ASCO answers

Lung Cancer

Trusted Information to Help Manage Your Care from the American Society of Clinical Oncology
ABOUT ASCO
The American Society of Clinical Oncology (ASCO) is the world’s leading professional organization representing oncology physicians of all oncology subspecialties who care for people with cancer. ASCO’s more than 35,000 members from the United States and abroad set the standard for patient care worldwide and lead the fight for more effective cancer treatments, increased funding for clinical and translational research, and, ultimately, cures for the many different types of cancer that strike an estimated 12 million people worldwide each year.

ABOUT CANCER.NET
The best cancer care starts with the best cancer information. Well-informed patients are their own best advocates and invaluable partners for physicians. Cancer.Net (www.cancer.net) brings the expertise and resources of the American Society of Clinical Oncology (ASCO), the voice of the world’s cancer physicians, to people living with cancer and to those who care for and about them. All the information and content on Cancer.Net was developed and approved by the cancer doctors who are members of ASCO, making Cancer.Net an up-to-date and trusted resource for cancer information on the Internet. Cancer.Net is supported by the Conquer Cancer Foundation, which provides funding for breakthrough cancer research, professional education, and patient and family support.

ASCO patient education programs are supported by:
# Lung Cancer

**Table of Contents**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>2</td>
</tr>
<tr>
<td>My Health Care Team</td>
<td>3</td>
</tr>
<tr>
<td>Lung Cancer Basics</td>
<td>4</td>
</tr>
<tr>
<td> Lung cancer development</td>
<td>4</td>
</tr>
<tr>
<td> Lung cancer spread</td>
<td>4</td>
</tr>
<tr>
<td>Understanding Your Diagnosis</td>
<td>7</td>
</tr>
<tr>
<td> Making a cancer diagnosis</td>
<td>7</td>
</tr>
<tr>
<td> Finding out where the cancer started</td>
<td>9</td>
</tr>
<tr>
<td> Molecular testing</td>
<td>10</td>
</tr>
<tr>
<td> Stages</td>
<td>10</td>
</tr>
<tr>
<td>Lung Cancer Treatment</td>
<td>15</td>
</tr>
<tr>
<td> Surgery</td>
<td>16</td>
</tr>
<tr>
<td> Adjuvant therapy</td>
<td>17</td>
</tr>
<tr>
<td> Clinical trials</td>
<td>22</td>
</tr>
<tr>
<td> Managing symptoms and side effects</td>
<td>24</td>
</tr>
<tr>
<td> Developing a treatment plan</td>
<td>26</td>
</tr>
<tr>
<td> Increasing the effectiveness of treatment</td>
<td>28</td>
</tr>
<tr>
<td>Coping With Side Effects</td>
<td>30</td>
</tr>
<tr>
<td> Physical effects</td>
<td>30</td>
</tr>
<tr>
<td> Emotional and social effects</td>
<td>31</td>
</tr>
<tr>
<td>Follow-Up Care</td>
<td>33</td>
</tr>
<tr>
<td>Lung Cancer Dictionary</td>
<td>35</td>
</tr>
</tbody>
</table>

ASCO ANSWERS is a collection of oncologist-approved patient education materials developed by ASCO for people with cancer and their caregivers.

The ideas and opinions expressed in ASCO Answers: Lung Cancer do not necessarily reflect the opinions of ASCO or the Conquer Cancer Foundation. The information in this guide is not intended as medical or legal advice, or as a substitute for consultation with a physician or other licensed health care provider. Patients with health-related questions should call or see their physician or other health care provider promptly, and should not disregard professional medical advice, or delay seeking it, because of information encountered in this guide. The mention of any product, service, or treatment in this guide should not be construed as an ASCO endorsement. ASCO is not responsible for any injury or damage to persons or property arising out of or related to any use of ASCO’s patient education materials, or to any errors or omissions.
Introduction

It is one of many people’s biggest fears—sitting in the doctor’s office and hearing the word cancer. People diagnosed with lung cancer often say they were stunned by their diagnosis and couldn’t hear, much less remember, what was said afterward. However, absorbing the news of a cancer diagnosis is a key part of the coping process.

In the weeks to come, you may find it helpful to have family members or friends come to your appointments with you. They will not only give you some much-needed support, but they can also help listen to and remember the information given by your health care team. Using this ASCO Answers guide may also be helpful. This booklet was designed to explain some of the medical terms doctors may use when talking about your cancer and help you keep track of the specifics of your lung cancer diagnosis and treatment plan. Throughout this guide, you will find questions to ask your doctor, nurse, or another member of your health care team, as well as plenty of space to write down their answers or other important information. There are also check boxes you can use to identify the tests, procedures, and treatments that will make up your cancer care plan.

However you choose to accurately keep track of this information, it is important to do so. Getting the facts about your diagnosis will help you make the best decisions based on your situation in the coming days. Additionally, being an informed, involved patient and voicing your questions and concerns will help you and your health care team form a partnership in your care. Tell your doctor and nurse how you prefer to receive information and how much you want to know about your diagnosis, treatment, and prognosis, which is the chance of recovery. Don’t be afraid to ask questions or to let your health care team know you don’t know what questions to ask.
# My Health Care Team

<table>
<thead>
<tr>
<th>Medical Oncologist:</th>
<th>Counselor / Therapist:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Information:</td>
<td>Contact Information:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pulmonologist:</th>
<th>Nutritionist / Dietitian:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Information:</td>
<td>Contact Information:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Radiation Oncologist:</th>
<th>Pharmacist:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Information:</td>
<td>Pharmacy:</td>
</tr>
<tr>
<td></td>
<td>Contact Information:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thoracic Surgeon:</th>
<th>OTHER TEAM MEMBERS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Information:</td>
<td>Name:</td>
</tr>
<tr>
<td></td>
<td>Specialty:</td>
</tr>
<tr>
<td></td>
<td>Contact Information:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Care Doctor:</th>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Information:</td>
<td>Specialty:</td>
</tr>
<tr>
<td></td>
<td>Contact Information:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oncology Nurse:</th>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Information:</td>
<td>Specialty:</td>
</tr>
<tr>
<td></td>
<td>Contact Information:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oncology Social Worker:</th>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Information:</td>
<td>Specialty:</td>
</tr>
<tr>
<td></td>
<td>Contact Information:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lung Cancer Basics

The lungs are part of a group of organs and tissues known as the respiratory system that help a person breathe. When a person inhales, the lungs absorb oxygen from the air and transport it into the bloodstream so it can be delivered to the rest of the body. As the body's cells use oxygen, they release carbon dioxide. The bloodstream carries this carbon dioxide back to the lungs so it can leave the body when a person exhales.

The lungs contain many different types of cells. Most cells in the lung are epithelial cells. Epithelial cells line the airways and produce mucus, which lubricates and protects the lungs. The lungs also contain nerve cells, hormone-producing cells, blood cells, and structural or supporting cells.

Lung cancer development

Lung cancer begins when cells in the lung change and grow uncontrollably, forming a mass called a tumor, lesion, or nodule. A tumor can be cancerous or benign. A cancerous tumor is malignant, meaning it can spread to other parts of the body. A benign tumor means the tumor will not spread.

There are two major types of lung cancer: non-small cell and small cell. Non-small cell lung cancer (NSCLC) comes from epithelial cells and is the most common type. NSCLC may also be described based on the type of epithelial cell where the cancer starts. Adenocarcinoma begins in cells that produce mucus. Squamous or epidermoid carcinoma begins in the cells that line the airways. Large cell carcinoma begins in other types of cells.

Small cell lung cancer begins in the nerve cells or hormone-producing cells of the lung. The term “small cell” refers to the size and shape of the cancer cells when they are viewed under a microscope. It is important for doctors to distinguish NSCLC from small cell lung cancer because they are usually treated in different ways.

Lung cancer spread

As a cancerous lung tumor grows, cancer cells may be carried to other parts of the body by the blood or a fluid called lymph that surrounds lung tissue. Lymph flows through tubes called lymphatic vessels that drain into collecting stations called lymph nodes, which are tiny, bean-shaped organs that help fight infection. Lymph nodes are located in the lungs, the center of the chest, and elsewhere.
in the body. The natural flow of lymph out of the lungs is toward the center of the chest, which explains why lung cancer often spreads there. When cancer cells move into a lymph node or to a distant part of the body through the bloodstream, it is called metastasis.

Although lung cancer can metastasize anywhere in the body, the most common places it spreads are the lymph nodes, the other lung, bones, brain, liver, and structures near the kidneys called the adrenal glands. When lung cancer spreads, it can cause further breathing difficulties, bone pain, abdominal or back pain, headache, weakness, seizures, and/or speech difficulties. Rarely, a lung tumor can release hormones that cause chemical imbalances, such as low blood sodium levels or high blood calcium levels. No matter the size and location of the tumor, whether the cancer has spread, or how far it has spread, treatment is always an option.

**QUESTIONS TO ASK THE DOCTOR**

- Who will be part of my health care team, and what will each member do?
- Did the cancer start in the lungs or has it spread from another part of the body?
- Where can I find more information about lung cancer?
- Whom should I contact if I have any questions or concerns?
Understanding Your Diagnosis

Doctors may use a number of different tests to diagnose lung cancer and figure out if it has spread to another part of the body. Just like for many other types of cancer, a biopsy is often the only way to make a definitive diagnosis of lung cancer. Imaging tests may be used to find out whether the cancer has spread to other parts of the body.

Not every test is right for every person. Your doctor may consider factors such as your age, medical condition, signs and symptoms, and previous test results when deciding whether a specific diagnostic test is right for you.

Making a cancer diagnosis

There are a number of different procedures doctors use to collect tissue for the diagnosis and staging of lung cancer. Your doctor or surgeon will talk with you about the test(s) that will provide the most useful information about your cancer. These may include:

☐ Biopsy
A biopsy is the removal of a small amount of tissue for examination under a microscope. Other tests can suggest that cancer is present, but only a biopsy can make a definite diagnosis. The sample removed during the biopsy is analyzed by a pathologist. A pathologist is a doctor who specializes in interpreting laboratory tests and evaluating cells, tissues, and organs to diagnose disease. If cancer cells are found, the pathologist is also able to figure out whether they are small cell lung cancer cells or NSCLC cells. In recent years, doctors have learned it is helpful to have a larger piece of tissue to determine the subtype of NSCLC and to identify specific genes, proteins, and other factors unique to the tumor. If not enough of the tumor is removed to do these tests, another biopsy may be needed.

☐ Sputum cytology
If lung cancer is suspected, your doctor may ask you to cough up some phlegm so it can be looked at under a microscope. A pathologist can find cancer cells mixed in with the mucus. However, sputum cytology provides a smaller amount of tissue than is needed to completely diagnose lung cancer and perform other, more specific molecular tests.
Bronchoscopy
During this procedure, the doctor passes a thin, flexible tube with a light on the end into the mouth or nose, down through the main windpipe, and into the breathing passages of the lungs. A surgeon or pulmonologist may perform this procedure. A pulmonologist is a medical doctor who specializes in the diagnosis and treatment of lung cancer. The tube lets the doctor see inside the lungs. Tiny tools inside the tube can take samples of fluid or tissue so a pathologist can examine them. Patients are given mild anesthesia during a bronchoscopy. Anesthesia is medication to block the awareness of pain.

Needle aspiration/core biopsy
After numbing the skin, a special type of radiologist, called an interventional radiologist, uses a needle to remove a sample of the lung tumor for testing. This can be done with a smaller needle or a larger needle depending on how much tissue is needed. Often, the radiologist uses special imaging equipment to guide the needle. In general, core biopsies, which use the larger needle, are more common since they provide more tissue than a needle aspiration, which is needed for diagnosis and molecular testing.

Thoracentesis
After numbing the skin on the chest, a needle is inserted through the chest wall and into the space between the lung and the wall of the chest where fluid can collect. The fluid is removed and checked for cancer cells by a pathologist.

Thoracotomy
This procedure is performed in an operating room, and the patient receives general anesthesia. A surgeon then makes an incision, or cut, in the chest, examines the lung directly, and takes tissue samples for testing. A thoracotomy is the procedure surgeons most often use to completely remove a lung tumor.

Thoracoscopy
Through a small cut in the skin of the chest wall, a surgeon inserts a special instrument and a small video camera to assist in the examination of the inside of the chest. Patients receive general anesthesia for this procedure, but recovery time may be shorter than with a thoracotomy because smaller incisions are used. This procedure may be referred to as video-assisted thoracoscopic surgery or VATS.

Mediastinoscopy
A surgeon examines and takes a sample of the lymph nodes in the center of the chest underneath the breastbone by making a small incision at the top of the breastbone. This procedure also requires general anesthesia and is done in an operating room.

Bone marrow aspiration and biopsy
These two procedures are often done at the same time to examine the bone marrow and are used occasionally for small cell lung cancer. Bone marrow has both a solid and a liquid part. A bone marrow aspiration removes a sample of the fluid with a needle. A bone marrow biopsy is the removal of a small amount of solid tissue using a needle. The sample(s) are then analyzed by a pathologist. A common site for a bone marrow aspiration and biopsy is the pelvic bone, which is located in the lower back by the hip. The skin in that area is usually numbed with medication beforehand, and other types of anesthesia may be used.

IMAGING TESTS
In addition to biopsies and surgical procedures, imaging tests also play a role in the care of people with lung cancer. Because no scan can diagnose lung cancer, chest x-ray and scan results are combined with a person’s medical history, a physical examination, blood tests, and information from a biopsy to figure out where the cancer began and whether it has spread.
Computed tomography (CT or CAT) scan
This test produces images that allow doctors to see the size and location of a lung tumor and/or lung cancer metastases. A CT scan creates a three-dimensional picture of the inside of the body with an x-ray machine. A computer then combines these images into a detailed, cross-sectional view that shows any abnormalities or tumors. Sometimes, a special dye called a contrast medium is given before the scan to provide better detail on the image. This dye can be injected into a patient’s vein or given as a liquid to swallow.

Positron emission tomography (PET) scan
A PET scan is a way to create pictures of organs and tissues inside the body. A small amount of a radioactive sugar substance is injected into the patient's body. This sugar substance is taken up by cells that use the most energy. Because cancer tends to use energy actively, it absorbs more of the radioactive substance. A scanner then detects this substance to produce images of the inside of the body.

Magnetic resonance imaging (MRI) scan
This test also produces images that allow doctors to see whether lung cancer has spread. However, an MRI uses magnetic fields, not x-rays, to produce detailed images of the body. MRI can also be used to measure a tumor’s size. A contrast medium is given before the scan to create a clearer picture. This dye can be injected into a patient’s vein or given as a liquid to swallow. MRI scanning does not create very good pictures of parts of the body that are moving, like your lungs, which move with each breath you take. For that reason, MRI scans are rarely used to look at the lungs. Instead, they may be helpful in finding lung cancer that has spread to the brain.

Bone scan
A bone scan uses a radioactive tracer to look at the inside of the bones. The tracer is injected into a patient's vein. It collects in areas of the bone and is detected by a special camera. Healthy bone appears gray to the camera, and areas of injury, such as those caused by cancer that has spread from the lungs, appear dark.

Finding out where the cancer started
Lung cancer starts in the lungs. However, many other types of cancer start elsewhere in the body and then spread to the lungs. For example, breast cancer that has spread to the lungs is called metastatic breast cancer, not lung cancer. It is important for doctors to know if the cancer started in the lungs or another part of the body to be able to create the most effective treatment plan.

To find out where the cancer started, the doctor takes into account a person’s symptoms and medical history, results of a physical examination, how the tumor looks on x-rays and scans, and risk factors for cancer. A pathologist can perform tests on the biopsy sample to help find out where the cancer began, and the doctor may recommend other tests to rule out certain types of cancer. If the doctor is still not sure where the cancer started after taking all of this into consideration, the doctor may give a diagnosis of metastatic cancer “of unknown primary.” Most treatments for metastatic cancer of unknown primary that is first found in the chest are the same as those for metastatic lung cancer.
Molecular testing

After a biopsy, needle aspiration, or other diagnostic procedure, your doctor may recommend running laboratory tests on a tumor sample to identify specific genes, proteins, or other factors unique to your tumor. This is known as molecular testing.

There are several changes in specific genes in a lung tumor that help the cancer grow and spread, including EGFR, ALK, KRAS, BRAF, and HER2. These mutations are only found in the tumor, not in normal cells in the body, so they are not inherited or passed down from parents to children. Testing for these mutations helps the doctor decide whether your treatment options should include targeted therapy, which is a type of treatment directed at specific mutations. People with the adenocarcinoma type of lung cancer and those who never smoked are more likely to test positive for these mutations.

Although molecular testing has become more widely available, these tests may not be available or appropriate for every patient. For example, this type of testing is rarely recommended for patients with small cell lung cancer. Talk with your health care team to learn more about molecular testing.

Stages

People with lung cancer are often given a stage along with their diagnosis. The stage is a way of describing where the cancer is located, if or where it has spread, and whether it is affecting other parts of the body. Doctors use diagnostic tests to find out the cancer’s stage, so staging may not be complete until all of the tests are finished. Another factor used to determine the stage of lung cancer is whether the cancer can be completely removed by a surgeon. Knowing the stage helps your doctor decide what kind of treatment is best and can help predict your prognosis.

The stage of both small cell and NSCLC is described by a number, zero (0) through four (Roman numerals I through IV).

Stage 0. This is called in situ disease, meaning the cancer is “in place” and has not grown into nearby tissues or spread outside the lung.

Stage I. A stage one (I) lung cancer is a small tumor that has not spread to any lymph nodes, making it possible for a surgeon to completely remove it. Stage I is divided into two substages, stage IA or stage IB, based on the size of the tumor. Tumors less than 3 centimeters (cm) wide are classified as stage IA, while larger ones between 3 cm and 5 cm wide are considered stage IB.

Stage II. Stage two (II) lung cancer is divided into two substages based on its size and spread. Stage IIA cancer describes a tumor between 5 cm and 7 cm wide that has not spread to the nearby lymph nodes or a tumor less than 5 cm wide that has spread to the nearby lymph nodes. Stage IIB lung cancer describes a tumor between 5 cm and 7 cm wide that has spread to the lymph nodes or a tumor larger than 7 cm wide that has not spread to the lymph nodes but may or may not have grown into nearby structures in the lung. Sometimes, stage II tumors can be removed with surgery. Other times, additional treatments are needed.

Learn more about what to expect when having common tests, procedures, and scans at www.cancer.net/tests.
Stage 0

Carcinoma in situ (presence of malignant cells)

Stage IA

Tumor less than 3 cm at its greatest dimension
AND
Cancer has not spread to any lymph nodes

Stage IB

Tumor more than 3 cm but less than 5 cm at its greatest dimension
AND
Cancer has not spread to any lymph nodes

Stage IIA

Tumor less than 5 cm at its greatest dimension
AND
Cancer has spread to regional lymph nodes

Stage IIB

Tumor more than 5 cm but less than 7 cm at its greatest dimension
AND
Cancer has not spread to any lymph nodes

OR

Tumor more than 7 cm
AND
Cancer in the main bronchus
OR
Tumor directly invades diaphragm (or any other nearby organ)
Stage III. Stage three (III) lung cancers are classified as either stage IIIA or IIIB. For many stage IIIA cancers, and nearly all stage IIIB cancers, the tumor is difficult or sometimes impossible to remove. For example, the lung cancer may have spread to the lymph nodes located in the center of the chest, which is outside the lung. Or, the tumor may have grown into nearby structures in the lung. In either situation, it is less likely that the surgeon can completely remove the cancer because removal of the cancer must be performed bit by bit.

Stage IV. Stage four (IV) means the lung cancer has spread to more than one area in the other lung, the fluid surrounding the lung or the heart, or distant parts of the body. Lung cancer is classified as stage IVA when it has spread within the chest or IVB when it has spread outside of the chest to places like the brain, bones, and adrenal glands. Stage IV is also called metastatic lung cancer.

Recurrent. Recurrent cancer is cancer that has come back after treatment.
STAGE IV

Cancer has spread to contralateral lymph nodes inside and outside the lungs

Distant metastasis in bone and liver

Used with permission of the American Joint Committee on Cancer (AJCC), Chicago, Illinois. The original source for this material is the AJCC Cancer Staging Manual, Seventh Edition (2010), published by Springer-Verlag New York.

DIAGNOSIS SUMMARY

TYPE:
☐ Non-Small Cell Lung Cancer (NSCLC)
   ☐ Adenocarcinoma
   ☐ Squamous cell carcinoma
   ☐ Large cell carcinoma
   ☐ Other: ________________________

☐ Small Cell Lung Cancer

☐ Metastatic Cancer of Unknown Primary

STAGE:
☐ Stage 0
☐ Stage IA
☐ Stage IB
☐ Stage IIA
☐ Stage IIB
☐ Stage IIIA
☐ Stage IVB
☐ Recurrent
☐ Limited Stage
☐ Extensive Stage

RESULTS OF OTHER DIAGNOSTIC/IMAGING/MOLECULAR TESTS:
QUESTIONS TO ASK THE DOCTOR ABOUT YOUR DIAGNOSIS

- What type and stage of lung cancer do I have? What does this mean?
- What other diagnostic tests or procedures may be necessary?
- How can I prepare myself for each test or procedure?
- Where do I need to go to have these tests?
- When will I get the results? How will I get the results (over the phone, at the next appointment, etc.)?
- Who will explain the results to me?
- Should I see another doctor for a second opinion? Can you give me names of doctors I could see?
- If I get a second opinion, will I have to repeat any tests or procedures?
- What is my prognosis?

NOTES:
Lung Cancer Treatment

In cancer care, different types of doctors often work together to create an overall treatment plan that combines different types of treatment. The treatment options and recommendations your doctor gives you will depend on several factors, including the size and location of the tumor and whether the cancer has spread. Doctors also measure a patient’s general strength and health using an index known as performance status. For example, patients who are strong enough to go about their daily activities without assistance and work outside their home can safely receive chemotherapy, radiation therapy, and/or surgery. Your care plan should also include treatment for symptoms and side effects.

It is important to note that a patient’s age has never been useful in predicting whether a patient will benefit from treatment. The average age of patients with lung cancer in the United States is 71. A patient’s age should never be used as the only reason for deciding what treatment is best, especially for older patients who are otherwise physically fit and have no other medical problems besides lung cancer.

When making treatment decisions, you are also encouraged to consider participating in a clinical trial. A clinical trial is a research study that tests a new approach to treatment to evaluate whether it is safe, effective, and possibly better than the standard treatment. Clinical trials may test approaches such as a new drug, a new combination of standard treatments, or new doses of current therapies.

Before treatment begins, it is important to discuss the goals and possible side effects of treatment with your doctor, including the likelihood that the treatment will work and its potential effect on your quality of life.

To start a conversation with your doctor about all of your treatment options, you may want to ask:

- What are the treatment options for my type and stage of lung cancer?
- Will I need more than one type of treatment?
- Based on the results of molecular testing, do you recommend targeted therapy? Why or why not?
- What treatment plan do you recommend for me? Why?
- What is the goal of the treatment(s) you are recommending? Is it to eliminate the cancer? To relieve my symptoms? Or both?
- What is the expected timeline for my treatment plan?
- When do I need to make a decision about starting treatment?

MY TREATMENT PLAN

- Surgery
- Radiation therapy
- Chemotherapy
- Targeted therapy
- Clinical trial
- Palliative care

TREATMENT GOALS

- Eliminate the cancer
- Slow cancer growth/spread
- Shrink the tumor
- Relieve symptoms
- Manage side effects
- Other:
**Surgery**

The goal of surgery is to completely remove the lung tumor and the nearby lymph nodes in the chest. To make sure the entire tumor is eliminated, a doctor specially trained to perform lung cancer surgery, called a thoracic surgeon, will also remove a small border of healthy lung tissue around the tumor. This is known as a margin.

The following types of surgery may be used for lung cancer:

- **Lobectomy**
  The lungs have five lobes, three in the right lung and two in the left lung. During a lobectomy, an entire lobe of the affected lung is surgically removed. For NSCLC, a lobectomy is often the most effective type of surgery, even when the lung tumor is very small.

- **A wedge**
  If the surgeon isn’t able to remove an entire lobe of the lung, he or she can remove the tumor along with an area of healthy lung tissue.

- **Segmentectomy**
  This is another way to remove the cancer when an entire lobe of the lung cannot be removed. During this procedure, the surgeon removes the portion of the lung where the cancer developed.

- **Pneumonectomy**
  If the tumor is close to the center of the chest, the surgeon may have to remove the entire lung.

- **Radiofrequency ablation (RFA)**
  During RFA, a needle is inserted into the tumor to destroy the cancer with an electrical current. It is sometimes used for a lung tumor that cannot be removed with the other types of surgery listed in this section.

The amount of time it takes to recover from lung surgery depends on how much of the lung is removed and your health before surgery. Talk with your health care team before your surgery about what to expect, including recovery time and possible side effects.

**QUESTIONS TO ASK THE DOCTOR ABOUT SURGERY**

- Which type of surgery do you recommend? Why?
- What is the goal of this surgery?
- Will lymph nodes or any other tissue need to be removed?
- Will I need to be admitted to a hospital for this operation? If so, how long will I need to stay in the hospital?
- Will my tumor be saved? Where will it be stored? For how long? How can it be accessed in the future?
- What will my recovery from surgery be like?
- What are the potential short- and long-term side effects of this type of surgery?
- Will I need any additional treatment after surgery?
Adjuvant therapy

Adjuvant therapy is treatment given after surgery to lower the risk of lung cancer returning. Adjuvant therapy may include radiation therapy, chemotherapy, and possibly targeted therapy. The goal is to get rid of any lung cancer cells that may still be in the body after the tumor has been removed. It helps decrease the risk of recurrence, although there is always some risk that the cancer will come back.

Along with the stage of the lung cancer, there are other factors that can help determine your prognosis and help your doctor decide whether adjuvant therapy would be beneficial. The website Adjuvant! Online (www.adjuvantonline.com) is a tool your doctor can use to interpret the variety of factors that are important for making this treatment decision. This website should only be used with the help of your doctor. In addition, ASCO provides specific decision aids for stage IB, stage II, and stage III lung cancer, which can help you start a discussion with your doctor about the risks and benefits of adjuvant therapy. Links to these aids can be found at www.cancer.net/lungcancerdecisionaids.

Radiation Therapy

Radiation therapy is the use of high energy x-rays or other particles to destroy cancer cells. If you need radiation therapy, you will be asked to see a doctor called a radiation oncologist who specializes in giving radiation therapy to treat cancer. The most common type of radiation treatment is called external-beam radiation therapy, which is radiation given from a machine located outside the body. When radiation treatment involves implanting radioactive material near the tumor, it is called internal radiation therapy or brachytherapy. Brachytherapy is rarely used as a treatment for lung cancer.

Like surgery, radiation therapy cannot be used to treat widespread cancer because radiation therapy only destroys cancer cells that are directly in the path of the radiation beam. However, it also damages any healthy cells that might be nearby. If enough of these cells are damaged, side effects occur.

Sometimes CT scans are used to plan exactly where to direct the radiation to lower the risk of damaging healthy parts of the body. This is called intensity modulated radiation therapy (IMRT) or stereotactic body radiation therapy (SBRT). It is not an option for all patients, but it may be used for patients with early-stage disease or small tumors when surgery is not an option.

Patients with lung cancer treated with radiation therapy often experience fatigue and loss of appetite. If radiation
therapy is given to the neck or center of the chest, patients may also develop a sore throat or have difficulty swallowing. Skin irritation, similar to a sunburn, may occur at the treatment site. However, most side effects go away soon after treatment is finished.

If radiation therapy irritates or inflames the lung, patients may develop a cough, fever, or shortness of breath months or sometimes years after treatment ends. About 15% of patients develop this condition, called radiation pneumonitis. If it is mild, radiation pneumonitis does not need treatment and goes away on its own. If it is severe, a patient may need treatment with steroid medications, such as prednisone. Radiation therapy may also cause permanent scarring of the lung tissue near where the original tumor was located. Typically, the scarring does not cause symptoms; however, severe scarring can cause a permanent cough and shortness of breath.

QUESTIONS TO ASK THE DOCTOR ABOUT RADIATION THERAPY

• What type of radiation therapy do you recommend? Why?
• How often will my radiation treatments occur, and how long will I need to receive treatment?
• How much time will each treatment take?
• Will you describe what I will experience when I receive radiation therapy? Will it hurt or cause me discomfort?
• How much healthy lung tissue will be included in the radiation field?
• What are the possible short- and long-term side effects of this treatment?
• What can be done to minimize this risk?

NOTES:
**CHEMOTHERAPY**

Chemotherapy is the use of drugs to destroy cancer cells, usually by stopping their ability to grow and divide. Chemotherapy is given by a medical oncologist, which is a doctor who specializes in treating cancer with medication. Systemic chemotherapy is delivered through the bloodstream to reach cancer cells throughout the body. Most chemotherapy used to treat lung cancer is given through an intravenous (IV) tube placed into a vein using a needle. A person may receive one drug at a time or a combination of different drugs at the same time.

Chemotherapy has been shown to improve both the length and quality of life for people with all stages of lung cancer. However, it is important to talk with your doctor about whether chemotherapy should be part of your treatment plan.

The side effects of chemotherapy depend on the individual and the dose used, but they can include fatigue, a higher risk of infection, nausea and vomiting, loss of appetite, diarrhea, hair loss, low blood counts, mouth sores, and numbness or tingling in the hands and feet. These side effects usually go away once treatment is finished, but your doctor can also prescribe drugs to help relieve many of them. Talk with a member of your health care team about ways to prevent or manage potential side effects.

**QUESTIONS TO ASK THE DOCTOR ABOUT CHEMOTHERAPY**

- What type of chemotherapy do you recommend? Why?
- How long will I need to have chemotherapy?
- How will the treatment be given?
- How will chemotherapy affect my daily life? Will I be able to work, exercise, and perform my usual activities?
- What are the potential side effects of this treatment? What can be done to prevent or manage these side effects?
- Where can I get more information about the medications I will be taking?
- If I am worried about managing the cost of treatment, who can help me?

**NOTES:**
TARGETED THERAPY

Targeted therapy is a treatment that targets specific genes, proteins, or the tissue environment that contributes to the cancer’s growth and survival. This type of treatment blocks the growth and spread of cancer cells while limiting damage to healthy cells.

Recent studies show that not all lung tumors have the same targets. For some lung cancers, unusually large amounts of specific proteins are found in the cancer cells. Sometimes doctors recommend specialized tests to find these proteins in a tumor sample, and the results help them better match each patient with the most effective treatment whenever possible.

In addition, many research studies are taking place to find out more about additional targets and new treatments directed at them. Therefore, it is important to talk with your doctor about the best possible treatment option for your type of lung cancer.

For lung cancer, the following types of targeted therapy may be used; however, other options may be available as part of a clinical trial. Talk with your doctor about possible side effects of a specific medication and how they can be managed.

☐ Anti-angiogenesis therapy

Anti-angiogenesis therapy is focused on stopping angiogenesis, which is the process of making new blood vessels. Because a tumor needs the nutrients delivered by blood vessels to grow and spread, the goal of anti-angiogenesis therapies is to essentially “starve” the tumor. Bevacizumab (Avastin) is an anti-angiogenic drug given along with chemotherapy for lung cancer.

The risk of serious bleeding for patients taking bevacizumab is about 2%. However, it is more common for patients with squamous cell carcinoma, so bevacizumab is not usually recommend for patients with this type of NSCLC.

☐ Epidermal growth factor receptor (EGFR) inhibitors

Researchers have found that drugs that block the EGFR may be effective at stopping or slowing the growth of lung cancer.
- **Erlotinib (Tarceva)**—Erlotinib has been shown to work better than chemotherapy if the lung cancer has a mutation in the \textit{EGFR} gene. It is approved by the U.S. Food and Drug Administration (FDA) for patients with locally advanced and metastatic NSCLC and as a maintenance therapy for patients with NSCLC that has not grown or spread after at least four cycles of chemotherapy. This medication is a pill that can be taken by mouth. The side effects of erlotinib include a rash that looks like acne and diarrhea.

- **Gefitinib (Iressa)**—Gefitinib is another drug that blocks EGFR. This treatment is only available in Europe and Asia.

- **Gilotrif (Afatinib)**—Gilotrif was approved by the FDA in 2013 as an initial treatment for NSCLC. It is a type of drug called a tyrosine kinase inhibitor (TKI) that works by stopping uncontrolled cell growth caused by a mutation in the \textit{EGFR} gene.

- **ALK inhibitors**
  
  Another type of targeted therapy may be used for NSCLC that has a mutation in the \textit{ALK} gene. ALK inhibitors include crizotinib (Xalkori) and ceritinib (Zykadia).

**QUESTIONS TO ASK THE DOCTOR ABOUT TARGETED THERAPY**

- Based on my test results, will I benefit from targeted therapy? Why or why not?
- How long will I need to have this treatment?
- How will the treatment be given?
- What are the possible side effects of this treatment?
- How will these side effects be managed?
- How will my treatment be monitored?
- If I am worried about managing the cost of treatment, who can help me?
Clinical trials

Doctors and scientists are always looking for better ways to treat people with lung cancer. To make scientific advances, doctors conduct research studies involving volunteers, called clinical trials.

Many clinical trials are focused on evaluating whether a new treatment is safe, effective, and possibly better than the standard treatment. These types of studies evaluate new drugs, different combinations of existing treatments, new approaches to radiation therapy or surgery, and new methods of treatment. There are also clinical trials that study new ways to ease symptoms and side effects during treatment, ways to manage late effects that may occur after treatment, and ways to prevent the disease.

Patients who participate in clinical trials are often among the first to receive new treatments before they are widely available. However, there is no guarantee the new treatment will be safe, effective, or better than a standard treatment.

Some people worry if they participate in a clinical trial, they may receive no treatment by being given a placebo or a “sugar pill.” However, placebos are usually combined with standard treatment in most cancer clinical trials. When a placebo is used in a study, it is done with the full knowledge of the participants.

If you decide to join a clinical trial, you will participate in a process known as informed consent. During informed consent, the doctor will list all of your options and help you understand how the new treatment is different from the standard treatment. The doctor must also list all of the risks of the new treatment, which may or may not be different from the risks of standard treatment. Finally, the doctor must explain what will be required of each patient in order to participate in the clinical trial, including the number of doctor visits, tests, the schedule of treatment, and the costs they may need to pay.

Keep in mind, even if you decide to join a clinical trial, you may stop participating at any time for any personal or medical reason.

To learn more about clinical trials, visit www.cancer.net/clinicaltrials.
QUESTIONS TO ASK THE DOCTOR ABOUT CLINICAL TRIALS

• How do clinical trials help people with lung cancer?
• What clinical trials are open to me? Where are they located, and how I find out more about them?
• What happens during a clinical trial?
• How do the costs of participating in a clinical trial compare with the costs of standard treatment?
• Where can I learn more about clinical trials?

NOTES:
Managing symptoms and side effects

In addition to treatment to slow, stop, or eliminate lung cancer, an important part of cancer care is relieving a person’s symptoms and side effects. This approach is called palliative care.

Palliative care is any treatment that focuses on reducing a person’s symptoms, improving quality of life, and supporting patients and their families. Any person, regardless of age or type and stage of cancer, may receive palliative care. Ideally palliative care should start as early as needed in the cancer treatment process and continue throughout all stages of the disease. It can be given at the same time as disease-directed treatment or on its own.

Palliative treatments vary widely and often include medication, nutritional changes, relaxation techniques, emotional support, and other therapies. You may also receive palliative treatments similar to those meant to eliminate the cancer, such as surgery and radiation therapy. Talk with your doctor about the goals of each treatment in your treatment plan.

For people with lung cancer, palliative care may include:

- **Radiation therapy**—A tumor in the chest that is bleeding or blocking the lung passages can be shrunk with radiation therapy.

- **Bronchoscopy**—During this procedure, lung passages blocked by cancer can be opened to improve breathing.

- **Surgery**—A surgeon can use a laser to burn away a tumor or place a stent (support) to prop open an airway.

- **Pain medications**—Many hospitals and cancer centers have pain control specialists who provide pain relief, even for very severe cancer pain. A number of drugs used to treat cancer pain, especially morphine, can also relieve shortness of breath caused by cancer.

- **Corticosteroids**—Methylprednisolone (multiple brand names) or prednisone help reduce inflammation caused by lung cancer or radiation therapy and improve breathing.

- **Other medications**—Medications can be used to suppress cough, open closed airways, or reduce bronchial secretions.

- **Supplemental oxygen**—Extra oxygen from small, portable tanks can help make up for the lungs’ reduced ability to extract oxygen from the air.

- **Bisphosphonates**—These medications strengthen bones, reduce bone pain, and help prevent future bone metastases.

- **Appetite stimulants and nutritional supplements**—These can improve appetite and reduce weight loss.
QUESTIONS TO ASK THE DOCTOR ABOUT PALLIATIVE CARE

- What can be done to manage any symptoms and side effects I may experience?
- Can you recommend someone who specializes in palliative care?
- Where can I receive palliative care services?
- What other support services are available to me? To my family?

Before treatment begins, talk with your health care team about the possible side effects of your specific treatment plan and palliative care options. Then during and after treatment, be sure to tell your doctor or another health care team member if you are experiencing a problem so it can be addressed as quickly as possible.

NOTES:
Developing a treatment plan

NSCLC

For patients with NSCLC, the stage of the cancer helps determine the treatment or combinations of treatments needed. However, clinical trials are an option for people with all stages of lung cancer.

Stage I and II.
In general, stage I and stage II NSCLC are treated with surgery, and surgeons successfully remove the entire tumor with these operations for many patients. Before or after surgery, a patient may be referred to a medical oncologist. Some patients with large tumors or signs that the tumor has spread to the lymph nodes may benefit from neoadjuvant or induction chemotherapy given before surgery or adjuvant chemotherapy given after surgery to reduce the chance the cancer will return. Radiation therapy may be used to treat a lung tumor when surgery is not recommended.

Stage III. Stage III NSCLC has spread to the point that surgery or radiation therapy alone is usually not enough to eliminate the tumor. Patients with stage III disease also have a high risk of the cancer returning, either in the same place or a distant location, even after successful surgery or radiation therapy. For this reason, doctors generally do not recommend immediate surgery, and sometimes suggest chemotherapy before surgery.

After chemotherapy, patients with stage III NSCLC may still have surgery, especially if the chemotherapy is able to shrink the cancer. However, some patients with stage III NSCLC do not have surgery. Instead, they may be given a combination of chemotherapy and radiation therapy.

Chemotherapy may be given either before or at the same time as the radiation therapy.

Chemotherapy given at the same time as radiation therapy is more effective than chemotherapy given before radiation therapy, but it causes more side effects. Patients who have received both chemotherapy and radiation therapy for stage III disease may still go on to have surgery. However, there is debate among doctors about whether surgery is needed when radiation therapy has worked well and if radiation therapy is needed when tumors have disappeared after chemotherapy.

For most patients with stage III NSCLC, the tumor is unresectable, meaning it cannot be removed with surgery. This may be because the surgeon feels doing an operation would be too risky or that the tumor cannot be removed completely. For patients with unresectable NSCLC who show no signs that the cancer has spread to distant sites or to the fluid around the lung, a combination of chemotherapy and radiation therapy can still be used to try to eliminate the cancer.

Stage IV. Most patients with stage IV NSCLC receive only chemotherapy. The goals of chemotherapy are to shrink the cancer, relieve discomfort caused by the cancer, prevent the cancer from spreading further, and lengthen a patient’s life. Chemotherapy rarely makes metastatic lung cancer disappear, and if it does, doctors know from experience that the cancer will usually return. Therefore, patients with stage IV disease are never considered “cured” of their cancer no matter how well the chemotherapy works.

Chemotherapy has been proven to improve both length and quality of life for patients with stage IV NSCLC. If the cancer worsens or chemotherapy causes too many side effects, the treatment may be stopped, but the patient would continue to receive palliative care.

Patients with stage IV NSCLC typically do not have surgery or radiation therapy. Occasionally, doctors may recommend surgery for a brain or adrenal gland metastasis if that is
the only place the cancer has spread. Radiation therapy or surgery may also be used to treat metastases that are causing pain or other symptoms. Bone metastases that weaken important bones can be treated with surgery, and the bones can be reinforced using metal implants.

**SMALL CELL LUNG CANCER**
As with NSCLC, the treatment of small cell lung cancer depends on the stage. You may hear your doctor refer to limited stage, which means there are no signs that the cancer has spread, or extensive stage, which means that the cancer has spread.

Small cell lung cancer spreads quickly so chemotherapy is the primary treatment for all patients. The most commonly used chemotherapy combination is etoposide (Etopophos, Toposar, VePesid) plus carboplatin (Paraplatin) or cisplatin (Platinol). For patients with limited stage small cell lung cancer, chemotherapy plus radiation therapy to the chest is given twice a day. Radiation therapy works best when given during the first or second month of chemotherapy. Patients with extensive stage cancer receive chemotherapy for three to six months.

Surgery is rarely used for patients with small cell lung cancer and is only considered for patients with very early-stage disease, such as cancer in a small lung nodule. In these situations, chemotherapy, with or without radiation therapy, is given after surgery.

For patients whose tumors have shrunk after chemotherapy, radiation therapy to the head reduces the risk that the cancer will spread to the brain. This is called prophylactic cranial irradiation (PCI), and it has been shown to lengthen the lives of these patients.

Like patients with later-stage NSCLC, patients with small cell lung cancer of any stage face the risk that their cancer can return, even when its growth is controlled. All patients with small cell lung cancer must be monitored closely by their doctors with x-rays, scans, and check-ups.

**RECURRENT LUNG CANCER**
If lung cancer returns after the original treatment, it is called recurrent cancer. Cancer recurs because tiny areas of cancer cells are difficult to find and can sometimes remain in the body after treatment. Over time, these cells may multiply and grow large enough to be found and diagnosed. The cancer may come back in the lung (called a local recurrence), within the chest (a regional recurrence), or in another part of the body, such as the brain, bones, liver, or adrenal glands (a distant or metastatic recurrence).

If a recurrence occurs, the cycle of testing will begin again to learn as much as possible about the recurrence. After testing is done, you and your doctor will talk about your treatment options. The treatment plan will be based on the cancer’s stage and may include surgery, chemotherapy, and radiation therapy. However, they may be used in a different combination or given at a different pace. Your doctor may also suggest clinical trials that are studying new ways to treat recurrent lung cancer.

People with recurrent cancer often experience emotions such as disbelief or fear. Patients are encouraged to talk with their health care team about these feelings and ask about support services to help them cope.

For more information about lung cancer treatment, visit www.cancer.net/lung.
Increasing the effectiveness of treatment

Lung cancer treatment may not be as effective for patients with bone or liver metastases, excessive weight loss, ongoing tobacco use, or pre-existing medical conditions, such as heart disease or emphysema. Although you can’t change some of these factors, if you are a smoker, quitting tobacco following a diagnosis of lung cancer is a small change that can make a big difference.

People living with lung cancer who stop smoking have an easier time with all treatments, feel better, live longer, and have a lower risk of developing a second lung cancer. On the other hand, continuing to smoke can lead to:

- Shorter survival
- Less of a chance of successful, effective treatment
- More complications from surgery and a slower recovery
- More treatment-related side effects from chemotherapy, including infection, fatigue, and weight loss
- Additional side effects from radiation therapy, such as dry mouth, mouth sores, loss of taste, and problems with your bones and soft tissues
- Increased chance of recurrence
- Increased risk of developing other serious illnesses

Stopping smoking is never easy, and it can be even harder when you are dealing with a diagnosis of lung cancer. However, a variety of treatments and resources are available to help you quit, including medications, counseling, and smoking cessation programs. Talk with a member of your health care team about which approach may work best for you.
QUESTIONS TO ASK THE DOCTOR ABOUT IMPROVING TREATMENT EFFECTIVENESS

• Are there any factors or behaviors that might make my treatment plan less effective?
• Is there anything I can do to increase the effectiveness of my treatment(s)?
• If I am a smoker, will smoking affect how well my cancer treatment works? Will I experience more or different side effects from treatment if I continue to use tobacco?
• What medications and other smoking cessation resources are available to me?
• How can you and your team help me manage the stress of quitting smoking along with the stress of a cancer diagnosis?

NOTES:
Coping With Side Effects

Fearing the side effects of lung cancer treatment is common, but it may help to know that preventing and controlling side effects is a major focus of your health care team. Before starting treatment, talk with your doctor or nurse about which side effects are most likely to happen and which are not. Then, once treatment begins, let your health care team know what side effects you are experiencing so they can help manage them.

Everyone’s experience with lung cancer treatment is different. The specific side effects you may experience during and after treatment depend on a number of factors, including the cancer’s location, your individual treatment plan, and your overall health. However, some of the potential physical, emotional, and social effects experienced by people being treated for lung cancer are described in this section.

Physical effects

**Pain.** Pain can be caused by the tumor, be a side effect of cancer treatment, or result from causes not related to the cancer. Untreated pain can make other aspects of cancer seem worse, such as fatigue, weakness, shortness of breath, nausea, constipation, sleep disturbances, depression, anxiety, and mental confusion. However, it is important to know that up to 95% of cancer pain can be treated successfully using medication or other strategies. Your doctor or a pain specialist can help you find an effective pain-relief strategy.

**Nausea and vomiting.** Nausea and vomiting are common side effects of many cancer treatments. Nausea is feeling the urge to vomit or throw up. Vomiting may happen before treatment, within 24 hours after treatment, or two or more days after treatment. Mild nausea and vomiting can be uncomfortable, but they usually do not cause serious problems. Severe vomiting, on the other hand, can cause dehydration; the loss of minerals, such as potassium and sodium, from the body; weight loss; and depression. In addition to medications that help prevent nausea and vomiting, many people find that behavioral treatments help control these side effects. Talk with your health care team about ways to change the expectation and fear of nausea and vomiting.

For more information about managing side effects, visit [www.cancer.net/sideeffects](http://www.cancer.net/sideeffects).
Fatigue. Cancer and its treatment often cause a persistent feeling of physical, emotional, or mental tiredness or exhaustion. Most people receiving cancer treatment experience some type of fatigue, which can make even a small effort, such as walking across a room, seem like too much. Fatigue can seriously affect all aspects of a person's life, from relationships with friends and family to the ability to perform at work. It is important to tell your doctor if you are experiencing fatigue because there are things your health care team can do to help.

Emotional and social effects

In addition to physical side effects, you may experience emotional and social effects. For many people, a diagnosis of lung cancer is stressful and can trigger difficult emotions. Unfortunately, many people with lung cancer feel that others believe that personal choices, such as smoking, caused the disease and will not provide as much support or help. The fact is not all patients with lung cancer smoke. Lung cancer is a disease that can affect anyone. Most people who get lung cancer today have either stopped smoking years earlier or never smoked at all.

Still, for many patients, these fears add extra stress to an already stressful situation and may lead to anxiety and, less commonly, depression. Therefore, it is important to express how you are feeling. Research has shown that sharing fears and anxieties with family, friends, counselors, clergy, or support groups helps strengthen patients emotionally, and perhaps even physically. Because not all people find it easy to open up to others, you may want to express your feelings in other ways, such as:

- Writing in a journal or starting a blog
- Doing artistic projects, such as painting
- Praying or meditating
- Reading
- Slowing down and reflecting

However, even with outlets to express their feelings, sometimes people with lung cancer and those closest to them continue to experience emotional and social effects. If you are feeling anxious, depressed, or stressed about your diagnosis and treatment, think about telling a member of your health care team, such as an oncology nurse. Oncology nurses not only have a wealth of experience and knowledge about cancer, cancer treatment, and side effects, but they can also provide you with emotional and social support, as well as help you develop effective coping strategies.

Another good resource is an oncology social worker. An oncology social worker can help you navigate the health care system, find support to manage the day-to-day challenges of living with cancer, and provide counseling, education, information services, discharge and home care planning services, and referrals to community resources for both you and your family and friends. Oncology social workers practice in many settings, including cancer centers, hospitals, doctors' offices, cancer-related agencies, hospices, and private practices. If there is not an oncology social worker at the place where you receive treatment, call the nearest cancer center or university/teaching hospital and ask if there is one on staff.

Learn more about coping with the physical, social, and emotional effects of lung cancer at www.cancer.net/coping. For a list of support organizations and other resources, visit www.cancer.net/support.
QUESTIONS TO ASK THE DOCTOR ABOUT SIDE EFFECTS

• What are the potential short- and long-term side effects of each treatment in my treatment plan?
• Are there ways to help me prepare for treatment and decrease the chance of experiencing side effects?
• What can be done to manage these side effects?
• What support services are available to me? To my family?
• If I am worried about managing the costs related to my cancer care, who can help me with these concerns?

NOTES:
Follow-Up Care

Each year, tens of thousands of people with lung cancer in the United States are successfully treated. However, cancer care does not end here. After treatment for lung cancer is finished, your doctor will outline a program of tests and visits to monitor your recovery and check that the cancer has not returned. This plan may include regular physical examinations and/or medical tests.

People treated for lung cancer may continue to have side effects, even after treatment ends. Common post-treatment issues include pain, fatigue, and shortness of breath. Feelings of depression and anxiety may also continue after treatment, and fearing that the cancer may come back is very common. Often people feel that they have less support once treatment has ended and that there is less assistance available from their doctors, nurses, and other programs, such as support groups. Your doctor, nurse, or social worker can help you develop a plan to manage any problems that continue after treatment.

People who develop lung cancer are also at higher risk for developing a second lung cancer so it is very important for you to keep an eye out for signs that the cancer has come back—even if this thought is scary. The symptoms of a lung cancer recurrence include:

- Fatigue
- Cough
- Shortness of breath
- Bone pain
- Appetite loss
- Coughing up phlegm or mucus
- Coughing up blood
- Malaise, a general feeling of discomfort or illness

During this period, tell your doctor or nurse about any new problem that lasts for more than two weeks. Your doctor may recommend scans to check for a recurrence so any new cancers can be found as early as possible.

Because many survivors of lung cancer have smoked cigarettes in the past, they also have a high risk of heart disease, stroke, emphysema, and chronic bronchitis. Certain cancer treatments can further increase these risks. Therefore, nothing helps recovery more than stopping smoking. There are many tools and approaches available. Enlist the support of your family, friends, nurses, and doctors because it is very difficult to stop on your own.

Even for those who don't smoke, making healthy lifestyle choices after cancer, such as maintaining a healthy weight, eating a balanced diet, minimizing alcohol intake, and having recommended cancer screening tests are important for your overall recovery.
well-being. Additionally, moderate physical activity can help rebuild your strength and energy level. Recovering patients, even those using oxygen, are encouraged to walk for 15 to 30 minutes each day to improve their heart and lung function. Your doctor can help you create an appropriate exercise plan based on your needs, physical abilities, and fitness level.

For cancer treatment summaries and survivorship care plans, visit www.cancer.net/survivorship.

QUESTIONS TO ASK THE DOCTOR ABOUT FOLLOW-UP CARE
- What are the chances that my cancer will return?
- Is there anything I can do to reduce the risk of recurrence?
- What follow-up tests will I need, and how often will I need them?
- How often will I need to see a doctor?
- What symptoms should I tell you about right away?

NOTES:
**Lung Cancer Dictionary**

**Adjuvant therapy:** Treatment given after the main treatment to reduce the chance of cancer coming back by eliminating any remaining cancer cells. It usually refers to chemotherapy, radiation therapy, and/or targeted therapy given after surgery.

**Anaplastic lymphoma kinase (ALK):** A gene that may be mutated (changed) in lung cancer cells. This mutation promotes cancer growth and can be targeted by a type of drug known as a tyrosine kinase inhibitor. These mutations only occur in cancer cells and are not passed from parents to children.

**Benign:** A tumor that is not cancerous. The tumor does not usually invade nearby tissue or spread to other parts of the body.

**Biopsy:** The removal of a small amount of tissue for examination under a microscope. Other tests can suggest lung cancer is present, but only a biopsy can make a definite diagnosis.

**Bisphosphonate:** Drugs that prevent and treat osteoporosis by blocking osteoclasts, the cells that cause bone destruction.

**Brachytherapy:** Radiation treatment given using small radioactive “seeds” or pellets placed inside the body near the tumor. Also called internal radiation therapy.

**Bronchoscopy:** A procedure that allows a doctor to look inside the breathing passages of the lungs.

**Cells:** The basic units that make up the human body.

**Chemotherapy:** The use of drugs to destroy cancer cells.

**Clinical trial:** A research study that involves volunteers. Many clinical trials test new treatments and/or prevention methods to find out whether they are safe, effective, and possibly better than the current standard of care, which is the best known treatment.

**Computed or computerized axial tomography (CT or CAT) scan:** An imaging technique that creates a 3D picture of the inside of the body using an x-ray machine.

**Cure:** To fully restore health. This term is sometimes used when a person's cancer has not returned for at least five years after treatment. However, the concept of “cure” is difficult to apply to cancer because undetected cancer cells can sometimes remain in the body after treatment, causing the cancer to return later. Recurrence after five years is still possible.

**Epidermal growth factor receptor (EGFR):** In a healthy cell, EGFR allows cells to grow and divide. However, when there are too many of these receptors caused by a genetic mutation, as happens in about 15% of patients with NSCLC, the cancer cells continue to grow and divide. Some research studies have shown that mutations to the *EGFR* gene may predict whether certain types of drugs, called tyrosine kinase inhibitors, can help treat lung cancer.

**External-beam radiation therapy:** Radiation therapy given from a machine located outside the body.

**Imaging test:** A procedure that creates pictures of internal body parts, tissues, or organs to make a diagnosis, plan treatment, check whether treatment is working, or observe a disease over time.
**Invasive cancer:** Cancer that has spread outside the layer of tissue in which it started and has the potential to grow into other tissues or parts of the body. Also called infiltrating cancer.

**Laboratory test:** A procedure that evaluates a sample of blood, urine, or other substance from the body to make a diagnosis, plan treatment, check whether treatment is working, or observe a disease over time.

**Late effects:** Side effects of cancer treatment that occur months or years after treatment has finished.

**Lobectomy:** Surgery to remove an entire lobe of the lung.

**Localized cancer:** Cancer that is confined to the area where it started and has not spread to other parts of the body. Also called in situ.

**Lymphatic system:** A network of small vessels, ducts, and organs that carry fluid to and from the bloodstream and body tissues. Cancer can spread to other parts of the body through the lymphatic system.

**Maintenance therapy:** The use of ongoing chemotherapy or another treatment to help lower the risk of recurrence.

**Malignant:** Refers to a tumor that is cancerous. It may invade nearby healthy tissue or spread to other parts of the body.

**Metastasis:** The spread of cancer from the place where it began to another part of the body. This occurs when cancer cells break away from the primary tumor and travel through the blood or the lymphatic system to the lymph nodes, brain, bones, adrenal glands, or other organs.

**Neoadjuvant therapy:** Treatment given before the main treatment. It may include chemotherapy or radiation therapy given before surgery to shrink a tumor so it is easier to remove.

**Non-small cell lung cancer (NSCLC):** Lung cancer that begins in the epithelial cells that line the airways and produce mucus. The most common type of lung cancer.

**Oncologist:** A doctor who specializes in treating cancer. The five main types are medical, surgical, radiation, gynecologic, and pediatric oncologists.

**Osteonecrosis:** An uncommon but serious side effect of treatment with bisphosphonates. The symptoms of osteonecrosis of the jaw include pain, swelling, and infection of the jaw; loose teeth; and exposed bone.

**Palliative care:** Any form of treatment that concentrates on reducing a patient’s symptoms or treatment-related side effects, improving quality of life, and supporting patients and their families.

**Pathologist:** A doctor who specializes in interpreting laboratory tests and evaluating cells, tissues, and organs to diagnose disease.

**Pneumonectomy:** The surgical removal of an entire lung.

**Positron emission tomography (PET) scan:** A diagnostic test used to detect cancer and find out the cancer's stage. This scan is sometimes used to evaluate the effectiveness of cancer treatments, such as chemotherapy or radiation therapy. A PET scan is often used to complement information gathered from a computed tomography (CT) scan, magnetic resonance imaging (MRI), or physical examination.

**Primary cancer:** The area in the body where a cancer started.

**Prognosis:** Chance of recovery; a prediction of the outcome of a disease.
Psychosocial effects: Emotional and social concerns related to cancer and cancer treatment that can greatly affect patients' well-being. These may include lack of information and support; emotional difficulties, including depression and anxiety; lack of transportation; disruptions to work, school, and family life; and insufficient financial resources.

Pulmonary fibrosis: Permanent scarring of the lungs caused by radiation therapy.

Pulmonologist: A doctor who specializes in diagnosing and treating lung diseases.

Radiation pneumonitis: Inflammation of lung tissue caused by radiation therapy.

Radiation therapy: The use of high-energy x-rays or other particles to destroy cancer cells. Also called radiotherapy.

Recurrence: Cancer that has returned after a period during which the cancer could not be detected. Local recurrence means that the cancer has come back in the same general area where the original cancer was located. Regional recurrence refers to cancer that has come back in the lymph nodes or other tissues near the original cancer site, usually by direct spread. Distant recurrence refers to cancer that has come back and has spread to other parts of the body, usually by traveling through the lymphatic system or bloodstream.

Regimen: A treatment plan that includes which treatments and procedures will be done, medications and their doses, the schedule of treatments, and how long each treatment will last.

Response: Shrinkage of the cancer as a result of chemotherapy, radiation therapy, targeted therapy, or another treatment.

Risk: The likelihood of an event.

Secondary cancer: Describes either a new primary cancer, which is a different type of cancer that develops after treatment for the first type of cancer, or cancer that has spread to other parts of the body from the place where it started (see metastasis).

Side effect: An undesirable result of treatment, such as fatigue, nausea, vomiting, or hair loss.

Small cell lung cancer: Lung cancer that begins in the nerve cells or hormone-producing cells of the lung. The term "small cell" refers to the size and shape of the cancer cells when viewed under a microscope.

Stage: A way of describing where the cancer is located, if or where it has spread, and whether it is affecting other parts of the body.

Standard of care: Care that experts agree or guidelines show is the most appropriate and/or effective for a specific type or stage of cancer.

Surgery: The removal of cancerous tissue from the body during an operation.

Survivorship: This term means different things to different people. Two common definitions include having no disease after the completion of treatment and the process of living with, through, and beyond cancer.

Survivorship care plan: A personalized schedule of follow-up examinations and tests that the doctor recommends after a patient's active treatment period. This may include regular physical examinations and/or medical tests to monitor a person's recovery for the coming months and years. It is often used together with a treatment summary. Also called a follow-up care plan.
Targeted therapy: A treatment that targets the cancer’s specific genes, proteins, or the tissue environment that contributes to cancer growth and survival.

Thoracic surgeon: A doctor who performs operations on the heart, lungs, esophagus, and other organs in the chest.

Tumor: A mass, lesion, or nodule formed when healthy cells change and grow uncontrollably. A tumor can be benign, meaning it is noncancerous, or malignant, meaning it is cancerous and can spread to other parts of the body.

Treatment summary: A written summary of the therapy(ies) that a person had during his or her active treatment period. This is often used in conjunction with a survivorship care plan to help monitor a survivor’s long-term health.

Unresectable: A tumor that cannot be removed with surgery.

For more definitions of common terms you may hear before, during, and after treatment, visit www.cancer.net/cancerbasics.