors in the testicle.

In cases where testicular cancer develops as a secondary tumor, most believe the peritoneal mesothelioma metastasizes and spreads to other areas of the body. However, there is no current theory to explain why exposure to asbestos might cause a primary tumor to develop in the testicles.

Once cells have become cancerous, they are no longer able to regulate their own cycles of growth and division. A primary tumor that develops in the testicle is formed from cancerous cells that divide without restraint, causing thickening of the tunica vaginalis, and eventually forming tumors.

**Symptoms and Diagnosis of Testicular Mesothelioma**

Due to the rarity of testicular mesothelioma, there is no recognized set of symptoms for this form of cancer. In the majority of the few reported cases of the disease, noticeable symptoms have been confined to the appearance of testicular lumps.

Testicular mesothelioma is not usually diagnosed until after these lumps appear. In some cases, testicular mesothelioma has been detected when a patient undergoes surgery for another reason (such as hernia repair). In these cases, a sample of tissue may be removed and biopsied for diagnostic purposes, or the entire tumor may be removed, if it is possible to do so.

**Treatment for Testicular Mesothelioma**

Treatment for testicular mesothelioma typically involves removal of a portion of one testicle, or even an entire testicle if necessary, depending on the extent of the cancer. Treatment may be followed up by chemotherapy or radiation therapy to kill any remaining cancer cells.

However, because testicular mesothelioma is often a secondary tumor, and the primary tumor is located within the peritoneum, treatment may not be as simple as removing testicular tumors. In these cases, the primary tumors must be treated as well.

It should be noted that both peritoneal and testicular mesothelioma are classified as being clinically aggressive types of cancer. This means they can spread rapidly and invasively. In addition, testicular mesothelioma tends to recur within a few years, even in cases where tumors are surgically removed. All of these factors make prognosis for those with testicular mesothelioma quite grim.
Benign Mesothelioma

In most cases, asbestos diseases like mesothelioma do not surface for anywhere between 20 and 50 years after exposure. However, a rare disease known as benign or non-malignant mesothelioma can occur much sooner. Not a form of cancer, benign mesothelioma can be addressed easily and immediately once detected. It also sometimes acts as a sort of “wake-up call,” prompting the patient's doctor to search for other asbestos-related diseases or signaling the need for consistent monitoring in case of future concerns.

In contrast to malignant mesothelioma, which has an extremely high mortality rate, effective treatment and full recovery is possible for most people who are diagnosed with benign mesothelioma.

Malignant Versus Benign Mesothelioma

Tumors form when previously healthy cells begin rapid division. This rapid pace of cellular growth leads to the formation of tumors because cells mass on top of one another, forming a solid lump of cells. Tumor cells are not all the same, however; they may be either benign or malignant. (Note that benign tumors are not called cancer. The word cancer refers only to malignant tumors.)

There are two important differences between malignant and benign tumor cells. First, malignant tumors can invade nearby tissues and cause damage to healthy tissues and organs. Second, malignant tumor cells can “relocate” to other parts of the body by traveling through the blood or lymphatic system. When this occurs, these cells can begin forming new tumors in new locations.

The key difference, therefore, is that benign tumors do not invade nearby tissues and do not spread to other parts of the body. For this reason, rare benign mesothelioma is much less serious than malignant mesothelioma, though it can certainly be life-threatening if not addressed.

While benign mesothelioma tumors will not invade or spread within the body, they can grow to large sizes, and larger tumors can have a negative impact on the tissues and organs around them. When these particular tumors grow large enough, they may cause fluid to build up in mesothelial membranes, and very large tumors can cause serious side effects such as coma and seizures.

Symptoms and Diagnosis of Benign Mesothelioma

Symptoms of benign mesothelioma are quite similar to those of malignant mesothelioma. Most people with benign mesothelioma of the pleura (lung membranes) experience shortness of breath, chest pain, and a chronic, dry cough. People with malignant mesothelioma also experience these symptoms, but additionally may experience fever, night sweats, weight loss, and other symptoms.

Diagnosis of benign mesothelioma is also similar to diagnosis of malignant mesothelioma. Patients will provide a complete medical history and undergo a physical examination. If a problem is suspected, the doctor will recommend one or more imaging tests or biopsy procedures.

Imaging tests include chest X-rays, CT scans, and MRI scans. Each of these allows the doctor to determine where tumors are located. A chest X-ray is usually the first test ordered by the physician, followed by CT and/or MRI scans, which are used to obtain a more detailed picture of the exact location of tumors inside the body.

Other diagnostic tests involve taking samples of tumor tissue or the fluid in or surrounding the tumor. A tissue biopsy, for example, involves removing a sample of tumor cells from the affected area, whereas a fluid biopsy (also called needle aspiration) involves the insertion of a long needle into the tumor to remove fluid.
**Treatment for Benign Mesothelioma**

In most cases of benign mesothelioma, the only treatment that is needed is a surgical procedure to remove the tumor. In contrast to malignant mesothelioma, there is no need for follow-up treatment such as chemotherapy because in these cases, the tumor is not cancerous and has not spread.

Because approximately 75% of individuals with benign mesothelioma most commonly develop tumors in the lung, a surgical procedure called a thoracotomy is performed. However, the exact nature of the procedure depends on the size and location of the tumor. Thoracotomy may involve removal of one segment of the lung, a lobe, or even the entire lung. (Note that removal of the entire lung is very rare in cases of benign mesothelioma.)

Although benign mesothelioma itself is a relatively harmless disease, complications may develop following surgery. The most common side effect of surgery is pleural effusion, a fluid build-up in the pleural spaces, which puts pressure on the lungs and heart. Patients are usually fitted with a chest drain for the first few days after surgery to remove excess fluid and prevent effusion.

Following surgical treatment, most people experience complete recovery. Studies show that 90% of those who develop a benign mesothelioma tumor will never experience a repeat occurrence of tumor development following successful surgery.

**Malignant Mesothelioma — Overview**

Malignant mesothelioma is a cancer that affects the thin tissue layer that covers your internal organs, called the mesothelium. Physicians divide malignant mesothelioma into types dependent on the area of the mesothelium affected.

The most common form of malignant mesothelioma is pleural mesothelioma, cancer of the pleura, the lining of the lungs. Peritoneal mesothelioma, the second most common form, is a cancer of the lining of the abdomen, and accounts for between 10% and 20% of malignant mesothelioma diagnoses. In much rarer cases, malignant mesothelioma can occur in the pericardium, the lining of the heart, or the tunica vaginalis, the lining around the testicles.

Malignant mesothelioma is caused by exposure to asbestos. This form of cancer develops when asbestos fibers are inhaled and lodge in the pleura, peritoneum, or pericardium, causing scarring and inflammation and, eventually, tumors.

Not everyone who is exposed to asbestos will develop malignant mesothelioma. Some individuals may have no reaction to the toxic mineral at all, while others may develop less severe asbestos-related diseases such as asbestosis or pleural plaques.

**Types of Malignant Mesothelioma**

Histologically, malignant mesothelioma is divided into three types: epithelioid, sarcomatoid, and biphasic. These classifications pertain to the shape and structure of the cancer cells. All are treated similarly, though some are handled more aggressively than others as they offer a shorter lifespan. Each case is considered individually. Your doctor will decide which treatment is best for you.

**Malignant Mesothelioma — Epithelioid**

In terms of cellular histology, there are three different types of mesothelioma cells: epithelioid, sarcomatoid, and biphasic. Epithelioid mesothelioma is the most common of the three types of malignant mesothelioma, occurring in between 50% and 70% of cases.
Epithelioid mesothelioma cells are given this name because, when viewed under a microscope, they have the appearance of epithelial cells. These are cells that line structures and cavities located throughout the body. Mesothelial cells are themselves a type of epithelial cell, and it is these cells that become cancerous when malignant mesothelioma develops within the pleura, peritoneum, or pericardium. Epithelioid mesothelioma cells tend to have a well-defined, uniform shape when viewed under a microscope.

An important point to note is that malignant epithelioid mesothelioma cells very closely resemble cells of another type of cancer known as adenocarcinoma, which can develop in the lungs or in other vital organs. This type of cancer also originates in epithelial tissue. When adenocarcinoma develops in the lungs, it can often spread to the mesothelial lining of the lungs (the pleural membrane).

For these reasons, those diagnosed with adenocarcinoma who have been exposed to asbestos in the past should seek a second opinion so as to ensure accurate diagnosis.

Prognosis and Treatment
Generally, each of the three types of mesothelioma — epithelioid, sarcomatoid, and biphasic — are treated in much the same way since treatment is based on the location and stage of the cancer, rather than the type of cells involved.

However, there are distinct differences in the way each type of cancer responds to treatment. In general, patients with malignant epithelioid mesothelioma have a better prognosis than patients with either sarcomatoid or biphasic mesothelioma, so treatment may not be as aggressive at the onset.

Malignant Mesothelioma — Sarcomatoid
In histological terms, there are three different types of mesothelioma: sarcomatoid, epithelioid, and biphasic. Malignant sarcomatoid mesothelioma is the least common of the three cellular mesothelioma types. This form of mesothelioma accounts for between 10% and 15% of cases.

When viewed under a microscope, malignant sarcomatoid mesothelioma cells appear as elongated, spindle-shaped cells that are irregularly shaped and often overlap one another.

It’s important to know that malignant sarcomatoid mesothelioma is sometimes difficult to diagnose on the basis of histological methods. For example, cells of another type of cancer called pulmonary sarcomatoid carcinoma are very similar in appearance and its characteristics may be confused with malignant sarcomatoid mesothelioma.

For this reason, if you are diagnosed with pulmonary sarcomatoid carcinoma but have been exposed to asbestos at some time in the past, obtaining a second diagnostic opinion may be essential. Misdiagnosis may result in improper treatment, which may affect the patient’s lifespan.

Prognosis and Treatment
Each of the three types of mesothelioma — sarcomatoid, epithelioid, and biphasic — are generally treated in the same way since treatment is not based on the specific type of cells involved, but instead on the location of tumors and the stage of the cancer.

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In general, patients with malignant sarcomatoid mesothelioma have a poorer prognosis than patients with epithelioid mesothelioma, because sarcomatoid cancers are more aggressive and resistant to treatment; therefore, a more aggressive treatment may be recommended in order to improve quality of life and possibly add additional months to the patient’s survival time.

**Malignant Mesothelioma — Biphasic**

In histological terms, there are three different types of mesothelioma: sarcomatoid, epithelioid, and biphasic. Malignant biphasic mesothelioma — or “mixed” mesothelioma — accounts for between 20% and 40% of all mesothelioma cases, making it the second most common type of mesothelioma.

Biphasic mesothelioma tumors are made up of a combination of both epithelioid and sarcomatoid cells. These are typically arranged in groups within a tumor, rather than appearing as an even mixture of cells. For this reason, during diagnosis, several different samples are taken from different locations within a tumor using a biopsy, to ensure that a correct diagnosis can be made, as this cancer does not have a unique cellular structure.

**Prognosis and Treatment**

Treatment for mesothelioma is not based on the type of cells involved, but instead on the location of tumors and the stage of the cancer. While cell type does not determine treatment options, each type of cancer responds to treatment in different ways.

In general, patients with biphasic mesothelioma have a poorer prognosis than patients with epithelioid or sarcomatoid mesothelioma, because biphasic tumors tend to be more treatment resistant. Because of this, biphasic malignant mesothelioma is often treated more aggressively in hopes of extending the life of the patient.

**Mesothelioma — Staging Systems — Overview**

For many decades, doctors have been addressing the seriousness of particular cancers in terms of stages. Over the years, various staging systems have been developed to assist doctors in determining a diagnosis and the best form of treatment for the patient in question.

There are three popular staging systems used to examine the extent of mesothelioma. Each of the three different staging systems measure various factors of malignant mesothelioma including the extent of tumor or primary mass, the metastasis (spreading), and the involvement of the lymph nodes.

**Butchart System**

The Butchart System is the oldest staging system for malignant mesothelioma and is the one most commonly used by doctors and specialists to diagnose and treat malignant mesothelioma. The Butchart System is based on the tumor size (mass) and divides malignant mesothelioma into four stages:

**Stage I** — Malignant mesothelioma has affected the right or left side of the chest cavity (pleura) and may be seen in the diaphragm.

**Stage II** — Malignant mesothelioma has been found in the pleura on both sides of the body and may have also moved into the heart, stomach, or esophagus on both sides. Lymph nodes may be affected.

**Stage III** — Malignant mesothelioma has reached the abdominal cavity (peritoneum). Lymph nodes past the chest may be affected.

**Stage IV** — Malignant mesothelioma has reached other organs and has entered the blood stream.
TNM System

The TNM System is a more modern staging system for malignant mesothelioma. The TNM System is based on the extent of the tumor, metastasis, and lymph node involvement. This system also divides malignant mesothelioma into four stages:

**Stage I** — Malignant mesothelioma is present in the left or right chest cavity (pleura) and may have metastasized to the lung, the sac around the heart (pericardium), or the diaphragm on the same side. Lymph nodes at Stage I are not involved.

**Stage II** — Malignant mesothelioma has reached from one side of the chest cavity to a lymph node near the lung area on the same side as the cancer. The cancer has metastasized to the diaphragm, pericardium (sac around the heart), or the lung on the same side as the original cancer.

**Stage III** — Malignant mesothelioma has penetrated the chest lining, heart, esophagus, muscle, ribs, and vital organs within the chest cavity on the same side as the cancer. Lymph nodes may or may not be involved during this stage.

**Stage IV** — Malignant mesothelioma has metastasized to the pleural area and the lymph nodes on the opposite side of where the cancerous tumor is located. It may also have reached the chest cavities or lungs on both sides or may have spread to the abdomen.

Brigham System

The Brigham System is the most modern of the three malignant mesothelioma staging systems. The Brigham System looks at different variables such as the involvement of the lymph nodes and the surgical ability to remove a malignant mesothelioma tumor (resectability). For this reason, it is often not used to stage mesothelioma as the cancer is rarely operable. The Brigham System divides malignant mesothelioma into four stages:

**Stage I** — The malignant mesothelioma tumor is still resectable (surgically removable) and the lymph nodes are not affected.

**Stage II** — The malignant mesothelioma tumor is still resectable (surgically removable), but the lymph nodes are now affected.

**Stage III** — The malignant mesothelioma tumor is not resectable (surgically removable) and it has penetrated the heart, chest wall, abdominal cavity, or diaphragm. Lymph nodes may or may not be affected.

**Stage IV** — The malignant mesothelioma tumor is not resectable (surgically removable) and has completely metastasized (spread throughout the body).

Process of Staging Malignant Mesothelioma

When mesothelioma is diagnosed by a physician or specialist, they must determine the extent of the cancer and how far it has spread (metastasized). Most often, they will use imaging procedures to see inside the chest or abdomen to help determine the staging of the malignant mesothelioma. The imaging options a physician may use include:

- Chest X-ray
- CT scan of the chest and/or abdomen
• MRI scan of the chest and/or abdomen
• PET scan of the chest and/or abdomen

Once the doctor is able to determine the stage of the mesothelioma, he/she will be able to formulate a plan for treatment and provide a prognosis.

Staging — Butchart System

Developed by mesothelioma expert Dr. Eric Butchart, the Butchart System of mesothelioma staging is the oldest of the mesothelioma staging systems, and even today it is a widely used and trusted method for determining the extent of mesothelioma development.

The Butchart System consists of four progressive levels, each of which represents the extent to which the primary mass or tumor has spread within the body. The Butchart System largely ignores secondary tumors and medical complications caused by the presence of cancer in the body.

As with most cancer staging systems, the Butchart System is divided into four distinct stages. They are:

• **Stage I** — This designation is given when the primary mass or tumor is located in either the right or left pleura and sometimes the diaphragm on the same side. Specifically, growth of the mass has been restricted to only one side of the body.

• **Stage II** — Mesothelioma is said to be in this stage when the mass is present in both of the lungs or in the chest wall. In many cases of Stage II mesothelioma, the presence of the primary mass will have extended into the esophagus, heart, or the lymph nodes located in the chest.

• **Stage III** — This designation means that the primary mass has penetrated the bounds of the diaphragm and has reached the peritoneum or abdominal cavity. At this point in development, the cancer may have spread to the lymph nodes outside the chest.

• **Stage IV** — At this point, the cancer has spread through the bloodstream to other parts of the body. This stage is known as “distant metastatic cancer.”

Staging — TNM System

One of the more common systems for determining the stage of a patient's mesothelioma disease is the TNM System, a relatively new system that is also known as the International Mesothelioma Interest Group staging system. The name of the system uses the first letter of each factor that is considered in order to stage the cancer.

**T** — refers to the tumor or primary mass

**N** — refers to the presence or absence of mesothelioma tumors in the lymph nodes

**M** — refers to the presence or absence of distant tumors, which is generally referred to as metastases

As with most cancer staging systems, the TNM System uses four stages:

• In Stage I, the masses are rigidly localized, having only grown, thus far, in one layer of the pleura or lungs. At this stage in development, the mesothelioma may also have grown into the covering of the heart and the diaphragm on the same side.

• In Stage II, the cancer has spread from the pleura to lymph nodes near the pleura on that side of the body. The mesothelioma remains present on only side of the body.
• In Stage III, the mesothelioma may have spread into the lymph nodes, esophagus, muscle, ribs, heart, and the chest wall on that same side.

• In Stage IV, the mesothelioma has spread via the bloodstream to other regions of the body.

**Staging — Brigham System**

Once doctors have determined that a patient is suffering from mesothelioma, they must determine the extent of the cancer. This is achieved by a method known as "staging." While some cancer staging systems measure the extent of tumor growth exclusively, the Brigham System also indicates whether reductive surgery is an option for the patient. This particular system is the one used least often to measure the stages or progress of mesothelioma because this particular cancer is seldom operable since it is usually not diagnosed until its late stages.

The Brigham system consists of four distinctive stages, each of which coincides with two variables: the possible efficacy or inefficacy of surgery to reduce or remove the mass from the patient's body and the presence or absence of cancer in the lymph nodes.

The Brigham System can be outlined as followed:

- **Stage I** — the cancer can be removed with surgery, and there is no growth in the nearby lymph nodes.
- **Stage II** — the masses developing in the pleura or lungs can still be removed with surgery, but the cancer has spread to the nearby lymph nodes.
- **Stage III** — the masses can no longer be removed with surgery because the cancer has spread to the chest wall, heart, or through the diaphragm into the lining of the abdomen.
- **Stage IV** — the mesothelioma has greatly metastasized, spreading through the bloodstream to distant regions of the body, possibly into bones, the brain, and other major organs of the body. This is also known as distant metastatic cancer.

**Mesothelioma — Staging — Stage I**

In general terms, Stage I mesothelioma means that the cancer is localized and remains in one small area of the body and has not spread to other locations. For example, in Stage I pleural mesothelioma, the cancer is located in just one section of one lung.

**Stage I and the Butchart System**

The Butchart staging system is the oldest system in place and is often the one used for staging pleural mesothelioma. (However, other forms of mesothelioma do not use this staging system.) The Butchart system categorizes an individual case of mesothelioma based on the size of the primary tumor.

In Stage I of the Butchart system, either the left or right side of the lung is affected by cancer. Typically, this means that cancer is limited to just one section of the pleural membrane of either lung. Mesothelioma may also be located in the diaphragm as well as in one lung but will still be limited to just one side.

**Stage I and the TNM System**

The TNM system is a newer cancer staging system that categorizes cancer based on the size of a tumor, whether or not cancer has spread to lymph nodes, and whether the cancer has metastasized to other locations in the body. While in most cases peritoneal mesothelioma is not staged, if staging is desired, this system will be used.
In TNM Stage I, mesothelioma is present in either the left or right pleura (in the case of pleural mesothelioma), and may have metastasized to the lung, the pericardium, or the diaphragm on the same side of the chest. In Stage I, there is no lymph node involvement, and the cancer has not metastasized to distant body locations.

In the case of peritoneal mesothelioma, the cancer is localized on one side of the abdomen, and has not spread to lymph nodes or metastasized.

Stage I and the Brigham System

The Brigham staging system is the most recently developed of the three systems used to stage malignant mesothelioma. The main focus of the Brigham system is categorizing mesothelioma based on whether the primary tumor can be successfully removed via surgery, and whether mesothelioma has spread to lymph nodes.

In Stage I of the Brigham system, mesothelioma is removable via surgery and the tumor is said to be “resectable.” At this stage, the cancer has not spread to any lymph nodes.

Stage I Treatment Options for Mesothelioma

Stage I mesothelioma patients have many more treatment options and a better prognosis than patients at any other stage. However, in the past, it has been rare for mesothelioma to be diagnosed at this stage because the symptoms usually do not surface until the disease is already advanced.

Stage I patients will typically undergo surgery to remove tumors and a small amount of surrounding tissue, followed by radiation therapy or chemotherapy to kill any remaining cancer cells.

Mesothelioma — Staging — Stage II

In general terms, Stage II mesothelioma is referred to as advanced mesothelioma. This means the cancer is located not only at its point of origin, but has spread to at least one nearby organ. In pleural mesothelioma Stage II, for example, the cancer has spread from the pleural membrane to the lungs or diaphragm.

Stage II and the Butchart System

The oldest system used to stage cancers, the Butchart System is often the system used for staging pleural mesothelioma. (However, other types of mesothelioma are rarely staged according to this staging system.) The Butchart system categorizes an individual case of mesothelioma based on the size of the primary tumor.

In the Butchart system, Stage II pleural mesothelioma has spread from its point of origin in the pleural membrane of one lung to the pleural membrane in the other lung or to the esophagus or the pericardial membrane of the heart. Lymph nodes may also be affected.

Stage II and the TNM System

A newer cancer staging system that categorizes cancer based on the size of a tumor, its presence in the lymph nodes, and whether the cancer has metastasized, the TNM system is sometimes used to stage pleural mesothelioma. In addition, it is the system most often used to stage peritoneal cancer.

When using the TNM system, Stage II indicates that pleural mesothelioma has spread from its point of origin to nearby lymph nodes on the same side of the body. Mesothelioma may have also spread to the lung, to the diaphragm, or to the pericardial membrane of the heart.
**Stage II and the Brigham System**

The Brigham system is the newest of the three systems that may be used to stage mesothelioma. The Brigham system focuses on categorizing mesothelioma according to two criteria: whether tumors can be removed via surgery and whether the cancer has spread to nearby lymph nodes.

In Stage II of the Brigham system, mesothelioma is resectable, meaning it is still possible to remove it surgically. However, in this stage, the cancer has spread to at least one grouping of lymph nodes.

**Stage II Treatment Options for Mesothelioma**

Treatment options for Stage II mesothelioma may be more limited than in Stage I, and for the patient, the prognosis is not as good as in Stage I. This is because Stage II involves the spread of mesothelioma from its point of origin to nearby organs (for example, from the pleural membrane to the lung) and because lymph node involvement means there is the possibility of metastasis to other locations, even if the primary tumor and the affected lymph nodes are surgically removed.

In Stage II, patients may receive surgery to remove primary tumors and affected lymph nodes, depending on the size and location of tumors and the extent of the disease in nearby organs. Surgery is generally followed by chemotherapy or radiation therapy to kill remaining cancer cells.

**Mesothelioma — Staging — Stage III**

In general, Stage III malignant mesothelioma is considered to be at an advanced stage. From its point of origin in the mesothelium, the cancer has spread to other nearby tissues or organs and to the lymph node group closest to the primary tumor location.

**Stage III and the Butchart System**

The Butchart System is the oldest cancer staging system and is quite often used for staging pleural mesothelioma, though other types of mesothelioma are rarely staged according to this staging system. The Butchart System categorizes an individual case of mesothelioma based on the size of the primary tumor and whether lymph nodes are affected.

In Stage III of the Butchart System, the mesothelioma has spread to the abdominal cavity and other locations, and distant lymph node groups may also be affected.

**Stage III and the TNM System**

The TNM System categorizes cancer based on the size of tumors, whether or not the cancer has spread to nearby lymph nodes, and whether the cancer has metastasized. The TNM System may be used to stage pleural mesothelioma as well as peritoneal mesothelioma.

In Stage III of the TNM System, pleural mesothelioma has spread from the mesothelial lining of the lungs to other locations within the chest cavity, such as the heart, ribs, esophagus, and other vital organs. Lymph nodes are probably also affected at this stage.

**Stage III and the Brigham System**

The newest staging system for cancer, the Brigham System categorizes cancers according to two main criteria: whether surgery can be used to remove tumors and whether the cancer has spread to lymph nodes.
In Stage III of the Brigham system, mesothelioma tumors are not removable surgically because the cancer has spread to multiple locations within the chest cavity or to locations where removal is not possible. Lymph nodes may also be affected.

**Stage III Treatment Options for Mesothelioma**

Stage III mesothelioma is considered too far advanced for any type of curative surgery. Patients generally have a poor prognosis in Stage III, due to the spread of cancer to multiple locations. In addition, in cases where the cancer has spread to lymph nodes, metastasis is likely to occur, and this means that even if primary tumors are removed, the cancer may reappear in other locations in the body.

In Stage III, mesothelioma treatments are typically palliative in nature. These types of treatments are designed to relieve symptoms rather than to significantly improve a patient’s prognosis. Large tumors may be removed to ease the pressure on nearby organs, but only if the patient is considered in good general health and able to undergo the physical strain of surgery. Palliative treatments such as thoracentesis or paracentesis are used to remove built-up fluid in the lungs or abdomen. Chemotherapy and radiation therapy may also be used to shrink tumors and provide symptomatic relief.

**Mesothelioma — Staging — Stage IV**

Generally, Stage IV mesothelioma is considerably advanced and has metastasized to locations that are distant from the primary tumor site. Mesothelioma typically metastasizes to locations such as the brain, throughout the abdomen, and in organs of the abdominal and chest cavity. For this reason, it is sometimes referred to as “distant metastatic cancer.”

**Stage IV and the Butchart System**

The Butchart System, the oldest of all cancer staging systems, categorizes an individual case of mesothelioma based mainly on the size and spread of the primary tumor. In Stage IV of the Butchart system, mesothelioma has metastasized, spreading through the bloodstream to organs and tissues that are distant from the primary tumor site.

**Stage IV and the TNM System**

The TNM system is newer than the Butchart system, and categorizes cancer based on three factors: the size of the tumor, whether the cancer has spread from its point of origin to nearby lymph nodes, and whether the cancer has metastasized. This system may be used to stage pleural and peritoneal mesothelioma. The TNM system is slightly more complex than other systems, as within each of the four stages, subcategories define the size of tumors and other factors.

In Stage IV of the TNM system, mesothelioma has metastasized to one or both sides of the body. In pleural mesothelioma, for example, both lungs might be affected, whereas in peritoneal mesothelioma, both sides of the abdomen might be affected. In addition, mesothelioma may have spread to organs in the neck, and lymph nodes are probably involved.

**Stage IV and the Brigham System**

The Brigham system is the newest of the three systems used to stage mesothelioma. This system categorizes mesothelioma according to whether tumors can be removed via surgery and whether the cancer has spread to nearby lymph nodes.

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In Stage IV of the Brigham system, mesothelioma is inoperable due to the size of tumors and the penetration of cancer into vital organs. In addition, mesothelioma has metastasized to other locations, meaning cancer is more than likely to recur even if primary tumors are removed.

**Stage IV Treatment Options for Mesothelioma**

Patients with Stage IV have few treatment options. For Stage IV mesothelioma patients, the prognosis is generally very poor, due to the spread of cancer to multiple locations. In addition, primary tumors have often penetrated too deeply into organs and tissues to be removed. Finally, the general health of Stage IV patients is typically too poor to withstand the physical strain of surgery.

Stage IV treatments are, therefore, limited to non-surgical palliative treatments that are performed to relieve symptoms of the disease. These may include procedures such as thoracentesis or paracentesis, in which built-up fluid is removed from the lungs or abdomen to relieve pain and pressure on internal organs and ease breathing. Chemotherapy and radiation therapy may also be used to shrink tumors to provide relief from symptoms, but because these treatments often carry serious side effects, patients should carefully consider whether or not they wish to endure the treatments at this stage.

**Mesothelioma Prevention**

Mesothelioma is one of the deadliest forms of cancer, particularly because it is difficult to diagnose early in its development. Therefore, prevention of the disease is of the utmost importance.

Quite simply, there is only one way in which you can develop mesothelioma. This deadly cancer occurs only with exposure to asbestos. Asbestos is a natural substance, still mined in a handful of locations throughout the world. It was once used in hundreds of products, including insulation, building materials, and even clothing, largely due to its strength, durability, flexibility, and heat resistance. However, this substance is very fibrous and when fibers are released, small pieces of asbestos can become trapped in the lungs, causing scarring and, in some cases, cancer.

**At-Home Prevention**

The first step toward preventing mesothelioma is, of course, avoiding exposure to this toxic mineral. Asbestos is no longer used in the vast majority of products, due to national laws regulating this product. However,
mesothelioma was used in almost every industry for many decades. Some of the older products in your house or around your home may still contain asbestos, including:

- Joint compound
- Roofing tar
- Brake pads
- Fireproofing
- Pipes
- Insulation
- Countertops
- Floor tiles
- Textured wall and ceiling coatings

If these items are intact, they present no health hazards. But if they are damaged or “friable,” they should be removed from your house immediately. However, the removal should be done by a licensed abatement company and can be completed after air quality tests confirm the presence of asbestos fibers.

**On-the-Job Prevention**

Workers in particular industries may still be at risk for exposure to asbestos. If you are in the construction industry, for example, you may encounter old buildings that contain asbestos. It is necessary to take great care in protecting yourself if the presence of asbestos is suspected, which includes wearing proper gear so as to avoid inhalation.

**Monitoring Your Health**

If you’ve already been exposed to asbestos, regularly monitoring your health is essential in order to catch the early warning signs of the disease. Remember, your options for treatment are greater the earlier the disease is diagnosed. It is important to have regular chest X-rays and pulmonary function tests, even if you are experiencing no symptoms of the disease.

In addition, if you’ve been exposed to toxic asbestos in the past, you may be able to reduce your chances of developing mesothelioma by not smoking. Studies show that smoking greatly increases the risk of developing mesothelioma and, of course, anyone who does develop the disease should stop smoking immediately.

**Mesothelioma Research**

Because mesothelioma is such a rare disease, historically, not a lot of research dollars were spent to learn new ways to diagnose and treat it. However, as the plight of asbestos sufferers throughout the world has come to light in the past 20 years, more and more doctors and scientists have begun to study the illness. Clinical trials using conventional treatments, such as chemotherapy, are being conducted around the world. Research into alternative treatments, such as immunotherapy, virotherapy, and gene therapy, is also being carried out.

More and more research centers dedicated specifically to the study of mesothelioma and other asbestos-related diseases are being opened in the United States and indeed throughout the world. These centers become involved in cutting-edge studies that are providing a better prognosis and longer lifespan for mesothelioma victims. Hopefully, the same researchers developing these new testing methods and treatments will eventually find a way to cure this aggressive cancer.
Becoming Part of a Clinical Trial

If you are a mesothelioma patient and would like to participate in mesothelioma research and clinical trials, talk to your doctor about the ones for which you might qualify. There are a number of different kinds of trials available to participants including:

- Treatment trials, which test new cancer treatments, including drugs, radiation therapies, chemotherapies, or multi-modal approaches to combating the disease.
- Prevention trials, which test new methods of lowering the risk of developing a certain kind of cancer, like mesothelioma.
- Screening trials, which work to devise new ways to detect cancer. Tests like these that focus on diagnosing cancer in its early stages are especially pertinent to mesothelioma sufferers as the disease is rarely diagnosed in Stage I or II.
- Supportive care trials, which attempt to develop new palliative therapies to improve the quality of life for someone suffering from this aggressive, debilitating cancer.
HOW TO TREAT MESOTHELIOMA
Becoming Part of a Clinical Trial

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Mesothelioma Treatment — Overview

There are several types of treatment available for patients with mesothelioma, some recommended more frequently than others. The most commonly used treatments are surgery, chemotherapy, and radiation therapy. In addition, some experimental treatments are becoming more widely used or are showing some encouraging results in clinical trials. These treatments include photodynamic therapy, gene therapy, and immunotherapy.

Most of these treatments are not used in isolation. In many cases, treatment may consist of a combination of therapies. For example, surgery to remove as much of the cancer as possible may be followed by radiotherapy or chemotherapy to remove residual cancer cells. This is one of the most common treatment options for mesothelioma among those who are candidates for surgery.

Surgery

Surgical treatments for mesothelioma are of three main types — diagnostic surgery, curative surgery, and palliative surgery. Some types of surgery fall into more than one category. For example, thoracentesis may be used as a diagnostic procedure and as a palliative treatment to provide symptomatic relief.

Only curative surgery can potentially remove all cancer from a patient with mesothelioma. However, for curative surgery to be effective, it is particularly important that mesothelioma be diagnosed as early as possible. Unfortunately, mesothelioma is usually not diagnosed until it reaches Stage III or IV and surgery is not an option at that point.

Chemotherapy

Most forms of chemotherapy involve the intravenous administration of drugs such as Alimta and cisplatin. Chemotherapeutic drugs are targeted to kill cells that are rapidly dividing by interfering with processes that occur during cell division. However, while cancer cells themselves divide rapidly, so do some types of healthy cells, causing some of the unpleasant side effects that are often associated with this form of treatment. Though chemotherapy drugs of old seemed to do little to fight mesothelioma, newer chemotherapy drugs are showing much promise.

A relatively new form of chemotherapy called heated chemotherapy is an option for patients with peritoneal mesothelioma. This treatment is carried out following surgery and involves the perfusion of heated chemotherapeutic drugs into the peritoneum.

Radiation

Radiation therapy, or “ionizing radiation,” is used to kill cancer cells and to limit the spread of cancer. For patients with mesothelioma, radiation therapy is most often used in conjunction with surgery. However, in some cases radiation may be used as a stand-alone treatment to relieve pain and other symptoms associated with mesothelioma. In either case, however, it is rare for radiation therapy to provide more than short-term symptomatic relief.

Mesothelioma patients may receive one of two types of radiation therapy, depending on whether they are suitable candidates for either procedure. External beam radiation therapy is the traditional type of radiation therapy, where tumors are bombarded with beams of radiation to kill cancer cells. Brachytherapy is a newer type of radiation treatment. It involves tiny radioactive rods that are implanted within a tumor to provide a strong, concentrated dose of radiation to tumors while doing very little damage to surrounding healthy tissue.
Photodynamic Therapy

Photodynamic therapy is a highly specialized and specific form of treatment that is most often used to treat skin cancers and some types of lung cancer, including pleural mesothelioma. However, this treatment is usually unsuitable for patients with metastasized cancer; it is most effective in patients who have localized disease.

This type of therapy involves the use of light energy to kill cancer cells. In a photodynamic therapy treatment, the patient is given an intravenous solution of a drug that makes cancer cells highly sensitive to a particular kind of light. One to three days after this treatment, the patient is exposed to the light, and cancer cells that have absorbed the drug are killed.

Gene Therapy

Gene therapy involves using genetic material to specifically target cancer cells and make them more vulnerable to chemotherapy treatment. The main type of gene therapy being developed for use in mesothelioma patients is called “suicide gene therapy” because it forces cancer cells to produce substances that kill them.

When undergoing this type of gene therapy, the patient is treated with a non-infectious virus that has been altered with genetic material that makes them produce a particular protein. Following this procedure, the patient is then treated with a chemotherapeutic drug that is specially formulated so that it is toxic only to cancer cells. This type of therapy has produced some promising results for mesothelioma patients, but it is still only available through clinical trials.

Immunotherapy

Immunotherapy is a type of treatment in which the patient’s own immune system is “tricked” into killing cancer cells. A healthy, normally functioning immune system does not kill cancer cells because even though these are diseased cells, the immune system is unable to recognize them as being harmful.

There are two main types of immunotherapy — active and passive. In active immunotherapy, mesothelioma cancer cells are removed from a patient and then treated in a laboratory to turn them into a vaccine. Following this laboratory treatment, the patient is injected with the vaccine, and if the treatment is successful, the patient’s immune system recognizes the vaccine as a harmful substance, thus recognizing the cancer as being harmful as well.

Passive immunotherapy is somewhat different in that it does not attempt to activate the patient’s immune system. Instead, it uses substances such as cytokines — molecules that direct and regulate the immune system — and other agents to help boost the patient’s immune response to their cancer.

Mesothelioma Treatment — Surgery — Overview

Surgical procedures involved in the treatment and diagnosis of mesothelioma are divided into three main types:

- Diagnostic surgery is used to confirm whether cancer is present and if so, where it is located. This is typically non-invasive.
- Curative surgery is carried out with the intention of removing as much cancer as possible, in the hope of curing the patient. Radiation therapy or chemotherapy is often administered following curative surgery.
- Palliative surgery, in which cancerous tissue is removed, is used to provide symptomatic relief but does not offer a cure.
Biopsy

Biopsy is a diagnostic surgical procedure in which suspected cancer cells are removed and tested to determine whether they are, in fact, cancerous. There are three types of biopsy procedures: core biopsy, excisional biopsy, and needle aspiration biopsy. Core biopsy is generally not used to diagnose mesothelioma.

Excisional biopsy involves an operation to determine how far mesothelioma cancer has spread. In some cases, rather than just removing a portion of suspected cancerous tissue, as much tissue as possible may be removed to prevent the spread of cancer.

Needle aspiration biopsy uses a very long needle to remove a small sample of cells from the area where cancer is suspected. The cells are then tested for the presence of mesothelioma.

Thoracentesis

Thoracentesis is used to diagnose patients who have suspected pleural mesothelioma and may also be used as a palliative surgical treatment for pleural mesothelioma patients who are suffering from the effects of a build up of fluid in the lungs.

During a thoracentesis, a very long, hollow needle is inserted into the pleural spaces of the lungs and fluid is removed through the needle. This process is performed under a local anesthetic. If the procedure is used for diagnostic purposes, your doctor may order chest X-rays before the operation to determine the best location from which to extract samples. After the process, the fluid is sent to a laboratory for diagnostic testing.

Pleurodesis

Pleurodesis is a palliative surgical treatment option for people with pleural mesothelioma. This procedure is performed in order to prevent a side effect of pleural mesothelioma, called pleural effusion. Pleural effusion is the build up of fluid in the lungs — this can cause considerable pain and breathing difficulties.

During a pleurodesis, the pleural spaces are first drained of fluid, and following this, are treated with a talc-like chemical that causes inflammation. This is done so that the pleural spaces “close up,” thus preventing further fluid build-up.

Pneumonectomy

A pneumonectomy is the removal of one lung. This procedure may be used for patients with pleural mesothelioma and may be a suitable method of treatment for patients who have mesothelioma in just one of their lungs. Anyone who has mesothelioma in both lungs, or who has cancer that has spread to other parts of the body, is usually not a good candidate for a pneumonectomy. Suitable candidates must also be otherwise healthy to prevent the possibility of complications during or after surgery.

Pneumonectomy is performed under general anesthetic, and during the procedure, the affected lung is completely removed. Following surgery, patients must usually breathe with the assistance of a respirator for several days.

Paracentesis

Paracentesis involves the removal of fluid that has built up in the abdominal cavity of patients with peritoneal mesothelioma. This fluid collection in the peritoneal cavity can cause considerable pain and discomfort due to the pressure the fluid places on internal organs. During a paracentesis procedure, the fluid is removed via a long, hollow needle that is inserted into the abdomen.
Note that paracentesis is a type of palliative surgery; it provides relief from some of the symptoms of mesothelioma, but it cannot provide a cure.

**Thoracotomy**

Thoracotomy is a generic term that refers to lung surgery that may be performed on patients with pleural mesothelioma. There are three main types of thoracotomy procedures: wedge resection, lobectomy, and pneumonectomy.

In cases where only small, localized tumors are present, a wedge resection may be performed to remove the tumor, while leaving as much healthy tissue as possible intact. In a lobectomy, one or more of the five lobes of the lungs are removed. The third option is a pneumonectomy, in which an entire lung is removed.

**Thoracoscopy**

Thoracoscopy is a procedure that may be used as a diagnostic measure for patients suspected of having pleural mesothelioma or another lung disease. During this procedure, an incision is made in the chest, and a long, thin tube is inserted into the pleural spaces of the lungs so that a doctor or surgeon is able to examine the pleura. Samples of suspected mesothelioma cancer cells may be removed for testing to determine if cancer is in fact present.

**Mesothelioma Treatment — Surgery — Biopsy**

Mesothelioma is a very rare form of cancer, most effectively treated when detected early. Unfortunately, the nature of the disease and the fact that it remains latent for decades usually results in detection after the cancer has already spread to other parts of the body, making it extremely difficult to treat. As mesothelioma only develops after exposure to asbestos, ongoing check-ups and testing after exposure make early detection a greater possibility.

One method used in the detection of mesothelioma is surgical biopsy. There are a few different types of biopsy that you and your doctor can consider if he or she suspects you have developed mesothelioma.

First, the doctor may surgically remove the tissue in question. With an incisional biopsy or a core biopsy, just a small part of the tissue is removed. This is common if the sample is in a location that makes it easy to collect.

However, in the case of mesothelioma, the cancerous cells develop in places that do not lend themselves to core biopsy, particularly the pleura, peritoneum, and pericardium. Rather than operating and removing just a small piece of the tissue in question, doctors are more likely to remove the entire affected area of a patient with mesothelioma. This is known as excisional biopsy.

Excisional biopsy is, of course, more dangerous. Surgery will be longer in duration and more complicated, and doctors may need to remove a significant portion of the sensitive linings surrounding the major organs. However, it is much less risky to perform just one surgery than to operate twice if the cells are shown to be cancerous.

The third type of diagnostic biopsy is called needle aspiration biopsy. This is the technique most preferred by surgeons in many cases because it is a safe, quick procedure. Although most often used for tumors that are close to the skin’s surface, needle aspiration biopsy (also called fine needle aspiration cytology or fine needle aspiration) can also be used to diagnose mesothelioma. Basically, this technique uses a long, hollow needle to remove a sample of the suspicious cells from the body so that they can be diagnosed properly.

After the cells are removed from the body in one of the three aforementioned procedures, experts analyze the cells to determine if mesothelioma is present. This work is done by a pathologist — a doctor specializing in diagnosing diseases. The pathologist examines the cells under a microscope to determine the diagnosis.
There are a number of techniques that can be used to diagnose the cells after biopsy, but in most cases, the pathologist removes a very thin layer of tissue from the sample, places it on a slide, adds dye to make cells more visible, and seals the slide so it can be examined under a microscope. The pathologist is trained to see abnormal cell growth, which can indicate mesothelioma or any other disease.

Biopsy also allows the oncologist to examine the possible spread of the cancer to other parts of the body. When the tumors in the body are removed, the pathologist carefully examines the margins to see if the cancer is present. “Negative margins” means that the cancer has probably not spread; the appearance of “positive margins” means that there is a good chance that doctors have not completely removed the cancer. Mesothelioma travels quickly, so if doctors are concerned about metastases, they’ll run additional tests, which may include biopsies and X-rays on parts of the body that are commonly affected, like the lymph nodes.

Mesothelioma Treatment — Surgery — Thoracentesis

Though researchers continue to develop new ways to diagnose and treat mesothelioma, there are a number of techniques used for these purposes that have been on the scene for several decades. One such technique, thoracentesis, was developed in the late 19th century and is still used today.

Thoracentesis, the extraction of fluid from the lungs and the pleura (pleural effusion), can be used for two purposes. The first is as a diagnostic tool. In this procedure, the doctor uses a hollow needle, or cannula, to withdraw pleural fluid in order to determine the reason for fluid build-up. The fluid is then examined for certain qualities that may indicate disease. Usually, however, thoracentesis is not sufficient to determine whether or not a person has mesothelioma. A biopsy is usually necessary as well.

To do the test, doctors will first X-ray the chest, which will tell them the extent of the problem and allow them to make the best insertion possible. The skin around the insertion will be disinfected and local anesthesia will be injected to numb the pain. The needle is then inserted. This may cause a feeling of pressure, but not pain, due to the anesthesia. The procedure is often followed by an X-ray to verify the success of the thoracentesis and the amount of fluid removed.

After the fluid is collected from the lung’s chest cavity, it is sent to a lab for analysis. There are a number of factors that doctors examine to determine whether mesothelioma is present. These include:

- Protein levels
- Glucose presence
- PH levels
- Cell count
- Cholesterol

Fluid in the pleural region can indicate a number of things other than mesothelioma. Although cancer is a common cause of excess fluid in the chest, the fluid may also indicate lung infection, connective tissue disease, congestive heart failure, cirrhosis, and a number of other conditions.

Thoracentesis may also be used for palliative reasons to treat the uncomfortable and often debilitating symptoms of pleural effusion. Removing the fluid lessens pressure on the chest and lungs, eases pain in those areas, and provides more space for the lungs to expand.
Thoracentesis is not without risk. Some of the complications that may occur include the following:

- **Pneumothorax**: This condition, better known as a collapsed lung, can occur if the doctor accidentally punctures the lung or disrupts an accumulation of air in the pleural cavity.
- **Hemopneumothorax**: Often causing the lung to collapse, hemopneumothorax happens when damage occurs and blood begins filling the pleural space.
- **Pulmonary edema**: While removing a sample of the fluids in the lung area is supposed to help, it can sometimes cause even more fluid build-up or swelling in the pleural. This condition is known as pulmonary edema and can lead to both lungs failing.

There are also a number of minor conditions that may develop as a result of the thoracentesis procedure. These include subcutaneous hematoma (slight bruising or bleeding), anxiety, and cough.

**Mesothelioma Treatment — Surgery — Pleurodesis**

The surgical procedure known as pleurodesis is used to treat pleural effusion, the build-up of fluid in the chest cavity between the lungs and their lining, called the pleural space.

Technically, the process of pleurodesis is used to, in effect, eliminate the pleural space so that the fluid simply cannot continue to build up. The doctors do this by draining the fluid already there and inserting a talc-like substance that causes inflammation and serves to seal the pleural space.

There are two methods that doctors may use to cause this inflammation. Usually, it is achieved chemically, but doctors also sometimes use a surgical procedure to irritate the tissue. When surgery is performed, it is common for some of the suspicious tissue to be removed as well.

In the chemical pleurodesis process, the chest is first drained using a tube. The doctors then introduce a chemical into the pleural space. There are a number of chemicals that may be used, but the most common are bleomycin, tetracycline, povidone iodine, and talc. These chemicals remain in the chest for a few hours until the tissue is thoroughly irritated. The doctors then hook up the tube to a suction device, which causes the two layers of the pleura to come together, sealing the space where fluid once built up. This process takes place over a few days because it takes some time for the fluid to drain thoroughly. During this time, anesthesia and pain medications are administered, but most patients still describe this procedure as quite painful.

The second form of pleurodesis is surgical. This surgery is performed by using either a thoracotomy or thoracoscopy. In both cases, the pleura are irritated with a rough pad, causing inflammation. As in chemical pleurodesis, the layers are then brought together so they can fuse and future fluid retention can be eliminated.

After recovering from the surgery, patients should experience a marked difference in their ability to breathe, and pain and coughing should lessen as well.

**Mesothelioma Treatment — Surgery — Pneumonectomy**

A pneumonectomy is, simply, the removal of a lung in order to remove a tumor or tumors associated with mesothelioma and other lung diseases. Human beings do not need both lungs to survive; however, the removal of a lung represents a serious procedure and is only done if doctors believe it represents the best chance for survival or will cause a great reduction in the debilitating symptoms of mesothelioma.

Not every mesothelioma patient is a candidate for a pneumonectomy. Doctors considering this as a first round of treatment for their patient will not recommend this procedure for those whose cancer has already spread to
other parts of the body but only for those whose cancer is limited to a single lung. Surgical candidates must also be in otherwise relatively good health for this procedure to be considered. Heart function must be strong, and the other lung must be in good working condition.

A pneumonectomy is performed under general anesthesia. The doctor will make a long incision (about 7 to 9 inches) and remove part of the rib in order to be able to properly view the lungs. The affected lung will be carefully collapsed and the doctors will clamp, cut, and tie off any attached blood vessels, along with the air tube that flows to the cancerous lung. The lung is removed through the incision and the cut tubes and vessels are thoroughly inspected to ensure that nothing is leaking. Also removed with the lung are the pleural lining of the chest and heart and the diaphragm.

Patients will need to breathe with the assistance of a respirator for the first few days after surgery, and drainage tubes will be used to remove fluid build-up. Usually a two-week hospital stay is required and patients often need to travel to a major hospital to find a surgeon who is an expert in this procedure. Full recovery may take as long as two to three months. In addition, the surgery does carry a risk of heart attack, pneumonia, bleeding, or serious infection. Studies show that about six or seven of every 100 patients who opt for pneumonectomy surgery die during or shortly after the procedure.

However, if successful, this surgery can greatly improve the patient's quality of life while adding several months to their life span.

**Mesothelioma Treatment — Surgery — Paracentesis**

Although mesothelioma is commonly a form of cancer that develops in the lungs, it can affect other parts of the body as well. In up to 15% of all cases, in fact, it may affect the peritoneum, the lining of the abdomen. This form of cancer is very dangerous and often accompanied by no symptoms, making it very hard to detect. Once discovered, however, there are a few treatment options for those with peritoneal mesothelioma.

**Paracentesis as an Option for Treating Peritoneal Mesothelioma**

Paracentesis does not offer a cure for mesothelioma, but is used as a palliative measure to help improve the patient's quality of life and ease the symptoms of the disease.

The main goal of paracentesis is to remove fluid that has collected in the abdominal area. Peritoneal fluid build-up around the stomach is known as ascites, and this fluid can cause a number of problems. Paracentesis can help to relieve pain and pressure in the belly associated with ascites, which can cause complications involving the bowels, kidneys, and other parts of the digestive system.

For patients undergoing paracentesis, the doctor will administer local anesthesia and then insert a long, hollow needle into the abdomen. The fluid will then be drained, which may take a few hours or even a few days. A sample of the fluid will be sent to the lab. After the fluid is drained, the doctor will be able to determine the next stage of treatment, if any.

Paracentesis is uncomfortable, but there are few risks. When the needle is inserted, patients may feel pain or pressure, or they may experience dizziness, especially with large amounts of fluid removal. The doctor may insert an IV during this procedure to help introduce necessary fluids into the bloodstream, preventing blood pressure problems and shock.

**Mesothelioma Treatment — Chemotherapy — Overview**

The term “chemotherapy” may be used to describe any drugs used in the treatment of disease; however, the word is most often used to refer to drugs that are used in the treatment of cancer.
Generally, chemotherapy drugs work by targeting specific processes in cells that are undergoing rapid division and growth, thus preventing cell division and killing cells. However, these drugs are not highly specific, which means that in addition to killing cancer cells, chemotherapeutic drugs also kill healthy cells that are dividing rapidly. Such cells may include those involved in hair growth and some immune cells.

In terms of mesothelioma treatment, there are several options for chemotherapy. Most of these chemotherapy drugs have specific side effects such as nausea, vomiting, loss of appetite, hair loss, and increased vulnerability to infection. Any symptoms you experience while being treated with chemotherapeutic drugs should be reported to your doctor.

**Which Chemotherapy Option Is Right for You?**

Deciding which chemotherapy option is the best treatment for your mesothelioma depends on a number of factors, including the type of mesothelioma you have, the stage of disease, and any other treatment options available. In addition, other factors such as overall physical health and age are also taken into consideration.

There are currently in excess of 100 chemotherapy drugs on the market with just a handful deemed appropriate for fighting mesothelioma. In most cases, oncologists treating mesothelioma patients recommend combination therapy — the tandem use of two different chemotherapy drugs. These combinations have been touted as most successful in the fight against this asbestos-caused cancer.

All treatment options should be thoroughly discussed with your doctor before a decision is made and he/she will educate you as to the pros and cons of the treatment being considered. In return, you should provide your medical team with a full disclosure of your medical history, including details of any prescription and over-the-counter medications you are taking, to ensure you receive treatment with the most appropriate chemotherapeutic agent.

Currently, the most common chemotherapy drugs for mesothelioma include Alimta, the only FDA-approved drug specifically designed for the treatment of mesothelioma; cisplatin; carboplatin; Onconase; gemcitabine; and Navelbine. These are usually administered conventionally — by IV or pill form — or they can be used in a newer treatment method called heated chemotherapy.

**Will Chemotherapy Cure Mesothelioma?**

Currently, there is no cure for mesothelioma. However, chemotherapy can help control the symptoms of the disease and is largely used as a palliative measure to help improve the patient’s quality of life by lessening pain, coughing, and shortness of breath.

The development of combination treatments has proved successful in achieving longer survival rates and researchers continue to look for new ways to fight this aggressive disease.

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Mesothelioma Treatment — Chemotherapy — Heated Chemotherapy

Most chemotherapy agents for the treatment of mesothelioma are administered intravenously, typically once a week or once every three or four weeks, for a length of time determined by the patient’s physician. There are several common chemotherapeutic agents that may be used to treat mesothelioma, including Alimta, cisplatin, and carboplatin.

However, a new form of chemotherapy is being tested in clinical trials involving mesothelioma patients. This treatment, called heated chemotherapy, is showing some promise for the treatment of peritoneal mesothelioma, a form of the disease that involves the protective lining around the abdomen. (Due to the nature of the treatment, it has been deemed not appropriate for pleural or pericardial mesothelioma.) This treatment was developed by Paul Sugarbaker at the Washington Cancer Institute, and for this reason may sometimes be referred to as the Sugarbaker Technique.

Heated Chemotherapy for Peritoneal Mesothelioma Treatment

Heated chemotherapy for peritoneal mesothelioma, which is also known as Heated Intraoperative Intraperitoneal Chemotherapy, is administered in a very different fashion than most other types of chemotherapy treatment.

During the heated chemotherapy procedure, a patient is treated with chemotherapeutic drugs in liquid form that are administered directly into the peritoneum (the lining of the abdominal cavity). However, before this can occur, the patient undergoes surgery that removes as much of the tumors growing in the peritoneum as possible. Once the surgical portion of the procedure has been completed, the chemotherapy portion can begin. During this part of the treatment, the patient’s peritoneum is permeated with heated chemotherapeutic drugs in order to expose all organs and tissues within the peritoneum to the heated chemotherapeutic agents in a uniform fashion, and to ensure all affected organs receive treatment.

The chemotherapeutic drugs used in the procedure are heated to a temperature of between 44 and 46 degrees Celsius, and the intraperitoneal environment is maintained at a temperature of approximately 42 to 43 degrees Celsius. The chemotherapeutic fluid is perfused in the peritoneum for between one and two hours and is then drained from the operation site.

Advantages of Heated Chemotherapy

There are two particularly important features of heated chemotherapy that make this a superior alternative to standard chemotherapy for suitable candidates.

First, the chemotherapeutic drugs are applied directly to the affected site. This means that the drugs come in direct contact with tissues that are affected by the mesothelioma. In traditional chemotherapy, the patient is treated with chemotherapeutic drugs intravenously and the patient’s entire body is affected by the drugs. Perfusing drugs directly into the peritoneum increases the concentration of the drugs at the site where they are most needed, and it also means that patients experience less serious side effects from exposure to chemotherapeutic drugs, because other body cells and organs do not come into direct contact with the drugs.

The second important feature is the fact that the drugs are heated to the approximate temperature of the human body. Heating the chemotherapeutic agents increases their ability to penetrate tissues. This is important because it is difficult for chemotherapeutic drugs to penetrate into large or dense tumors when the drugs are administered in the traditional intravenous method. In addition, the heat from the heated chemotherapeutic drugs is actually damaging in itself, especially to cancer cells.
Is Heated Chemotherapy a Good Treatment Option for You?

Again, it is important to note that heated chemotherapy is currently a treatment option only for patients with peritoneal mesothelioma. If you have mesothelioma of the pleura or pericardium, you will need to explore other treatment options with your doctor.

If you are eligible for heated chemotherapy, both you and your doctor will need to discuss your treatment options extensively before determining whether this is a good choice for you.

Mesothelioma Treatment — Chemotherapy — Cisplatin

Cisplatin is a chemotherapy medication that contains platinum, a common element used to treat a variety of forms of cancer, including mesothelioma. Today, cisplatin is often combined with newer medications to increase the effectiveness of the medication and, hence, the chemotherapy treatment itself.

Cisplatin has been on the market for some time, though it was generally found to be ineffective in treating mesothelioma. However, combined with the new chemotherapy drug Alimta, which was just recently approved by the Food and Drug Administration (FDA), cisplatin has proven to be an effective chemotherapy drug. The Alimta and cisplatin combination is now considered to be one of the most effective chemotherapy treatments for pleural mesothelioma for those patients who are not candidates for surgery.

Because the drug is about 30 years old and was the first in its class of alkylating agents, it often causes more side effects than newer chemotherapy drugs. Because of this, doctors will often try other chemotherapy drugs before recommending treatment with cisplatin.

Treatment with Cisplatin

If your doctor does recommend the use of cisplatin, probably combined with Alimta, you’ll want to make sure you take time to have a discussion on any potential concerns associated with the drug.

Discussion should include statistics on the effectiveness of the cisplatin and Alimta combo, the administration of the drug combination, and the side effects that you may encounter with treatment. It's also imperative that you begin taking a B12 supplement by injection starting the week before your treatment begins, with weekly B12 shots continuing throughout treatment. You should also take folic acid by mouth daily, which will continue for 21 days after the last dosage cycle of cisplatin and Alimta. Your doctor will also give you an oral steroid to help minimize side effects such as skin rash. If you are taking other medications, either prescription or non-prescription, including supplements, be sure to tell your physician about them so as to avoid potential serious drug interactions.

Cisplatin with Alimta is given to mesothelioma patients every 21 days on an outpatient basis, usually at a hospital or cancer treatment center. The treatment consists of a dose of Alimta by IV, which usually lasts about 10 to 15 minutes, followed by the cisplatin, which generally takes about 2 hours to administer. The number of cycles required will depend on your response to the medications as well as any side effects that you experience.

Side Effects of Cisplatin

The side effects of cisplatin and Alimta are usually mild to moderate for most patients with pleural mesothelioma and include:

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• Nausea
• Vomiting
• Fatigue

However, some patients may encounter extreme side effects, which should be reported to your medical professional immediately. Cisplatin has the potential of causing serious kidney problems, and it is essential to drink lots of water during treatment with this chemotherapy agent.

**Mesothelioma Treatment — Chemotherapy — Alimta**

Historically, mesothelioma has been one of the most difficult forms of cancer to treat. Though doctors have been prescribing chemotherapy for decades, it seems that few chemotherapy agents have had much effect on the aggressive, hard-to-fight disease.

Among recently approved drugs, however, one stands out as having the most promise in regard to prolonging the life of the mesothelioma patient and also improving his/her quality of life.

Alimta (pemetrexed), manufactured by drug maker Eli Lilly, is a newer chemotherapy drug that has recently been approved by the Food and Drug Administration. Often used in conjunction with cisplatin, another chemotherapy drug, Alimta is the first drug that is specifically approved for the treatment of mesothelioma and is considered to be the most effective chemotherapy treatment for pleural mesothelioma for those patients who are not candidates for surgery.

Alimta is a multi-targeted antifolate drug that works by blocking the enzymes that are required for DNA copying and cell division. During clinical trials, Alimta, used in tandem with cisplatin, added an average of three months to the lives of malignant pleural mesothelioma patients and also helped to reduce the symptoms of the disease.

**Treatment with Alimta**

As with any drug, it is imperative that you discuss the use of Alimta and cisplatin with your doctor before beginning treatment. Your oncologist will provide facts about the effectiveness of Alimta, the administration of the drug, and the side effects that you may encounter. When you begin treatment with Alimta, your doctor will also recommend that you receive B12 supplements by injection and that you take folic acid by mouth daily, which you should continue for 21 days after the last dosage cycle of Alimta. Your physician will also give you an oral steroid to help minimize side effects such as skin rash. Inform your doctor of all other medications, prescription and non-prescription, that you take on a regular basis so as to avoid dangerous interactions.

Alimta is administered to mesothelioma patients every 21 days on an outpatient basis. The treatment consists of a 10-minute IV infusion of Alimta, followed by two hours of treatment with cisplatin. The number of cycles that you are required to take will depend on your response to the medications as well as any side effects that you may experience.

**Side Effects of Alimta**

The side effects of Alimta are usually mild to moderate for most patients with pleural mesothelioma and include:

• Nausea
• Vomiting
• Fatigue
However, some patients may experience extreme side effects, and your doctor should be informed immediately if you suspect a problem.

**Mesothelioma Treatment — Chemotherapy — Onconase**

Onconase, which is also known as P-30 protein, is a derivative of eggs and early embryos of the leopard frog. Onconase has been proven to provide activity against many tumor cell lines, such as those produced by the asbestos-caused cancer, mesothelioma.

The clinical trial of Onconase was conducted at Columbia University. Dr. Taub, the trial’s coordinator, did a two-phase study involving 105 patients who had advanced metastasizing mesothelioma. Onconase was administered by IV to the patients for over 30 minutes each week.

The median survival time for these patients was nearly six months, and some patients achieved one- and two-year survival rates. These results were quite encouraging and prompted a Phase III trial of Onconase, conducted versus doxorubicin in patients who had unresectable mesothelioma. The survival times were similar in the two groups of Onconase trials, as well as for the trial of doxorubicin. However, the results in the test trials of Onconase versus doxorubicin favored Onconase.

**The Treatment of Mesothelioma with Onconase**

Onconase is one of the first embryonic stem cell products to reach the final stages of testing, currently in Phase IIIB trials. The drug shows much promise and may be considered as a potential early first-line preventative treatment for mesothelioma, which could mean prolonged life for those exposed to asbestos as mesothelioma is generally not diagnosed until it has reached Stage III or IV.

Currently, the only way to receive this chemotherapy drug is through enrollment in one of these trials. Ask your doctor if you might be a candidate for Onconase clinical trials.

**Mesothelioma Treatment — Chemotherapy — Navelbine**

Navelbine, which is also known as vinorelbine, is relatively unique among chemotherapy drugs used for the treatment of mesothelioma because while most chemotherapy drugs are entirely synthetic, Navelbine is a semi-synthetic drug that is extracted from a flowering plant known as the periwinkle.

**Navelbine for Mesothelioma Treatment**

Most chemotherapeutic drugs, including Navelbine, work by preventing cells from dividing or by directly killing cells. Navelbine kills cells by entering them and binding to structures that are essential in cell division. This prevents cells from dividing, and because the cells cannot function normally, a form of “cellular suicide” occurs. Therefore, Navelbine can both slow down the spread of cancers and kill existing cancer cells.

Relatively new on the scene, Navelbine has shown a slightly higher success rate than some other chemotherapy drugs in the treatment of mesothelioma, especially drugs that were developed two or three decades ago.

Often used in conjunction with other treatments such as surgery, or in tandem with other chemotherapeutic agents, Navelbine is usually given once a week for several weeks. The drug is administered intravenously, on an out-patient basis, and the treatment procedure usually takes around 30 minutes to an hour. The number of treatments a patient will receive is determined by the seriousness and location of the cancer.

When discussing your treatment options with your doctor, it is important to let him/her know about any other medical conditions from which you suffer, such as kidney or liver problems or a history of blood problems such as anemia. In addition, you must let your doctor know if you are taking any other medications, both
prescription and over-the-counter. This is important because other medications or pre-existing medical conditions may affect your treatment options and help determine the dose of Navelbine that is right for you. In addition, some drugs do not interact positively with Navelbine.

**Side Effects of Navelbine**

People who are taking Navelbine for mesothelioma treatment may experience some symptoms and side effects that may become serious if left untreated. These symptoms should be reported to your doctor immediately if you experience them.

- An allergic reaction — including difficulty breathing; swelling of the lips, tongue, or face; or hives
- Extreme fatigue, tendency to bruise or bleed easily, blood in the stools, chills, fever, or other signs of infection (These symptoms indicate decreased bone marrow function and increased vulnerability to infection.)
- Pain, swelling or redness at the injection site
- Constipation or abdominal pain
- Cough or difficulty breathing
- Chest pain, numbness or tingling

Less serious side effects include:

- Minor feelings of fatigue
- Hair loss
- Nausea, vomiting, loss of appetite and diarrhea
- Inflammation or soreness inside the mouth or on the lips

All side effects should be reported to your doctor immediately to determine their seriousness.

It’s very important to note that while you are being treated with Navelbine, you are much more vulnerable to infections. It is also best to avoid contact with people who have colds, the flu, and other contagious conditions.

**Mesothelioma Treatment — Chemotherapy — Gemcitabine**

Another chemotherapeutic drug available for the treatment of mesothelioma is gemcitabine, most often used to treat pancreatic, bladder, and breast cancers. However, doctors have also found some success with gemcitabine in the treatment of certain types of lung cancer, including pleural mesothelioma, and often use the drug in combination with another chemotherapy drug to treat these types of cancer.

Most chemotherapeutic drugs, including gemcitabine, work simply by killing cells as a result of complex chemical reactions. Gemcitabine can slow the growth of cancer by killing existing cancer cells and interfering with DNA replication in other cells.

Chemotherapeutic drugs like gemcitabine target cells that are dividing rapidly, such as cancer cells. However, the treatment may also affect some healthy cells, including cells that are involved in hair growth and some types of immune cells. This is why many chemotherapy patients lose their hair and are easily susceptible to illness.
Gemcitabine Treatment for Mesothelioma

Gemcitabine chemotherapy is most often administered on an out-patient basis, and the drug is given intravenously. Treatment with gemcitabine typically means a trip to a doctor’s office, clinic, or hospital; the entire procedure usually lasts a few hours, with the actual administration of gemcitabine lasting around 30 minutes. In most cases, gemcitabine is administered once a week for up to seven weeks, though the length of treatment and strength of dosage will depend on the type and stage of the cancer being treated.

When considering treatment with gemcitabine, it is necessary to inform your doctor of any medications you currently take, including all prescription drugs and any supplements or over-the-counter meds that you use regularly. In addition, anyone who has impaired liver or kidney function is generally advised not to use gemcitabine, as the drug can cause severe liver and kidney damage. It is essential that your doctor be aware of any kidney or liver problems you may already be experiencing.

Finally, because gemcitabine and most chemotherapy drugs are known to be harmful to unborn babies, women who are pregnant or breastfeeding should not use this drug.

Side Effects of Gemcitabine

Side effects of treatment with gemcitabine include the following:

- Nausea and vomiting
- Tendency to bruise or bleed easily
- Constipation or diarrhea
- Swelling in the ankles, feet, or hands (edema)
- Less frequent urination
- Blood in urine, or particularly dark urine
- Change in kidney function
- Change in liver function
- Chest pain
- Numbness or weakness, most often on one side of the body
- Confusion, balance impairment, or impaired vision or speech
- Fever, chills, aching body (similar to symptoms of flu)
- Sores or white patches inside the mouth
- Pain or swelling at the side where gemcitabine was administered

Some of these symptoms are more serious in nature because they indicate either kidney damage (in the case of changes in urination and urine) or infection (such as in the case of flu symptoms).

People who are treated with gemcitabine (and other chemotherapy drugs) have reduced immune system function because the drug kills some types of immune cells. If you are taking gemcitabine for mesothelioma, it is important to avoid contact with people who have colds or other infections. Report any illness to your doctor immediately.
Mesothelioma Treatment — Chemotherapy — Carboplatin

Throughout the years since chemotherapeutic drugs have been available for the treatment of mesothelioma, doctors have experimented with the use of many different chemotherapy drugs, including carboplatin. Introduced in the late 1980s, carboplatin is favored by many physicians because its side effects are much less severe in comparison to many other chemotherapeutic drugs, particularly cisplatin, which is the “parent” drug of carboplatin (meaning that carboplatin is a modified form of cisplatin). Carboplatin is most commonly used to treat ovarian, lung, head, and neck cancers, but has shown some success in treating mesothelioma as well.

Most chemotherapeutic drugs, including carboplatin, work simply by killing cells. Carboplatin kills cells by entering them and binding to the cell’s DNA, preventing the cell from dividing and from functioning normally, eventually killing the cell. These drugs tend to target cancer cells because they are attracted only to cells that are dividing rapidly, as cancer cells do. However, there are some types of healthy cells in the human body that divide as rapidly as cancer cells, and that means when carboplatin chemotherapeutic treatment is given, these cells are also killed. This may include cells that are involved in hair growth and some types of immune cells.

Treatment with Carboplatin

Carboplatin chemotherapy is typically administered on an out-patient basis at a hospital or treatment center, and the drug is given intravenously, usually once every 28 days. However, in cases where a patient with mesothelioma requires more frequent chemotherapy, or where carboplatin treatment is combined with other treatments or drugs, it may be administered on an in-patient basis, requiring a stay of two or more consecutive days in the hospital.

If your doctor or oncologist recommends treatment with carboplatin, remember to discuss with him/her any medications that you are already taking, including both prescription medicines and over-the-counter remedies or supplements that you consume on a regular basis.

Anyone with kidney disease is discouraged from seeking treatment with carboplatin, so it is essential to inform your doctor of any kidney problems you may have. It should be noted that carboplatin, like most chemotherapy drugs, is harmful to unborn babies, so women who are pregnant or breastfeeding should not use this drug.

Side Effects of Carboplatin

Side effects of carboplatin are, in general, less severe than those associated with some other chemotherapeutic agents. However, patients taking this drug can still expect to experience some unpleasant side effects, which may include:

- Hair loss
- Loss of immune function
- Nausea and vomiting
- Loss of appetite
- Impaired vision or hearing
- Feelings of fatigue or weakness
- Increased tendency for bruising or bleeding (due to poor clotting)

Because people who are treated with carboplatin for mesothelioma typically experience reduced immune system function, they are more prone to infection. This means even a cold may be significantly more dangerous.
to a patient receiving this treatment. Anyone who is being treated with carboplatin should take care to avoid contact with people who have colds or other infections.

A potentially serious side effect of carboplatin is kidney damage. The symptoms of kidney damage usually include pain or difficulty in urinating or the appearance of blood in the urine.

The appearance of any symptoms, whether mild or serious, should be discussed with a doctor as soon as possible. Your doctor may be able to provide you with medication to help alleviate some of these side effects, such as nausea, vomiting, and loss of appetite. In order to avoid potential life-threatening complications, anyone who is taking carboplatin should seek medical advice if they contract any kind of infection or show any signs of fever, chills, rash, or sore throat.

**Mesothelioma Treatment — Radiation — Overview**

In addition to chemotherapy and surgery, radiation therapy is one of the three most commonly used treatments for mesothelioma.

Radiation therapy makes use of a type of radiation called “ionizing radiation,” used to kill existing cancer cells and control the growth of new cancer cells. Depending on the nature of the patient’s condition and their type of cancer, radiation therapy may be used as a stand-alone treatment or may be used in conjunction with surgery or chemotherapy.

In addition, radiation may be used either as a curative treatment or as a palliative treatment. In the latter case, the purpose of radiation therapy is not to cure the patient, but simply to provide relief from pain and other symptoms of the cancer. This is very often the case for mesothelioma patients that are prescribed radiation therapy.

There are three main types of radiation therapy: external beam radiotherapy, unsealed source radiation therapy, and brachytherapy. In most cases, only external beam radiotherapy and brachytherapy are used to treat mesothelioma. The type of radiation treatment patients receive depends on several factors, including the type of mesothelioma, the stage of the disease, and whether other treatment options are also viable.

**External Beam Radiotherapy**

External beam radiotherapy is the most commonly used type of radiation therapy for the treatment of cancer. During this procedure, the patient sits or lies down to expose the area that requires treatment, and an external source of radiation is directed at the treatment area.

Over the course of a series of treatments, the mesothelioma tumors are bombarded with radiation to kill cancer cells and limit the growth and spread of new cancer cells. However, in most cases involving mesothelioma, radiation therapy is unable to completely eradicate all tumor cells, so this type of therapy is usually given to provide the patient with some relief from the pain and other symptoms associated with mesothelioma, such as shortness of breath and coughing.
Due to the nature of the treatment, it is common for healthy tissue near the treatment area to be affected by radiation, and it is this damage that causes the side effects of radiation therapy, such as skin irritation, pain near the treatment site, digestive problems, and difficulty swallowing.

External beam radiotherapy is rarely effective as a stand-alone treatment for mesothelioma, and it is most often used in conjunction with chemotherapy or surgery.

**Brachytherapy**

Brachytherapy, also known as “sealed source radiation therapy,” is a procedure that involves the implantation of tiny radioactive rods in or near tumors of mesothelioma and other types of cancer such as breast, cervical, and prostate. This treatment method allows the delivery of a highly concentrated, very closely targeted dose of radiation to mesothelioma tumors that might be resistant to other types of radiation therapy.

This type of radiation therapy is also viewed positively because it causes little damage to healthy cells surrounding the affected area and is much more non-invasive than traditional radiation.

Patients with mesothelioma may receive either temporary or permanent brachytherapy treatment. For temporary treatment, radioactive seeds are placed within tumors for a short time and are then removed. In the case of permanent treatment, the seeds are not removed, but are simply left within tumors, eventually ceasing the emission of radiation.

**Unsealed Source Radiation Therapy**

Treatment with unsealed source radiation involves the administration of soluble forms of radioactive substances. This type of treatment is administered either orally or via injection, but is only used to treat very specific types of cancer. For example, patients with thyroid cancer are often treated with a solution of radioactive iodine.

One major disadvantage of unsealed source radiation therapy is that people who receive this treatment are considered to be radioactive for the duration of the treatment and for several weeks after — this means they can actually pose a health risk to other people. However, it should be noted that this is not a treatment that is used for patients with mesothelioma.

**Mesothelioma Treatment — Radiation — Brachytherapy**

Along with surgery and chemotherapy, radiation therapy is one of the most commonly recommended treatments for mesothelioma. Radiation has long been a standard treatment for many types of cancer and is often used in mesothelioma patients as a palliative measure — a form of therapy that helps reduce the unpleasantness of the symptoms of this aggressive disease. It does not offer a cure for the disease.

**What Is Radiation Therapy?**

Radiation therapy uses a form of radiation called “ionizing radiation” as a medical treatment for cancer, designed to kill and control the growth of cancer cells. In some cases, radiation therapy is used as a curative treatment; however, in situations where cure is not possible, this treatment is used as a palliative therapy to provide symptomatic relief.

Radiation therapy is often used in conjunction with other cancer treatments such as surgery and chemotherapy. For example, radiation therapy may be administered before surgery to shrink tumors or in conjunction with chemotherapy to improve the success of both treatments.

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We can help!
There are three main types of radiation therapy: external beam radiotherapy, unsealed source radiation therapy, and brachytherapy.

**Brachytherapy for Mesothelioma Treatment**

Brachytherapy is a type of radiation therapy that involves the implantation of tiny radioactive rods in or near tumors. It is most commonly used to treat cervical, breast and prostate cancers, as well as cancers of the head and neck, but has also been used to treat mesothelioma.

An advantage of brachytherapy is that the radioactive rods placed inside tumors — often referred to as “seeds” — emit radiation only over very short distances of approximately one centimeter. This treatment allows for the delivery of a strong and highly concentrated dose of radiation directly to tumor cells, but causes very little damage to surrounding healthy cells and tissue. Because of this, healthy tissue is spared and side effects are less severe.

Brachytherapy seeds are very small — about the size of a grain of rice — and insertion of the seeds is carried out under general anesthetic. This means that patients must be evaluated to ensure they are fit enough to undergo surgery. Additional tests are done to determine the size and location of tumors so that seeds can be placed for maximum effectiveness.

The seeds may be implanted using one of two methods. Intracavitary treatment involves inserting radioactive seeds housed in small containers into body cavities. For interstitial treatment, containers are not used, and instead the seeds are placed directly into cancer tumors. In this case, they are inserted through the use of a thin needle.

**Types of Brachytherapy**

There are two main types of brachytherapy treatment for mesothelioma: temporary and permanent.

When a patient undergoes temporary brachytherapy treatment, radioactive seeds are placed inside tumors for a short period of time and are then removed. If the therapy is to be permanent, the seeds are never removed. However, over time the remaining seeds produce less radiation, until eventually radiation emission ceases. Depending on the type of radioactive material used in the treatment, radiation emission will most likely end within three to twelve months.

**High Dose and Low Dose Brachytherapy**

Brachytherapy treatments for mesothelioma are separated into two further types according to the strength of the dose that is administered and the duration of the treatment.

High dose brachytherapy is administered via a catheter, with the seeds being delivered into tumors one by one at regular intervals. This treatment takes place over the course of a single session that typically takes only a few minutes to complete and is carried out as an out-patient procedure. Patients typically receive up to twelve separate treatments over the course of two or more weeks.

Low dose brachytherapy administers continuous low-dose radiation over several hours or even days, but the patient is given only one treatment rather than several. This is carried out as an in-patient procedure and requires at least an overnight hospital stay.
Pros and Cons of Brachytherapy

The immediate side effects of brachytherapy treatment for mesothelioma are pain, swelling, and sometimes bruising at the treatment site. These symptoms are typically mild and last for just a few days. However, there are few other side effects, and the side effects of brachytherapy are much less severe than with other types of radiation therapy.

Brachytherapy is a very non-invasive procedure due to the delivery method used to administer treatment. Patients can typically resume normal levels of activity within just a few days. People who receive this treatment also benefit from a much reduced risk of developing post-operative infections and other complications that may result from more invasive surgical procedures.

Despite the lack of side effects for patients, there are some other concerns surrounding brachytherapy. The amount of radiation emitted by patients who receive brachytherapy is very low, but patients are still advised by their physicians to avoid contact with young children and pregnant women, who are typically more vulnerable to the effects of the radiation.

Mesothelioma Treatment — Photodynamic Therapy

The potential success of photodynamic therapy is linked to the fact that normal cells and cancer cells react differently to photosensitizing drugs. Photodynamic therapy uses light energy to destroy cancer cells while leaving healthy cells largely unaffected.

During the photodynamic therapy treatment process, a patient is given drugs called photosensitizers, which make cells sensitive to light. The treated cells are then exposed to light of a specific wavelength, and this causes them to produce a particular form of oxygen that is toxic and able to kill nearby cancer cells.

Photodynamic Therapy for the Treatment of Mesothelioma

Photodynamic therapy begins with the injection of a photosensitizing drug. This drug is administered intravenously, directly into the bloodstream, and over a period of 24 to 72 hours, the drug travels throughout the body and is absorbed by cells.

In general, cancer cells absorb the photosensitizing drug much more quickly than do healthy cells. In addition, the drug remains in cancer cells longer than it does in healthy cells. For these reasons, by the time the patient proceeds to the next stage of treatment — light therapy — the drug is mostly present only in cancer cells with perhaps low concentrations remaining in some healthy cells.

After the drug administration phase of the process, the patient is treated with light of a special wavelength that reacts to the photosensitizing drug present in cancer cells. This is a simple process. A physician simply shines a beam of light onto the affected area for the duration of the treatment, which may last anywhere from a few minutes to up to an hour. During the treatment, cancer cells absorb the light, causing them to produce a form of oxygen that is highly reactive. The oxygen enters nearby cancer cells, damaging and killing them. In addition, photodynamic therapy can also destroy cancer cells by damaging blood vessels that are present in tumors, thus preventing cancer cells from absorbing nutrients.

Photodynamic therapy is usually performed on an out-patient basis and is often used in conjunction with other types of treatment, such as surgery and chemotherapy. For example, photodynamic therapy may be used after surgery designed to remove the bulk of a cancerous tumor, or it may be used after chemotherapy administered for the purpose of shrinking a tumor.
However, due to the nature of this type of mesothelioma treatment, it is not effective for the treatment of cancer that has spread extensively throughout the body. Photodynamic therapy is most effective in treating single, localized cancers.

**Side Effects of Photodynamic Therapy**

Some drugs that are used in photodynamic therapy can make the eyes and skin very sensitive to light for up to six weeks after treatment has been completed. If the skin and eyes are not protected, they can become burned or blistered after just a few minutes of exposure to sunlight or bright indoor lights. For this reason, people undergoing photodynamic therapy are generally advised to avoid bright indoor lights, as well as direct sunlight, for six weeks or longer after photodynamic treatment.

Damage to normal, healthy tissue is minimal when photodynamic therapy is used because the treatment is highly specific. However, in some cases, the treatment may cause burns, pain, and swelling in nearby healthy tissue and side effects such as coughing or shortness of breath may also be a concern, depending on the location of the treatment.

**Photodynamic Therapy in the Future**

Because the type of light used in photodynamic therapy cannot penetrate very deeply into skin and tissue, it is most effective in cancers that affect the skin, or for cancers that are near the skin’s surface, including some types of lung cancer. In addition, individuals with large tumors may not be suitable candidates for photodynamic therapy, as the light is unable to penetrate throughout the tumor.

Medical research for photodynamic therapy seeks to increase the range of cancers for which the treatment can be used, including peritoneal mesothelioma, and to improve the efficacy of the therapy for treating larger tumors. Other research is concentrating on the possibility of administering photodynamic therapy during surgery or administering photodynamic therapy by means of optical fibers that are guided directly into tumors.

**Mesothelioma Treatment — Gene Therapy**

While more conventional therapies such as radiation and chemotherapy are commonly used to treat mesothelioma, experimental treatments such as gene therapy are becoming more widely used, most often in clinical trials that test how effective such treatments might be in fighting asbestos-caused cancer.

**What Is Gene Therapy?**

Genes — which are carried on chromosomes — are the “building blocks” of life. They provide living organisms with instructions for making an enormous variety of proteins, and these proteins are the molecules that perform most functions within the body and make up most cellular structures. If a gene is defective, the protein that is produced from it is also defective, and this may cause the development of a genetic disease. Hemophilia, muscular dystrophy, and color blindness are all examples of disorders that are caused by faulty genes.

Gene therapy is a largely experimental medical treatment that seeks to correct the problems caused by a defective gene by using genetic techniques to replace the defective copy of a gene with a copy that functions correctly.

In most cases, this is done by genetically altering a virus so that it carries a normal copy of the gene. Viruses are an ideal way of transporting genes into cells, because their normal mode of action is to enter cells and “take over” the cell’s genetic machinery to produce viral proteins.

In gene therapy, a patient is “infected” with a virus that has been genetically altered with a copy of a normal gene, which has been treated to prevent it from causing infection. The virus enters target cells and causes those cells to begin producing normal proteins instead of defective ones.
Gene Therapy for Mesothelioma Treatment

Gene therapy was originally conceived of as a means of treating inherited genetic diseases such as hemophilia. However, in the last decade, gene therapy research has concentrated mainly on developing potential treatments for various types of cancer. In terms of mesothelioma treatment, gene therapy involves the use of genetic material to target cancer cells and make them vulnerable to chemotherapeutic drugs.

One of the most promising types of gene therapy for mesothelioma treatment is called “suicide gene therapy.” This involves targeting tumor cells with a virus that has been genetically altered. The virus carries a gene that produces a protein that converts a non-toxic drug into a drug that can kill those cells.

When this genetically altered virus is administered to a patient, the virus infects only tumor cells. After a short waiting period, the patient is subsequently treated with a drug that is not toxic to normal cells. To cancer cells, however, the drug is toxic, because cancer cells have now been infected with the virus, causing them to produce the protein that makes them sensitive to the drug.

Suicide gene therapy has seen some success in patients enrolled in clinical medical research trials. In one such clinical trial at the University of Pennsylvania Medical Center, 34 patients were treated with varying doses of genetically altered Adenovirus. Of these 34 patients, four achieved considerable tumor regression, and two patients from this group achieved complete regression of tumors for more than seven years after treatment.

Other types of gene therapy for mesothelioma treatment include using genetically altered viruses to deliver immune system molecules called cytokines to target cells. Cytokines are proteins that control and direct the immune response. When delivered using gene therapy, cytokines can help the immune system mount an attack against cancer cells.

Side Effects of Gene Therapy

Because gene therapy involves infection with a genetically modified virus, it is not uncommon for recipients of the treatment to experience symptoms of infection such as chills and fever. More serious side effects are possible, but for many people with mesothelioma, the potential benefits far outweigh the risks.

Potential Problems with Gene Therapy

At present, gene therapy is available only to patients who qualify for clinical trials, as the FDA has not yet approved gene therapy for widespread public use. Issues still remain that relate to the effectiveness of gene therapy. There is minimal concern as to side effects and safety issues.

Researchers continue to address concerns in regard to how the patient's immune system responds to the genetically altered virus used in treatment. A negative response can reduce the efficacy of the treatment and will make it difficult to repeat treatments.
Another significant concern about gene therapy is simply the difficulties involved in delivering the virus to target cancer cells in a way that ensures the therapeutic gene will be able to produce the protein once it is inside cancer cells.

Until these two issues are addressed, gene therapy may continue to provide some short term benefits, but the therapeutic genes will be unable to provide a permanent cure.

Mesothelioma Treatment — Immunotherapy

While conventional cancer treatments such as radiation and chemotherapy are more widely used to treat mesothelioma, alternative treatments such as immunotherapy are beginning to be used more often. Alternative therapies like immunology provide the patient with additional options for the control of symptoms, and while immunology does not yet offer a cure, researchers continue to experiment with the treatment in hopes of achieving better results.

What Is Immunotherapy?

Immunotherapy involves using and manipulating a patient’s own immune response to help them fight diseases to which the immune system would not normally respond.

In the case of mesothelioma and other types of cancer, the patient’s immune response does not normally react to and destroy cancer cells, for one very important reason: when the immune system is functioning normally, it destroys only cells that it recognizes as being “foreign,” such as bacteria and viruses. Therefore, a normal healthy immune system does not destroy the cancer cells that are produced by and are part of the body because they are not recognized as foreign. Immunotherapy is a type of treatment that “tricks” the immune system into believing that cancer cells are foreign. When this type of treatment is administered to cancer patients, the immune system can be made to destroy cancer cells, while leaving normal healthy cells unharmed.

Immunotherapy for Mesothelioma

Treating mesothelioma patients with immunotherapy relies on helping the body’s immune system recognize the difference between healthy cells and cells that have become cancerous.

To understand how immunotherapy works, it is first important to understand how the immune system recognizes the difference between body cells and foreign cells. It does this by recognizing and reacting to what are called antigens. Antigens are molecules that are present on the surface of all cells, whether human, bacterial, or viral. A normal immune system can react to and destroy cells that produce antigens that are foreign, but cannot react to cells that produce self-antigen — that is, antigen produced by the body. Immunotherapy, therefore, is geared toward making the immune system recognize antigens on cancer cells as being foreign, so the immune system can destroy those cells.

Active Immunotherapy for Mesothelioma

Active immunotherapy treatments are designed to stimulate the immune system to fight disease. Vaccines, for example, are a type of active immunotherapy. Cancer vaccines are slightly different, in that they are designed to fight diseases that already exist in the body, whereas most other types of vaccine are administered to prevent disease.
Mesothelioma vaccines may be created by removing cancer cells from a patient with mesothelioma. This is usually done in a laboratory by using either whole cancer cells or antigens removed from cells. The cells or antigens are modified in a laboratory so that they can be recognized by the patient’s immune system; they are then injected back into the patient, with the hope of stimulating the patient's immune response to destroy the cancer cells in the body.

Active immunotherapy treatments for mesothelioma are highly specific treatments that are made using cells from the patient's own body. This means that a different vaccine is created for each patient who receives active immunotherapy treatment.

**Passive Immunotherapy for Mesothelioma**

Passive immunotherapy treatments are those that use components created outside the body. These types of treatments differ from active immunotherapy in that passive treatments do not attempt to force the immune system to actively destroy cancer cells.

One example of a passive immunotherapy treatment for mesothelioma is monoclonal antibody therapy, which is currently the most widely used immunotherapy for treating cancer. Antibodies are molecules that the immune system produces to help fight infections. In a normally functioning immune system, antibodies are produced that recognize and bind to foreign antigens that are present on foreign cells, effectively targeting those foreign cells for destruction by other parts of the immune system.

Monoclonal antibody therapy for mesothelioma and other cancers involves removing cancer cells from a patient, and then growing these cells in a laboratory together with other cells that produce antibodies in response to antigens on the cancer cells. During this process, antibodies are produced that are all exactly the same and recognize the same antigen — hence, they are termed “monoclonal.”

The next stage of the treatment involves injecting the patient with the monoclonal antibodies. Once inside the body, the antibodies recognize and bind to tumor cells, because the tumor cells possess the specific kind of antigen that the antibodies were created to identify. If the treatment is successful, the immune system will recognize the monoclonal antibodies and destroy the cancer cells.

As with active immunotherapy, passive immunotherapy treatments are typically specific to an individual patient because they use cancer cells from the patient’s own body.

**Non-specific Immunotherapy for Mesothelioma**

Non-specific immunotherapy treatments differ from the other two types in that they do not involve using cancer cells from the patient’s body. Instead, these non-specific treatments are largely based around using molecules called cytokines, which are an important part of the immune system.

Cytokines are molecules that direct and control the immune system; they are chemicals that have a large variety of functions and enable different types of immune cells to communicate with one another.

Cytokines are usually administered in conjunction with other immunotherapy treatments. For example, cytokines called Interferon and Interleukin-2 can be used to boost the immune response to a cancer vaccine.
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SUPPORT FOR MESOTHELIOMA PATIENTS

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Support Overview

No one likes to be told they have a fatal disease, but mesothelioma sufferers face such diagnoses every day. Dealing with this disease and its prognosis can be quite difficult for both the patient and their loved ones and the eventual outcome is often overwhelming for everyone involved.

Feelings experienced after diagnosis can vary from anger to denial to depression. That’s why it is so important for mesothelioma patients to have a strong support group. Usually that group begins with family and friends but can extend to the medical community and to others who are dealing with the same disease. The right kind of support from the right people can go a long way in helping the patient through difficult days ahead.

Support persons can help the patient understand treatments, manage pain, handle the stress of the disease, and can counsel the patient on such things as legal rights and end-of-life issues, like wills and DNRs. These same support people can help the mesothelioma patient with relationship and practical issues, such as when and what to tell family members about their disease, and where to go to solicit help for everyday chores such as shopping, eating, and personal care.

Because the plight of mesothelioma victims has come to light within the last decade and more people are recognizing the seriousness of asbestos exposure, more and more “official” support groups are available as well. These victim assistance organizations can help mesothelioma patients with medical issues, such as suggestions about the best doctors or places to go for treatment. They can also refer victims to lawyers who are highly experienced in dealing with wrongful asbestos exposure suits. They also bring together mesothelioma victims and their families so they can work in tandem to help each other.

Dealing with Symptoms

One of the major fears that mesothelioma victims face is the fear of the unknown. Many questions will be at the forefront of the patient’s thoughts.

- What will happen to me next?
- How will I feel when the disease begins to progress?
- Will my symptoms get worse?
- Will I be able to take care of myself?”

Indeed, from the onset, dealing with the disease, its debilitating symptoms, and how those symptoms will affect your life can be one of the most difficult parts of facing the disease.

If you’ve been diagnosed with mesothelioma, you’ve no doubt already been dealing with some of the major symptoms, which include:

- Shortness of breath
- Chest pain
- Coughing
- Loss of appetite
- Fatigue
- Depression, anxiety

These symptoms, unfortunately, are likely to worsen as the disease progresses, and added to those symptoms may be the painful and disconcerting side effects of cancer treatments like chemotherapy and radiation, which may cause additional symptoms such as:

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• Hair loss
• Skin rashes
• Dry mouth and throat
• Vomiting and nausea

Handling all these symptoms and dealing with the ways they affect the patient’s life can seem like a daunting task, so it’s necessary for the mesothelioma victim to reach out for support from whatever avenues are available. The first person the patient or family should turn to is the doctor or oncologist. They should speak honestly about the symptoms that are the most severe and ask for help in controlling issues such as pain or breathing problems. Oncologists are trained in dealing with cancer symptoms and can often suggest remedies to ease the symptoms. Patients can also turn to alternative treatments to address some of these same difficulties.

For mental health issues such as depression, anxiety, or issues dealing with death, mesothelioma patients should reach out to a trusted love one or, if necessary, a trained psychologist, counselor, or clergyperson for assistance. Symptoms that plague your mind can be as detrimental as physical symptoms and should be addressed immediately.

Most importantly, patients should never be afraid to ask questions. Understanding the symptoms of mesothelioma, both physical and mental, can help you deal with them head-on when they arise. Knowing what the future may hold for you and avoiding unpleasant surprises can ease the overall stress of dealing with a mesothelioma diagnosis.

Feelings after Diagnosis

Being told that you have a terminal illness is one of the most devastating experiences that anyone can have. When that illness is mesothelioma, the typical reactions can be amplified by anger at the companies and industries that knowingly allowed you to be exposed to a deadly carcinogen. Knowing about and understanding the range of emotions and reactions that often accompany a diagnosis of mesothelioma can help you recognize and deal with them before they get out of hand.

Shock and Disbelief

It is not uncommon for the first reaction to a mesothelioma diagnosis to be “This cannot be happening to me.” At first, you may insist that there must be some mistake or simply not understand the diagnosis or absorb the words that the doctor is saying.

Why Me?

One of the first questions asked by most mesothelioma patients is “Why did this happen to me?” Those who are religious may question their faith or become angry at God for allowing such a terrible thing to occur. It sometimes helps to speak with a clergyperson at this point, for reassurance and guidance.

Anger

Anger is another very common reaction to the news that you have a terminal illness. In the case of mesothelioma, anger can be very pointed and harsh because the disease could have been prevented if information about the effects of asbestos had been more widely known. Often, though, the anger that a mesothelioma patient feels is unfocused and may be directed at family members and friends. If you are a family member of someone
diagnosed with mesothelioma, it is important to remember that they are not angry at you, but at the unfairness of the world, and they may not know any other way to express their helplessness and rage.

**Fear and Uncertainty**

When your entire future is reduced to dealing with the effects of a terminal disease, it is only natural to be afraid. You do not know what the future will bring, who will care for your family when you’re gone, or how you will be able to cope with all the changes in your life. One of the best ways to deal with the uncertainties and fears is to become educated on the topic, and take steps to eliminate the uncertainties. Ask your doctor what to expect medically, and talk to a mesothelioma lawyer about options to protect yourself and your family financially. A psychiatrist, psychologist, counselor, or clergyperson can also help with fear issues. If necessary, don’t hesitate to ask for medication to help with panic and extreme anxiety.

**Depression**

Depression is more than feeling sad and fearful. When depression persists, it is overwhelming and can affect the success of mesothelioma treatments and reduce your quality of life. Depression is a medically treatable condition, but it can be made worse by chemical changes brought on by medications and other treatments. Do not hesitate to ask for help in dealing with depression. Medications can help restore balance and give you strength to better deal with your illness in a more logical way.

**Blame and Guilt**

Many patients diagnosed with mesothelioma will feel guilty and blame themselves. They may question how they could have allowed themselves to be exposed to asbestos or tell themselves that they somehow should have known what would have happened if they allowed exposure to continue. Unfortunately, that guilt is misplaced as many individuals were not warned of the hazards of the deadly dust. Talking to a professional counselor can help alleviate these feelings if they persist.

**Denial**

Beyond the initial feelings of shock or disbelief, most patients accept their diagnosis and begin making decisions about their treatment. Some, though, continue to deny that they have cancer. They may refuse to discuss treatment options or talk about their disease because speaking about it makes it a reality. If denial does not subside, it may be necessary to seek professional help so that the patient begins receiving helpful treatments as soon as possible.

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Dealing with Stress

A mesothelioma diagnosis immediately raises many questions and concerns, causing stress to be an inevitable outcome of the diagnosis. Typical worries include issues concerning your health, stress about finances, anxiety about the future, and feelings of sorrow and loss. For many families, the anxiety and emotional distress are among the most difficult parts of the disease to handle. Knowing what to expect can help both the patient and their families deal with the emotional effects and the stress more easily. Learning about the stages of acceptance is a powerful first step in dealing with stress. It is far easier to arm yourself against stress when you know what to expect.

The most common reactions to the news that you or a loved one has mesothelioma are:

- Shock or disbelief
- Fear of the pain and the future
- Anger at the world, former employers, God, and yourself
- Guilt for allowing oneself to become ill
- Depression
- Grief and feelings of loss
- Denial

Knowing and understanding these reactions can help you and your family deal with them, but sometimes knowing is not enough. It’s often necessary to seek help to combat the stress of the diagnosis.

Mental Health Professionals

A visit to a mental health professional who specializes in assisting people with terminal illnesses can be of value in helping you sort out your stress and deal with all the emotions connected to the disease and its diagnosis. Psychiatrists can prescribe medication to help alleviate mood problems and depression. Others, like counselors or clergypersons, may help you work through issues that are causing struggles and stress merely by talking with you about them.

Alternative and Complementary Methods

Many people find relief from stress in alternative methods such as meditation, visualization, music, and massage. In some cases, health insurance may cover the cost of specialized treatments, which vary from low to rather expensive. If the cost is affordable to you, it’s a good idea to check out some of these methods, which have been known to improve quality of life for mesothelioma patients.

Support Groups

In many instances, talking with others that are going through or have gone through the same experiences can be the best way to deal with stress. Many doctors suggest that their patients join a mesothelioma support group. There are also similar support groups that allow spouses or other family members of mesothelioma victims to speak with others like them. Nonetheless, all of these support groups help mesothelioma victims and their families cope and deal with the associated stress surrounding a mesothelioma diagnosis. Ask your doctor or speak to a mesothelioma lawyer to find a support group near you or, if there are none, join an online support group.
Pain Management

Pain is the scariest part of any disease. No one wants to feel constant pain, and the thought of experiencing such pain is frightening. Unfortunately, however, pain is a very real part of a mesothelioma diagnosis. Dealing with it properly can mean the difference between a good and not-so-good quality of life for the patient.

Pain can be caused by the disease itself and the treatments or procedures associated with the disease. For example, a pleurodesis may cause severe pain in the area of the lungs or chest for several weeks. Radiation may cause pain to the area at which it is focused.

But no matter the type of pain you’re experiencing and the reason for it, mesothelioma patients and their caregivers should be proactive in addressing the pain and its causes. When pain is not addressed, it can affect a number of factors.

- **Sleeping** — Severe pain can result in a lack of sleep, which is essential in fighting the disease. Someone who is not well-rested is less likely to be able to handle difficult treatments or other issues associated with the disease.

- **Eating** — Most people don’t eat well when they’re feeling badly. Pain can cause a loss of appetite as well as nausea or vomiting. A mesothelioma patient must consume all the nutrients needed to fight the disease and the side effects of its treatment, so it’s essential to be honest about pain and your tolerance of it so that you can resume normal eating habits. When pain is addressed, the appetite usually improves.

- **Work** — If you plan to keep working, the presence of pain will no doubt affect your ability to do that, which will, in turn, cause stress that accompanies a loss of income. If you work at home, pain can affect the ability to do everyday tasks, such as vacuuming the house or doing the laundry.

The first person who needs to know about your pain and its severity is your doctor. He/she may first suggest over-the-counter remedies, but as the pain progresses, prescription medication may be required to provide relief. Tell your doctor specific details about your pain such as where it occurs, when it most often occurs, and how severe it is. If it’s affecting your everyday duties, talk about that as well. Finally, if your current pain reliever is not working, request something different or stronger.

Many individuals specifically fear the pain at the end of their lives, when they may be unable to communicate the need for medication. That’s why it’s important to provide advance directives and to allow a loved one to intervene on your behalf. With myriad pain relievers available, death does not need to be a painful ordeal.

Creating a Management Plan

After a diagnosis of malignant mesothelioma, your entire life may seem to be completely out of your control. Other people are making appointments for you, ordering your medications, dealing with the everyday decisions that you have always made, and you are suddenly confronted with decisions you never dreamed you would have to make.

Working with your caregivers and other professionals to create a plan for managing your mesothelioma and your care is an important step in retaining control of your life and seeing to it that all the important issues are addressed.

A management plan for mesothelioma is more than a “work schedule.” It should encompass every aspect of your life that is affected by your illness — your health, your relationships, your finances, and your daily care. It is not an easy task, but it is a necessary and gratifying one. A carefully crafted management plan can help you prioritize the things in your life and ensure that all the important issues are being addressed.
Finances

Finances are likely to be among your biggest worries, and sorting them out may be at the top of your priority list. Mesothelioma usually robs you of the ability to financially support yourself and your family, though some individuals continue working after diagnosis. Your health insurance may cover medical care, but you may also incur expenses that are not covered by your insurance. Some prescription medications are only partially covered or not covered at all, and the cost of long-term care may eat into the savings you had intended for retirement, leaving your family in debt.

A good financial management plan will help you prioritize expenses and allow you to explore all the options available for financial assistance and compensation for your family. Due to the unique circumstances surrounding asbestos-related conditions, a consultation with a mesothelioma lawyer can be invaluable in discovering and accessing financial resources that are available to your family.

Medical Care

Creating a management plan for medical care for malignant mesothelioma should include yourself, your main caregivers, and the medical professionals involved in treating you. It should cover everything from medications to the options that are open to you in the future. One of the most important components of your medical management plan is a treatment schedule. It will help you and your caretakers with medication schedules, meals, appointments, and transportation so that every aspect of your medical care is addressed. Having things planned in advance will help you avoid additional stress caused by things like having to scramble for transportation to a treatment appointment. In the long run, it will also assist your family when it comes time for them to make more difficult decisions.

Nutrition, Diet, and Exercise

When faced with a serious illness like mesothelioma, nutrition and physical exercise become more important than ever in managing the pain and stress associated with such a disease. Both diet and exercise can provide your body with nutrients that will reduce your pain and help you deal with everyday life far more easily. Discuss your options for pain management, nutrition, and stress management with your medical providers and work them into an overall management plan to combat your illness.

Life Plans

When you are confronted with the devastating news that you have malignant mesothelioma, your first reaction may be to think that your life is over. All your future dreams and plans may seem completely out of reach. While your future has definitely changed, you do still have a future, and as treatments for mesothelioma progress, the life spans of those diagnosed with the disease lengthen.

While it is essential to address issues like pain management and wills in your management plan, it does not all have to be negative. Faced with the prospect of a completely changed future, you may find that you want to reprioritize your life plans. It may mean leaving your job now to make the most of every moment you have left, or shuffling your finances to take that trip to Europe that you and your partner have planned all your lives, while you are healthy enough to enjoy it.
Relationship Issues

A diagnosis of mesothelioma will affect every area of your life, including your relationships with other people. In many cases, you will have little control over how people react to the news of your illness. Some may change the way that they act around you, from being more conscious and careful of the things that they discuss with you to completely avoiding you. Those things can be difficult to handle, but understanding that they are dealing with their own emotions and their grief at potentially losing a friend may make it easier to bear.

Most likely, you will spend some time considering how to confront others about your disease. Some questions may include:

When do I tell people that I have mesothelioma?

The decision to tell or not tell people that you have been diagnosed with mesothelioma is a very personal one. Some people decide that they are more comfortable letting someone else deliver the news. They are not sure how they will deal with their own emotional reactions to speaking the words out loud or how others will react to the news that a loved one is dying of a terminal illness.

There are many reasons that you might delay telling friends, family members, and co-workers about your illness. Do keep in mind that those close to you will eventually notice that something is wrong. Even if you decide to wait to tell people that you are ill, you may want to find ways to let them know before it becomes obvious and rumors begin to spread.

Should I tell my children/grandchildren?

Many people feel that it is best to shelter younger children from the more difficult parts of life. The biggest problem with shielding your younger children, grandchildren, or family members from the news that you have mesothelioma is that they will probably figure out that something is wrong and determine that the adults in their life are hiding something from them. Young children are much attuned to the moods and actions of people around them. When grandpa is always too tired to play, or is suddenly irritable, they may misinterpret what is happening. Many will blame themselves or believe that grandpa has stopped loving them.

Depending on the age and sensitivity of the child, you may not want to share all the details of your illness or the prognosis. It is often enough to just tell them, for example, that grandpa is taking medicine to help him feel better, but it makes him tired sometimes. If you are not comfortable discussing your illness with your children or grandchildren yourself, it may be easier to let another family member explain things to them.

How will this affect my intimate relationships?

Everyone reacts differently, but having mesothelioma does not necessarily spell the end of intimate relations with your partner. While some may find that sex is the furthest thing from their minds, others may want and need the closeness and comfort of being close to the one that they love most. Your sexuality after a mesothelioma diagnosis is a very personal thing, and it will be different from one person to the next. But it is important for both you and your partner to understand that your sexual relationship will almost inevitably change after your diagnosis.

There are many reasons for this. Your treatments may leave you feeling too tired or ill to enjoy sexual activities. The physical changes to your body may make you feel unattractive and hesitant to approach your partner sexually. The stresses of dealing with the day in and day out realities of your mesothelioma treatments may leave both of you feeling little sexual desire.
No matter what you are feeling, the most important thing that you can do is to communicate with your partner so that they understand what is happening within you and between the two of you. Communication can help both of you move back toward a loving, physical relationship that may be different than your old relationship, but fulfilling and comforting in the same ways.

**Practical Issues**

Being diagnosed with mesothelioma raises many questions and issues for both the patient and his or her family. Once the initial shock has passed, you will have many questions and concerns about the practical aspects of handling your care and your everyday life. The most important thing to remember is that you are not the only one who has ever asked these questions. There are many others just like you who have had to deal with the questions of working, caring for their families, transportation, and finances. There are always places to turn for support and answers. These are some of the most common questions that people facing a mesothelioma diagnosis may ask.

**Can I continue to work?**

Working is a major issue for many people. The decision of whether to continue to work may be taken out of your hands, depending on the severity of your disease and the treatments recommended. If your doctor feels that you are physically well enough to continue at your job, you may have to talk to your employer about your disease.

**Should I tell my employer?**

In most cases, the answer is a resounding “yes.” Most employers will be empathetic and do whatever they can to help adjust your working hours and make modifications that will allow you to continue working. Keep in mind that you cannot legally be fired or laid off because of your diagnosis. If that happens, you should immediately seek legal advice or tell your lawyer if you have already retained one.

**Should I tell my co-workers?**

That is a personal choice that is different for each person. You may feel more comfortable if people do not know, especially at first. Chances are, though, that your co-workers will eventually notice that something is wrong. You may choose at that point to tell them rather than let rumors circulate.

**How about my financial rights and insurance?**

Review your medical insurance and other policies with your human resources officer to find out what will and will not be covered under your health insurance and other policies. Human Resources may also be able to help you manage your sick time, vacation time, and other paid time off so that you can remain employed as long as possible. If you have any questions about your legal rights regarding employment and your health, consult a lawyer skilled in handling mesothelioma cases.

**What if I want to leave work?**

Many people choose not to continue working after being diagnosed with mesothelioma. Some choose to use their time to get closer to family and friends or to do things that they have always wanted to do. Others simply choose to focus all of their energy and attention on their treatment. The choice is personal.
**How will this affect my daily life?**

Since every patient is different, it is difficult to determine how your mesothelioma diagnosis and treatment will affect your daily life. For some, even the smallest tasks become overwhelming. Being ill is draining, and the side effects of some medications and treatments can bring exhaustion, nausea, and other discomforts. One of the most important things to remember is that you do not have to do this alone. Ask for help with difficult tasks, even those that you have been managing yourself for years. This may mean engaging a housekeeper to deal with the housecleaning or handing off errands to a family member or friend.

There are also federal and local programs for which you may qualify that will help relieve some of the burdens of daily chores like making meals. Your mesothelioma lawyer can often direct you to programs and financial aid for which you may be eligible.

**Financial Issues**

Among the most worrisome of practical issues are those that concern your finances. It is important to address these as soon as possible. If your illness forces you to leave your job, discuss your options for long-term disability benefits or other benefits that may be part of your job package, and look into the other options that may be available to you. In addition to bringing suit against those responsible for your illness, a mesothelioma lawyer can also be a valuable resource in applying for other benefits for which you may qualify through the VA or Social Security.

**Treatment Side Effects**

Some of the treatments used to combat mesothelioma produce unpleasant side effects. While some of this is unavoidable, there are things that you or your doctor can do to help reduce the severity and discomfort of side effects related to chemotherapy and radiation treatments, as well as the side effects of other medications that you may be taking to control pain.

**Dealing with Fatigue and Exhaustion**

- Plan ahead to minimize chores and physical activities in the days that immediately follow treatment. Side effects vary from person to person, but it is common to feel weak and nauseous after treatment. Plan your days to allow plenty of rest, and try to have someone around to help you with everyday tasks.
- Ask someone else drive you to and from your appointments to conserve energy.
- Try one of the alternative or complementary methods of dealing with fatigue. Many people find that yoga, therapeutic music, biofeedback, or some other method helps them to energize during this time.
- Have your doctor check your blood for anemia, which is a side effect of many types of mesothelioma therapy. There are medications that can counteract the loss of iron in your blood.
- You may need to lower your expectations in regard to what you can and cannot do. If you are tired, rest or nap without feeling guilty. Or instead of going to bed, sit with your feet up and eyes closed and listen to music for half an hour or so.

**Dealing with Nausea**

- Nausea is one of the more unpleasant side effects of chemotherapy, radiation, and even pain medications. Your doctor may prescribe anti-emetics to help control nausea and vomiting.
- Avoid sweet, fatty, and fried foods, which tend to make nausea worse.

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• Space out your meals over the course of the day. Several small meals with snacks in between instead of two or three large meals may reduce the occurrence of nausea and vomiting.

• Eat a light snack or meal before your mesothelioma treatment. Since there may be a long wait at the treatment center, some experts recommend bringing a light snack with you so that you are not receiving treatment on an empty stomach when it’s finally your turn.

• Complementary therapies can be helpful in dealing with nausea. Speak with a nutritionist about foods and meals that may reduce nausea. In addition, nausea is made worse by stress, so stress reduction techniques may be helpful in reducing nausea and vomiting.

• Eat foods that appeal to you. Forcing yourself to eat something that is unpalatable will only make things worse.

• Make eating convenient. It is tempting to skip meals when you are too tired to prepare something to eat. Keep foods like sliced fruits, chilled vegetables, soup and other easy to digest and eat items on hand, preferably in single serving sizes that you can prepare and eat easily.

• Try massage. Many proponents of this alternative therapy note that it often relieves nausea.

Dealing with Constipation

• Constipation nearly always accompanies treatment with opioid pain medications. Knowing that in advance can help you prepare for it.

• Your doctor may be able to prescribe stool softeners or other medications to relieve constipation.

• A nutritious diet with plenty of fluids and fresh fruits and vegetables will help keep constipation to a minimum.

Dealing with Hair Loss

Chemotherapy does not always cause hair loss, but when it does, it can be a particularly distressing side effect. Consider wigs, turbans, or hats to minimize the effect on your appearance. Your hair will grow back after treatment, but in the meantime, combat the emotional effects by doing something that makes you feel good about yourself.

Planning Ahead to Reduce Side Effects

Knowledge can help you deal with the side effects of mesothelioma treatments. Discuss possible side effects with your doctor before starting treatment so that you know what to expect. Once you start your therapy, keep track of your side effects so that you can discuss them with your doctor at your next appointment and determine ways to better control them.

For the Caregiver

Being the primary caregiver for a person with mesothelioma is not an easy task. If a loved one or family member has been diagnosed with mesothelioma and you are chosen as the designated caregiver, it will be very important for you to not only take care of the patient but yourself as well.

The daily tasks of caring for someone you love who has been diagnosed with malignant mesothelioma can be overwhelming. Besides dealing with your own emotions, fears, and uncertainties, you will find yourself responsible for most of the daily tasks, as well as managing appointment schedules, remembering medications...
and treatments, dealing with professionals both medical and legal, bathing and feeding your loved one, and managing his or her financial affairs. Add to this the realization that your you and your family’s lives are forever changed and you may find that you just can’t handle it.

Burnout is common for caregivers, so it is vital that you find support for yourself and take care of your own needs while caring for your loved one. The quality of the care that you can provide will be affected when you feel tired and overwhelmed yourself. There are many places you can turn to find support, and there are a number of things that you can do for yourself to reduce the risk of being overextended and becoming ill.

**Five Things to Do for Yourself**

**Find a support group.** Family and friends are well-meaning and can be a great comfort, but there is no substitute for the experience, advice, and support you can find in others who are dealing with the same issues that you are facing. If there is no support group in your area, an online group can be helpful. Check with your oncologist for referrals, or, if you are pursuing a legal mesothelioma claim, check with your lawyer for any resources that his/her office may provide.

**Take time off when you can.** Even a few hours away from the house can help lift your spirits when everything is overwhelming. Health insurance, including most publicly funded healthcare plans, often includes coverage for respite care so that you can take some time away.

**Take the time to eat properly.** Good nutrition is far more important than most people realize. When your time is consumed with taking care of someone who is ill with mesothelioma, it is easy to forget to take care of yourself. Make healthy, nutritious meals for both yourself and your loved one. You will both find it much easier to cope with stress when your bodies have all their nutritional needs met.

**Meditate, pray, read, or take a walk.** Stress and anxiety are ever-present when dealing with a terminal illness. Find an effective method of dealing with stress and do it every day. Some people find relief in meditation or yoga. Some turn to prayer. Others find that something as simple as a daily 15-minute walk helps relieve the stress and anxiety they are experiencing.

**Ask for help.** It is not a sign of weakness to ask for help when you feel overwhelmed. If friends and family are not available to do things like run errands or take your place for a few hours so you can get away, there are other resources you can access. Volunteer groups provide meals and daily visitors, and your doctor or mesothelioma lawyer may be aware of many resources in your community that can provide respite and other services.

If you still feel guilty about asking for help, remember that doing everything by yourself deprives others of a chance to serve. Very often, there are people in your life who want to help but do not know how and these people will welcome the opportunity to be of assistance.
Wills and DNRs

Currently, a diagnosis of mesothelioma means that your illness is terminal. While there are ways to prolong your life and improve its quality while dealing with the illness, mesothelioma is incurable. For many people, that means dealing with end-of-life issues long before expected. While it may not be pleasant to consider making your will, drawing up a living will, assigning power of attorney, or writing directives concerning care management, if you are later unable to make decisions for yourself, they will ensure that your wishes are carried out in the event that you can no longer speak for yourself.

Many people feel uncomfortable with these issues. For some, they are very personal and private. But if you are not sure that you can deal with the decisions on your own, you can ask a trusted friend or family member for assistance or find a lawyer who can be sure that everything is in good legal order.

What is an “advance directive”?

Advance directive is the name given to legal documents that allow you to let your family and care providers know about your wishes regarding end-of-life care ahead of time. They include living wills, durable powers of attorney, and do-not-resuscitate (DNR) directives.

Do I really have to make these decisions now? What if I change my mind?

It can be difficult to make decisions about end-of-life care even when you are well. When you are seriously ill, the entire process can seem overwhelming. Avoiding the decisions until you are incapable of making them will place undue burden on your loved ones. Providing them with an advance directive like a living will or do-not-resuscitate order will be a great relief to them.

Ideally, writing advance directives should not be a one-time event. There is always the possibility that you may change your mind or that circumstances may change between now and a critical moment. Signing a do-not-resuscitate order does not lock you into that decision forever. If something changes, you can re-write the directive.

Why should I write a will?

Your Last Will and Testament is a legal document that instructs surviving relatives how your personal effects and wealth are to be distributed. If you die without a will (intestate), your family will have to go through probate to settle your estate; the process is long and there is no guarantee that your effects will be distributed as you wish. An attorney can help you draw up a will that is legally binding, which will make things easier on your family after your death.
What is a living will?

A living will is a legal document that outlines your wishes for medical care in the event that you are unable to communicate them. Sometimes known as “health care directive” or “advance declaration,” a living will allows you to make advance decisions about which medical care you will accept or decline, including use of a respirator, artificial feeding, and other medical procedures designed to sustain your life.

How is that different from a DNR?

A do-not-resuscitate order is a legal document signed by a licensed physician at your request or at the request of your legal representative. It instructs doctors that you do not wish them to attempt resuscitation in the event of cardiac or respiratory arrest. It is best to discuss this option with your family and loved ones so that they understand how important this is to you, but the doctors are bound by law to follow it if you have signed a DNR.

What does a medical power of attorney do?

Some people prefer to put the decisions about their health care into the hands of someone that they trust to follow their wishes. A medical power of attorney is a legal document naming a particular person as the one who is legally entitled to make medical decisions on your behalf if you are unable to make them for yourself. A medical power of attorney should always be drawn up with the assistance of a lawyer to be certain that it is enforceable.

Is there anything else I should know about advance directives and wills?

Keep in mind that you can always change your mind about any medical directive. If your circumstances change, you can call your attorney and have your will, living will, power of attorney, DNR, or any other document directing your medical care modified. In addition, be certain that members of your family know that these documents exist and that the directives are accessible if needed in an emergency situation.
OCCUPATIONS EXPOSED TO ASBESTOS
Occupations

Since its creation, asbestos has been used in a variety of ways in a number of occupations. Many of the people who worked in these various occupations have contracted different health problems from their exposure to asbestos.

Workers from practically all trades have been involved with asbestos in some way, even those who worked in the unlikeliest of professions. Asbestos was used in the past in a variety of products, but was largely found in shipyards, petrochemical plants, paper mills, factories, steel mills, building construction, and the telephone industry.

- Asbestos textile mill, protective clothing, and glove makers came in contact with asbestos while they weaved it into cloth.
- Automobile manufacturing production, brake and clutch manufacturing, and assembly workers, including automobile mechanics and brake repairers, used asbestos on brake linings and clutch pads.
- Building engineers, building material products manufacturers, cement plant production workers, and construction workers all worked with asbestos-related products.
- Electrical workers, including electricians, electrical linemen, and telephone linemen, came in contact with asbestos insulation around electrical products.
- Shipyard workers, Coast Guard personnel, longshoremen, merchant mariners, and U.S. Navy personnel worked and lived in areas that employed the use of asbestos.
- Demolition and wrecking crews were at risk when they destroyed buildings that used asbestos as insulation.
- Custodians, insulation manufacturing plant workers, pipefitters, machinists, insulators, packing and gasket manufacturing plant workers, and powerhouse workers all came in contact with asbestos.
- Railroad workers, sheet metal workers, steamfitters, refinery workers, rubber workers, refractory products plant workers, and warehouse workers also worked with asbestos on a daily basis.

U.S. Navy Vets

United States Navy veterans are passers-on of a legendary military tradition — one with a rich history of triumph, glory, perseverance, and suffering. All of our veterans have been through a great deal of hardship. Whether they suffered injuries overseas, lost friends during combat, were held prisoners of war, or made it home from their tours unscathed, veterans have sacrificed a great deal to preserve our way of life in the United States.

Unfortunately, for many of the men and women who sacrificed everything to protect the sovereignty of our nation, the hardship is seemingly never-ending. Oftentimes, those lucky veterans who made it home alive face innumerable difficulties once they are back on United States soil. Many of our U.S. Navy vets are beset with mental-health troubles and plagued by reminders of their war experiences or by a lingering health complication.

Of those thousands of Navy men and women who served overseas during World War II, many came back having been exposed to a threat they had not foreseen and for which they could not prepare themselves: they had been exposed to asbestos. The number of soldiers and seamen who were exposed to asbestos during World War II is absolutely staggering. In fact, so many U.S. Navy veterans were exposed to asbestos during their tour that the number of soldiers killed in battle is rivaled by the number killed by asbestos-related diseases like mesothelioma, asbestosis, and lung cancer. Nearly 100,000 U.S. Navy veterans and shipbuilders would die as a result of exposure to asbestos during the World War II years.
As our nation declared war, the economy in the United States shifted to fulfill the great need for wartime supplies, such as sea vessels. Asbestos was widely used in shipbuilding during this boom in the industry because it was readily available, inexpensive, durable, fire-resistant, and had excellent insulating properties.

As a result of the increased use of asbestos in insulations and other shipbuilding materials, asbestos materials could be found in scores of locations on Navy ships, potentially exposing thousands of servicemen to the effects of asbestos. In the engine room, asbestos was used in engine gaskets and in insulation surrounding electrical wires and pipes. Boilers were insulated with an asbestos compound, as were boiler pipes, and any machine or pipe requiring a seal against leakage was typically sealed using an asbestos sealant.

Nearly ubiquitous on a Navy ship, most ropes were woven with asbestos fibers, which were released into the air as the material frayed. With these fibers in the atmosphere, no seaman was safe. Multiuse blankets on Navy ships also contained asbestos, and according to eyewitness testimony, these asbestos blankets were used everywhere, filling the living and working space with dangerous asbestos dust.

U.S. Navy vets were also exposed to asbestos when the insulation in the walls, ceilings, and in the flooring tiles of the ship were disturbed. Behind these surfaces, shipbuilders had installed vast quantities of asbestos insulation, intended to prevent the transference of heat from engine rooms and to protect living spaces from extreme temperatures. While asbestos insulation, floor tiles, and ceiling tiles fulfilled their function as an effective insulation, the presence of these hazardous materials put veterans in harm's way.

Because the symptoms of asbestos-related illnesses take years or even decades to present, U.S. Navy veterans may have been exposed without their knowledge, only realizing the danger when the first signs of asbestosis or mesothelioma begin to appear.

While lawsuits filed by Navy veterans are common, these vets cannot sue the U.S. government for their pain and suffering. However, they can sue the manufacturers of the asbestos-containing products that may have compromised their health.

Auto Mechanics

A good mechanic is invaluable and, in general, mechanics play a vital role in the health of the U.S. economy. Mechanics perform a very important function, repairing and maintaining vehicles so that the transportation needs of Americans are met. But over the last hundred years, due to the presence of asbestos in auto parts such as brakes and clutches, the health of many automotive mechanics has been compromised.

Auto Mechanics and the Risk of Asbestos Exposure

For decades, thousands of mechanics were exposed to asbestos, unaware of the dangers of working with the mineral. Little or nothing was done to protect these men (and women), largely because asbestos manufacturers and the leaders of the automotive industry kept the everyday automotive mechanic in the dark, refusing to expound on the dangers of working with the toxic material.

Although the EPA warned automotive industry executives about the dangers of asbestos by the mid-20th century, these executives did little to inform the members of their working community. Compounding the problem was the fact that auto mechanics usually worked in tight areas (such as garages) with poor ventilation, increasing the chance of inhaling tiny asbestos fibers that would lodge in their lungs and cause health problems later in life.

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Despite the fact that the EPA issued official asbestos warnings in the mid-1970s and OSHA continues to offer guidelines on working with asbestos safely, dangerous levels of asbestos dust can still be found in thousands of automotive workshops across the country, where they pose a serious threat to the health of workers and bystanders. In a study recently conducted by the EPA, more than two-thirds of the automotive garages inspected had dangerous levels of asbestos dust present. As a matter of fact, the researchers who conducted this study estimate that the dust found in most garages ranges from 2% to 60% asbestos — a staggering finding.

From where does all the asbestos dust come? The worst culprits are the parts surrounding the automotive brake — the brake lining, pad, and the drum. These once contained asbestos, due to its excellent heat- and fire-resistant properties. With use, the lining and pad wear down, causing asbestos dust to settle on the drum and other brake parts. During repair or replacement of the brake, an automotive mechanic must remove and clean the brake drum, at which point he or she is at a high risk of aspirating the loose asbestos dust.

Clutch facings and gaskets were also once commonly manufactured with asbestos materials. Especially problematic is the gasket, which during removal and installation must often be cut and fashioned to fit a particular engine. During this procedure, asbestos fibers in the gasket material may be released into the air, where they pose a serious threat to the health of automotive mechanics.

Though these parts no longer contain asbestos if manufactured in America, foreign parts sometimes still contain the hazardous mineral. In addition, those working on older cars might encounter old asbestos-containing parts. According to recent studies, the incidence of lung cancer in automotive mechanics is significantly higher than in the general population, and anecdotal evidence points to similar numbers for mesothelioma, which can only be caused by exposure to asbestos.

**Boilermaker**

A boilermaker is an individual whose job it is to maintain, install, and repair boilers or other large vessels that hold either liquids or gasses. The job of a boilermaker can be difficult and dangerous, sometimes involving hours spent in damp, cramped quarters, working with potentially hazardous acetylene torches and other tools.

**Boilermakers and the Risk of Asbestos Exposure**

Many years after the first boilers were manufactured and installed in commercial buildings and residences, many thousands of boilermakers are suffering from serious diseases, largely due to the fact that their working environment was contaminated with asbestos.

Because boilers and other similar vessels produce extreme heat — hence the name “boiler” — insulation was often used to protect the vessels from fire. In the days prior to the asbestos warnings, the insulation was fashioned from the most successful insulation product ever manufactured — asbestos. In fact, thousands of boilers around the country are still contaminated with asbestos, found in the insulation for both the boiler and the pipes that surround it. While repairing or maintaining such a boiler, a boilermaker is at risk of disturbing the asbestos insulation, which may then in turn release asbestos dust into the air. If a worker or bystander aspirates this dust, he or she may eventually develop a life-threatening illness.

Other boiler-related materials also pose the risk of asbestos exposure for the working boilermaker. Sealants used to patch boilers and pipes often contained asbestos, as did asbestos cloth and asbestos tape, used to prevent leakage of gas or liquid from pipes. Most boilers also require a gasket, which is used to protect the inner parts of the boiler from extreme heat. For many years, asbestos was the number one material from which gaskets for boilers and other heating units were produced. During installation, boilermakers would often cut or manipulate the asbestos gasket so that it would fit properly inside the boiler. As the asbestos material was manipulated, microscopic asbestos fibers could be released into the air, where they could cause serious harm if inhaled.

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We can help!
Even today, most boilermakers are at risk of exposure because well-made boilers can last decades, which indicates that many boilers insulated with asbestos are still in use today and may present a hazard for the individual who maintains, repairs, or disassembles them for removal.

Carpenters

Carpenters are an ancient profession. The word itself is derived from the Latin word carpentrius, meaning “carriage maker,” a highly regarded occupation in ancient times. Today, carpenters are still perceived as highly skilled craftsmen who use their talents to build furniture, buildings, and even ships.

Carpenters may be separated into two broad groups: rough carpenters and finishing carpenters. The first category is comprised of carpenters who carry out large construction tasks such as framing for residential or commercial buildings. Roofers are also in this category, as are some shipwrights. Finishing carpenters are those who design and build furniture and complete more detailed carpentry tasks for buildings.

Carpenters and the Risk of Asbestos Exposure

Throughout most of the 20th century, carpenters worked with an array of construction materials that often contained asbestos. Due to the substance’s durability, fire/heat resistance, and insulating properties, it was commonly used in these products as a safety precaution.

During the 20th century, anyone employed in construction may have been at risk of asbestos exposure. For carpenters, the greatest risk was in rough carpentry and shipbuilding, which includes any carpenter working as a framer or roofer. Finishing carpenters who worked in construction were also at risk; however, finishing carpenters who worked primarily at furniture-making faced little chance of exposure.

Carpenters may have been exposed to asbestos through working with products such as:

- Finishing cement, flatboard, micarta, millboard, rollboard
- Acoustical plaster or acoustic finishers
- Patching plaster or patching fiber
- Asbestos cord, felt, packing, agricultural filler
- Roofing materials such as felt, shingles, and adhesives

In short, almost every construction product that carpenters used prior to the mid 1970s or early 1980s may have contained asbestos. In addition, because many other construction products — not just those used by carpenters — contained asbestos, it is likely that carpenters working on residential and commercial building sites toiled in asbestos-laden environments on a daily basis.

It was not until 1977 that the Consumer Product Safety Commission began to regulate the use of asbestos in construction products. Even so, while the use of asbestos in most construction products was banned at that time, the ban did not extend to existing stocks of such supplies — only to the manufacture of new products. For that reason, carpenters may have continued to be exposed to asbestos on the job as late as the mid-1980s.

Until the late 70s, there were virtually no restrictions on the use of asbestos, and very few companies provided their workers with protective equipment to prevent asbestos exposure, resulting in thousands of workers across America being exposed to asbestos on a regular basis. In the late 20th century, the true dangers of asbestos were highlighted in tragic fashion as carpenters and other workers began developing debilitating and fatal diseases related to exposure, including asbestosis and mesothelioma.
While construction products no longer contain asbestos, there is still significant risk of asbestos exposure to carpenters who work on old buildings or ships. Individuals who work at such sites must take care to wear protective clothing in any situation where they may be at risk of asbestos exposure. Older asbestos construction materials are particularly hazardous. As asbestos ages it becomes dry and friable, the materials crumble and break more easily, potentially releasing large quantities of asbestos fibers into the air. In any location where the presence of asbestos is suspected, protective clothing should always be worn.

**Construction Workers**

Construction workers are employed across America on residential and commercial construction sites. They may be electricians, plumbers, bricklayers, painters, carpenters or other specialty workers, or they may be involved in heavy labor, machinery operating, or other tasks.

The construction industry is one of the most hazardous in the country, with a high risk of falling, machinery and vehicle accidents, and until the mid-1970s, the potential of exposure to asbestos from thousands of asbestos-containing building products.

**Construction Workers and the Risk of Asbestos Exposure**

During the 20th century, construction workers of all types worked with products that often contained large amounts of asbestos. This naturally occurring substance was recognized for its fire and heat resistant/insulating properties, and it was a common component of a vast array of different construction materials until warnings were issued about its hazards in 1977.

Construction workers may have been at great risk of asbestos exposure when working with any types of construction materials, including:

- Finishing cement, refractory cement
- Flatboard, micarta, permaboard, millboard, rollboard
- Acoustical plaster or acoustic finishers
- Patching plaster or patching fiber
- Packing, agricultural filler and insulation
- Floor and ceiling tiles
- Roofing materials such as felt, shingles, and adhesives

In 1977 the Consumer Product Safety Commission began to restrict the use of asbestos in such products; however, while asbestos could not be used in manufacturing most construction materials after this time, the ban did not cover existing stocks of such products. Any construction worker who was employed on residential or commercial building sites up to the mid-1980s may have been at great risk of asbestos exposure, regardless of the specific type of work they did, simply because asbestos was used in so many different construction products for so long.

In addition to the lack of restriction on the use of asbestos throughout most of the 20th century, most construction companies did not provide their workers with protective equipment and clothing to prevent their workers from being exposed to asbestos. Indeed, construction workers were often employed in environments that were heavily laden with airborne asbestos fibers, and these fibers were inhaled by unprotected workers on a daily basis.

1-800-615-2270

We can help!
Even though the dangers of asbestos were known as early as the 1930s, many thousands of construction workers were repeatedly exposed to this toxic substance without being provided with safety equipment that could have saved their lives. In the late 20th century, the results of this widespread exposure were seen as construction workers and other people working with asbestos began to develop life-threatening diseases such as asbestosis and a rare but aggressive form of cancer called mesothelioma.

Asbestos-containing construction materials are no longer used in new construction. However, construction workers may still be at risk for asbestos exposure when they work on residential or commercial buildings that were constructed before the 1980s. The danger of asbestos exposure is heightened as buildings age, because asbestos construction materials become friable over time, meaning that the asbestos crumbles easily and the fibers have an increased tendency to become airborne. Construction workers should take care to use protective equipment in any situation where the risk of asbestos exposure is present.

Drywall Tapers

Before the late 1800s, interior walls were made of plaster. The process of building these walls was time consuming and difficult, as it involved building up layers of plaster over a framework of laths, with each layer required to dry completely before the next could be applied.

In 1916, US Gypsum invented Gypsum board, also called drywall or sheetrock. Drywall came in standard size sheets of 4 feet by 8 feet. It sandwiched a layer of gypsum and other materials, including asbestos, between two sheets of heavy paper. It could be nailed onto wall studs to offer a smooth surface for finishing in a fraction of the time required to plaster a wall.

Drywall did have some disadvantages, however. For example, walls would show seams where the sheets of drywall met, as well as marks where the nails were driven into the studs. For that reason, the job of “drywall taper” was soon invented. This individual would follow behind the sheetrock workers, applying drywall tape and taping compound over the seams and nail heads, then sanding the surface to a smooth finish.

Drywall Tapers and the Risk of Asbestos Exposure

Like the vast majority of products used in construction, drywall contained asbestos. From the time that gypsum board was invented in 1916 to the late 1970s and early 1980s, drywall tapers were exposed to high levels of asbestos in the workplace from a number of different sources. Among the duties that might have exposed drywall tapers to asbestos dust were:

- Sanding taping compound, which contained asbestos
- Cutting and applying asbestos-treated tape to drywall seams
- Mixing drywall compound and taping compound, which contained powdered asbestos

In addition, drywall tapers work side by side with other contract workers. They may have been in the vicinity while sheetrock was being cut, sanded and fit to the walls, increasing the possibility of their exposure to asbestos dust.

Any activity that involves sanding and cutting products that contain asbestos can result in the release of asbestos dust into the air, where it can be inhaled or swallowed. Asbestos exposure has been linked to mesothelioma, a deadly cancer of the thin membrane that covers the lungs, along with lung cancer, asbestosis and a number of other illnesses and diseases.

Among the products that might have posed an asbestos exposure risk to drywall tapers are:

- Sheetrock
- Gypsum board
• Drywall
• Asbestos plaster
• Taping compound
• Drywall tape

Since the late 1970s, most of the products now used in construction, including drywall tape, sheetrock compound, plaster, and taping compound, are asbestos-free. However, if you worked as a drywall taper at any time in the past, there is a very high chance that you were exposed to asbestos in the workplace. Furthermore, if you participate in remodeling or renovations at old homes or commercial buildings, you may encounter asbestos throughout these buildings. Be sure to wear a mask or respirator when performing drywall duties in these structures.

Electricians

Electricians are trained professionals who install, connect, repair, and maintain wiring and electrical systems in commercial and residential construction. Electricians can be involved with construction from the earliest stages of building or may be responsible for replacing outdated electrical systems in homes and commercial buildings that were built at an earlier time.

Throughout the history of a building, electricians are among the groups of professionals who are most likely to be involved in upgrading and renovations. Because the electrical industry has changed considerably over time, electricians are often called upon to upgrade wiring, install new electrical outlets, repair damaged wiring, and otherwise maintain and improve the electrical wiring and systems in buildings of all ages. Besides residential work, electricians may also work in aviation or shipbuilding, both fields where electrical equipment is vital to proper operation.

As they work, electricians are exposed to many hazards, including the risk of electrocution, of falling while working on ladders or scaffolding, and the chance of exposure to deadly chemicals and substances like asbestos.

Electricians and the Risk of Asbestos Exposure

Because electricians often work in buildings that were constructed during the years in which the construction industry made heavy use of asbestos-containing products, including wire and electrical insulation, there is often a high risk of exposure to asbestos.

Electrical insulation products are not the only source of asbestos exposure for electricians, however. Wiring is most often concealed in and behind walls, which means that in order to reach wiring that needs repairs, electricians must often cut holes in walls and dig through asbestos-containing drywall and insulation. If the building in which they are working was built before 1980, electricians face the risk of inhaling asbestos dust as they work.

Asbestos exposure carries with it the risk of developing serious lung diseases, including mesothelioma, a rare but deadly cancer with no known cure. Certain professions are more inclined to develop the disease than others. Electricians are among that group.

Electricians may be exposed to asbestos during the course of their work when carrying out tasks like:
- Cutting through old drywall containing asbestos
- Working in attics, cellars, and other closed spaces with asbestos insulation
- Removing and replacing asbestos insulation on old wiring
- Rewiring or replacing outdated electrical systems

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We can help!
There were once more than 5,000 products on the market that contained asbestos, including many of those used in the construction industry. Some of the asbestos-related products that electricians might come into contact with include:

- Acoustical plaster
- Decorative plaster
- Ceiling tiles
- Electrical panel partitions
- Electrical ducts
- Electric wiring insulation
- Textured paints
- Cement siding
- Cement wallboard
- Drywall
- Drywall compound
- Sheetrock
- Thermal paper products
- Electrical cloth

Prior to the asbestos warnings of the 1970s, electricians rarely protected themselves against asbestos exposure. Today’s electrician, however, understands that he/she faces serious dangers when exposed to this toxic mineral. Part of an electrician’s professional training now includes the importance of exercising safety precautions when working near asbestos, including wearing a ventilator or face mask to avoid inhaling asbestos dust.

**Industrial Workers**

The term “industrial worker” refers to a very broad category of laborers that comprise factory workers, assemblers and machinists, custodial and maintenance staff, and many other semi-professional and non-professional workers. By definition, industrial plants are factories where products are made in mass quantities, often using automated methods to increase productivity. Industrial workers may perform any number of tasks related to chemical or mechanical construction of products, from unpacking materials to cutting and assembly to packaging of finished products.

In addition to the workers responsible for the actual manufacturing process, industrial workers include those who are responsible for the installation, maintenance, and repair of heavy machinery and equipment in the factory or plant. Their duties might extend to maintenance and repair of heating and cooling systems or plumbing and electrical systems.

**Industrial Workers and the Risk of Asbestos Exposure**

Industrial workers are exposed to many hazards on the job, some more obvious than others. Among those dangers is exposure to noxious chemicals and poisonous substances that are often used in the course of manufacturing. Those substances may be in the form of fumes or dusts in the air. Inhalation of various types of dust has been known to cause illnesses, particularly lung diseases. Inhaling asbestos dust is one of the industrial worker’s most ominous hazards.
Asbestos, a mineral substance, was widely used in the construction and manufacturing industries throughout most of the last century. Its chemical properties, including fire and heat resistance, offered many unique advantages for manufacturing, not only for the products being made, but also in the machines and processes used to make them.

Exposure to asbestos, however, has the potential to be deadly. More specifically, exposure to asbestos dust can lead to mesothelioma, a fatal malignant cancer that affects the thin tissue lining the lungs.

When the tiny fibers released by the breakage of asbestos are inhaled, they can lodge in the lungs or linings of the lungs. Mesothelioma can take nearly half a decade to develop, and it may result from as little as a single exposure to asbestos dust. More often, those who develop mesothelioma worked with it in mines, factories, industrial plants, shipyards, or on construction sites for many years on a daily basis.

One of the most difficult parts of proving the source of mesothelioma — the original exposure to asbestos — is that often, industrial workers were unaware that the products they once handled contained asbestos. Indeed, plant workers may have inhaled asbestos dust during many different facets of their work, including:

- Mixing and pouring materials for manufacture
- Spraying asbestos solutions on products
- Wearing protective asbestos clothing like gloves, boots, and overalls
- Spraying asbestos insulation on pipes, machinery, and boilers
- Working with asbestos packing and lading
- Removing asbestos lagging and padding
- Cutting materials that contain asbestos
- Sandblasting or otherwise cleaning asbestos spray paint from fixtures and pipes
- Applying and replacing asbestos insulation around pipes

Industrial workers who were exposed to asbestos in the past have a greatly increased risk of developing mesothelioma and other asbestos-related diseases. However, the dangers of asbestos exposure in factory and industrial work continues, though it is reduced because of the raised awareness of the dangers of asbestos. OSHA and the EPA set forth guidelines for the safe handling of asbestos-containing materials, and those guidelines should be followed in all factories and industrial plants, especially older ones where asbestos might still be present.

**Insulators**

For a number of years, those laborers now referred to as insulators were called “asbestos workers” because nearly all insulation products contained asbestos. In general, however, insulators are construction workers who specialize in the installation of insulation wherever it is needed. There are many types of insulation used for different applications, and most insulators specialize in a particular type of insulation.

During the years that the construction industry depended heavily on asbestos in nearly all of its products, insulation was the product that usually contained the highest levels of asbestos. In some cases, the concentration of asbestos in insulation was well over 50%.

Most people think of insulation as a material that keeps the cold out of their homes; however, it actually prevents heat from transferring in either direction. As such, insulation was widely used both to keep heat in and to keep cold in. Insulators might wrap pipes to keep them from freezing, work on HVAC systems, apply insulation to new or older construction to help regulate heat, or insulate boilers and heating pipes to keep the liquids or gasses that they carry at a consistent temperature.
Insulators and the Risk of Asbestos Exposure

Insulation containing asbestos might have been installed in sheets, as foam, as fibers, or as paint. It could be sprayed on, blown in, applied with a brush, wrapped around pipes, nailed to walls or spilled out of sacks into crevices and between walls. Insulators worked with asbestos every day, throughout the day. The most popular methods of applying insulation created high concentrations of asbestos fibers in the air. Those methods included:

- Asbestos in aerosol sprays to be spray applied
- Foam containing asbestos applied with a spray nozzle
- Asbestos mixed with foam flecks or fluff blown into cavities and crevices
- Asbestos paints rolled or sprayed onto walls or equipment
- Foam sheets of asbestos cut and shaped to fit walls and pipes
- Pre-formed blocks and tubes of asbestos foam for pipe insulation
- Asbestos board and bricks that had to be sawed and sanded

Before the 1970s, few people understood the dangers of asbestos, particularly its inhalation. Insulators, like most construction laborers, used asbestos products without wearing any protective equipment to prevent the inhalation of asbestos fibers. When protective measures were taken, they usually included the use of paper masks, which were insufficient to filter out asbestos fibers.

For insulators who regularly worked with asbestos insulation in the past, the rates of mesothelioma are among the highest of any profession. Though the risk of exposure to asbestos while on the job is now significantly lower, insulators who work on old homes or commercial buildings should be diligent about taking the proper precautions to avoid exposure to asbestos products.

Iron Workers

Iron workers are often referred to as the men who built the “skeleton of America.” From the frameworks of skyscrapers to bridges and railroad tracks, iron workers put together the bones on which this country’s resources were formed. They built ships and hulls, airplanes, and the skins of trains. Throughout the 20th century, iron workers hung frameworks hundreds of feet above the ground or deep in the belly of the earth. They braved the dangers of working high above the ground, and the churning waters of rivers and waterfalls to build our country’s infrastructure.

Iron Workers and the Risk of Asbestos Exposure

Construction workers, including those who worked with iron, have one of the highest rates of mesothelioma of all population groups as asbestos was used abundantly in the construction industry because of its unique properties. Iron workers were most likely exposed to asbestos in a number of ways. The dangers of asbestos exposure, of course, are greatest when fibers are released into the air, where they can be inhaled or swallowed. For ironworkers, this might have happened when iron beams banged against each other or when they were drilled or pierced with rivets. Sanding and other handling may also have released metal fragments containing asbestos into the air, causing it to be inhaled and eventually lodged in the lungs.

The most direct exposure probably came from the asbestos paint that was sprayed on the iron beams that were used in building a variety of structures. The asbestos spray was employed as a fireproofing material in order to increase the temperatures at which the iron would melt or burn in a fire. Its use was a common safety measure through the 1970s, before the dangers of asbestos were publicly known.
Iron workers may have also been exposed to asbestos via their own protective clothing. Often, these laborers used insulated gloves, aprons, pants, and vests made from asbestos and designed to protect them from heat and fire. According to a number of studies performed in the 1990s, insulating clothing made with asbestos was generally safe when new. However, within a few weeks of wear, the amount of asbestos fibers released by the clothing during normal wear reach dangerous levels and airborne fibers are easily inhaled.

Among the iron workers most affected by asbestos are those who worked in shipyards. These shipyard employees were surrounded by asbestos found in dozens of products, including:

- Boiler insulation paint
- Spray applied insulation
- Asbestos gaskets
- Asbestos paint
- Spray on fireproofing
- Pipe insulation
- Block insulation
- Pre-formed insulation
- Insulating asbestos paper
- Spray foam asbestos insulation

Recently, shipyard workers, railroad employees, and other iron workers have been awarded large settlements in compensation for the damage they suffered because of asbestos exposure.

The risk of exposure to asbestos for iron workers still exists, particularly for those involved in the demolition and deconstruction of Navy and other ships that were built between World War I and 1980, so iron workers should always be sure to take proper precautions when working on vessels or other structures that may contain asbestos.

**Machinists**

Machinists are a group of highly skilled workers who use large machines such as lathes, machining centers, and milling machines to manufacture metal parts. Many industries and businesses require custom-made metal parts, and as a result, machinists may be employed in any number of industries, including the aerospace industry, the railroad industry, the automobile manufacturing industry, or simply in a machine shop that caters to many different sorts of clientele with the need for precisely crafted metal parts.

In the past, machinists ran their lathes and mills manually, controlling the speed and other factors of manufacture with the power of their bodies. Much has changed over the last few decades. Although today most machinists run their machining operations with a sensitive computer system, machining is still a job that requires skill, precision, and care.

**Machinists and the Risk of Asbestos Exposure**

Because the process of machining metal or other solid materials involves intense heat, machine shops were often full of asbestos. As a matter of fact, employers typically used asbestos materials to insulate the machine room itself. As long as the asbestos contained in the machine room ceiling tiles, walls, and flooring was not disturbed, the machinists would be relatively safe, but as soon as these tiles were
disturbed, removed, or replaced, asbestos dust could be released into the air, where it would pose a serious health risk to the machinists working in the room.

Often times, machinists were exposed to asbestos by the very materials intended to protect them from harm. In a machine room, there are countless ways a body can be injured, and out of consideration for these dangers, machinists often wore gloves and other protective gear, keeping their hands and fingers safe from the sharp tools with which they crafted metal parts and the heat that was present throughout the room. For years, these gloves were manufactured with asbestos, which could pose a threat to the health of a machinist once the gloves began to wear or were cut or damaged during operation of a large machine.

Today, machinists are aware of the dangers presented by asbestos exposure, and wear protective gear such as masks when exposure is a possibility. For decades, however, machinists were not given access to information about the dangers of asbestos and the health of many of these individuals has been affected due to development of diseases such as asbestosis and mesothelioma.

Merchant Marines

The history of the U.S. merchant marines is one that is richly storied, full of adventure, danger, and sometimes even profit. The merchant marines are a vast fleet of civilian-owned-and-operated merchant ships. During times of peace, when the United States is not engaged in any overseas warfare, these ships are a key to our great economy, delivering consumer goods to and from the United States as determined by supply and demand. When the United States is at war with another country, the merchant marines act as a supplementary fleet to the Navy, transporting supplies, rations, and troops overseas for the war effort.

The merchant marines have played an integral role in the U.S. economy and the success of foreign affairs during times of war. Merchant mariners, the men and women who function as crew on the vessels of the merchant marine, are highly skilled seamen who fulfill a variety of roles in the successful operation of a sea vessel. These seamen act as captains, mates, pilots, and engineers, each role carrying with it, its own set of demands, required skills, and at times, even particular dangers.

Merchant Marines and the Risk of Asbestos Exposure

Ironically, nearly one-third of the seamen of the merchant marine who perished during World War II as a result of their occupation were not killed overseas by enemy fire or any other act of war. More than 100,000 dedicated merchant mariners died many years later from illnesses like mesothelioma and lung cancer, caused by exposure to asbestos as they worked.

For many years, asbestos played a huge role in the manufacture of materials and goods used in the shipping and merchant marine industries. Asbestos was used in literally thousands of products. As a result, everyone working aboard these ships could have been subject to asbestos exposure. For example, the ropes and rigging used on deck and on the masts were manufactured with asbestos. With use and wear, these ropes deteriorated and released an asbestos dust into the air, where mates and other workers could inhale it. Many workers developed terrible diseases after working with asbestos rope.

The blankets used on board merchant marine ships also contained asbestos fibers. These blankets were all-purpose — used for anything for which a blanket could be helpful — and they exposed many workers to friable asbestos fibers. The blankets were particularly dangerous when used to put out fire; at which point millions of asbestos particles could be released into the atmosphere.
For many decades, the gloves, fire coats, and other safety gear worn by engineers and machine workers aboard merchant marine ships contained asbestos materials. This safety gear — intended to protect mariners from the scourge of fire — exposed workers to harmful asbestos, leading them to later develop painful, deadly illnesses, such as mesothelioma and asbestosis.

Today, workers know the dangers posed by asbestos, but for many years, the men and women working aboard merchant marine vessels were not so well-informed. As a result, many thousands of innocent merchant mariners have developed painful, potentially fatal diseases that could have easily been avoided.

Metal Lathers

A metal lather is a man/woman who works with metal and/or wood lath. A lath is a narrow strip that is usually nailed to framing supports in rows, used to support plaster, shingles, slates, or tiles.

However, metal lathers do more than just tack lath to supports. They are often involved in performing a number of tasks during the process of constructing a home, office, factory, or other structure. A metal lather also:

- Tears down plaster to prepare a site for re-plastering
- Installs corner beads, moldings, base screens, and miscellaneous reinforcements
- Reads plans and blueprints and lays out jobs according to those plans
- Cuts, fits, and installs wood or metal studding or furring strips
- Builds framework for cornices, archways, etc.
- Hangs suspended ceilings

Metal Lathers and the Risk of Asbestos Exposure

For decades, because of the kind of work they did, metal lathers were consistently exposed to asbestos. Asbestos-containing cement was the biggest culprit, as it was often used to cover metal lathing. Made from a mixture of sand, Portland cement, and up to 10% asbestos fibers, the cement was widely used throughout the industry. The asbestos in it served as a thickening agent and strengthened the cement for better durability.

Because this cement was usually manipulated in some way (drilling, sanding, cutting), it wasn’t unusual for scores of asbestos particles to be released and, therefore, inhaled by lathers and others in the workplace. Adding to the danger was the fact that the lathers often worked in small, badly insulated places, allowing the asbestos particles to remain in the air longer and making inhalation more likely.

In addition, lathers sometimes performed tasks that involved affixing metal lathing to pipes insulated with asbestos. This also caused the release of fibers, especially if the insulation had to be removed or cut.

Because information about the dangers of asbestos was often covered up by those in charge, most metal lathers were unaware that their work with asbestos was compromising their health and usually wore no protective clothing, including masks. It wasn’t until decades later that many lathers began experiencing severe pulmonary problems. In many cases, the problems indicated the presence of mesothelioma.

Millwrights

Since the earliest days of large-scale industry, millwrights have been employed at factories, construction sites, power plants, and innumerable other workplaces where large machines are operated. Millwrights are skilled workers who build, install, maintain, repair, and oversee the placement of large, industrial-grade machines, such as boilers, generators, and turbines. Due to the constant demand for workers with these skills, millwrights may work in nearly any industry or sector of the economy, whether in the United States or abroad.
Millwrights may perform a number of highly specialized duties, depending upon the immediate needs of their employer and their area of training and specialization. Using manufacturer’s blueprints or manuals, a millwright may be called upon to build and install a machine at a factory site. Very often, the millwright must cooperate with site management to determine the best placement of the machine. If building modification is required, such as the installation of a cement base, this modification is commonly the responsibility of the millwright. Also, machinery must often be sized to fit a particular location and it was the responsibility of the millwright to saw, drill, sand or cut to achieve a good fit. These procedures produced airborne asbestos fibers.

At a construction site, a millwright may install and maintain a machine for the duration of the project. If the machine breaks down or needs a replacement part, such as a gasket, the millwright will expedite the repair of the machine or its parts at the site.

As a result of the myriad responsibilities of the millwright, someone who practices this craft uses hundreds of different materials, tools, machines, and other products. He or she may work on a contract basis, traveling from site to site, repairing lathes or other sorts of specialized large machines.

**Millwrights and the Risk of Asbestos Exposure**

In the course of his or her work, a millwright may be exposed to asbestos from countless different sources. For many years, the insulating elements or parts of the machines with which millwrights worked contained asbestos. Until only recently, gaskets used to protect engines and machine parts from the effects of heat were also made from asbestos. When a millwright produced, installed, replaced, or otherwise manipulated an asbestos gasket, he or she may have been exposed to asbestos.

Wiring used to convey electrical current to the large machines was also a dangerous source of asbestos. Manufacturers of these wires wrapped the metal coils in asbestos material to keep them from transferring heat. During the repair or replacement of these wires, millwrights — or any other workers who performed these duties — could have been exposed to friable asbestos fibers.

Millwrights also protected themselves from heat and fire by wearing protective clothing that was often made from asbestos, including aprons, coats, gloves, and even face masks. This gear put them into further close contact with asbestos and prompted the inhalation of fibers. Today, many millwrights are suffering the ill-effects of this exposure, having developed asbestosis, pleural plaques, and mesothelioma.

**Oil Refinery Workers**

The refinement of oil into various fuels for consumer use is a complex procedure, requiring sophisticated machines and employees with the skills to run them. An oil refinery worker might be an engineer, specialized at working with machines, chemicals, electricity, or other materials to expedite the oil refining process. Other oil refinery workers are journeymen, who work on construction-related projects. Some act as managers of the refinery, overseeing the facility or project, including managing employees and finances.

The oil refinery workers who perform these functions must have a tremendous amount of skill and expertise to work with the utmost efficiency and expedition. Many oil refinery workers — engineers, especially — go through many years of schooling before they can properly perform their chosen occupation at an oil refinery complex.

**Oil Refinery Workers and the Risk of Asbestos Exposure**

Exposure to asbestos and the subsequent illnesses that result are very likely the leading cause of death among oil refinery workers, many of whom have taken every precaution available to them in their line of work.
Researchers have found that there is a strong correlation between working in an oil refinery and exposure to asbestos; in fact, researchers recently published a study showing that a much greater percentage of the oil refinery working population dies of illnesses such as asbestosis and mesothelioma than the general population.

Oil refinery jobs are dangerous and often involve intense heat and highly flammable materials. That is why, for decades, asbestos materials were abundant at oil refineries. Vessels that hold petroleum as well as steampipes and process pipelines were usually lined with asbestos. Workers who toiled around them on a regular basis or whose job it was to repair or maintain this equipment were exposed to the hazardous material on a regular basis.

In addition, those oil refinery workers who were exposed to heat or dangerous chemicals often wore lab coats and gloves to protect their bodies as they worked. Until recently, asbestos was often used in this protective gear, sometimes causing more harm than good because asbestos fibers were inhaled when the gear became old or damaged.

Lab hoods, used to carry off chemical fumes, oftentimes contained asbestos. The dangerous material was also installed in ceiling and floor tiles and in walls, in order to insulate workspaces against extreme temperatures and to protect expensive machines from climate damage and the transference of heat from other rooms. When these insulating materials were installed, removed, replaced, renovated, or damaged by heavy traffic, asbestos fibers could be released into the atmosphere, where oil refinery workers could inhale them, putting them at risk of developing life-threatening illnesses, such as mesothelioma, asbestosis, lung cancer, and heart disease.

Painters

Painters play an important role in the construction and renovation of industrial, commercial, and residential buildings — applying paints, sealants, and papers where necessary to beautify a building and protect its parts, such as walls and ceilings, from the ravages of time, traffic, and general wear. A good painter knows not only how to paint a wall, but how to strip and remove old paint and materials, which paints are ideal for a particular application, how to mix colors, and other skills of the trade.

Painters fulfill a variety of niches, working for a municipality or state government, residential and commercial building construction companies, for renovation contractors, or running their own small business. In fact, nearly one half of painters in the United States are self-employed, highly skilled workers who have been in the business for many years.

Painters and the Risk of Asbestos Exposure

Of the many workers exposed to asbestos over the years, painters are at a particular risk of developing mesothelioma and other asbestos-related illnesses because they have traditionally come in contact with many different sources of asbestos, from materials of their trade to the environments in which they worked.

Although paints themselves did not typically contain asbestos, painters frequently used other products containing asbestos. Sealants and putties used to patch up holes before painting were a common source of asbestos, as were the materials used to create texture on a wall or ceiling. Also, painters would sometimes mix asbestos with paint to give the paint fire-resistant properties. Since the 1970s, old joint compounds have become known as a notorious source of asbestos, and silver paints have also been known to contain the deadly ingredient.

Painters are also put at risk for exposure to asbestos when they enter an environment in which the material was used during construction or renovation. Only a few decades ago, asbestos was regularly used in homes and businesses as insulation. Even today, many thousands of buildings across the country contain asbestos ceiling tiles, floor tiles, wall insulation, shutters, and more. During the course of painting these surfaces, slight damage to the asbestos material can result in the release of millions of asbestos particles into the atmosphere. When these particles are released, the painter and his or her colleagues are at risk of exposure.
As a result of negligence on the part of asbestos manufacturers, many thousands of painters who worked in their field prior to the 1980s have been exposed to asbestos. Although some of these workers have already developed deadly diseases like mesothelioma and asbestosis, many have yet to show symptoms of illness. As time goes on, painters in greater and greater numbers may continue to develop these life-threatening diseases. Although the use of asbestos is not so common today as it was a few decades ago, painters must still exercise extreme caution, especially when working in an environment that might contain asbestos. Protective masks or respirators should always be worn if the potential of exposure is present.

Pipefitters

Pipefitters play an essential role in the construction or development of any large infrastructure or industrial, commercial, or institutional complex. Whereas a plumber or two is ordinarily sufficient to install a pipe system in a small home or business, large projects involving complicated pipe systems require the know-how and expertise afforded by a large team of pipefitters. These pipefitters often specialize in installing, repairing, and maintaining pipe systems that convey water or chemicals, create electricity, or moderate building temperature. Some corporations employ full- or part-time pipefitters whose sole duty is to maintain a system of pipes vital to the work at hand.

Pipefitters and the Risk of Asbestos Exposure

To get this job done quickly and efficiently, pipefitters work with a great number of tools and materials. Although most of these materials no longer contain asbestos, there was a time not long ago when most pipefitters were exposed to asbestos on a daily basis. As a result of frequent exposures in this line of work, numerous pipefitters have developed diseases like mesothelioma and asbestosis — diseases that cause a considerable amount of pain and are fatal or life-threatening. Research conducted over the past two decades has shown that the incidence of lung cancer, mesothelioma, asbestosis, and heart disease is significantly higher in a sampling of pipefitters than in the general public.

When maintaining pipes, pipefitters sometimes employed materials such as asbestos tapes, canvas, and paints that were designed to seal and insulate pipes, protecting their environment from the transfer of heat. During the use of these asbestos materials, many pipefitters probably inhaled asbestos fibers. The extent of exposure for pipefitters was such that one pipefitter, involved in litigation with a manufacturer of asbestos products, has been cited as saying, “Did we work with asbestos? We pipefitters ate asbestos!”

Pipefitters can also be exposed to asbestos otherwise present in the work environment. Very often, pipefitters must drill or cut holes in walls and ceilings in order to install or remove pipes, and in a building constructed before the 1970s, there is a great likelihood that asbestos insulation could be present in these walls, ceilings, and floors. If this asbestos material is disturbed, the pipefitter may inhale friable asbestos fibers, after which time he may be at risk of developing mesothelioma and other life-threatening asbestos-related illnesses.

Because asbestos was such a popular material for so many years, and because information about the dangers of the mineral was often withheld from workers, pipefitters were usually unknowingly exposed to the dangers of asbestos, some nearly every day of their working lives.

Today, pipefitters who work at restoring or replacing old pipe systems might still be exposed to asbestos insulation that was installed decades ago. For pipefitters, the risk of developing mesothelioma is still very real if precautions are not observed.

Unfortunately, many pipefitters exposed to asbestos years ago will only begin to present symptoms of their disease in the near future. This delay or latency period means that pipefitters who are exposed today while renovating or working in old buildings may not be aware of their exposure for many years or decades. It is important that all pipefitters work with protective gear, including a filter mask, whenever they believe they might be working in an environment that harbors asbestos.
Plumbers

Plumbers are trained professionals who install and repair pipe systems that are vital to the comfort of families and workers — controlling temperature and conveying water for cooking, bathing, and other purposes. Plumbers most often work on residential projects; larger-scale projects are tackled by the pipefitter, who possesses similar skills.

Oftentimes, plumbers must cooperate with other members of a construction crew, using blueprints to determine the specifics of a particular installation. Sometimes, plumbers are also called upon to design pipe systems for a project, using their skill and understanding of such to create the ideal complex of pipes for a home or other small building.

Plumbers and the Risk of Asbestos Exposure

For many years, asbestos was a common source of insulation for pipe and pipe systems, because it is fire-resistant and is a poor conductor of heat. Before the 1970s, most pipes installed in homes contained this material and plumbers were often exposed during installation, maintenance, repair, and replacement of the pipes. If the asbestos insulation were at all disturbed during the course of plumbing work, microscopic fibers could be released into the air, where plumbers or members of a construction crew could easily inhale them. Subsequently, plumbers ran the risk of developing asbestos-related diseases later in life.

To this day, many plumbers still risk the potential of exposure to asbestos that’s already present in a home or office in which they are working. For example, plumbers must often drill or cut holes in a wall or ceiling in order to complete a repair or installation. In a building constructed before 1970, it is highly likely that those surfaces could contain asbestos insulation, which, when cut, drilled, or otherwise damaged will release dangerous fibers.

Given the near-omnipresence of asbestos in buildings constructed before the 1970s, plumbers still frequently work in the vicinity of asbestos-containing materials. Before the 1970s, the dangers of asbestos were not widely acknowledged, and as a result of this, many thousands of plumbers came into contact with asbestos without using the proper safety procedures and equipment. In consideration of these threats, plumbers should always assume that a home or building might contain asbestos and take the proper precautions.

Power Plants

In today’s society, electricity is absolutely essential to the welfare of our communities. Electricity provides people with the power to produce goods, deliver services, heat and cool their homes and offices, and much more. Though to most people, electricity is available at the flip of a switch, a tremendous amount of work goes into the production and distribution of electricity to our communities. Power plant workers make this happen.

Given the complexity and variety of today’s types of power plants and methods of electricity production, the functions that a power plant worker may serve are many and varied. In the most advanced power plants, where computers are used to control the production and flow of electricity, a power plant worker may spend most of his or her time operating a system in a central control room. Using computers, he or she can control and monitor generators, turbines, transformers, and other essential equipment.

In power plants that function without a central control room, a power plant worker may control each generator and turbine with switches on the units themselves. This power plant worker may need to monitor these units closely, making sure that each is supplying the appropriate voltage and that the flow of electricity is suitable to the energy demands of the community.
Power Plant Workers and the Risk of Asbestos Exposure

Because many of the machines in a power plant generate or give off extraordinary heat, asbestos was often used gratuitously as an insulation and protection against fire. Additionally, asbestos may be found inside many power plant machines. For example, many of the machines contained asbestos gaskets used to seal pumps and valves. Power plant workers typically installed these gaskets, which were sometimes handmade from asbestos material. In the process of crafting and installing these gaskets, workers may have exposed themselves to friable asbestos fibers.

A power plant worker could also be exposed to asbestos that was used to insulate pipes going to and from turbines and other large, heat-producing machines. Used to generate heat, boilers were nearly always present in a power plant, and asbestos can often be found in the insulation surrounding these boilers and their networks of pipe.

Even the walls, floor tiles, and ceiling tiles in a power plant may be sites of exposure for the power plant worker. For many years, asbestos was installed in tiling and walls to insulate rooms against extreme temperatures. With time, traffic, or with renovation and removal, asbestos fibers may be released from these materials into the air, where power plant workers may be exposed to them. Many power plants across the United States have been renovated, and asbestos has been removed. However, some plants still contain asbestos. Workers should be particularly diligent when working in older plants to ensure that they are not exposed. Respirators or filtering masks should always be worn.

Railroad Workers

Since the early age of the steam locomotive, over 100 years ago, the railway industry has relied heavily upon asbestos material for the production of carriages and engine parts and for use as insulation. As recently as the 1980s, many railroad companies and manufacturers of train carriages still purchased materials made from asbestos, which they used to repair and manufacture a variety of train surfaces and parts. Because of this long-standing, heavy reliance upon asbestos, many thousands of railroad workers over the past two centuries have been exposed to asbestos.

Railroad Workers and the Risk of Asbestos Exposure

Historically, the railroad industry has been notorious for its widespread use of asbestos in a number of applications. In fact, research conducted over the last two decades has shown that railroad workers have a significantly greater chance than the general population of developing diseases associated with exposure to asbestos, including mesothelioma, asbestosis, and lung cancer. This disconcerting ratio of asbestos illness in the railway industry is unlikely to decline any time soon — according to some sources, locomotives carrying asbestos insulation were in use as recently as the late 1990s.

Because of the aforementioned heavy reliance upon asbestos in the railroad industry, railroad workers had many daily opportunities to be exposed to friable asbestos. In the earlier years of the railway age, asbestos lagging was used to insulate mains, steam pipes, and steam cylinders on steam locomotives. Boilers and boiler pipers were similarly insulated. During initial installation or with eventual wear, removal, renovation, or during inspection, the insulation covering these units could be disturbed, releasing asbestos fibers into the air and putting railroad workers at risk.

Even in later years, when the steam locomotive was replaced by the diesel engine, asbestos was still widely used as an insulator in the railroad industry. Carriages and boxcars — the cars that convey passengers or cargo...
— were oftentimes heavily lined with asbestos insulation. This insulation was installed in the walls, ceiling, and in the form of floor tiles. Installers were at risk as were those who removed or repaired the insulation.

Asbestos was also an essential material in the shoes covering locomotive brakes. By the nature of their function, asbestos brake shoes wore down often, releasing asbestos fibers and requiring frequent replacement. Until recently, when the use of asbestos in brake parts came to a halt in the United States, many thousands of railroad workers were exposed to asbestos in the course of their work with locomotive brakes.

Gaskets were also composed of asbestos and subjected the engine-repair workers to the same exposure. Because gaskets were not usually custom-manufactured for a given engine, railroad workers had to cut, fashion, and manipulate the gasket material before it could be installed in the locomotive engine. During this manipulation and installation, friable asbestos fibers were released from the material; at which point, the railroad workers could aspirate the fibers, putting them at risk of developing related illnesses later in life.

Although railroad industry leaders had allegedly known about the dangers of asbestos exposure for many decades, railroad workers were rarely warned and were continually exposed to the toxic material. This alleged negligence on the part of industry leaders has resulted in hundreds of lawsuits against railroads and manufacturers of asbestos products filed by railroad workers who were exposed to asbestos in the course of their work and subsequently developed illnesses like mesothelioma and lung cancer.

Roofers

Roofers and slaters, two terms often used interchangeably, are responsible for the installation, replacement, and repair of roofs on both commercial and residential structures. Their job can be quite hazardous, due to the need to climb to great heights to complete their job.

Roofers and the Risk of Asbestos Exposure

However, roofers and slaters face other dangers as well. As early as the 1880s, experiments conducted with asbestos illuminated its durability, fire-resistance, and insulating properties; following these discoveries, leaders in the construction trade began to use asbestos to make repairs on roofs using a compound that consisted of Portland cement and asbestos fibers.

Not long after these first experiments with asbestos, manufacturers devised another process by which Portland cement and asbestos material were combined, creating a hard cement shingle. These shingles were cheap and incredibly strong — in some cases, capable of lasting for 50 years or more. However, the advent of asbestos use in the roofing industry would be a sad day for roofers and slaters, whose occupation it was to install these asbestos materials. By the time asbestos warnings were issued a few decades ago, many thousands of roofers and slaters would already be exposed to asbestos, leaving them with the potential to develop life-threatening illnesses such as mesothelioma, lung cancer, and asbestosis.

For many years, these asbestos shingles were installed on homes and commercial buildings by the thousands, and many of the shingles remain on roofs, aging and deteriorating under the forces of weather. During initial installation, roofers and slaters would cut, drill, and otherwise manipulate these cement shingles so that they fit correctly, releasing microscopic asbestos particles into the atmosphere, putting nearby workers in danger.

Today, roofers who perform repairs on old homes may still be exposed to asbestos during the removal of these old shingles.

On commercial and industrial buildings with low-incline roofs, roofers used a mixture of asbestos and asphalt to seal the roof surface before asphalt shingles or other roof covering was applied. Roofers and slaters often
mixed this compound on site, using loose asbestos material and asphalt mix, during which process they could aspirate particles of airborne asbestos.

Other asbestos-containing products often encountered by roofers included roofing felts, caulking and roofing putties, cold-applied adhesives, fire sealants, mastic, and corrugated, flat, or laminated cement extrusion panels. All of these materials may still be present on old roofs that require repair or replacement, so roofers/slaters should be sure to wear protective masks when tackling a job on an older structure.

**Sawyers**

Historically, a sawyer was someone who worked exclusively with wood, and was mainly involved in sawing timber to create planks that were used in construction. In modern terms, a sawyer may work with natural or manufactured wood or stone products. In both cases, sawyers play an important role in building and construction, in creating the raw materials that are used to erect both commercial and residential buildings.

On construction sites, sawyers often work with large sheets and slabs of stone and concrete, cutting the materials to the correct size so that it is suitable for the location where it is intended for use.

**Sawyers and the Risk of Asbestos Exposure**

During most of the 20th century, asbestos was a common component of a vast array of construction materials, including insulation, cements, tiles, boards, packing, and adhesives. Asbestos was widely used due to physical characteristics such as heat and fire resistance, making it an excellent insulator. Sawyers who worked in construction may have been exposed to asbestos directly through working with materials such as finishing cement and refractory cement, which typically contained at least 20% asbestos.

The nature of the sawyer’s work on construction sites meant that during the decades in which asbestos was a common component of concrete construction materials, they were often at great risk of inhaling asbestos fibers. Sawyers were responsible for cutting and shaping concrete materials, and as those materials commonly contained asbestos, the sawyer and people working nearby would be exposed to asbestos fibers that were released and became airborne during the cutting.

Up until the 1970s, the use of asbestos in construction products was unrestricted despite the fact that the dangers of this substance were already widely recognized and had been for decades. Unfortunately, sawyers and other construction site employees who routinely handled asbestos products were not provided with safety equipment such as masks and protective clothing. With nothing to prevent them from inhaling asbestos fibers, they were exposed repeatedly to the dangerous substance.

Even though cements and other construction products are no longer manufactured with asbestos, workers may still be exposed to asbestos when working on the repair or demolition of buildings constructed in or before the 1980s. Care should always be taken to use protective clothing to prevent asbestos exposure in situations where asbestos-containing materials are suspected to be present.

For today’s sawyers, there remains just a small risk of asbestos exposure, as the materials they use no longer contain asbestos, and they are less likely than other construction workers to be involved in repair or demolition of older buildings. However, because asbestos-related diseases have long latency periods, sawyers who worked in this profession up until the mid-1980s may still be at risk of developing diseases such as asbestosis and mesothelioma and should visit their doctor immediately if they experience any symptoms such as chest pain or breathing-related problems.
Shipyard Workers

Shipyards are large facilities that build and repair large military or commercial ocean-going vessels such as cargo ships, oil tankers, fishing boats, barges, aircraft carriers, battleships, submarines, and more. Shipyard workers may be painters, welders, carpenters, electricians, plumbers, architects, and engineers.

During periods of wartime, shipyards have been exceptionally busy and serve as crucially important places of industry. During World War II and the Korean War, for example, literally hundreds of thousands of military men and women as well as civilians worked in America’s shipyards in the construction and repair of Navy vessels.

Shipyard Workers and the Risk of Asbestos Exposure

Throughout much of the 20th century, asbestos was very widely used in the shipbuilding industry. The physical characteristics of asbestos — its durability, fire and heat resistance, and insulating properties — made it ideal for use in a large number of different construction materials that were used both in building construction and in ship building and repair.

Almost anyone working in a shipyard prior to the 1980s may have been exposed to asbestos fibers. The dangerous mineral was found in:

- Pipe covering
- Wall, floor, and ceiling insulation
- Boiler and furnace insulation
- Gaskets and gasket coverings, turbines, and pumps
- Cement products

Shipyard workers involved in repairing damaged ships were particularly vulnerable to inhalation of asbestos fibers. Damaged ships often contained damaged asbestos products, and in these situations, the risk of airborne asbestos fibers was greatly increased. Particularly during World War II, shipyard workers who were involved in ship repair had to work very quickly due to the necessity of repairing damaged ships as quickly as possible to make them seaworthy and ready for use again. In such situations, shipyard repair workers would typically work without protective clothing, handling asbestos with their bare hands, and inhaling large quantities of airborne asbestos fibers.

Shipyards were so heavily laden with airborne asbestos fibers that people who did not work directly with asbestos were exposed to the risks of inhalation as well. Asbestos dust on the clothes of shipyard workers could be transported to other shipyard locations, and office workers who did not work on the ships themselves were exposed simply through interacting with people who did.

Due to the widespread use of asbestos in the shipbuilding industry, the lack of provision of protective clothing for shipyard workers, and the general nature of the shipyard environment, this industry is now known to have been the single most hazardous working environment in terms of asbestos exposure. In recent decades, thousands of shipyard workers have developed serious and sometimes fatal diseases, such as asbestosis and mesothelioma.

Those who worked in the nation’s shipyards during the 1940s, 1950s, and 1960s have begun to show evidence of these diseases, in some cases more than 50 years after exposure. The greatest tragedy of asbestos-related disease is that it could largely have been avoided if workers had been provided with protective clothing and equipment to prevent asbestos inhalation. The dangers of asbestos were known several decades before its use was restricted, but workers were uninformed and therefore unnecessarily exposed.
Even though asbestos is no longer used in shipyards for the construction of new vessels, workers who are involved in the repair of older ships may still be exposed to any asbestos present in these vessels and should always wear protective gear.

**Tile Setters**

In past centuries, tile setters created the stunning, intricate mosaics that can still be seen adorning churches and other buildings created by older civilizations. Tile setters were highly trained workers who created detailed scenes, with apprentices to the craft undertaking many years of training and instruction before working independently. Tile setting is generally a much less detailed craft these days. While there are still specialized tile setters who create those intricate designs on walls, floors, and ceilings in homes and public buildings such as churches, another type of tile setter works with less intricately designed materials, laying floor, wall, and ceiling tiles that are much larger and less-detailed in design. The craft of tile setting is no less specialized even if the materials used are different, and the tile setter of the modern era is as much a craftsman as the tile setter of eras long past.

**Tile Setters and the Risk of Asbestos Exposure**

Asbestos is a naturally occurring substance that is highly heat and fire resistant and is also an excellent insulator, making it ideal for many construction-related purposes. Throughout the 20th century, asbestos was widely used in a vast array of construction products, including in tiles used on floors, walls, and ceilings. Asbestos-containing tiles were first manufactured in the 1920s, and the manufacture of these tiles continued until the 1970s. Even though the dangers of asbestos were known for much of the 20th century, it was not until 1977 that the Consumer Product Safety Commission banned the use of asbestos in most construction materials, such as tile.

While asbestos-containing tiles were most often used in locations where heat protection or insulation was required, asbestos tile was also commonly used in other areas. Asbestos tile was made from a composite of asbestos and vinyl, and usually contained around 20% asbestos. The acoustical form of these tiles was also used in performance halls, schools, and other public locations where acoustical issues needed to be addressed. Up until the mid-1980s, tile setters may have been exposed to asbestos not only when handling and working with asbestos-containing tiles, but also simply by being present on a construction site, due to the extensive use of asbestos in construction materials. In addition, due to the nature of the work, tile setters were often at great risk of being directly exposed to inhalable asbestos fibers. Tiles must often be cut, sanded, or otherwise altered so that they fit properly into their assigned spaces and the act of cutting and sanding releases asbestos fibers into the air.

Tile setters and people working in the surrounding area were at great risk of inhalation of fibers if they were not using appropriate safety equipment such as masks and protective clothing. Those who were exposed to asbestos in this way did not know the true risks of working with asbestos until decades after their exposure. It is now widely known that repeated inhalation of asbestos fibers causes deadly diseases such as asbestosis and mesothelioma, a rare and very aggressive form of cancer that develops in the lining of the lungs. Tragically, few tile setters were made aware of the dangers present on the job and were rarely provided with safety equipment to protect them from asbestos fiber inhalation while working.

Tile setters may still be exposed to the hazards of asbestos exposure today, especially if they work in residential or commercial buildings that were constructed in or before the mid-1980s. Tile setters working in such buildings should always be aware that asbestos may be present, and take appropriate precautions in working with and disposing of these asbestos-containing materials.
Welders

Because of the great demand for joined metal parts in the manufacture of consumer goods, many thousands of welders in the United States are employed in various manufacturing fields, including the automotive, aerospace, and shipbuilding industries. The particular duties of these welders may vary with the field in which they are employed, but all welders share a need for caution in their line of work. Although an educated, experienced welder may be able to perform his or her job with relative safety, there are many hazards that welders must face during the course of their daily routine.

Welders and the Risk of Asbestos Exposure

Aside from the increased risk for developing diseases such as Parkinson's or the risk of injury from fire and intense heat, welders in the past were particularly susceptible to exposure to asbestos, which was often found in the tools and products they used. Although for years manufacturers denied the presence of asbestos in welding rods, subsequent research has shown that until the 1980s, many brands of welding rods were covered with a thin material comprised of from 5% to 15% asbestos. As this material was exposed to the welding torch flame, the asbestos particles would be released into the atmosphere as a dust, after which point the welder would be at a severe risk of aspirating the asbestos.

Welders who worked installing and repairing pipe systems were also at grave risk of being exposed to asbestos. During the decades preceding the 1970s asbestos warnings, asbestos lagging was widely used on pipes as insulation against extreme temperatures and the transference of heat. When repairing these asbestos-lagged pipes with a torch and rod, this lagging would burn and break down, releasing asbestos dust into the atmosphere.

Because of the dangers posed by the heat of the welding torch, welders wore special heat- and flame-resistant gloves and used blankets designed to halt flames in case of accidental fire. Sadly, this equipment intended to protect the welder from the scourges of fire also contained asbestos material. With each use, the welder was put at a greater risk of exposure to asbestos, and if these materials were burned or deteriorated with age, the consequences for the welder could be dire.

Although workers were able to protect themselves from exposure to asbestos if they took the proper precautions, many thousands of welders were unknowingly exposed to the dangerous mineral because the manufacturers of asbestos-containing goods neglected to provide vital health-related information to those who worked with their products.

Although most welding products no longer contain asbestos, many welders still die each year from asbestos-related diseases as these diseases develop slowly and often do not manifest themselves for decades. Proper precautions are essential for today's welder who may still encounter asbestos on the job.

Many brands of welding rods were covered with a thin material comprised of from 5% to 15% asbestos.