Malignant Mesothelioma Early Detection, Diagnosis, and Staging

Know the signs and symptoms of malignant mesothelioma. Find out how malignant mesothelioma is tested for, diagnosed, and staged.

Detection and Diagnosis

Finding cancer early, when it's small and before it has spread, often allows for more treatment options. Some early cancers may have signs and symptoms that can be noticed, but that's not always the case.

- Can Malignant Mesothelioma Be Found Early?
- Signs and Symptoms of Mesothelioma
- Tests for Malignant Mesothelioma

Stages of Mesothelioma

After a cancer diagnosis, staging provides important information about the extent of cancer in the body and anticipated response to treatment.

- Malignant Mesothelioma Stages

Outlook (Prognosis)

Doctors often use survival rates as a standard way of discussing a person's outlook (prognosis). These numbers can’t tell you how long you will live, but they might help you better understand your prognosis. Some people want to know the survival statistics for people in similar situations, while others might not find the numbers helpful, or might

even not want to know them.

- Survival Rates for Malignant Mesothelioma

Questions to Ask About Mesothelioma

Here are some questions you can ask your cancer care team to help you better understand your diagnosis and treatment options.

- Questions to Ask About Malignant Mesothelioma

Can Malignant Mesothelioma Be Found Early?

Mesothelioma is rare, and there are no recommended screening tests for this cancer in people who are not at increased risk. (Screening is testing for cancer in people who don't have any symptoms.)

For people who are known to have been exposed to asbestos, some doctors recommend regularimaging tests[1], like chest x-rays or computed tomography (CT) scans, to look for changes in the lungs that might be signs of mesothelioma or lung[2] cancer. But it's not clear how useful these tests are in finding mesotheliomas early.

Doctors have found that people with mesothelioma have high levels of certain substances in their blood, including **fibulin-3** and **soluble mesothelin-related peptides** (SMRPs). Researchers continue to study how blood tests for these substances might help find mesotheliomas early, as well as how they might be used to monitor the course of the disease in people who have mesothelioma.

Most mesotheliomas are found when a person goes to a doctor because of symptoms, most often chest pain and shortness of breath. People who have been exposed to asbestos should know the possible signs and symptoms of mesothelioma. Many of these symptoms are more likely to be caused by something other than mesothelioma. Still, it’s important to report any new symptoms to a health care provider right away so that the cause can be found and treated, if needed.

Hyperlinks

1. www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/imaging-radiology-tests-for-cancer.html
2. www.cancer.org/cancer/types/lung-cancer.html

References

Jain SV, Wallen JM. Cancer, Mesothelioma, Malignant. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2018 Jan-2018 Jul 18.

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Signs and Symptoms of Mesothelioma

exposed to asbestos), it’s important to see a health care provider right away so the cause can be found and treated, if needed.

References

Tests for Malignant Mesothelioma

Mesothelioma is most often found after a person sees a health care provider because of symptoms they're having. If there's a reason to suspect you might have mesothelioma, you will be examined and some tested to find out more. Symptoms might suggest that you have mesothelioma, but tests must be done to find out what's causing your symptoms.

Medical history and physical exam

Your provider will want to talk with you about your medical history to learn more about your symptoms and possible risk factors[1], especially asbestos exposure.

Your provider will also examine you to look for signs of other health problems. Pleural mesothelioma can cause fluid to build up around the lungs in the chest (called a **pleural effusion**). In cases of peritoneal mesothelioma, fluid can build up in the abdomen (called **ascites**). In pericardial mesothelioma, fluid builds up in the sac around the heart (called a **pericardial effusion**). Rarely, mesothelioma can develop in the groin and look like a hernia. All of these might be found during a physical exam, such as when your provider listens to these areas with a stethoscope or taps on your chest or belly.

Mesothelioma can be hard to diagnose. If the results of your history and physical exam suggest you might have mesothelioma, more tests will be needed. These could include imaging tests, blood tests, and/or biopsies.

Imaging tests

Imaging tests[2] use x-rays, radioactive particles, sound waves, or magnetic fields to make pictures of the inside of your body. Imaging tests might be done to:

- Look at suspicious areas that might be cancer
- See if and/or how far cancer has spread
- Help find out if treatment is working
- Look for signs that the cancer has come back after treatment

Chest x-ray

This is often the first test done to look for problems in the lung. Findings that might suggest mesothelioma include an abnormal thickening of the pleura, calcium deposits on the pleura, fluid in the space between the lungs and the chest wall, or changes in the

lungs themselves as a result of asbestos exposure.

Computed tomography (CT) scan

A CT scan uses x-rays to make detailed cross-sectional images (like slices) of your body. CT scans are often used to help look for mesothelioma and to find the exact location of the cancer. They can also help determine the stage (extent) of the cancer. For instance, they can show if the cancer has spread to other organs. This can help decide if surgery might be a treatment option. Finally, CT scans can also be used to learn if treatment like chemotherapy is shrinking or slowing the growth of the cancer.

Echocardiogram

This is an ultrasound of the heart. It may be done if your doctor suspects that you have fluid around your heart (a pericardial effusion). This test can also show how well your heart is working.

Positron emission tomography (PET) scan

PET scans usually use a radioactive sugar that's put into the blood. The amount of radioactivity used is very low. Because cancer cells grow quickly, they absorb more of the sugar than most other cells. A special camera then creates a picture of areas of radioactivity in the body.

The picture from a PET scan can give the doctor a better idea of whether a thickening of the pleura or peritoneum seen on a CT scan is more likely cancer or scar tissue. If you have been diagnosed with mesothelioma, your doctor may use this test to see if the cancer has spread to lymph nodes or other parts of the body. A PET scan can also be useful if your doctor thinks the cancer may have spread but doesn't know where.

PET/CT scan: Some machines can do both a PET and CT scan at the same time. This lets the doctor compare areas of higher radioactivity on the PET scan with the more detailed picture of that area on the CT scan.

Magnetic resonance imaging (MRI) scan

Like CT scans, MRI scans show detailed images of the soft tissues in the body. But MRI scans use radio waves and strong magnets instead of x-rays. A contrast material called **gadolinium** is often injected into a vein before the scan to better show details.

MRI scans can sometimes help show the exact location and extent of a tumor since

they provide very detailed images of soft tissues. For mesotheliomas, they may be useful in looking at the diaphragm (the thin band of muscle below the lungs that helps us breathe), a possible site of cancer spread.

Blood tests

Blood levels of certain substances are often higher in people with mesothelioma:

- FIbulin-3
- Soluble mesothelin-related peptides (SMRPs)

Mesothelioma can't be diagnosed with these blood tests alone, but high levels of these substances can make the diagnosis more likely. Still, more research is needed, and these tests are not routinely used in because of their limited value.

Other blood tests might be used to get an idea of your overall health and how well other organs, like the liver and kidneys, are working.

Tests of fluid and tissue samples

Symptoms and test results may strongly suggest that a person has mesothelioma, but the actual diagnosis is made by removing cells from an abnormal area and looking at them under a microscope. This is called a biopsy[3]. It can be done in different ways.

Removing fluid for testing

If there is a build-up of fluid in part of the body that might be due to mesothelioma, a sample of this fluid can be taken out by putting a thin, hollow needle through the skin and into the fluid. The skin is numbed before the needle is put in. This may be done in a doctor's office or in the hospital. Sometimes ultrasound (or an echocardiogram) is used to guide the needle.

This procedure has different names depending on where the fluid is:

- **Thoracentesis** removes fluid from the chest.
- **Paracentesis** removes fluid from the belly.
- **Pericardiocentesis** removes fluid from the sac around the heart.

The fluid is then tested and looked at with a microscope to see if it contains cancer

cells. If cancer cells are found, special tests might be done to see if the cancer is a mesothelioma, a lung cancer, or another type of cancer.

Even if no cancer cells are found in the fluid, a person might still have cancer. In many cases, doctors need to get an actual sample of the mesothelium (the pleura, peritoneum, or pericardium) to know if a person has mesothelioma.

Needle biopsies

Tiny pieces of tumors in the chest are sometimes taken out by needle biopsy. A long, thin, hollow needle is passed through the skin of the chest, between the ribs, and into the pleura. Imaging tests, like CT scans, are used to guide the needle into the tumor so that small samples can be taken out. This is often done using just numbing medicine.

Needle biopsy can also be used to get samples of the lymph nodes in the space between the lungs to see if the cancer has spread there. (See Endobronchial ultrasound needle biopsy below.)

Needle biopsies do not require a surgical cut or overnight hospital stay. But the downside is that sometimes the sample taken out isn't big enough to make an accurate diagnosis. This is especially true for mesothelioma. And a more invasive biopsy method is usually needed.

Needle biopsy risk: There's a slight chance that the needle could put a small hole in the lung during the biopsy. This can cause air to build up in the space between the lung and the chest wall (known as a *pneumothorax*). A small pneumothorax might not cause any symptoms. It may only be seen on an x-ray done after the biopsy, and will often go away on its own. But a larger pneumothorax can make part of a lung collapse and might need to be treated. The treatment is putting a small, flexible tube (a catheter) through the skin and into the space between the lungs. The tube is used to suck the air out in order to re-expand the lung. It's left in place for a short time as the hole heals.

Endoscopic biopsies

Endoscopic biopsy is commonly used to diagnose mesothelioma. An endoscope[4] is a thin, tube-like instrument used to look inside the body. It has a light and a lens (or tiny video camera) on the end that allows your provider to look inside your body. Tools can be used through the endoscope to take out tissue samples. Endoscopes have different names depending on the part of the body where they’re used.

Thoracoscopy: This procedure uses an endoscope called a thoracoscope to look

inside the chest. It can be used to look at the pleura and take tissue samples for biopsies.

Thoracoscopy is done in the operating room while drugs are used to put you in a deep sleep (general anesthesia). The doctor slides the thoracoscope through one or more small cuts made on your chest to look at the space between your lungs and the chest wall. This lets the doctor see possible areas of cancer and take out small pieces of tissue for testing. The doctor can also take out lymph nodes and fluid. They may be able to see if a tumor is growing into nearby tissues or organs.

Thoracoscopy can also be used as part of a procedure to keep fluid from building up in the chest. This is called **pleurodesis** and is covered in Palliative Procedures Used for Malignant Mesothelioma[5].

Laparoscopy: For this test, the doctor uses an endoscope called a **laparoscope**to look inside your belly and biopsy any tumors there. This is done in the operating room while you are under general anesthesia (in a deep sleep). The laparoscope is put into your abdomen through small cuts on the front of your belly.

Mediastinoscopy: If imaging tests suggest that the cancer might have spread to the lymph nodes between the lungs, the doctor may want to sample some of them to see if they really contain cancer. The area between the lungs is called the **mediastinum**, and looking at it with an endoscope is called *mediastinoscopy*. This is done in an operating room while you are under general anesthesia (in a deep sleep).

A small cut is made in the front of your neck above your breast bone (sternum). Then a thin, hollow, lighted tube (a mediastinoscope) is slid in behind the sternum and in front of the windpipe to look at the area. Special instruments can be passed through this tube to take tissue samples from the lymph nodes along the windpipe and the space around the major breathing (bronchial) tubes.

Lung cancers often spread to lymph nodes, but mesotheliomas do this less often. Testing the lymph nodes can help show whether a cancer has started to spread, which might affect treatment options. It can also sometimes help tell lung cancers from mesotheliomas. People with mesothelioma don’t need to have a bronchoscopy. (This is when a tube is used to look inside the breathing tubes.) It's not needed because mesothelioma doesn’t spread inside the breathing tubes. Instead, sometimes a bronchoscopy may be used to biopsy lymph nodes near the lungs instead of a mediastinoscopy.

Endobronchial ultrasound needle biopsy: For this test, a bronchoscope (a long, thin, flexible, fiber-optic tube) with an ultrasound device at its tip is passed down the throat

and into the windpipe. The ultrasound lets the doctor see the nearby lymph nodes. A hollow needle is passed down the bronchoscope and through the airway wall into the nodes to take biopsy samples. This procedure may be done with either general anesthesia (where you are asleep), or with numbing medicine (local anesthesia) and light sedation.

Open surgical biopsy

Sometimes, endoscopic biopsies aren't enough to make a diagnosis, so more invasive procedures are needed. By making an incision in the chest (thoracotomy) or in the abdomen (laparotomy) the surgeon can remove a larger sample of tumor or, sometimes, take out the entire tumor.

Testing the samples in the lab

All biopsy and fluid samples are sent to a pathology lab. There, a doctor will look at them with a microscope and test them to find out if they contain cancer cells (and if so, what type of cancer it is).

It's often hard to diagnose mesothelioma by looking at cells from fluid samples. It can even be hard to diagnose mesothelioma with tissue from small needle biopsies. Under the microscope, mesothelioma often looks like other types of cancer. For example, pleural mesothelioma can look a lot like some types of lung cancer[6], and peritoneal mesothelioma in women may look like some cancers of the ovaries[7].

For this reason, special lab tests are often done to help tell mesothelioma from some other cancers. To learn more about some of the tests that might be done on tissue samples, see Testing Biopsy and Cytology Specimens for Cancer[8].

If mesothelioma is diagnosed, the doctor will also determine what type of mesothelioma[9] it is, based on the patterns of cells seen in the microscope. Most mesotheliomas are classified as either epithelioid, sarcomatoid, or mixed/biphasic .

Pulmonary function tests

If mesothelioma has been diagnosed, pulmonary function tests (PFTs) may be done to see how well your lungs are working. This is especially important if surgery[10] might be an option to treat the cancer. Surgery often requires removing part or all of a lung, so it's important to know how well the lungs are working to start with. These tests can give the surgeon an idea of whether surgery may be an option, and if so, how much lung can safely be removed safely.

There are a few different types of PFTs, but basically you breathe in and out through a tube connected to a machine that measures airflow and how much air your lungs can hold.

Hyperlinks

1. www.cancer.org/cancer/types/malignant-mesothelioma/causes-risks-prevention/risk-factors.html
2. www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/imaging-radiology-tests-for-cancer.html
3. www.cancer.org/cancer/diagnosis-staging/tests/biopsy-and-cytology-tests/biopsy-types.html
4. www.cancer.org/cancer/diagnosis-staging/tests/endoscopy.html
5. www.cancer.org/cancer/types/malignant-mesothelioma/treating/palliative-procedures.html
6. www.cancer.org/cancer/types/lung-cancer.html
7. www.cancer.org/cancer/types/ovarian-cancer.html
8. www.cancer.org/cancer/diagnosis-staging/tests/biopsy-and-cytology-tests.html
9. www.cancer.org/cancer/types/malignant-mesothelioma/about/malignant-mesothelioma.html
10. www.cancer.org/cancer/types/malignant-mesothelioma/treating/surgery.html

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American Society of Clinical Oncology. Mesothelioma: Diagnosis. 07/2017. Accessed at www.cancer.net/cancer-types/mesothelioma/diagnosis on October 26, 2018.

Jain SV, Wallen JM. Cancer, Mesothelioma, Malignant. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2018 Jan-2018 Jul 18.

National Cancer Institute. Malignant Mesothelioma Symptoms, Tests, Prognosis, and Stages (PDQ®)–Patient Version GJul 18.

Has it spread into other nearby pleura or structures? Can it be removed with surgery?

- The spread to nearby lymph **nodes (N)**: Has the cancer spread to nearby lymph nodes?
- The spread (**metastasis**) to distant sites **(M)**: Has the cancer spread to distant organs, like the bones, liver, the lungs or pleura (lining of the lung) on the other side of the body, or the peritoneum (the lining of the abdomen)?

IB	M0	

		The cancer has spread to nearby lymph nodes on the same side of the body as the main tumor (N1). It has not spread to distant parts of the body (M0).
IIIB	**T1-T3** **N2** **M0**	Mesothelioma may or may not have grown into nearby structures, and it may still possibly be removed (resected) with surgery (T1 to T3). The cancer has spread to nearby lymph nodes on the other side of the body, or to lymph nodes above the collarbone (supraclavicular lymph nodes) on either side (N2). It has not spread to distant parts of the body (M0).
	OR	
	T4 **Any N** **M0**	Mesothelioma has grown too far to be removed completely with surgery (T4). The tumor is in the pleura lining the chest wall on one side of the chest, as well as the pleura coating the lung, diaphragm, and mediastinum on the same side. The tumor also has grown into at least 1 of the following: • More than 1 place in the deeper layers of the chest wall, including the muscle or ribs • Through the diaphragm and into the peritoneum (the lining around the abdomen) • Any organ in the mediastinum (esophagus, trachea, thymus, or blood vessels) • The spine • Across to the pleura on the other side of the chest • Through the heart lining (pericardium) or into the heart itself The cancer may or may not have spread to nearby lymph nodes (any N). It has not spread to distant parts of the body (M0).
IV	**Any T** **Any N** **M1**	Mesothelioma may or may not have grown into nearby structures (any T). It may or may not have spread to nearby lymph nodes (any N). It has spread to distant organs, like the bones, the liver, the lung or pleura on the other side of the body, or the peritoneum (the lining of the abdomen) (M1).

* The following categories may be used, but are not listed on the table above:

- **TX:** Main tumor cannot be assessed due to lack of information.

- **T0:** There's no evidence of a primary tumor.
- **NX:** Nearby lymph nodes cannot be assessed due to lack of information.

Survival rates can give you an idea of what percentage of people with the same type and stage of cancer are still alive a certain amount of time (usually 5 years) after they were diagnosed. They can’t tell you how long you will live, but they may help give you a

SEER Stage	5-Year Relative Survival Rate
Localized	24%
Regional	16%
Distant	7%
All SEER stages combined	12%

Understanding the numbers

- **These numbers apply only to the stage of the cancer when it is first diagnosed.** They do not apply later on if the cancer grows, spreads, or comes back after treatment.
- **These numbers don't take everything into account.** Survival rates are grouped based on how far the cancer has spread, but your age and overall health, the type of mesothelioma[1] you have, how resectable the cancer is[2], how well it responds to treatment, and other factors can also affect your outlook.
- **People now being diagnosed with MPM may have a better outlook than these numbers show.** Treatments improve over time, and these numbers are based on people who were diagnosed and treated at least 5 years earlier.

Hyperlinks

1. www.cancer.org/cancer/types/malignant-mesothelioma/about/malignant-mesothelioma.html
2. www.cancer.org/cancer/types/malignant-mesothelioma/treating/surgery.html

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Ruhl JL, Callaghan C, Hurlbut, A, Ries LAG, Adamo P, Dickie L, Schussler N (eds.) Summary Stage 2018: Codes and Coding Instructions, National Cancer Institute, Bethesda, MD, 2018.

SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. Accessed at https://seer.cancer.gov/explorer/ on February 23, 2023.

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Questions to Ask About Malignant Mesothelioma

It’s important to have honest, open discussions with your cancer care team. You should ask any question, no matter how small it might seem.

Here are some questions you can use to help better understand mesothelioma and your treatment options. Don’t be afraid to take notes and tell the doctors or nurses when you don’t understand what they’re saying. You might want to bring another person with you and have them take notes to help you remember what was said.

When you're told you have mesothelioma

- What kind of mesothelioma[1] do I have?
- Where is the cancer? Has my cancer spread beyond where it started?
- What's the stage (extent) of the cancer, and what does that mean?
- Do I need other tests before we can decide on treatment?
- Do I need to see any other types of doctors?
- If I’m concerned about the costs and insurance coverage[2] for my diagnosis and treatment, who can help me?

When deciding on a treatment plan

- How much experience do you have treating this type of cancer?
- Should I get a second opinion[3] ? How do I do that?
- What are my treatment options[4]?
- Do you think my cancer can be removed by surgery[5]?
- Should I think about taking part in aclinical trial[6]?
- What is the goal of treatment?
- What do you recommend and why?

- How soon do I need to start treatment?
- What should I do to be ready for treatment?
- How long will treatment last? What will it be like? Where will it be done?
- What risks or side effects are there to the treatments you suggest? Is there anything we can do to reduce side effects?
- How will treatment affect my daily activities? Can I still work?
- What will we do if the treatment doesn't work or if the cancer recurs?

During treatment

Once treatment starts, you'll long wiDuring treatment

Keep in mind that doctors aren't the only ones who can give you information. Other health care professionals, such as nurses and social workers, can answer some of your questions. To find out more about speaking with your health care team, see The Doctor-Patient Relationship[10].

Hyperlinks

1. www.cancer.org/cancer/types/malignant-mesothelioma/about/malignant-mesothelioma.html
2. www.cancer.org/cancer/financial-insurance-matters/understanding-health-insurance.html
3. www.cancer.org/cancer/managing-cancer/finding-care/seeking-a-second-opinion.html
4. www.cancer.org/cancer/types/malignant-mesothelioma/treating.html