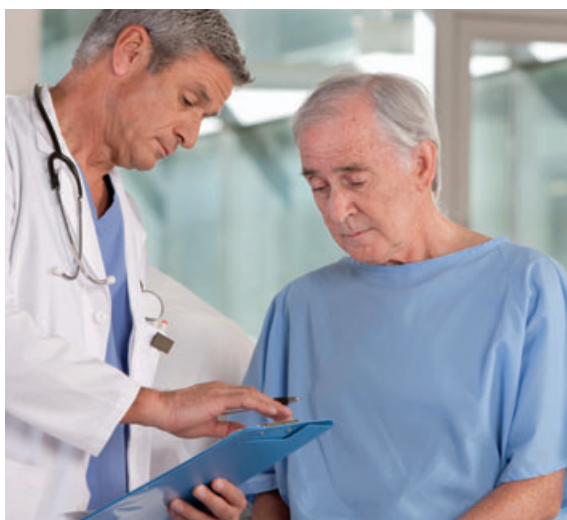


NCCN Guidelines for Patients™



Version 2011

BARON  **BUDD, P.C.®**

NCCN Guidelines for Patients™: Malignant Pleural Mesothelioma
Presented with support from the national law firm of Baron & Budd

Also available at NCCN.com

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Part 1: **About these guidelines**

1.1 NCCN Guidelines for Patients™

NCCN aims to offer the most current and trustworthy cancer information to patients and their families in a manner that is easy to understand. To reach this goal, NCCN has developed the NCCN Patient Guidelines™. These guidelines are meant to help patients talk with doctors and make the best decisions possible. They are based on the NCCN Guidelines™ that are developed for doctors. For more information on NCCN or the most recent NCCN Patient Guidelines, visit NCCN.com.

List of NCCN abbreviations and acronyms

NCCN®

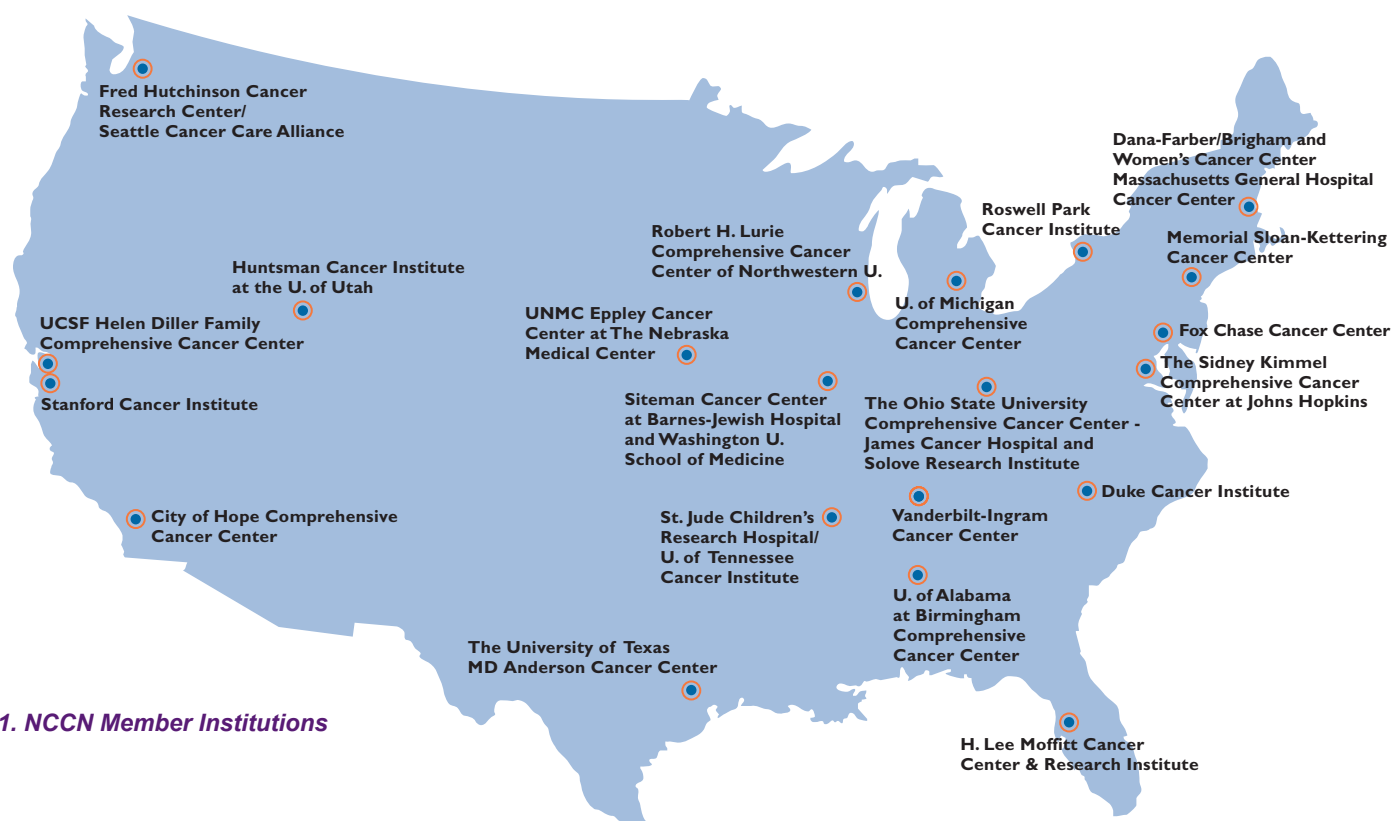
National Comprehensive Cancer Network®

NCCN Patient Guidelines™

NCCN Guidelines for Patients™

NCCN Guidelines™

NCCN Clinical Practice Guidelines in Oncology™



1.2 NCCN Clinical Practice Guidelines in Oncology™

The NCCN Guidelines are the most complete and most frequently updated clinical practice guidelines in medicine. They give a step-by-step course of action that many cancer doctors follow to make sure their decisions are well-informed. The NCCN Guidelines are developed by 44 group panels. These panels include almost 900 well-known experts from the 21 NCCN Member Institutions (Figure 1). The panel members include experts from different fields of medicine, such as medical oncology, radiology, and social work.

Recommendations in the NCCN Guidelines are based on clinical trials and the experience of the panel members. Most of the panel members have jobs that include clinical research and treating people with cancer. Members work on the guidelines that match their area of expertise. Some guidelines panels also include patient advocates to include the point of view of patients in the panel meetings. Panel members volunteer more than 15,000 hours each year to revise the NCCN Guidelines so that new information can be quickly included.

Doctors use the NCCN Guidelines to inform their decisions when diagnosing and treating people with cancer. There are guidelines for 97% of the tumors seen among patients treated at cancer clinics. Each is continually updated as new information becomes available. The NCCN Guidelines allow doctors and

patients to have access to the same information that is used by NCCN Panel Members to treat their patients. Doctors in your community may or may not perform research, but by using the NCCN Guidelines they have access to the newest information from clinical trials.

By identifying what is the standard of care, the NCCN Guidelines can help patients in two ways. First, they can reduce the number of differences in how patients are treated. Second, patients can get the best care for their situation.

It is important to note that a certain treatment may not be right for everyone. Research shows that some treatments are better for a specific disease than others. Likewise, studies have shown that among patients with the same type of cancer, some patients may need different treatments.

The treatment included in the NCCN Guidelines is what the NCCN doctors feel is most useful based on science and their experience. Therefore, even if a treatment is part of the NCCN Guidelines, it may not be the right treatment for everyone. This is because each patient has his or her own medical history and circumstances.

On the other hand, if a treatment is not included in the NCCN Guidelines, it only means that there is not enough proof at this time to support using it as a standard of care. Because of differences between patients and other factors, the NCCN Guidelines do not replace the expertise and clinical judgment of your doctors.

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1.4 How to use this booklet

The NCCN Guidelines for Patients™: Malignant Pleural Mesothelioma (MPM) are designed to help you better understand cancer treatment. These guidelines address all the stages of MPM, so not all of the information will apply to you. In addition, although the guidelines recommendations apply to most patients, they depend on the general health and situation of each patient.

The guidelines include several important parts:

- You will find information to help you understand what MPM is and what tests and treatments are available in Part 2 through Part 5.
- Tables and figures are included throughout the guidelines to either simplify information or to provide you with more information.
- A treatment guide is included in Part 6. It shows the step-by-step course of action from diagnosis through all the phases of treatment. This information is presented in a flowchart and is explained further in the text.
- Definitions of words or phrases that you may not know are provided throughout the text and in Part 7.
- There are user pages in Part 8 to help you talk with your doctor and track your medical care.

This booklet can help you and your doctors decide which choices best meet your medical and personal needs. Making decisions about treatment is important for your long-term health and the quality of your life since there are risks and benefits to every choice. Getting enough information to make an informed decision is an important first task.

Reading the guidelines in order from the beginning to the end may be the most helpful if you do not know much about MPM. The first half of the guidelines provides more basic information that will make it easier to understand the more detailed treatment guide. As you read through these guidelines, you may find it helpful to learn some general issues in order to create a list of questions to discuss with your doctor. A suggested list of questions is located at the end of the guidelines in Part 8, but you may think of more questions to ask.

Part 2: **About my cancer**

Main Points

- The pleura is the tissue that covers the lungs.
- Malignant pleural mesothelioma is usually caused by exposure to asbestos.
- Pleural effusions and thickening should prompt testing for mesothelioma.

Mesothelioma is a rare cancer of the mesothelium, which is the tissue that covers most organs inside the body. Although this cancer occurs in multiple areas, these guidelines focus on mesothelioma of the lungs since it is the most common type (Figure 2). The next pages provide more information to increase your understanding of what MPM is and how it develops.

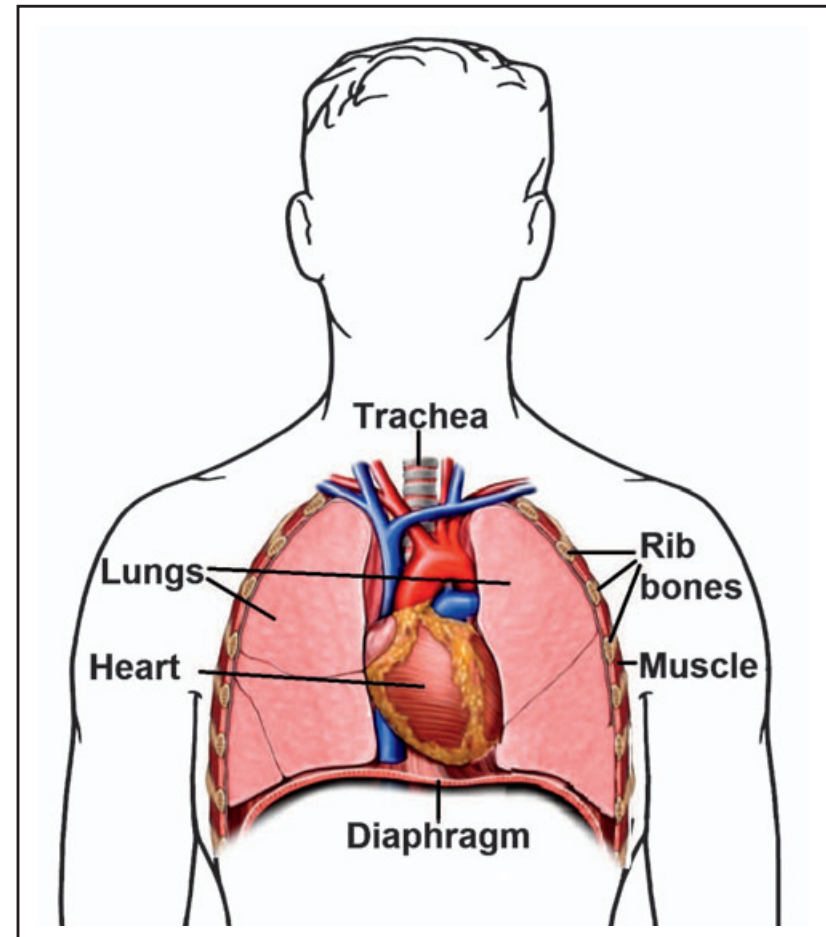


Figure 2. Body parts in the chest area

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2.1 What is the pleura?

The lungs are covered in tissue called the pleura (Figure 3). The pleura tissue has two layers. The outer layer is known as the parietal pleura, and the inner layer around the lungs is called the visceral pleura. The space in between the two layers is called the pleural cavity.

The parietal pleura has contact with many structures in the chest. It lines the inside of the chest wall, covers the top of the diaphragm, and divides the pleural cavity from the mediastinum. The parietal pleura also lines part of the ribcage and its muscles.

The parietal pleura has four names depending on its location. It is called the coastal pleura where it lines the inside of the ribs and its muscles. The parietal pleura near the diaphragm is called the diaphragmatic pleura. Where it extends into the neck it is called the cervical pleura, and where it divides the pleural cavity from the mediastinum it is called the mediastinal pleura.

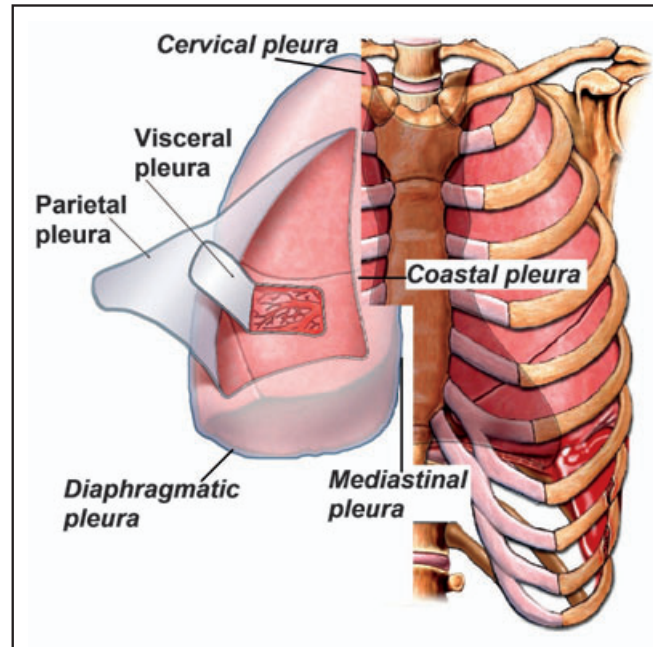


Figure 3. Pleural mesothelium

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Notes:

Definitions:

Chest wall: The muscles and other parts of the body around the lungs

Diaphragm: A sheet of muscles below the ribs that helps a person to breathe

Mediastinum: The area between the lungs where the heart is

Another name for the visceral pleura is pulmonary pleura. This layer covers not only the surface of the lungs but extends down into the spaces between the lobes of the lungs. It is directly attached to the lungs.

The pleural cavity is usually filled with a small amount of fluid called pleural fluid. Pleural fluid helps the two pleura layers slide against each other during breathing. It also helps other moving organs, such as the heart and lungs, to glide against each other.

2.2 What is malignant pleural mesothelioma?

Mesothelioma is a rare type of cancer. It occurs in about 3,000 people in the United States every year. Although rare, it is deadly. Half of the people diagnosed with MPM will die in about 1 year. MPM occurs in both men and women. People with MPM usually worked with asbestos 20 – 40 years before diagnosis. There are no studies with clear results on the length of time exposed to asbestos needed to increase the risk for mesothelioma. Because MPM takes a long time to develop, the number of deaths from this disease is likely to increase by 5% – 10% each year for the next 20 – 30 years in countries where many people work in industry.

In North America, asbestos is the only known cause of MPM. In countries outside North America, mesothelioma has occurred in some people who were not exposed to asbestos. This suggests that there are other causes of the disease. In the country of Turkey, erionite fibers, an asbestos-like mineral, have been shown to cause mesothelioma. Also, some reports have suggested that radiotherapy may be a cause.

Cancer begins in the cells of the body. Cells are the building blocks that form tissues, which in turn make up the organs of the body. Normal cells grow and then divide to form new cells as the body needs them, but stop when they have developed fully. When normal cells grow old or get damaged, they die. Cancer cells do not do this. New cancer cells form when the body does not need them, and old or damaged cancer cells do not die as they should. In mesothelioma, it is unknown how asbestos gets into the pleura and how it causes normal cells to become cancerous.

Mesothelioma is different from lung cancer. It starts in the pleura (Figure 3) as opposed to the inside of the lungs. Additionally, tobacco smoking does not increase the risk for mesothelioma. However, exposure to both tobacco smoke and asbestos does increase the risk for lung cancer.

2.3 Signs of malignant pleural mesothelioma

There are no regular screening tests for MPM. MPM is usually first suspected by doctors due to symptoms reported by patients. Symptoms of MPM may not show until decades after working with asbestos. Two common symptoms of asbestos exposure are pleural effusion and thickening (Figure 4). Pleural effusion is usually the earliest sign of asbestos-related disease developing 10 to 20 years after exposure to asbestos. Signs of pleural effusion should prompt testing for mesothelioma. Pleural plaques are the most common sign of asbestos-related disease, but are not believed to lead to cancer. However, the Guidelines panel recommends testing for MPM if scarring is present.

Symptoms of MPM overlap with symptoms of other medical conditions, so only a doctor will be able to determine if your symptoms are due to MPM. Possible symptoms of MPM include but are not limited to:

- Trouble breathing
- Chest wall mass
- Chest pain
- Weight loss
- Pleural effusion
- Sweating
- Cough
- Fever

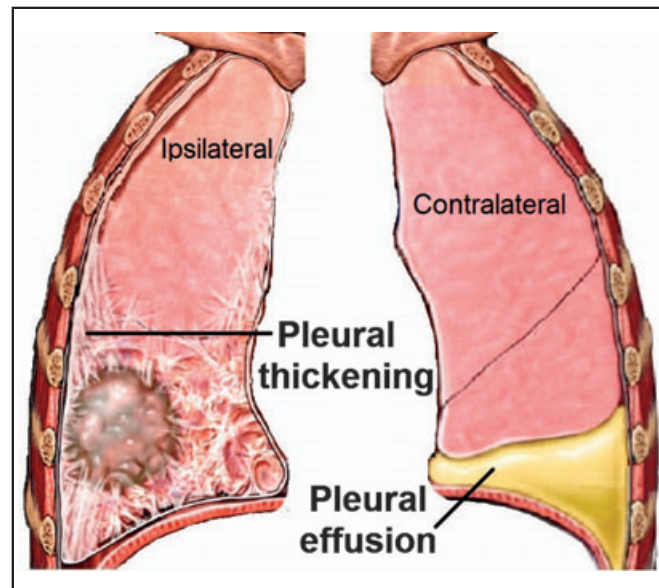


Figure 4. Signs of mesothelioma

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Notes:

Definitions:

Asbestos: A mineral fiber used in housing and commercial materials

Diagnosis: Identification of a disease

Lobes: Clearly seen divisions in the lungs

Pleural effusion: Extra fluid around the lungs

Pleural plaques: Concentrated areas of pleura scarring

Pleural thickening: Widespread scarring of the pleura tissue

Radiotherapy: Treatment with radiation

Part 3: Tests of malignant pleural mesothelioma

Main Points

- Imaging scans and tests of pleural fluid and tissue are needed for diagnosis.
- There are 4 stages of mesothelioma. Earlier stages have better treatment results.
- The 3 types of pleural mesothelioma are epithelioid, sarcomatoid, and mixed.

3.1 Do I have malignant pleural mesothelioma?

If MPM is suspected, your doctor will want you to undergo a number of tests. A list of questions about tests for MPM that you may want to ask your doctor is provided in Part 8. The following tests are used for the initial evaluation to diagnose MPM or as part of the pre-treatment evaluation.

Recommended diagnostic tests

Computed tomography (CT). A CT scan of the chest and/or abdomen with contrast is suggested to make a diagnosis and plan treatment. A CT scan is a way to examine body organs by viewing the

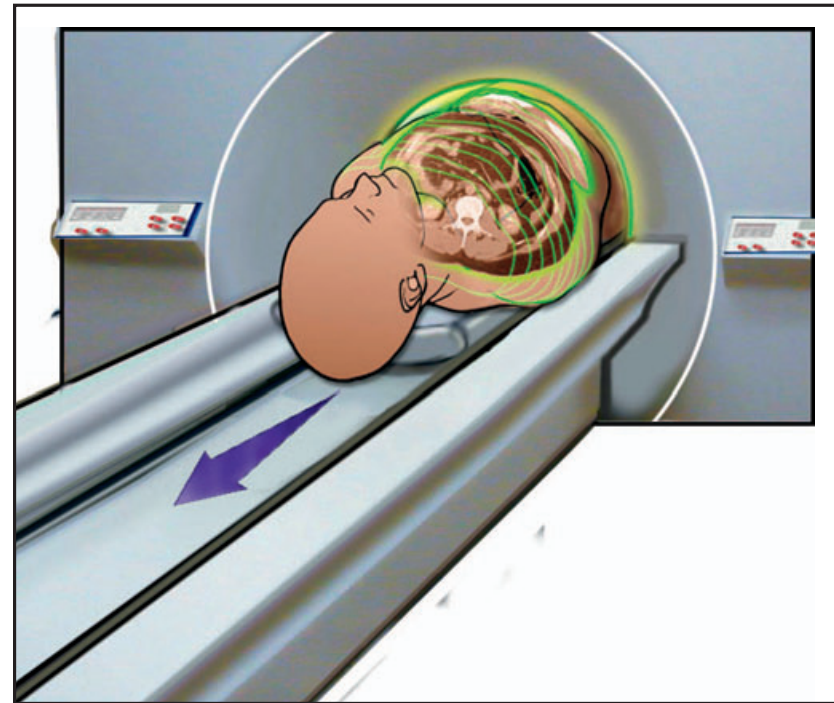


Figure 5. Computed tomography

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results of x-rays on a computer in detailed 3-D pictures. When a contrast is used, a substance will be put into your body either by mouth or injection to improve the pictures. A CT scanner is a large machine with a tunnel in the middle. During the scan, you will lie on a table that will move slowly through this tunnel (Figure 5).

Optional Diagnostic Tests

Blood tests. Your doctor may take samples of your blood to look for abnormal levels of substances. High levels of serum mesothelin-related peptide (SMRP) or osteopontin may be markers of MPM.

Mediastinoscopy. This procedure allows access to lymph nodes in the mediastinum (Figure 7). Mediastinoscopy involves making cuts into the tissue near the breast bone and inserting a thin, long tube (called a mediastinoscope) with a light and lens to view the area on a video monitor. The mediastinoscope may also have a tool to remove tissue.

Endobronchial ultrasonography fine-needle aspiration (EBUS-FNA). This is another procedure used to assess mediastinal lymph nodes. The EBUS-FNA is less invasive than a mediastinoscopy. During an EBUS-FNA procedure, a thin tool called a bronchoscope is attached to an ultrasound device and then is guided through the mouth down into the lungs. The ultrasound is able to show the location of the lymph nodes. A needle is passed through the wall of the trachea or bronchus and into a lymph node to get a sample.

Laparoscopy. To assess if MPM has spread across the diaphragm, a laparoscopy may be necessary. During this procedure, very small cuts are made in the belly and a tube called a laparoscope is inserted to see the area and take a biopsy.

Magnetic resonance imaging (MRI). An MRI of the chest is an optional procedure for the pre-treatment evaluation. It is another medical imaging tool that is used to view the detailed structures and functions of organs and tissues of the body. An MRI uses radio waves and powerful magnets to make pictures on a computer.

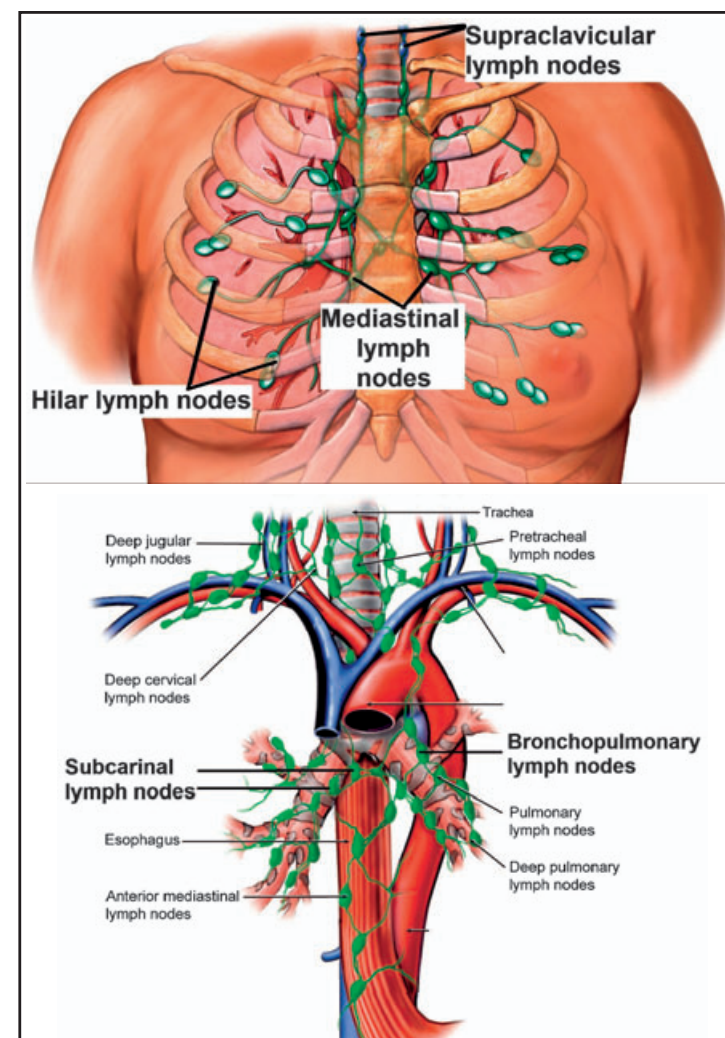


Figure 7. Lymph nodes in the chest

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3.2 The pathology report

The thoracentesis and biopsy samples are reviewed by a pathologist. The samples are stained with dyes to help see the differences between parts of a single cell and differences between multiple cells. These stained samples are placed on glass slides and examined under a microscope. Next, the pathologist looks for markers of the disease and writes a report for your doctor.

If you have questions about your biopsy results, the pathology report, or any other part of the diagnostic process, do not hesitate to talk with your doctor. In some cases, the pathologist may have questions about reading the slides and request a 2nd opinion from another pathologist. You can also request that your biopsy specimen be reviewed by a pathologist at an NCCN Member Institution or other specialist suggested by your doctor.

3.3 Stages of malignant pleural mesothelioma

Staging is a process of learning how far your cancer has spread within the pleural tissue, to other nearby tissues, and to other organs. It requires careful review of the results from the initial tests, including imaging scans. The stage of a cancer is one of the most important factors in choosing treatment options and predicting how long patients will live. To follow the treatment guide in Part 6, you will need to know your cancer stage. Be sure to ask your cancer care team to explain this to you if you have any questions.

Notes:

Definitions:

Bronchus: One of the two main passages through which air reaches the lungs

Lymph nodes: Small groups of special immune cells located throughout body

Osteopontin: A type of protein found in bone tissues

Serum mesothelin-related peptide (SMRP): A protein in mesothelial cells

Trachea: The air passage between the throat and bronchi

The American Joint Committee on Cancer (AJCC) staging system is most often used for MPM. In this system, the cancer is given a TNM classification. The T category describes the size of the tumor. The N category specifies the extent of the cancer in the lymph nodes. The M category specifies if the cancer

has metastasized to distant organs. The staging used by AJCC for MPM was developed by the International Mesothelioma Interest Group. There are four stages of mesothelioma based on the TNM classification. Each stage is represented by a Roman numeral (I – IV). To determine the stage of MPM, the TNM categories are combined (Table 1). Stage I is the earliest MPM stage.

The definitions for tumor growth in the TNM classification are as follows:

T1	Tumor growth in the ipsilateral parietal pleura
T1a	No tumor growth to visceral pleura
T1b	Tumor growth to visceral pleura
T2	Tumor growth to all ipsilateral pleura areas and either the diaphragm or lungs
T3	Tumor growth to all ipsilateral pleura areas and ≥ 1 of the following: Tissue lining of the thorax or heart, mediastinal fat, or single area of chest wall
T4	Tumor growth to all ipsilateral pleura areas and ≥ 1 of the following: Many areas of chest wall, peritoneum, contralateral pleura, spine, mediastinal organs, or inside the heart
N0	No growth to lymph nodes
N1	Tumor growth to ipsilateral bronchopulmonary or hilar nodes
N2	Tumor growth to subcarinal or ipsilateral mediastinal nodes including mammary and peridiaphragmatic nodes
N3	Tumor growth to contralateral mediastinal or internal mammary nodes, or any supraclavicular nodes
M0	No distant metastasis
M1	Distant metastasis

Table 1. Staging of malignant pleural mesothelioma

Stages			
Stage	T	N	M
I	T1	N0	M0
IA	T1a	N0	M0
IB	T1b	N0	M0
II	T2	N0	M0
III	T1, T2	N1	M0
	T1, T2	N2	M0
	T3	N0, N1, N2	M0
IV	T4	Any N	M0
	Any T	N3	M0
	Any T	Any N	M1

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In Stage I, a tumor has grown in the parietal pleura on only one side of the chest (Figure 3). It has not spread to the lymph nodes or throughout the body. In stage IB, the tumor has also grown in the visceral pleura.

In Stage II, the tumor has spread to all the ipsilateral pleura surfaces (Figure 4). In addition, it has spread either into the muscle of the diaphragm or inside the lung. There is still no lymph node growth or metastases.

In Stage III, the tumor has grown significantly in the chest area or to the lymph nodes. It may involve the endothoracic fascia, the chest wall, the fatty part of the mediastinum, and/or the pericardium (Figure 8). The subcarinal lymph nodes or ipsilateral bronchopulmonary, hilar, or mediastinal lymph nodes may be affected. At this stage, MPM has not metastasized to distant organs.

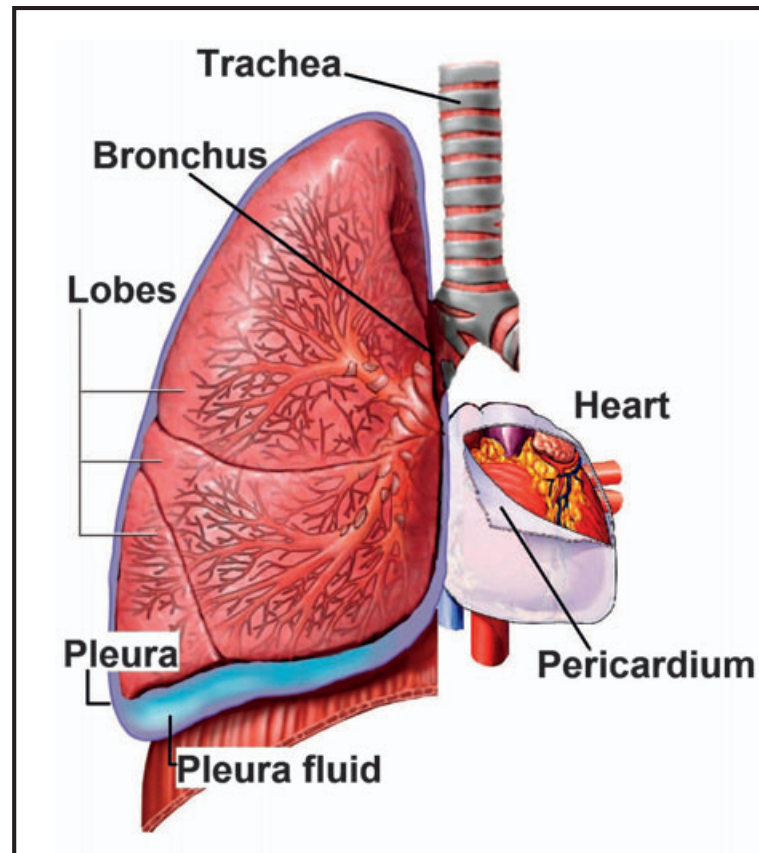


Figure 8. The pericardium of the heart

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Notes:

Definitions:

Contralateral: On the opposite side of the body from the tumor (Figure 4)

Endothoracic fascia: The lining of the thorax

Ipsilateral: On the same side of the body as the tumor (Figure 4)

Metastasized: Cancer that has spread to distant tissues

Pericardium: The heart's outer lining

Peritoneum: The lining of the abdomen

Thorax: The chest area between the head and abdomen

In Stage IV, the tumor may have spread to the many areas of the chest wall, the contralateral pleura, the spine, the peritoneum, and/or inside the heart or other mediastinal organs, but may or may not have spread to the lymph nodes. This stage also includes any T stage with non-metastatic wide lymph node growth involving the contralateral mediastinal or internal mammary nodes or any supraclavicular lymph nodes. Any metastasized MPM would be classified as Stage IV.

3.4 Types of malignant pleural mesothelioma

The pathologist classifies the type of mesothelioma based on the shape and structure of the cancer cells. This is known as histologic subtyping. The histologic subtypes of MPM include epithelioid, sarcomatoid, and biphasic (mixed). Epithelioid cells are organized and structured. This is the most common histologic subtype of MPM and tends to have a better outcome (prognosis) than the other subtypes. Sarcomatoid cells are random and irregular, and the biphasic subtype has both epithelioid and sarcomatoid cells. The histologic subtype is used to determine which treatment is best for you.

There is no single right answer for which treatment is best for a patient. The final decision will require talking about the possible results and your personal feelings toward treatment. Your cancer care team can help you sort through the choices.

4.2 Getting a 2nd opinion

The time around a cancer diagnosis is very stressful. Often people with cancer want to get treated as soon as possible. They want to make their cancer go away before it spreads or becomes more aggressive. It is important to know that while cancer can't be ignored, there is time to think about treatment choices and decide which treatment plan is best for you.

You may wish to have another doctor review your test results and the treatment plan your doctor has recommended. This is called getting a 2nd opinion. Mesothelioma is a serious disease and new information may be published about which treatments are most effective and safe. While you may completely trust your doctor, it is sometimes helpful to get a 2nd opinion on which treatment is right for you.

Your doctor will need to give copies of the pathology report and other test results to the other doctor. Some people feel uncomfortable asking their doctor for help. However, a 2nd opinion is a normal part of cancer care. Even when doctors are diagnosed with cancer, most will consult with more than one doctor before choosing their treatment. Furthermore, some health plans require a 2nd opinion. If your health plan does not cover the cost of a 2nd opinion, you have the choice of paying for it yourself.

Choosing your cancer treatment is a very important decision. It can have consequences for your length and quality of life. There are few cancers that are so aggressive that you can't take a few weeks to get a 2nd opinion and select the best treatment for you.

4.3 Malignant pleural mesothelioma treatments

There are different treatment approaches for MPM based on cancer stage and histology. Treatments include surgery, chemotherapy, and radiotherapy. Some patients are candidates to receive multi-modality treatment, which includes a combination of surgery, radiotherapy, and/or chemotherapy. Several factors should be taken into account when choosing treatment, including the potential benefits and risks.

Surgery

The removal of the tumor by surgery is called a resection. To determine if you are a candidate for resection, a surgical evaluation is needed. The guidelines recommend pulmonary functioning tests (PFTs), quantitative ventilation/perfusion (V/Q) tests, and a cardiac stress test. PFTs are a set of breathing tests that involve blowing into a tube to determine the strength of your lungs, and V/Q tests evaluate the flow of air and blood in the lungs. A cardiac stress test evaluates the condition of your heart under stress, such as during running.

The goal of surgery is complete removal of the tumor and should be done by a board-certified thoracic surgeon. Furthermore, during surgery, a dissection of the mediastinal lymph node should be done. There are two surgery options for resection.

Pleurectomy/decortication (P/D) completely removes the affected pleura and the entire tumor. It can be done with VATS or a larger cut on the side of the chest. This surgery can cause air leakage, bleeding, and pus. A small number of patients die from this surgery.

The second surgical option is an extrapleural pneumonectomy (EPP). It is more invasive than P/D. It involves removing both pleural layers, the affected lung, ipsilateral diaphragm, and often the pericardium. It has a higher rate of death than P/D and more side effects.

Chemotherapy

Chemotherapy uses drugs that are harmful to cancer cells and is designed to keep them from dividing. It is not expected to kill all of the cancer cells, but it may slow their growth and reduce pain. Chemotherapy is given intravenously or as a pill. Either way, the drugs travel in the blood to kill cancer cells throughout the body.

Notes:

Definitions:

Dissection: Cutting away or apart in order to study

Multi-modality treatment:
A combination of different types of treatment

Pus: A yellowish thick fluid in an area of inflammation

There are several terms used to describe chemotherapy. Induction chemotherapy is when chemotherapy is given as an initial treatment for cancer, especially as part of multi-modality treatment. A first-line regimen is the first round of chemotherapy given, and a second-line regimen is the second round of chemotherapy given. First-line chemotherapies usually provide the best chance of destroying cancer cells. Adjuvant chemotherapy is given after the primary treatment for cancer has ended. Chemotherapy drugs can be given in combination or as single-agent drugs. For MPM, a combined first-line regimen using cisplatin and pemetrexed is currently the only regimen approved by the U.S. Food and Drug Administration (FDA) for MPM.

Table 2 lists the chemotherapy drugs used to treat MPM. Chemotherapy drugs kill cancer cells, but they also damage some normal cells. The doctor must maintain a careful balance of doses high enough to kill the

cancer cells but low enough to avoid destroying too many healthy cells. It is important to know that even the best drugs do not always work. Also, while these drugs are safe, you may have side effects, even serious ones.

Side effects of chemotherapy. The side effects of chemotherapy depend on the type of drug(s), the amount taken, and the length of treatment. Short-term side effects may include fatigue, nausea and vomiting, diarrhea, loss of appetite, numbness, hair loss, and mouth sores. Because chemotherapy can harm the cells that make blood, you may have low blood cell counts. This can increase the chance of infection, too much bleeding or bruising after minor injuries, and fatigue. There are treatments for side effects, and many disappear once treatment is stopped. For example, anti-nausea drugs can be given for nausea and vomiting, and other drugs can be given to boost blood cell counts.

Radiotherapy

Some cancer cells may be left behind after surgery. Radiation therapy uses high-energy rays (such as x-rays) or particles (such as electrons or protons) to kill these cancer cells. Radiotherapy can be used as an adjuvant treatment in a multi-modality regimen or as palliative treatment for relief of chest pain or bone or brain metastases. The dose (measured in Grey units, or Gy) and duration of radiation therapy are determined by the purpose of the treatment.

Table 2. Chemotherapy drugs for malignant pleural mesothelioma

Generic Name	Brand Name	Drug Class
Pemetrexed	Alimta	Folate antimetabolite
Cisplatin	Platinol, Platinol-AQ	Alkylating agent
Carboplatin	Paraplatin	Alkylating agent
Gemcitabine	Gemzar	Antimetabolite
Vinorelbine	Navelbine	Mitotic inhibitor

Most cancers grow in a ball shape, but mesothelioma grows as sheets blanketing the lung. This shape makes it difficult to treat with radiotherapy. Thus, radiotherapy is mostly used to treat residual tumors, microscopic cancer cells, or ports where imaging and surgical instruments were inserted. The first step in radiation therapy requires treatment planning that considers the size and location of the tumor. Exact measurements need to be taken to find the best angles for aiming the radiation beams.

The most common form of radiotherapy for MPM is external beam radiation therapy (EBRT). This radiation comes from a machine outside the body. There are newer EBRT technologies that target the tumor more precisely and reduce the exposure of radiation to healthy tissue. This offers a better chance of killing cancer cells and limiting side effects. Such technologies recommended by the NCCN Guidelines panel include four-dimensional computed tomography (4D-CT), image-guided radiation therapy (IGRT), intensity-modulated radiation therapy (IMRT), tomotherapy, and proton therapy.

For patients with residual tumors, some experienced doctors have used brachytherapy or intraoperative EBRT following surgery. Brachytherapy involves the delivery of radiation therapy using small radioactive pellets that are placed directly into the tumor with thin needles. Radiation from the pellets travels a very short distance, so the pellets can put out a very large amount of radiation to a very small area. This decreases the amount of damage to the nearby healthy tissues.

Side effects of EBRT. Despite the best treatment planning and positioning of the patient, there are side effects. Special attention should be paid to reduce radiation to the healthy lung, as the risk of fatal pneumonitis with IMRT is very high when strict limits are not used. Other side effects of radiotherapy include fatigue, which may last for a few months after treatment stops; pain with swallowing; nausea; dehydration; and skin changes.

Notes:

Definitions:

Blood cell counts: The number of red blood cells, white blood cells, and platelets

Dehydration: Low amounts of fluids in the body

Fatigue: Severe tiredness despite getting enough sleep

FDA: A government agency that regulates drugs and food

Intravenously: Drugs given by needle through a vein

Intraoperative: During the course of surgery

Microscopic: Can't be seen by the naked eye

Palliative treatment: Treatment for symptoms of a disease

Particle: Small pieces of matter

Pneumonitis: Swelling of the lungs

Ports: Holes cut in body tissue for medical procedures

Residual tumors: Small parts of a tumor that are not removed by surgery

4.4 What are clinical trials?

Many new cancer treatments are available because patients have been willing to take part in clinical trials. In these studies, new treatments are compared to current treatments, such as those described in Part 4.3. The purpose of the clinical trial is to find out whether the new treatment or the current treatment is better at fighting cancer. Clinical trials may also look at new ways to diagnose or prevent a disease, make current treatments better, or assess whether a new treatment is safe. NCCN believes that the best management for any patient with cancer is in a clinical trial.

Your doctor may ask you if you would like to be in a clinical trial. There are several benefits. First, you will receive the most current cancer care according to a very specific treatment plan. Second, doctors who work with clinical trials know the newest cancer treatments. They also track the results of treatment—both good and bad—and compare their results with other doctors to improve treatment.

There are many decisions to make after your diagnosis of cancer, and one may be whether or not a clinical trial is right for you. Here we will give you a brief review of clinical trials. Talking with your cancer care team, your family, and your friends can help you make the best treatment choice for you.

The purpose of clinical trials

Clinical trials are done to test new treatments to see whether they are better than the current treatments. A clinical trial is only done when there is good reason to believe that the new treatment, test, or procedure may be better than the current one. Treatments tested in clinical trials are often found to have benefits and may become tomorrow's standard treatment. However, there is no way to know whether this will be the case before the trial results have been confirmed.

Clinical trials can focus on many things, such as:

- New uses of medications that are already approved by the FDA. For example, drugs that are used for one type of cancer may be tested for another type of cancer.
- Different ways of giving chemotherapy, such as by mouth instead of by a needle in the arm.
- New drugs that have not yet been approved by the FDA. For example, research to know the best dose that treats the disease and has few side effects.
- Alternative medicines, such as herbs and vitamins.
- New diagnostic tests, such as genetic tests, to assess which patients are the best candidates for certain treatments.
- Medicines or procedures to relieve symptoms.

Phases of clinical trials

There are four phases of clinical trials, which are numbered I, II, III, and IV. The phases are described below using the example of a drug treatment:

- **Phase I clinical trials:** The purpose of a phase I study is to find the best way to give a new treatment safely to patients. The cancer care team closely watches patients for any harmful side effects. In phase I studies, the drug has already been tested in lab and animal studies but needs to be tested in humans to understand the best dose for treatment with the fewest side effects.

Since phase I trials are usually the first type of trial in humans, most patients in these trials have already been treated with current treatments. Doctors start by giving very low doses of a new drug to the first patients and increasing the doses for later groups of patients until side effects appear or the desired treatment effect is seen. Doctors are hoping to help patients, but the main purpose of a phase I trial is to test the safety of the drug. If a drug is found to be reasonably safe in phase I studies, it can be tested in a phase II clinical trial.
- **Phase II clinical trials:** These studies test if a drug works for a specific type of cancer and are done in larger groups of patients when standard treatments are not working. Often, phase II trials test new combinations of drugs. Patients are closely watched to see if the treatment has an effect, such as shrinking of the tumor. The cancer care team also looks for side effects. If a drug or combination of drugs is found to be effective in phase II studies, it can be tested in a phase III clinical trial.
- **Phase III clinical trials:** Phase III studies include large numbers of patients. Often, these studies are randomized. This means that patients are put into a treatment group by chance. There can be more than two treatment groups in a clinical trial. The control group gets the standard treatment and the other groups get a new treatment. Neither you nor your physician can pick which group you get assigned. This may make you feel uneasy. Your doctor will explain to you the

Notes:

Definitions:

Alternative medicine:

Treatments used in place of ones usually given by doctors

Control group: Research participants who do not receive a new treatment

Genetic tests: Procedures that evaluate information from genes

Randomized: Assignment to a group by chance

exact reason for the clinical trial and the risks and benefits of all treatments. Every patient in phase III studies is watched closely. The study will be stopped early if the side effects of the new treatment are too severe or if one group has much better results than the other(s). Phase III clinical trials are usually needed before the FDA will approve a new drug for use by the general public.

- **Phase IV clinical trials:** Once a new drug has been approved by the FDA and is available for all patients, it may be studied in phase IV studies. In phase IV studies, the treatment is tested in a very large number of patients with different types of cancer. This way more can be learned about short-lived and long-lasting side effects and safety. For example, some rare side effects may only become apparent in phase IV studies. Doctors can also learn more about how well the drug works and if it might be helpful when used in other ways, such as in combination with other treatments.

Deciding to enter a clinical trial

If you would like to take part in a clinical trial, you should begin by asking your doctor if clinical trials are available where you have decided to get treatment. If clinical trials are available, you will be evaluated to see if you meet specific conditions of the study. In clinical trials, study participants are usually similar in terms of their tumor and general health. The purpose is to know that any improvement is because of treatment and not because of differences between patients. Even if you meet the conditions of the study, it is still your choice to participate.

All study participants need to sign a paper called an informed consent form (ICF). The ICF describes the study in detail including the risks and benefits. Your doctor will explain why the clinical trial may be right for you, and the ICF will be reviewed completely before you decide whether to participate.

How can I find out more about clinical trials that might be right for me?

You can get a list of clinical trials by calling the National Cancer Institute (NCI) Cancer Information Service toll free at 1-800-4-CANCER (1-800-422-6237) or by visiting the NCI clinical trials website at www.cancer.gov/clinicaltrials. Based on information about your cancer, this service can put together a list of clinical trials that may match your medical needs. The service will also ask where you live and whether you are willing to travel so a nearby treatment center can be found.

4.5 Controlling symptoms

Most of these guidelines cover ways to treat MPM. However, maintaining your quality of life is also a very important goal. Don't hesitate to discuss your symptoms or any other quality-of-life concerns with your cancer care team.

Pleural effusion is one common symptom among patients with MPM. It can be managed with either talc pleurodesis or a pleural catheter. Pleurodesis involves putting talc powder into the pleural cavity to irritate the tissue and cause the pleura layers to grow together during the healing process. This seals the pleural cavity and stops fluid buildup. In contrast, a pleural catheter allows the fluid to be drained from the chest through a tube. However, fluid can build up again once the tube is removed.

There are effective and safe ways to treat other symptoms of MPM and most of the side effects caused by MPM treatments. Depending on the symptoms, changes in behavior or diet or over-the-counter medications can be helpful. When properly given, medications can relieve symptoms without causing other symptoms. Symptom relief can help some patients be more active and may, indirectly, help them live longer.

4.6 Supportive care

Some people with advanced MPM may decide they do not want to continue to take cancer treatment. In this situation, supportive care is an option. Supportive care includes treatments intended to stop suffering rather than to control the spread of the cancer. Pain medications are one example of supportive care. Removing tumors or killing cancer cells may also make you feel better. However, even when such treatment is not possible, there may be other choices. There is no reason to endure pain or other discomfort when supportive care treatments are available. Some patients assume that nothing can be done to help them. This is not the case. Talk with your cancer care team about any discomfort. If you do not, you may miss your chance to keep your best quality of life for as long as possible.

Notes:

Definitions:

Informed consent form (ICF):

A document describing a study and requiring a signature from participants after review

Part 5: **Beyond usual treatment**

Main Points

- Tell your doctor about any alternative and complementary medicines you are taking.
- There is help for the many challenges you will face as a patient with cancer.
- Caregivers who don't ignore their own needs will likely give better care to their loved ones.

5.1 Aren't there other treatments?

You may hear about other treatments from your family and friends. They may suggest complementary and alternative medicine (CAM), such as vitamins, herbs, or stress reduction, as a treatment for your cancer or to help you feel better. CAM is a group of various treatments that are not usually given by doctors. There is currently a great deal of interest in CAM for cancer treatment.

Complementary medicines are treatments given along with usual medical treatments. Examples include acupuncture for pain management or yoga for relaxation. Many CAMs are being studied to find out if they are truly helpful. While some of these treatments may not be designed to kill cancer cells, they may be helpful if they improve your comfort and well-being.

Alternative medicine is used in place of usual medicine. Some alternative medicines are promoted as cures, though typically they have not been proven to work. If there was good evidence that CAM or other treatments cured cancer, it would be included in these guidelines.

It is important to let your cancer care team know of any CAMs that you are using for two key reasons: (1) Your cancer care team can help you figure out which CAMs may be helpful and which have no benefit; and (2) Some CAMs may limit how well your treatment for cancer or other medical conditions works.

5.2 What else can I do?

For most patients with cancer, their primary concern is that their treatment works. However, having cancer is complex and brings many physical and emotional challenges. It is important to know these challenges, talk about them with your cancer care team, and use what support is available. Don't wait until you feel overwhelmed to ask questions or raise issues. There are ways of dealing with most of the problems you will face.

Part 5: Beyond usual treatment

It is also important to know that there is no norm for how people cope with their cancer. Everyone reacts differently. Your reaction can be shaped by your type of cancer, personality, overall health, the support you have, and other factors. You can help yourself by knowing potential challenges and taking an active role in managing them. Below are some of the issues patients with cancer face, and in Part 8 there is a list of suggestions for taking care of yourself.

Becoming a “patient with cancer”

Hearing the words “you have cancer” is life changing. Becoming a patient with cancer also means dealing with major changes in your life. These can include managing doctor’s visits, figuring out how to care for your children, missing work, feeling a loss of control over your life, and, possibly, considering the end of life itself. Some people try to keep their life as normal as they can. Others change their life drastically. However, many cancer survivors will tell you that during the active treatment period, being a patient with cancer becomes your job. It’s a job that requires a major commitment of time and energy and can be a difficult adjustment. Understanding how large of an impact cancer has on your life may help you reach out for support.

Having a treatment plan

One of the best ways to make sure that you agree with your treatment plan is to have it written on paper. Treatment plans include information about your cancer, treatment, side effects, physical and emotional issues, and a statement about what is important to you in deciding future treatment goals. Treatment plans are useful for anyone at any stage but are critical for patients who may not survive cancer. A treatment plan allows you to be clear about your wishes for treating advanced disease or for end-of-life decisions. Treatment plans are also valuable when you change your care from one doctor to another, such as from your cancer care team back to your primary doctor. Ask your cancer care team for help with creating a written treatment plan.

Notes:

Anxiety and depression

Feelings of anxiety and depression are common among patients with cancer. For some patients, this may be a minor problem, such as the normal anxiety you feel while sitting in the doctor's office or waiting for test results. It may also be a passing depression related to a difficult part of treatment. However, for some, it is a longer lasting, more serious distress that limits their ability to live and interact with people. If you are having anxiety or depression, tell your treatment team. Too many people hesitate to talk about emotional concerns when there is excellent help available. This might include support groups, "talk" therapy, or medication. Some people also benefit from using relaxation and meditation techniques. Your cancer care team has information to help you.

Fatigue

Fatigue is one of the most common problems that patients with cancer have. It can occur during treatment and beyond, and can have a serious impact on life. Cancer-related fatigue differs from normal tiredness in that it comes on suddenly and is not relieved by sleep. Some patients have described it as paralyzing. Researchers are not sure what causes cancer-related fatigue. There are medicines that can help, but there is no specific treatment. Be aware of your energy levels and try to conserve your energy. Plan ahead, rest, limit activities, and prioritize. Good nutrition and stress management can also be helpful. If you are experiencing fatigue, talk with your treatment team and work with them to develop an individual plan to help you.

Pain

Patients with cancer fear pain more than any other symptom. The good news is that it is usually possible to control cancer pain with the right medications at the right doses. Medications also allow most people to function at whatever level is possible for them. Do not suffer in silence. Talk with your doctors and nurses about pain control.

Nutrition

Some patients with cancer lose weight while others gain weight during treatment. In every case, good nutrition is always important. Depending on your type of cancer and treatment, you may have changes in taste, loss of appetite, or problems eating and digesting food, or you may become much less active. For some patients, eating is related to stress or anxiety. Be aware of your dietary needs during and after treatment and plan to talk with a nutritional specialist. Meeting your calorie needs, getting plenty of fluids, and eating a balanced diet are all important.

Exercise

Until very recently, most patients with cancer were told not to exercise during treatment. New data, however, have shown that many patients benefit from moderate exercise. Exercise helps people maintain muscle tone and overall health, build good nutritional habits, and lower stress. Exercise programs vary depending on each person's situation, so talk with your treatment team about which exercises would be good for you.

Notes:

No one experiences cancer alone. Having cancer deeply affects a patient's family and friends, especially those who provide care. This care can take many forms and changes with the stage of the disease. It can range from providing emotional support to giving medical services in the home. Caregivers often take on major extra responsibilities to maintain day-to-day life for the family. Caregivers also play a central role in explaining what is happening to the patient to others, including children, friends, and the treatment team.

It is natural to focus on the needs of their loved one, but caregivers should pay attention to their own needs as well. Cancer treatment can last for months and years. Caregivers often describe themselves as exhausted by trying to meet the physical and mental challenges related to their loved one having cancer. It is not simple, but caregivers need to remember to take care of themselves. If they do not, they will likely be unable to give their loved ones the best support and care. In Part 8, there is a list of suggestions for caregivers on how to take care of themselves.

Part 6: **A step-by-step treatment guide**

Main Points

- Mesothelioma treatment should be managed by an experienced cancer care team.
- Stage I–III epithelial or mixed mesothelioma should be evaluated for surgery.
- Surgery is suggested for stage I epithelial or mixed mesothelioma.
- Multi-modality treatment is suggested for stage II–III epithelial or mixed mesothelioma that can be treated with surgery.
- Chemotherapy is suggested for stage I–IV mesothelioma that can't be treated with surgery.

The treatment guide for MPM can be found on the next pages. The goal of this guide is to increase your understanding of the treatment pathways of MPM. These pages will show you step-by-step how you and your doctor can arrive at the choices you need to make about your treatment.

On each page there is a chart to display the flow of events and an explanation of the chart. Every effort has been made to make this treatment guide easy to read. Some words that may not be familiar to you are defined on the page, and there is also a dictionary in Part 7 that you can check. For more information about tests and treatments discussed below, read Parts 2 through 5.

The treatment guide is organized by clinical stage, so make sure that you know this information. Keep in mind that this information is meant to be used with your doctor who knows your situation, medical history, and personal preferences. In Part 8, there is a brief summary of treatment recommendations that you may want to print out and bring with you to your next doctor's visit.

6.1 Diagnostic tests for malignant pleural mesothelioma

Signs	Tests
Pleural effusion and/or pleural thickening	<ul style="list-style-type: none">• Computed tomography (CT) scan with contrast of the chest• Tests of cells from the fluid around the lungs• Tests of the tissue covering the lungs removed by thoracoscopic video-assisted thoracic surgery (VATS) biopsy. Other accepted biopsies are a pleural biopsy with Abrahms needle, CT-guided core biopsy, or open biopsy.• Talc pleurodesis or pleural catheter for pleural effusion.• Blood tests for serum mesothelin-related peptide (SMRP) and osteopontin (optional)
For tests prior to starting mesothelioma treatment, see Part 6.2	

The guidelines recommend testing for MPM if pleural effusion or thickening is present (Figure 4). Three of the tests listed should be standard for all patients. First, you should receive a chest CT scan with contrast along with tests of the cells from the fluid and tissue covering your lungs. Thoracentesis to remove fluid and a VATS biopsy to remove tissue from the chest are preferred. If treatment of pleural effusion is needed, either talc pleurodesis or pleural catheter can be done. Talc pleurodesis will also stop the buildup of new fluid. Your doctor may also be interested in measuring your levels of SMRP and osteopontin. Based on these tests, your doctor will let you know if you have MPM. If your tests are positive, a treatment team that has different areas of expertise within MPM is recommended.

Notes:

Definitions:

Biopsy: A medical procedure that collects tissue

CT scan: A test that uses x-rays to view body parts

Osteopontin: A type of protein found in bone tissues

Pleural catheter: A tube that drains fluid from the chest

Pleural effusion: Extra fluid around the lungs

Pleural thickening: Widespread scarring of the pleura tissue

SMRP: A protein in mesothelial cells

Talc pleurodesis: Sealing of the pleural cavity with powder to stop fluid buildup.

Thoracentesis: Removal of pleural fluid with a needle

6.2 Pre-treatment tests for malignant pleural mesothelioma

Tests

- X-ray of the chest and abdomen using computed tomography (CT) with contrast
- Positron emission tomography - computed tomography (PET-CT)
- Tests of the lymph nodes from between the lungs by either mediastinoscopy or endobronchial ultrasonography (EBUS) fine-needle aspiration (FNA).
- Laparoscopy to test if MPM has spread to the diaphragm (optional)
- Magnetic resonance imaging (MRI) of the chest (optional)
- Consider thoracoscopic video-assisted thoracic surgery (VATS) biopsy if MPM in both lungs is suspected

Results

Clinical stage I–III with epithelial or mixed histology

Clinical stage IV or sarcomatoid histology

For tests prior to surgery, see Part 6.3

For stage IV or sarcomatoid treatment, see Part 6.5

The next step after diagnosis is to get another evaluation to clinically assess MPM. The results of these tests will determine the cancer stage and histology and, therefore, the type of treatment. If you have not already had a CT scan of the chest and abdomen (Figure 5), it should be included in the evaluation along with a PET-CT scan. The PET-CT scan should be performed before talc pleurodesis if possible. Other optional tests include a MRI, EBUS-FNA or mediastinoscopy to assess lymph nodes, and laparoscopy to assess if MPM has spread to the diaphragm. You may have many doctor visits for tests and treatments, so in Part 8 there is a personal treatment record that you can use to write down the names and dates of the tests and treatments you receive.

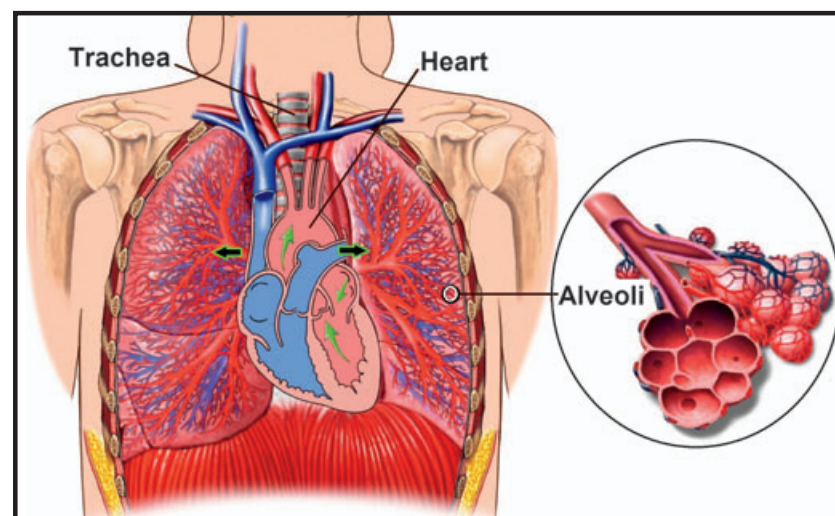


Figure 9. Blood flow in the heart and lungs

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6.3 Surgical tests for stages I–III epithelial or mixed mesothelioma

Tests

- Pulmonary function tests (PFTs)
- Quantitative ventilation/perfusion (V/Q) tests
- Cardiac stress test

For mesothelioma treated with surgery, see Part 6.4

For mesothelioma unfit for surgery, see Part 6.5

Results

- Can be treated with surgery
- Cannot be treated with surgery

Patients with clinical stage I–III epithelial or mixed MPM should be evaluated for surgery. Surgical evaluation includes PFTs and V/Q tests as well as a cardiac stress test. Figures 9 and 10 show blood and air flow in the chest that are measured by these tests. The treatment you receive for MPM will be based on the results of these tests. If you are being considered for surgery, your doctor should examine the area by looking inside your chest with a single port thoracoscopy. It is necessary that you receive a careful surgical evaluation.

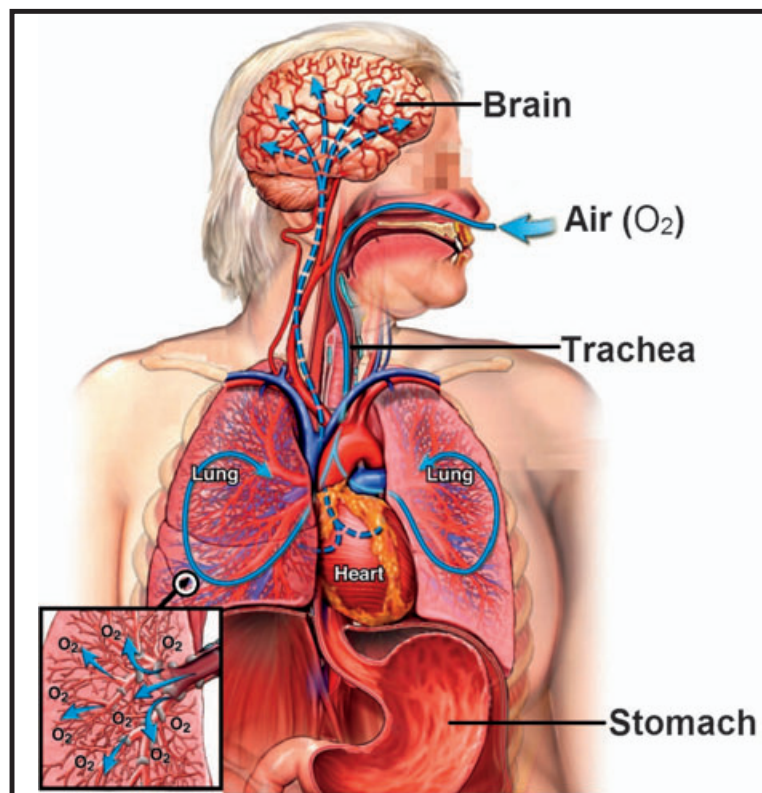


Figure 10. Air flow through the lungs and body

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Definitions:

Abdomen: The belly area between the chest and pelvis

Cardiac stress test: Test of the heart under stress

Diaphragm: A sheet of muscles below the ribs that helps a person to breathe

EBUS-FNA: Insertion of a thin tool into the lungs via the mouth to remove tissue

Histology: Study of cancer types that are based on cell shape and structure

Laparoscopy: Insertion of a thin tool into the abdomen to view or remove tissue

Lymph nodes: Small groups of special immune cells

Mediastinoscopy: Insertion of a thin tool into the center of the chest to view or remove tissue

MRI: Use of radio waves and powerful magnets to see the shape and function of body parts

PET-CT scan: Use of radioactive material to see the shape and function of body parts

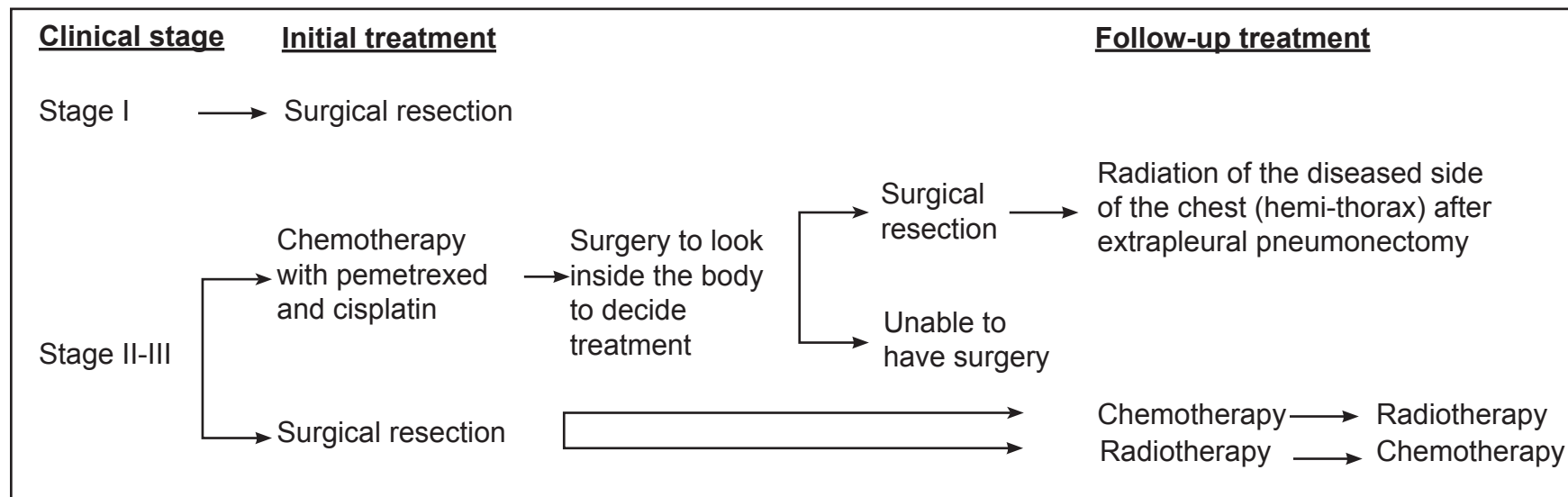
PFTs: Tests of how well the lungs are working

Port: A surgical opening into the body

Thoracoscopy: Insertion of a thin tool into the pleural cavity to view or remove tissue

V/Q tests: Tests of the flow of air and blood in the lungs

6.4 Surgery for stages I–III epithelial or mixed mesothelioma



Surgical resection is recommended if you have stage I epithelial or mixed MPM and are approved for surgery by your doctor. If you have stage II or III epithelial or mixed MPM, you may qualify for a treatment regimen that includes surgery, chemotherapy, and radiotherapy. Your doctor will decide whether chemotherapy before or after surgery is better for you. If it is decided that you should receive induction chemotherapy, the guidelines recommend pemetrexed and cisplatin. After chemotherapy, you may undergo minor surgery to further examine if you are a good candidate for surgical resection.

Surgical resection should be performed by a board-certified thoracic surgeon. There are two surgical choices: P/D and EPP. It is debatable if patients should receive either

P/D or EPP. EPP is often needed to remove the entire tumor in patients with stage II-III MPM. However, EPP has greater risks. Thus, P/D may be a better choice for some patients. Talk with your doctor if you have questions about which surgery is best for you. In addition to the resection, your lymph nodes from between the lungs should be examined for any signs of cancer.

Radiotherapy can also be a part of a multi-modality treatment for stage II-III MPM. The best time for giving radiotherapy after surgery and/or with chemotherapy should be discussed by your cancer care team. Use of newer radiotherapy methods (such as 4D-CT, IMRT, IGRT, tomotherapy, and proton therapy with sophisticated radiation planning) is the preferred choice.

Radiotherapy after complete surgical removal of the tumor is recommended to improve the odds that the cancer will not come back. Radiotherapy may be considered with caution when there is limited or no surgical resection and after P/D surgery because of severe side effects and lack of proof for extending life. Your surgeon should talk with the radiologist to decide which areas of your body need to be radiated. In addition to the areas near to the where the tumor was, your doctor may decide that you need radiotherapy to the ports used for the biopsy and surgery to stop the cancer from returning. Radiotherapy may also be used to lessen chest pain from MPM or for cancer that has spread to the bones or brain.

The dose of radiation should be based on the purpose of treatment (Table 3). The total dose of adjuvant chemotherapy ranges between 50 and 60 Gy. However, a dose of 60 Gy or more should be given to visible residual tumors if the doses to nearby normal tissue are limited. Radiotherapy to the other side of the chest where the lung is intact should be minor due to risk of pneumonitis.

Table 3. Radiotherapy for malignant pleural mesothelioma

Reason for radiotherapy	Total dose	Faction size	Treatment duration
Before surgery	45 to 50 Gy	1.8 to 2.0 Gy	4 to 5 weeks
After surgery			
No cancer cells in edge of tissue	50 to 54 Gy	1.8 to 2.0 Gy	4 to 5 weeks
Cancer cells in edge of tissue	54 to 60 Gy	1.8 to 2.0 Gy	5 to 6 weeks
Disease and symptom management			
Chest wall pain from recurrent nodules	20 to 40 Gy	≥4 Gy	1 to 2 weeks
Brain or bone metastasis	30 Gy	3 Gy	2 weeks
Prevention			
Cancer recurrence at surgical sites	21 Gy	7 Gy	1 to 2 weeks

Notes:

Definitions:

EPP: Surgery that removes the pleura, lung, diaphragm, and the pericardium on the side of the body where the cancer is

Gy: Dose of radiation

Induction chemotherapy:

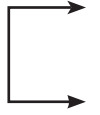
Chemotherapy that is given as the initial treatment for cancer

Resection: Surgery to remove a tumor

Residual tumors: Cancer that was not removed during surgery

Thorax: The chest area between the head and abdomen

6.5 Treatment for stages I–IV mesothelioma unfit for surgery

Clinical stage or histology	Treatment
Stage I	 Ongoing tests to assess if cancer advances Chemotherapy
Stage II–IV	→ Chemotherapy
Sarcomatoid subtype	→ Chemotherapy

If you have stage I epithelial or mixed MPM and cannot have surgery, there are two options. First, you can withhold treatment and be tested over time to see if the cancer grows. Second, you can start chemotherapy. Chemotherapy alone is recommended if you have stage II–III MPM and cannot have surgery, stage IV MPM, or sarcomatoid MPM.

The gold standard of first-line treatment is the combination of pemetrexed and cisplatin. See Table 4 for chemotherapy schedules. Other first-line chemotherapy choices include pemetrexed with carboplatin or gemcitabine with cisplatin. The carboplatin with pemetrexed schedule is better for patients with poor functioning or other medical conditions. Other first-line chemotherapy choices with only one drug include pemetrexed or vinorelbine. Second-line chemotherapy options include pemetrexed, vinorelbine, or gemcitabine. There is little research to provide guidelines for second-line therapy.

Table 4. Chemotherapy schedules for malignant pleural mesothelioma

FIRST-LINE CHEMOTHERAPY
Combined chemotherapy <ul style="list-style-type: none"> • Pemetrexed 500 mg/m² day 1 and cisplatin 75 mg/m² day 1 administered every 3 weeks • Pemetrexed 500 mg/m² day 1 and carboplatin AUC 5 day 1 administered every 3 weeks • Gemcitabine 1000 – 1250 mg/m² days 1, 8, and 15 and cisplatin 80 – 100 mg/m² day 1 administered in 3-4-week cycles Single-agent chemotherapy <ul style="list-style-type: none"> • Pemetrexed 500 mg/m² every 3 weeks • Vinorelbine 25 – 30 mg/m² weekly
SECOND-LINE CHEMOTHERAPY
Pemetrexed (if not given as first-line) Vinorelbine Gemcitabine

Part 7: Dictionary

Abdomen:

The belly area between the chest and pelvis.

Adjuvant chemotherapy:

Chemotherapy used after the initial treatment.

Alternative medicine:

Treatments used in place of ones usually given by doctors.

Anesthesia:

Loss of feeling with or without loss of wakefulness.

Asbestos:

A mineral fiber used in housing and commercial materials.

Biopsy:

A medical procedure that collects tissue.

Biphasic subtype:

Mesothelioma that has both epithelioid and sarcomatoid cells.

Blood cell counts:

The number of red blood cells, white blood cells, and platelets.

Brachytherapy:

Radiation therapy received from a device inside the body.

Bronchi:

Two main passages through which air reaches the lungs.

Bronchopulmonary lymph nodes:

Lymph nodes near the bronchi of the lungs.

Cardiac stress test:

A test of the condition of your heart under physical exercise.

Cervical pleura:

Pleura that extends into the neck area.

Chemotherapy:

Drugs used to kill cancer cells.

Chest wall:

The muscles and other parts of the body around the lungs.

Clinical trials:

A type of research that compares new treatments to the best current treatment to find out which is better. It may also compare different methods to prevent or diagnose disease.

Control group:

Research participants who do not receive a new treatment.

Costal pleura:

The pleura that lines the inside of the ribs and nearby muscles.

Computed tomography (CT):

A test that uses x-rays to view body parts.

Contralateral:

On the other side of the body.

Dehydration:

Low amounts of fluids in the body.

Diagnosis:

Identification of a disease.

Diagnostic imaging specialist:

A person trained to read pictures of the body made by imaging tests.

Diaphragm:

A sheet of muscles below the ribs that helps a person to breathe.

Diaphragmatic pleura:

Pleura near the diaphragm.

Dissection:

Cutting away or apart in order to study.

Endobronchial ultrasonography fine-needle aspiration (EBUS-FNA):

A medical procedure that allows a doctor to see and get tissue from the chest area using a bronchoscope.

Endothoracic fascia:

Lining of the thorax.

Epithelioid subtype:

The most common type of malignant pleural mesothelioma. Epithelioid cells are organized and structured.

Esophagus:

A passage between the mouth and stomach.

External beam radiation therapy (EBRT):

Radiation therapy received from a machine outside the body.

Extrapleural pneumonectomy (EPP):

Surgery that removes the pleura, lung, diaphragm, and the pericardium on the side of the body that has the cancer.

Fatigue:

Severe tiredness despite getting enough sleep that limits one's ability to function.

First-line treatment:

The first treatment used against a disease. Other names include induction therapy or primary treatment.

Food and Drug Administration (FDA):

A federal government agency that regulates drugs and food.

Four-dimensional computed tomography (4D-CT):

A CT scan that can show movement of organs in the body.

Genetic tests:

Procedures that evaluate information from genes.

Grey units (Gy):

A measure of radiation dose.

Hilar lymph nodes:

Lymph nodes located in the lung near openings for blood vessels to enter.

Histologic subtypes:

Grouping of cancer types based on differences in cancer cells.

Image-guided radiation therapy (IGRT):

Delivery of radiation that is directed by imaging tests.

Induction chemotherapy:

Chemotherapy that is given as the initial treatment for cancer.

Informed consent form (ICF):

A document describing the details of a research study and that must be read and signed by any person wanting to participate.

Intensity-modulated radiation therapy (IMRT):

A dose of radiation therapy that is based on the thickness of the tissue.

Intraoperative:

During the course of surgery.

Intravenously:

Drugs given by needle through a vein.

Ipsilateral:

On the same side of the body.

Laparoscope:

A thin, long tube with a light and camera used to see the abdomen.

Laparoscopy:

Insertion of a laparoscope through a small cut to see the area or take a tissue sample.

Lobes:

A clearly seen division in an organ or part of the body.

Lymph nodes:

Small groups of special immune cells located throughout the body.

Magnetic resonance imaging (MRI):

A test using radio waves and powerful magnets to view the parts of the body and how they are working.

Malignant:

Cancerous; growing out of control.

Mammary lymph nodes:

Lymph nodes near the breasts.

Mediastinal pleura:

Pleura near the mediastinum.

Mediastinal lymph nodes:

Lymph nodes in the mediastinum.

Mediastinoscope:

A thin, long tube with a light and camera used to see the middle area of the chest.

Mediastinoscopy:

Insertion of a mediastinoscope through a small cut to see the area or take a tissue sample.

Mediastinum:

The area between the lungs where the heart, trachea, esophagus, thymus, and lymph nodes are located.

Medical oncologist:

A physician who specializes in all types of cancer.

Mesothelioma:

A rare cancer of the tissue that covers most organs inside the body.

Metastasized:

Cancer that has spread to distant tissues.

Microscopic:

Can't be seen by the naked eye.

Multi-modality treatment:

A combination of different types of treatment.

Oncology:

A branch of medicine that deals with tumors (cancer).

Osteopontin:

A type of protein found in bone tissues that can be measured in the blood.

Palliative therapy:

See supportive care.

Parietal pleura:

The outer layer of the pleura.

Particle:

Small pieces of matter.

Pathologist:

A doctor who specializes in assessing tissue or blood samples.

Pericardium:

The outer lining of the heart.

Peridiaphragmatic lymph nodes:

Lymph nodes near the diaphragm.

Peritoneum:

The lining of the abdomen.

Pleura:

The two layers of tissue of the pleural mesothelium.

Pleural catheter:

A tube that drains fluid from the chest.

Pleural cavity:

The space between the two pleural layers.

Pleural effusion:

Extra fluid around the lungs.

Pleural fluid:

The fluid in the pleural cavity.

Pleural mesothelium:

The lining of the lungs.

Pleural plaques:

Concentrated areas of pleura scarring.

Pleural thickening:

Widespread scarring of the pleura tissue.

Pleurectomy/decortication (p/d):

Surgery that removes the tumor and affected pleura.

Pneumonitis:

Swelling of the lungs.

Port:

A surgical opening into the body.

Positron emission tomography-computed tomography (PET-CT):

A test that uses radioactive material to view the shape and function of organs and tissues.

Prognosis:

A prediction of the pattern and outcome of a disease based on clinical information.

Proton therapy:

Radiation that uses protons to treat a disease.

Pulmonary functioning tests:

A set of breathing tests to test the strength of the lungs.

Pulmonary pleura:

Pleura on the surface of the lungs.

Pulmonologist:

A doctor who specializes in lung diseases.

Pus:

A yellowish thick fluid in an area of inflammation.

Quality of life:

The satisfaction with one's well-being.

Quantitative ventilation/perfusion (V/Q) tests:

Tests of the air and blood flow in the lungs.

Radiation oncologist:

A doctor who specializes in the treatment of cancer with radiation.

Radiotherapy:

Treatment with radiation.

Radiotracer:

Radioactive material used to make images of the body.

Randomized:

Assignment to a group by chance.

Resection:

Surgery to remove a tumor.

Residual tumor:

Cancer that was not removed during surgery.

Sarcomatoid subtype:

The type of malignant pleural mesothelioma with random and irregular cell shapes.

Second-line treatment:

The second treatment used against a disease when the initial treatment has failed.

Serum mesothelin-related peptide (SMRP):

A protein in mesothelial cells that can be measured in the blood.

Staging:

Grouping of cancer according to how far it has spread in the body.

Subcarinal lymph nodes:

Lymph nodes near the trachea.

Supportive care:

Treatment for symptoms of a disease.

Supraclavicular lymph nodes:

Lymph nodes near the collar bone.

Surgeon:

A doctor who specializes in operations.

Talc pleurodesis:

A medical procedure that puts powder into the pleural cavity to seal it and stop fluid buildup.

Thoracentesis:

A medical procedure that removes pleural fluid with a needle through the ribs.

Thoracoscopic video-assisted thoracic surgery (VATS):

A type of biopsy that allows the surgeon to view the pleura.

Thoracoscopy:

Insertion of a thin tool into the pleural cavity to view or remove tissue.

Thorax:

The chest area between the head and abdomen.

Thymus:

A gland of the immune system located behind the top of the breastbone.

Tomotherapy:

Radiation therapy that radiates the entire tumor at one time.

Trachea:

The air passage between the throat and bronchi; the windpipe.

Visceral pleura:

Pleura along the surface of the lungs.

Part 8: Tools

8.1 Questions to ask about testing for mesothelioma

- Where will the procedure take place? Will I have to go to the hospital?
- How long will it take? Will I be awake?
- Will it hurt? Will I need local anesthesia?
- What are the risks? What are the chances of infection or bleeding afterward?
- What if I am pregnant?
- How do I prepare for it? Will I need to avoid taking aspirin to reduce the chance of bleeding? Should I not eat beforehand?
- Should I bring a list of my medications?
- Should I bring someone with me?
- How long will it take me to recover? Will I be given an antibiotic or other medicine afterward?
- How soon will I know the results and who will explain them to me? If a biopsy is done, will I get a copy of the pathology report?
- If I do have cancer, who will talk to me about the next steps? When?

Notes:

8.2 Questions to ask about treating mesothelioma

- What are the available treatments for mesothelioma?
- What are the risks and benefits of each treatment for mesothelioma?
- How will my age, general health, stage of mesothelioma, and other medical conditions influence treatment choices?
- Would you help get a second opinion?
- What can I do to prepare for treatment?
- How soon should I start treatment?
- How much will the treatment cost and how can I find out how much my insurance company will cover?
- How likely is it that I'll achieve remission with treatment?
- What symptoms should I look out for while taking medications for mesothelioma?
- What is the chance that my cancer will progress to advanced phases?

Notes:

8.3 Questions to ask about clinical trials

- Is there a clinical trial that I could take part in?
- What is the purpose of the study?
- What kinds of tests and treatments does the study involve?
- What does this treatment do? Has it been used before?
- Will I know which treatment I receive?
- What is likely to happen in my case with or without this new treatment?
- What are my other choices and their advantages and disadvantages?
- How might the study affect my daily life?
- What side effects can I expect from the study? Can the side effects be controlled?
- Will I have to stay in the hospital? If so, how often and for how long?
- Will the study cost me anything? Will any of the treatment be free?
- If I am harmed as a result of the research, to what treatment might I be entitled?
- What type of long-term follow-up care is part of the study?
- Has the therapy been used to treat other types of cancers?

Notes:

8.4 Suggestions for taking care of yourself

- Let other people help you. This is the time to take advantage of offers for rides, meals, childcare, or just good company.
- Be as healthy as you can—eat well, get enough rest, exercise, and stop smoking.
- Talk with your family and friends about your concerns and needs. Let them know what is important to you, including your feelings about end-of-life decisions.
- Do the things that help you cope—keep a journal, garden, play music, or take that trip you’ve been wanting to take.
- Don’t be afraid to take medications that can help your emotional and physical symptoms. Let your cancer care team help you.
- Talk with your treatment team about what you are experiencing. Don’t wait until you are feeling overwhelmed.
- Know the resources that are available to you and use them.
- Be your own advocate—ask questions, take notes, and be active in your treatment.

Notes:

8.5 Suggestions for taking care of caregivers

- Take the time to understand your loved one's cancer and its treatment. Educating yourself will help you know what to expect and how you can be supportive.
- Help provide eyes and ears and sometimes a voice for your loved one. It is extremely useful for patients to have someone with them at doctor's visits to listen, ask questions, take notes, process what is being said, and sometimes speak up on their behalf.
- Talk about the important issues. Do it from the very beginning. Don't wait until a patient is too sick or has lost too much ability to address important matters.
- Help develop a treatment plan and, if appropriate, an advance directive. Such plans help everyone involved understand what is important to the patient in terms of treatment goals and end-of-life decisions.
- Take care of yourself. Find the time to get away—take a walk, have lunch with a friend, see a movie, and do something that feels normal. In addition, eat well, try to sleep well, and exercise. You will be a better caregiver if you are taking care of yourself.
- Let other people help you. Take advantage of offers to make you a meal, provide a ride, watch the kids, or just give you a break. Let your friends know what they can do.
- Take advantage of the resources that are available. There are many approaches to dealing with the complex issues that you face as a caregiver. You should know what support is there for you and use these resources.
- Understand that caregivers are survivors too just as much as patients. Cancer is life changing whether you are the patient or the person caring for the patient.

Clinical Assessment	Treatment Recommendation
Stage I epithelial or mixed subtypes Surgery indicated	Surgery
Surgery not indicated	Watchful waiting or chemotherapy
Stage II-III epithelial or mixed subtypes Surgery indicated	Surgery, chemotherapy, and/or radiotherapy
Surgery not indicated	Chemotherapy alone
Stage IV or sarcomatoid subtype	Chemotherapy alone

8.7 Personal treatment record

GENERAL INFORMATION

Patient information

Name: _____ Hospital ID number: _____

Emergency contact: _____ Emergency telephone: _____

Provider Information

Name: _____ Address: _____ Telephone: _____

Name: _____ Address: _____ Telephone: _____

Name: _____ Address: _____ Telephone: _____

Name: _____ Address: _____ Telephone: _____

CLINICAL ASSESSMENT

Tests

Name/Date: _____ Result: _____

Name/Date: _____ Result: _____

Name/Date: _____ Result: _____

Name/Date: _____ Result: _____

Name/Date: _____ Result: _____

Cancer information

Cancer site: _____ Diagnosis date: _____

(T)umor score: _____ (N)ode score: _____ (M)etastasis score: _____

Stage: _____ Histology: _____

TUMOR TREATMENT

Name: _____ Start date: _____ End date: _____

Name: _____ Start date: _____ End date: _____

Name: _____ Start date: _____ End date: _____

Name: _____ Start date: _____ End date: _____

SYMPTOM TREATMENT

Name: _____ Start date: _____ End date: _____

Name: _____ Start date: _____ End date: _____

Name: _____ Start date: _____ End date: _____

Name: _____ Start date: _____ End date: _____

POST-TREATMENT PLAN

Describe: _____

NCCN Member Institutions

**City of Hope
Comprehensive Cancer Center**

Los Angeles, California
800.826.4673
www.cityofhope.org

**Dana-Farber/Brigham and
Women's Cancer Center |
Massachusetts General Hospital
Cancer Center**

Boston, Massachusetts
800.320.0022
www.dfbwcc.org • www.massgeneral.org/cancer

Duke Cancer Institute

Durham, North Carolina
888.275.3853
www.cancer.duke.edu

Fox Chase Cancer Center

Philadelphia, Pennsylvania
888.369.2427
www.foxchase.org

**Huntsman Cancer Institute
at the University of Utah**

Salt Lake City, Utah
877.585.0303
www.huntsmancancer.org

**Fred Hutchinson Cancer Research Center/
Seattle Cancer Care Alliance**

Seattle, Washington
206.288.7222 • www.seattlecca.org
206.667.5000 • www.fhcrc.org

**The Sidney Kimmel Comprehensive
Cancer Center at Johns Hopkins**

Baltimore, Maryland
410.955.8964
www.hopkinskimmelfcancercenter.org

**Robert H. Lurie Comprehensive Cancer
Center of Northwestern University**

Chicago, Illinois
866.587.4322
www.cancer.northwestern.edu

Memorial Sloan-Kettering Cancer Center

New York, New York
800.525.2225
www.mskcc.org

**H. Lee Moffitt Cancer Center &
Research Institute**

Tampa, Florida
800.456.3434
www.moffitt.org

**The Ohio State University Comprehensive
Cancer Center - James Cancer Hospital
and Solove Research Institute**

Columbus, Ohio
800.293.5066
<http://cancer.osu.edu>

Roswell Park Cancer Institute

Buffalo, New York
877.275.7724
www.roswellpark.org

**Siteman Cancer Center at Barnes-
Jewish Hospital and Washington
University School of Medicine**

St. Louis, Missouri
800.600.3606
www.siteman.wustl.edu

**St. Jude Children's Research Hospital/
University of Tennessee Cancer Institute**

Memphis, Tennessee
901.595.4055 • www.stjude.org
877.988.3627 • www.utcancer.org

Stanford Cancer Institute

Stanford, California
877.668.7535
www.cancer.stanfordhospital.com

**University of Alabama at Birmingham
Comprehensive Cancer Center**

Birmingham, Alabama
800.822.0933
www.ccc.uab.edu

**UCSF Helen Diller Family
Comprehensive Cancer Center**

San Francisco, California
800.888.8664
<http://cancer.ucsf.edu>

**University of Michigan
Comprehensive Cancer Center**

Ann Arbor, Michigan
800.865.1125
www.mcancer.org

**UNMC Eppley Cancer Center at
The Nebraska Medical Center**

Omaha, Nebraska
800.999.5465
www.unmc.edu/cancercenter

**The University of Texas
MD Anderson Cancer Center**

Houston, Texas
877.632.6789
www.mdanderson.org

Vanderbilt-Ingram Cancer Center

Nashville, Tennessee
800.811.8480
www.vicc.org

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