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2019

Lung Cancer

Early and Locally Advanced

NON-SMALL CELL LUNG CANCER



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**It's easy to
get lost in the
cancer world**



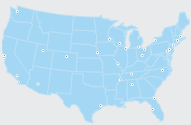
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- ✓ Based on treatment guidelines used by health care providers worldwide
- ✓ Designed to help you discuss cancer treatment with your doctors

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- ✓ For people with cancer and those who support them
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- ✓ Key points from the NCCN Guidelines for Patients

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The American Lung Association strongly supports efforts to help ensure all patients facing lung cancer get the highest standard of treatment and care. Helping patients understand treatment guidelines is one important step in empowering them to get the care they want and need. That is why we are pleased to endorse NCCN's efforts to provide accessible treatment guidelines and information to patients through the NCCN Guidelines for Patients. Lung.org

Bonnie J. Addario Lung Cancer Foundation

The Bonnie J. Addario Lung Cancer Foundation is proud to endorse these NCCN Guidelines for Patients. We believe that educated and empowered patients live longer. This book should be in the hands of every patient diagnosed with lung cancer. lungcancerfoundation.org

Caring Ambassadors

The Caring Ambassador Lung Cancer Program is pleased to endorse these NCCN Guidelines for Patients: Lung Cancer. Patients and their loved ones need reliable resources to achieve the best possible outcomes for their disease. lungcancerap.org

Dusty Joy Foundation (LiveLung)

With patients' best interest at heart, NCCN defines the standard of care for patients and physicians through proven scientific methods and expectations for new discoveries leading to improved patient outcomes. As a lung cancer advocacy nonprofit, our organization wholeheartedly supports the NCCN Guidelines for Patients. LiveLung.org

Free ME from Lung Cancer

As a lung cancer survivor and President and CEO of Free ME from Lung Cancer, I am pleased to endorse this vitally important resource so that lung cancer patients can have the information needed to make informed decisions about their treatment. freeMEfromLungCancer.org

Lung Cancer Action Network (LungCAN)

The NCCN provides the most current standards for patient care in an easy-to-understand and highly accessible format. As a collaborative association of approximately 25 U.S.-based

nonprofits dedicated to lung cancer, the Lung Cancer Action Network (LungCAN) is proud to endorse NCCN Guidelines for Patients®: Lung Cancer. LungCAN.org

Lung Cancer Alliance

Lung Cancer Alliance is proud to collaborate with the National Comprehensive Cancer Network to endorse these NCCN Guidelines for Patients®: Lung Cancer. lungcanceralliance.org

Lung Cancer Circle of Hope

Lung Cancer Circle of Hope (LCCH) emphatically endorses the NCCN Guidelines for Patients. Knowledge is power and with this comprehensive resource, patients and their families can proactively work with a qualified physician to make informed decisions in the battle to conquer cancer. lungcancercircleofhope.org

Lung Cancer Initiative of North Carolina

As an organization specializing in connecting patients, survivors and loved ones with the medical research community, the Lung Cancer Initiative of NC fully supports these NCCN Guidelines for Patients. These guidelines set the standard for patient education and access to care. lungcancerinitiativeinc.org

Lung Cancer Research Foundation

As a non-profit organization focused on supporting lung cancer research, the Lung Cancer Research Foundation is proud to endorse the NCCN Guidelines for Patients. These guidelines play an important role in providing lung cancer patients with up to date information and empowering them to make informed decisions about their care. lcrf.org

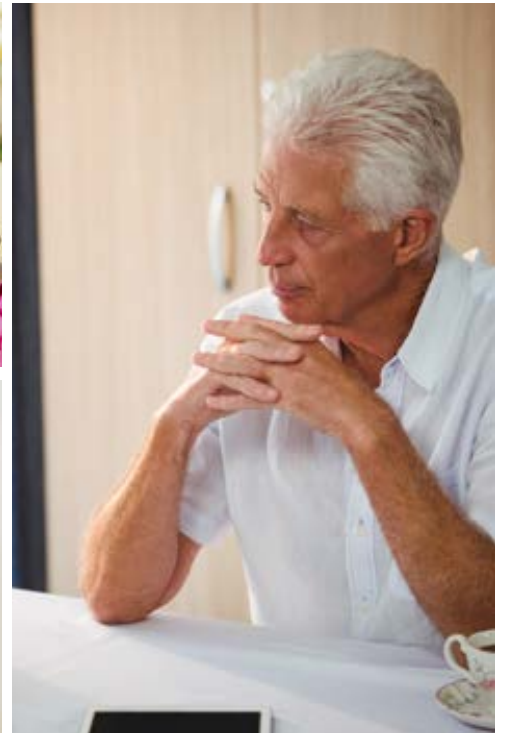
LUNgevity Foundation

LUNgevity Foundation supports the NCCN Guidelines for Patients as an excellent resource, as we strongly believe in providing education for all those affected by the disease. LUNgevity.org

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1

Lung cancer basics

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You've learned that you have or may have lung cancer. It's common to feel shocked and confused. This chapter reviews some basics that may help you learn about lung cancer.

Lungs

To learn about lung cancer, you first must know about the lungs. The lungs are the main organs of the respiratory system. They are involved in the exchange of gases in and out of the body.

Airways

Your lungs transfer oxygen—a gas that cells need to live—from the air into the blood. The blood then carries oxygen to all the cells in the body. The lungs

also remove carbon dioxide—a gas made by cells—from the blood. Carbon dioxide is then exhaled from the lungs into the air. The transfer of these gases in and out of the body is called respiration.

When you inhale, air travels down your throat into your windpipe (trachea). **See Figure 1.** Air then enters your lungs through the bronchi. The bronchi branch off into each part (lobe) of your lung. Your right lung has three lobes and your left lung has only two lobes to make space for your heart.

Within the lobes, the bronchi divide into smaller airways called bronchioli. At the end of each bronchioli are bunches of alveoli wrapped in blood vessels. The transfer of gases in and out of the blood occurs in the alveoli.

Figure 1 The airways and lungs

Oxygen enters your body through a series of airways that include the windpipe (trachea), bronchi, and bronchioli. Inside your lungs, oxygen is transferred into the bloodstream in the alveoli. Carbon dioxide is transferred out of the bloodstream in the alveoli and exits your body through your airways.

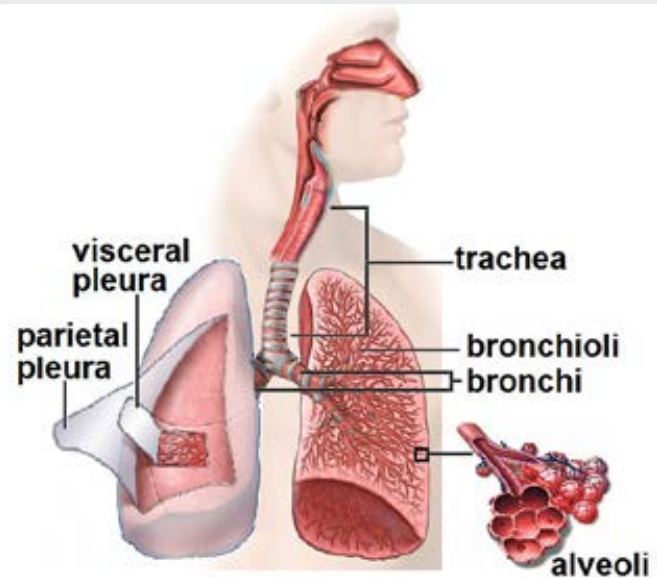


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Lymph

Throughout your body—including in your lungs—is a clear fluid called lymph. Lymph gives cells food and water. It also contains germ-fighting immune cells. Lymph drains from tissue into vessels that transport it to the bloodstream. **See Figure 2.** As lymph travels, it passes through small structures called lymph nodes. Lymph nodes remove germs from lymph.

Pleura

Your lungs are protected by tissue called the pleura. Pleura covers each lung and helps the lungs safely rub against other organs. Pleura is made of two layers. The outer layer is known as the parietal pleura. The inner layer is called the visceral pleura. The space in between the two layers is called the pleural cavity. It is filled with a small amount of fluid called pleural fluid.

A disease of cells

Your body is made of trillions of cells. Cancer is a disease of cells. Each type of cancer is named after the cell from which it formed.

Lung cancer

Lung cancer starts in cells of the lung. Other cancers that have spread to the lung are not lung cancers. For example, breast cancer that has spread to the lungs is still breast cancer.

Almost all lung cancers are carcinomas. Carcinomas are cancers of cells that line the inner or outer surfaces of the body. Lung carcinomas start in cells that line the airways of the lungs.

NSCLC

Lung carcinomas are divided into two groups based on how the cells look. One group is called small cell lung cancer and the other group is called NSCLC (**non-small cell lung cancer**). The second

group is much more common and is the focus of this book.

There are two major types of NSCLC. The first type is non-squamous carcinoma. It includes adenocarcinomas, large-cell carcinomas, and rare cell types. The second type of NSCLC is squamous cell carcinoma. It is also sometimes called epidermoid carcinoma.

Mutations

Cells have a control center called the nucleus. The nucleus contains chromosomes, which are long strands of DNA (**deoxyribonucleic acid**) tightly wrapped around proteins. **See Figure 3.** Within DNA are coded instructions for building new cells and controlling how cells behave. These instructions are called genes.

There can be abnormal changes in genes called mutations. Some types of mutations that are linked to cancer are present in all cells. Other mutations are present only in cancer cells. Mutations cause cancer cells to not behave like normal cells and, sometimes, to look very different from normal cells.

Figure 2 Lymph vessels and nodes

Throughout your body, including your lungs, is a network of vessels that transport lymph to the bloodstream. Lymph is a clear fluid that contains germ-fighting blood cells. As lymph travels in vessels, it passes through lymph nodes, which remove germs from lymph.

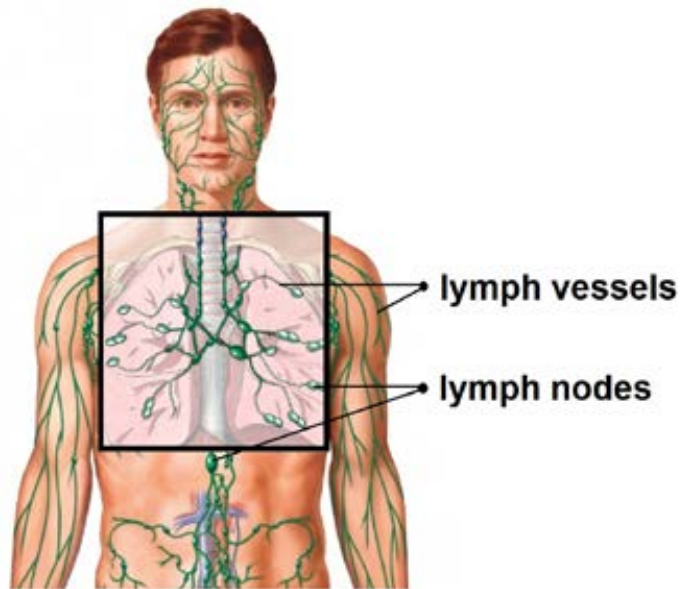


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Figure 3 Genetic material in cells

Most human cells contain a plan called the “blueprint of life.” It is a plan for how our bodies are made and work. It is found inside of chromosomes. Chromosomes are long strands of DNA that are tightly wrapped around proteins. Genes are small pieces of DNA. Humans have about 20,000 to 25,000 genes.

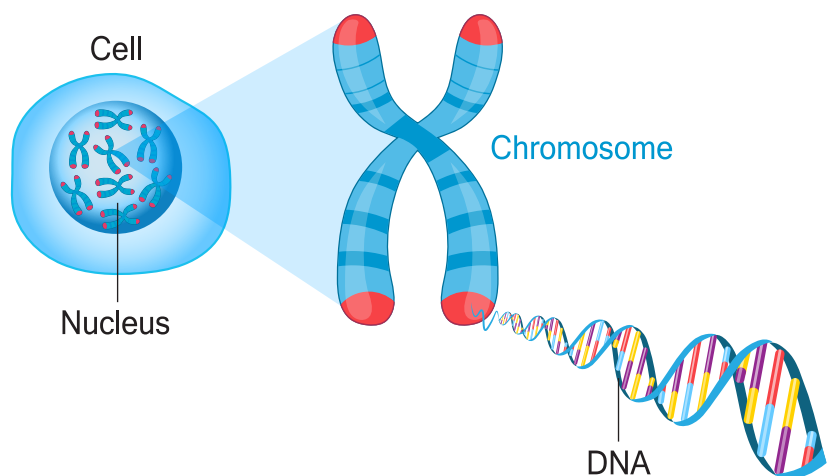


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Cancer's threat

When needed, normal cells grow and then divide to form new cells. When old or damaged, they die as shown in **Figure 4**. Normal cells also stay in place. Cancer cells don't behave like normal cells. Cancer cells differ from normal cells in three key ways.

Mass of cells

Cancer cells make new cells that aren't needed. They don't die quickly when old or damaged. Over time, cancer cells form a mass called the primary tumor.

Invasion

The second way cancer cells differ from normal cells is that they can grow into surrounding tissues. If not treated, the primary tumor can grow through an airway. It can even grow into nearby structures. This is called invasion. Lung cancer can invade another bronchus or the pleura. Cancer cells can replace many normal cells making it hard to breathe.

Metastasis

Third, unlike normal cells, cancer cells can leave the lungs. This process is called metastasis. In this process, cancer cells break away from the tumor and merge with blood or lymph. Then, the cancer cells travel in blood or lymph through vessels to other sites. Once in other sites, cancer cells may form secondary tumors and cause major health problems.

Figure 4 Normal cells vs. cancer cells

Normal cells increase in number when they are needed and die when old or damaged. In contrast, cancer cells quickly make new cells and live longer because of abnormal changes in genes.

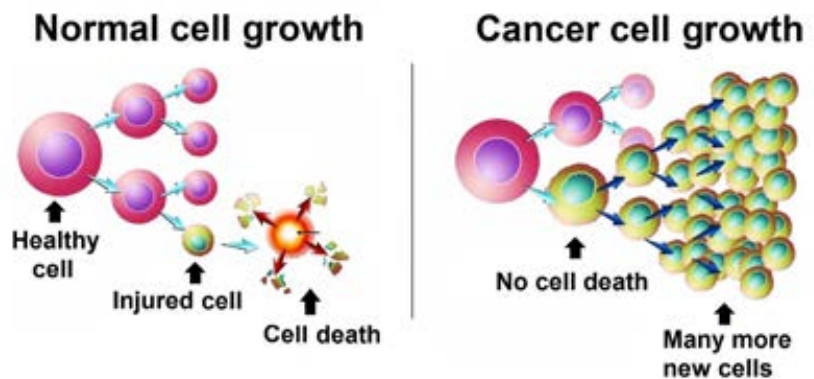


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Cancer stages

The cancer stage describes the extent of lung cancer in the body. Your doctor uses it for many things. It is used to assess the outlook of the cancer (prognosis). It is used to plan treatment. It is also used for research.

Your doctor may try to diagnose and stage the cancer at the same time. This can be done by testing a body part that likely has cancer and is furthest from the lung tumor. By doing this, you'll have fewer procedures.

For some people, cancer staging is done twice. The rating before any treatment is called the clinical stage. The second staging is called the pathologic stage. It is based on tests of tissue removed during surgery. Sometimes, cancer outside of the lungs isn't found until after surgery.

Staging system

The AJCC (**A**merican **J**oint **C**ommittee on **C**ancer) staging system is used to stage lung cancer. In this system, the letters T, N, and M describe different areas of cancer growth. Your doctors will assign a score to each letter.

The T score describes the growth of the primary tumor. There are seven main scores—TX, T0, Tis, T1, T2, T3, and T4. The more serious the growth the higher the T score.

The N score reflects how far lung cancer has spread within nearby lymph nodes. There are five scores—NX, N0, N1, N2, and N3. The more serious the growth the higher the N score.

The M score tells if there's cancer spread to body parts far from the lung in which it started. M0 means the cancer has not spread to distant parts. M1 means the cancer has spread to distant parts.



Snapshot: Lung cancer staging

- ✓ The cancer stage describes the extent of lung cancer in the body.
- ✓ Your doctor may try to diagnose and stage the cancer at the same time.
- ✓ The staging system uses the letters T, N, and M to describe different areas of cancer growth.
- ✓ The TNM scores will be combined to assign the cancer a stage.
- ✓ Stages I and II are early cancers.
- ✓ Stage III is locally advanced cancer.
- ✓ Stage IV is metastatic cancer.

Numbered stages

The TNM scores will be combined to assign the cancer a stage. The stages of lung cancer range from stage 0 to stage 4. Occult carcinoma is also included. Doctors write these stages as—stage 0, stage I, stage II, stage III, and stage IV.

Occult carcinoma

Occult carcinoma means a primary tumor was not found. Lung cancer cells may have been found in

fluids or mucus from the lungs. There are no signs of lung cancer in other parts of the body.

Stage 0

Stage 0 means there are abnormal or cancer cells in airways. The cancer cells haven't grown into lung tissue or spread outside the lung.

Stages I–III

Stages I through III have grown into lung tissue. Some have spread to nearby lymph nodes. They have not spread to body parts far from the primary tumor.

Letters and sometimes numbers are used to further group the stages. The subgroups give more details about the extent of the cancer. Stage I has four groups—IA1, IA2, IA3, and IB. Stage II has two groups—stages IIA and IIB. Stage III has three groups—IIIA, IIIB, and IIIC.

Stage IV

Metastatic lung cancers have spread to body parts far from the primary tumor. Stage IV is metastatic cancer that was present at diagnosis. It is grouped into stages IVA and IVB. Over time, other stages of lung cancer may metastasize. Lung cancer tends to spread to the brain, adrenal gland, and to the lung without the primary tumor.

Treatment types

This section briefly describes the treatments used for stages I–III lung cancer. Not everyone receives the same treatment. Often, more than one type of treatment is used. Your doctor will tailor treatment to you based on tests described in **Part 3**. Treatment options based on the cancer stage are discussed in **Part 4**.

Local therapy

Local therapy treats cancer in a limited region. It cannot fully treat cancer that is widespread. Local therapies for lung cancers include surgery, radiation therapy, and ablation.

Surgery

Surgery is a treatment that removes tumors or entire organs with cancer. It is a very common treatment for stages I, II, and III. The type of surgery done depends on where and how much the cancer has grown. Common lung surgeries are:

- **Wedge resection** – A small part of a lobe is removed,
- **Segmentectomy** – A large part of a lobe is removed,
- **Lobectomy** – An entire lobe is removed,
- **Sleeve lobectomy** – An entire lobe and part of the bronchus is removed, and
- **Pneumonectomy** – The entire lung is removed.

Removal of a lung tumor can sometimes be done with one of two methods. The classic method is thoracotomy. This surgery removes tissue through a large cut. Thoracoscopy is a newer method. It removes tissue through small cuts. It can be done with or without help from a robot.

Radiation therapy

Radiation therapy most often uses high-energy x-rays to treat lung cancer. The x-rays damage DNA in cancer cells. This either kills the cancer cells or stops new cancer cells from being made.

For lung cancers, the most common radiation method is EBRT (**external beam radiation therapy**). A large machine makes the high energy x-rays used for treatment. Conformal techniques are used. These techniques shape the radiation dose to the cancer

site to spare healthy tissue. Common techniques for lung cancer are:

- **3D-CRT (three-dimensional conformal radiation therapy)** delivers a photon beam that matches the shape of the target. Treatment is completed in about 6 weeks.
- **IMRT (intensity-modulated radiation therapy)** is a form of 3D-CRT. It further modifies the beam's intensity during treatment.
- **SABR (stereotactic ablative radiotherapy)** treats cancer with very precise, high-dose photon beams. It is also called SBRT (stereotactic body radiation therapy). Receiving SABR is much like other conformal techniques except treatment is finished in about 1 to 2 weeks.
- **Proton therapy** treats cancer with proton beams that deliver radiation mostly within the tumor. Treatment is completed in about 6 weeks.

A lung tumor is harder to target than some other tumors in the body. This is because breathing causes the tumor to move. IGRT (image-guided radiation therapy) can improve how well the radiation beam targets the tumor. It uses a machine that delivers radiation and also takes pictures of the tumor.

Ablation

Ablation destroys small tumors with little harm to nearby tissue. It isn't used often for lung cancer. It may be used for small tumors. Radiofrequency ablation kills cancer cells using heat or cold from electrodes that are passed through a bronchoscope. This treatment is done by an interventional radiologist.

Systemic therapy

Systemic therapy is a cancer treatment for the whole body. It will treat cancer in your lungs. It will also treat cancer in your lymph nodes and elsewhere. For stages I–III, chemotherapy and immunotherapy are used.

Chemotherapy

Chemotherapy works by stopping the cell life cycle. As a result, cancer cells cannot make new cells. Chemotherapy can also cause cells to destroy themselves. Often, cisplatin or carboplatin—drugs made with platinum—is used with another drug. These regimens are called platinum-doublet chemotherapy.

Most chemotherapy drugs for lung cancer are liquids that are slowly injected into a vein (infusion). Some are a pill that is swallowed. Chemotherapy is given in cycles of treatment days followed by days of rest. The cycles vary in length depending on which drugs are used. Ask your doctor how many cycles and days of treatment there are within a cycle of your treatment.

Immunotherapy

T cells are part of your body's disease-fighting (immune) system. They are unable to attack cancer cells that have PD-L1. Durvalumab is a treatment that enables T cells to attack cancer cells. It is given by infusion every 2 weeks for 60 minutes.

Clinical trial

One treatment choice may be whether to join a clinical trial. Joining a clinical trial is strongly supported. NCCN believes that you will receive the best management in a clinical trial.

A clinical trial is a type of research that studies a test or treatment in people. It gives people access to health care that otherwise couldn't usually be received. Ask your treatment team if there is an open clinical trial that you can join.



I qualified for a clinical trial. Tumor has reduced in size by almost two-thirds and fluid cleared. Right now I'm doing great and my horizon has lengthened considerably. Grateful to be a "survivor."

– Fred

Lung cancer survivor

Review

- The lungs help the body get the air it needs to live.
- The lungs are made of many small airways and sacs.
- Lung cancer often starts in the cells that line the airways. These cancers are called carcinomas.
- Cancer cells form a tumor since they don't grow and die as normal cells do.
- Cancer cells can spread to other body parts through lymph or blood.
- The stages of lung cancer range from stage 0 to stage 4.
- Lung cancer is very often treated with more than one type of treatment. The lung tumor as well as any cancer elsewhere in the body will be treated.
- Clinical trials give people access to new tests and treatments that they otherwise couldn't have received.

2

Assessing lung nodules

- 16 Team work
- 16 Your cancer risk
- 18 Signs of cancer
- 19 Follow-up care
- 21 Confirming cancer
- 22 Review



Many people have small masses of tissue in their lungs. These small masses are called nodules. A nodule may have been found in your lung by chance. This chapter discusses how doctors decide if this nodule is likely cancer.

Team work

On x-rays, nodules are sometimes called spots or shadows. They can be caused by cancer, infections, scar tissue, and other conditions. Most nodules are not cancer. It takes a team of experts to decide if a nodule is cancer.

Team members

Your treatment team should include a board-certified pulmonologist, thoracic radiologist, and thoracic surgeon. A pulmonologist is a doctor who's an expert of lung diseases. A thoracic radiologist is a doctor who's an expert of imaging of the chest. Imaging makes pictures of the insides of the body. A thoracic surgeon is a doctor who's an expert in operations within the chest.

Methods

Your team will assess if a lung nodule is cancer by three or four methods. One method is to assess your risk for lung cancer. Another method is to review images for signs of cancer. A third method is to repeat imaging to look for changes. When doctors suspect cancer, a fourth method is used. Tissue is removed from your body and tested to confirm if cancer is present.

Your cancer risk

Guide 1 lists the risk factors that doctors use to assess if a nodule may be cancer. A risk factor is anything that increases your chance of lung cancer. Risk factors can be activities that people do, things in the environment, or personal data like age and health. If these risk factors describe you, it doesn't mean you have lung cancer. Likewise, lung cancer occurs in some people who have no known risk factors.

Tobacco smoke

Smoking tobacco is the biggest risk factor for lung cancer. There are more than 50 compounds in tobacco smoke known to cause cancer. Any smoking increases your risk for lung cancer. However, the more you smoke, the higher your risk.

If you quit smoking, your risk will decrease. However, the risk for lung cancer is higher for former smokers than for people who never smoked. Thus, current or past tobacco smoking is a risk factor for lung cancer.

In 1981, a link between second-hand smoke and lung cancer was first suggested. Since then, other studies have found the risk for lung cancer is greater for people exposed to second-hand smoke. However, the risk may depend on how much contact a person has had.

If you smoke, ask your treatment team for help to quit.

Older age

As you get older, you are more likely to get cancer. Half of the people who were diagnosed with lung cancer in recent years were 70 years old or older. Only 12 out of every 100 people with lung cancer were younger than age 55.

Guide 1. Risk factors for lung cancer

You are more likely to get lung cancer if you:

- Smoke or have smoked
- Have had major exposure to second-hand smoke
- Are older in age
- Have had certain other cancers
- Have a parent, sibling, or child who has had lung cancer
- Have had exposure to cancer-causing agents
- Have had COPD or pulmonary fibrosis

Having had cancer

Your risk for lung cancer may be increased if you've had certain types of cancer. Having had any type of lung cancer increases your risk for other types of lung cancer. If you had lymphoma, you are more likely to get lung cancer. If you've had a smoking-related cancer, your risk for lung cancer is increased. These cancers include head and neck, kidney, bladder, pancreatic, stomach, and cervical cancers and AML (acute myeloid leukemia).

Some cancer treatments also increase risk. The risk for lung cancer increases after receiving radiation therapy in the chest, especially if you smoke. Treatment of Hodgkin's lymphoma with an alkylating agent—a type of cancer drug—increases the risk for lung cancer too.

Family who've had lung cancer

If your parent, sibling, or child has had lung cancer, your risk for lung cancer is higher than a person with no family history. Your risk is even higher if your relative had cancer at a young age. Your risk is also higher if more than one relative has had lung cancer.

Cancer-causing agents

There are 11 agents known to cause lung cancer. You are more likely to have lung cancer after having major contact with these agents. The risk after exposure is higher for those who smoke than for those who don't smoke.

Asbestos

Exposure to asbestos can cause lung cancer, especially if you smoke. Asbestos is a group of minerals made of tiny fibers. It has been used in housing and commercial products, such as roofing and brake pads. Asbestos can break into tiny pieces that may be breathed in or swallowed. The pieces can then get trapped in the lungs and remain there for years.

Uranium and radon

Uranium is a cancer-causing agent. It is a substance found in rocks and soil. As it decays, a gas called radon is made and gets into air and water.

Miners of uranium have a high risk of developing lung cancer. Some studies of radon found in the home have linked radon to lung cancer, while other studies have not. The risk for lung cancer may depend on how much radon is in the home.

Other agents

Five metallic metals known to cause lung cancer are arsenic, beryllium, cadmium, chromium, and nickel. Other cancer-causing agents include coal smoke, soot, silica, and diesel fumes.

Other lung diseases

Two lung diseases have been linked to lung cancer. A history of COPD (chronic obstructive pulmonary disease) increases your risk for lung cancer. COPD makes breathing hard because the lung tissue is damaged or there's too much mucus. The second disease linked to lung cancer is widespread pulmonary fibrosis. Pulmonary fibrosis is major scarring of lung tissue that makes it hard to breathe.

Hormone replacement therapy

Some women take female hormones to treat symptoms of menopause. This treatment is called hormone replacement therapy. It prevents bone loss and fracture. On the downside, it does increase the chance of getting breast cancer. It is not clear if it increases the risk for lung cancer. More research is needed.

Signs of cancer

Sometimes, a lung nodule is found by chance with imaging. Such imaging includes CT (computed tomography) and PET (positron emission tomography). **See Figure 5.** Your radiologist will review the images to decide if the nodule may be cancer. Important test results are the features of the nodule, abnormal lung tissue, and PET hot spots.

Features of the nodule

Nodules caused by cancer have specific traits. First, they aren't likely to have calcium buildup. Second, they often have rough edges and odd shapes. Other very important features are the nodule size and density.

Size

Nodules with cancer often grow faster and are larger than ones without cancer. Thus, nodules that are large are more likely to be cancer than small nodules.

Density

The density of the nodule is also assessed to decide if the nodule may be cancer. Non-solid nodules have low density. Solid nodules have high density. Part-solid nodules have both high and low areas of density. Part-solid nodules are found less often than solid nodules, but more of them are caused by cancer. On the other hand, solid nodules that are cancer grow faster than part-solid nodules that are cancer.

Figure 5 CT machine

Pictures of the insides of your body can be made with imaging. During the scan, you will lie on a table that will move into the tunnel of the imaging machine. The pictures will be viewed by a doctor who will look for signs of cancer.



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Abnormal lung tissue

Besides nodules, imaging may show other abnormal findings. It may show tissue inflammation, tissue scarring, or both. A nodule is more likely to be cancer if there's inflammation or scarring than if neither is present.

PET hot spots

PET shows how your cells are using a simple form of sugar (glucose). To create the pictures, a sugar radiotracer is put into your body. The radiotracer emits a small amount of energy that is detected by the imaging machine. Cancer quickly uses glucose so it appears “hot” in images. Other health problems can also cause hot spots, too. Cancer detected by PET often needs to be confirmed with other testing.

Follow-up care

This section is for lung nodules found by chance with CT. Care for nodules found by routine lung cancer screening is described in the [NCCN Guidelines for Patients®: Lung Cancer Screening](#). Read this book to learn more about lung cancer screening.

Nodules found by chance

[Guide 2](#) lists the options for follow-up care for solid nodules. Options are partly based on whether you are at low or high risk for lung cancer. Your risk is low if you have none or minor risk factors. You must not have smoked or smoked very little. Other risk factors are absent or minor.

Guide 2. Follow-up care for solid nodules**Low risk for lung cancer**

Baseline nodule size	What are the options?
Smaller than 6 mm	<ul style="list-style-type: none"> No routine follow-up care is needed
Between 6–8 mm	<ul style="list-style-type: none"> Repeat CT at 6–12 months <ul style="list-style-type: none"> If no increase, your doctor may order a CT at 18–24 months
Larger than 8 mm	<ul style="list-style-type: none"> Your doctor may order CT at 3 months Your doctor may order PET/CT now Your doctor may order a biopsy now

High risk for lung cancer

Baseline nodule size	What are the options?
Smaller than 6 mm	<ul style="list-style-type: none"> Repeat CT at 12 months is an option <ul style="list-style-type: none"> If no increase, no further routine follow-up
Between 6–8 mm	<ul style="list-style-type: none"> Repeat CT at 6–12 months <ul style="list-style-type: none"> If no increase, repeat CT at 18–24 months
Larger than 8 mm	<ul style="list-style-type: none"> Your doctor may order CT at 3 months Your doctor may order PET/CT now Your doctor may order a biopsy now

Guide 3 lists the options for follow-up care for subsolid nodules. Subsolid nodules include both non-solid and part-solid nodules. Non-solid nodules are also called GGOs (**g**round-**g**lass **o**pacities) or GGNs (**g**round-**g**lass **n**odules). Many of sub-solid nodules will go away in time. Those that remain are likely not to become a problem.

Repeat CT

Often, one CT scan doesn't clearly reveal whether the nodule is cancer. Instead, CT needs to be repeated over time. Your radiologist will look for increases in nodule size or density. Such changes are likely signs of cancer. If cancer may be present, read the next section, *Confirming cancer*.

LDCT (**l**ow-**d**ose **C**T) or a diagnostic CT may be used. LDCT uses much less radiation than a standard scan. It also does not require contrast. Contrast is a dye that is injected into the body to make clearer pictures. LDCT is preferred by NCCN experts for cancer screening unless a clearer picture is needed.

PET/CT scan

Sometimes, CT is combined with PET. When used together, they are called a PET/CT scan. Your whole body or from the base of your skull to your knees can be scanned.

Your doctor may order PET/CT if he or she suspects cancer. PET/CT may detect cancer quicker than a series of CT. It may also show signs of cancer spreading in the body. If cancer may be present, read the next section, *Confirming cancer*.

Biopsy

If your doctor strongly suspects cancer, he or she may order a biopsy. However, sometimes a biopsy can't be done. Also, your doctor may think it's better to wait and repeat CT. Read the next section, *Confirming cancer*, to learn more about biopsies.

Guide 3. Follow-up care for subsolid nodules

One non-solid nodule (no solid parts)

Baseline nodule size	What are the options?
Smaller than 6 mm	<ul style="list-style-type: none"> No routine follow-up care is needed
Larger than or equal to 6 mm	<ul style="list-style-type: none"> Repeat CT at 6–12 months <ul style="list-style-type: none"> If no increase, repeat CT every 2 years until 5 years after baseline scan

One part-solid tumor

Baseline nodule size	What are the options?
Smaller than 6 mm	<ul style="list-style-type: none"> No routine follow-up care is needed
Larger than or equal to 6 mm	<ul style="list-style-type: none"> Repeat CT at 3–6 months <ul style="list-style-type: none"> If no growth and solid part remains smaller than 6 mm, repeat CT every year for 5 years If solid part is 6 mm or larger, your doctor may order PET/CT or biopsy now

Multiple subsolid nodules

Baseline nodule size	What are the options?
Smaller than 6 mm	<ul style="list-style-type: none"> Repeat CT at 3–6 months <ul style="list-style-type: none"> If no increase, your doctor may order CT at 2 and 4 years after baseline scan
Larger than or equal to 6 mm	<ul style="list-style-type: none"> Repeat CT at 3–6 months <ul style="list-style-type: none"> Next steps depend on the nodule that is the most likely to be cancer

Confirming cancer

Body tissue or fluid must be tested to confirm (diagnose) cancer. There is no single plan for diagnosis that is best for all people. Your plan will depend on the tumor's size, where cancer might be in your body, your health, and the experience of your doctors.

Choice of method

For lung cancers, tissue or fluid samples may be removed by biopsy or surgery. Some people have a choice between the two methods. When deciding, doctors should think about 1) how strongly they think there's cancer; 2) where the cancer is in your body; and 3) what method you prefer.

There is more than one type of biopsy and surgery to diagnose lung cancer. They are briefly described next by broad groups. Read **Part 3** for more details. Which type you will have depends partly on where the cancer is.

- **External needle biopsies** involve inserting a needle through your chest wall. The needle is guided to the site with an imaging test like CT. These biopsies include TTNB (transthoracic needle biopsy) and thoracentesis.
- **Down-the-throat biopsies** involve guiding a thin device down your throat into your windpipe or esophagus. Samples may be removed by needle, brush, tongs, or liquid. These biopsies include bronchoscopy and EUS (endoscopic ultrasound)-guided biopsies.
- **Phlegm biopsy** requires that you cough up some mucus (phlegm). The phlegm will be tested for cancer cells. This may be the easiest way to test for cancer, but you'll likely have another biopsy or surgery.

- **Portal surgeries** involve cutting small holes (ports) into your chest. Small tools are inserted through the ports to remove tissue. Compared to open surgery, this technique is "minimally invasive." These surgeries include thoracoscopy and mediastinoscopy.
- **Open surgery** involves making a large cut between your ribs to spread them farther apart. The whole nodule is removed by your doctor with a surgical knife (excision). Open surgery is done when other methods won't work or a larger piece of tissue is needed.

Choice of timing

Another choice you may have is when to get diagnosed. Some people can wait to be diagnosed until the day of surgical treatment. If a nodule is very likely cancer, a biopsy done in advance would increase health risks, time spent, and costs. Tissue removed by biopsy or excision can be used for diagnosis at the time of surgery. More lung tissue may be removed if cancer is present.

There are times when a diagnosis before treatment is a better choice. An example is a pre-treatment core or fine-needle biopsy if your doctor strongly suspects a cancer other than lung cancer. A pre-treatment diagnosis is also needed if you will receive treatment other than surgery. Sometimes, a diagnosis on the same day as treatment would be too hard or risky.

Review

- It takes a team of experts to assess lung nodules for cancer.
- Tobacco smoking is the biggest risk factor for lung cancer.
- Signs of cancer can be found with imaging tests. For lung cancer, doctors assess a nodule's features, the condition of the lung tissue, and for PET hot spots.
- Doctors assess changes in a nodule with a series of CT scans. Nodules that quickly increase in size or density are more likely to be cancer.
- Testing of tissue that is removed by biopsy or surgery is needed for diagnosis.



When you are diagnosed with cancer, the most important thing that you can arm yourself with is knowledge and education.

– Anonymous
Lung cancer survivor

3

Treatment planning

24	Medical history
24	Physical exam
25	Smoking treatment
25	Blood tests
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29	Lung function tests
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Not all lung cancers are the same. Your cancer doctors will want to learn all about the cancer you have. This chapter describes what health care should be received before treatment.

Doctors plan treatment using many sources of information. These sources include the health care listed in [Guide 4](#). Another source is you. Tell your doctor your concerns and goals for treatment. Together, you can share in the decision-making process. Read **Part 5** to learn more about making treatment decisions.

Medical history

Your doctor will ask about any health problems and their treatment during your lifetime. Be prepared to tell what illnesses and injuries you have had. You will also be asked about health conditions and symptoms. It may help to bring a list of old and new medicines to your doctor's office.

Your doctor will ask about symptoms that may be related to lung cancer. Such symptoms include cough, trouble breathing, chest pain, and weight loss. Knowing which symptoms you have can help your doctors stage the cancer.

Some cancers and other health conditions can run in families. Thus, your doctor will ask about the medical history of your close blood relatives. Such family includes your siblings, parents, and grandparents. Be prepared to tell who has had what diseases and at what ages.

Your doctor will ask if you have ever smoked. Tell your doctor if you smoke or have smoked in the past. You'll also be asked how much you've smoked in

Guide 4. Health care before cancer treatment

Tests and services

Medical history

Physical exam

Smoking treatment if needed

CBC

Chemistry profile

Diagnostic CT of chest and upper abdomen

FDG PET/CT

Brain MRI

MRI of spine and thoracic inlet if needed

Bronchoscopy for stages I, II, IIIA, and some IIIB and IIIC

Biopsy

Lung function tests

Supportive care

your lifetime. Smoking is often measured by packs per day and the number of years that you have smoked.

Physical exam

A physical exam is a study of your body. It is done to look for signs of disease. It is also used to help assess what treatments may be options.

To start, your basic body functions will be measured. These functions include your temperature, blood pressure, and pulse and breathing rate. Your weight will also be checked.

Your doctor will listen to your lungs, heart, and gut. He or she will also assess your eyes, skin, nose, ears, and mouth. Parts of your body will be felt. Your doctor will note the size of organs and if they feel soft or hard. Tell your doctor if you feel pain when touched.

Smoking treatment

If you smoke, it is important to quit. Smoking can limit how well cancer treatment works. Nicotine addiction is one of the hardest addictions to stop. The stress of having cancer may make it harder to quit. There is help. Ask your doctor about counseling and drugs to help you quit.

Blood tests

Lung cancer is not found in blood. Instead, doctors test blood to look for signs of disease. Blood tests require a sample of your blood. Blood samples can be removed with a blood draw.

Blood draw

Some blood draws require no eating and drinking for hours. Your doctor will say if you can eat or drink. Blood samples will be removed with a needle placed into your vein.

Your blood will be tested by a pathologist. A pathologist is a doctor who's an expert in testing tissue and cells. The lab results will be sent to your doctor.

Complete blood count

A CBC (**complete blood count**) measures parts of the blood. This lab test gives a picture of your overall health. Test results include counts of white blood

cells, red blood cells, and platelets. Cancer and other health problems can cause low or high counts.

Chemistry profile

Chemicals in your blood come from your liver, bone, and other organs. A chemistry profile assesses if the chemicals in your blood are too low or high. Abnormal levels can be caused by spread of cancer or by other health problems.

Imaging

Imaging makes pictures of the insides of the body. It can show which body parts may have cancer. Some types of imaging also reveal certain features of a tumor and its cells. This information helps to stage the cancer and plan treatment.

Your treatment team will tell you how to prepare for these tests. You may need to stop taking some medicines and stop eating and drinking for a few hours before the scan. Tell your doctor if you get nervous when in small spaces. You may be given a pill to help you relax.

Diagnostic CT

Diagnostic CT should be one of the first tests used for cancer staging. It uses higher doses of radiation than low-dose CT. As a result, the images show more details. Contrast should be used.

Imaging of your chest and upper abdomen is needed. Your doctor will use the results to plan where to biopsy and which treatment is best. A scan should not be older than 60 days when used to assess if you can have surgery.

FDG PET/CT

PET/CT is a common test used for cancer staging. It may find cancer not found by CT alone. A scan

should not be older than 60 days when used to assess if you can have surgery.

A FDG (fluorodeoxyglucose) radiotracer will be used. It is made of fluoride and glucose. Usually, the area between the base of the skull and the knees is scanned. Sometimes, the whole body is scanned.

Cancer detected by PET/CT often needs to be confirmed. A biopsy is used in most cases. For some people, imaging, such as brain MRI (magnetic resonance imaging), is done.

Brain MRI

MRI uses a magnetic field and radio waves to make pictures. **See Figure 6.** It may show small brain tumors that aren't causing symptoms. It is not needed for clinical stage IA but is an option for stage IB. It is needed for clinical stages II and III. If MRI can't be done, you may get CT with contrast of your head.

MRI of spine and thoracic inlet

Some stage IIB and III lung cancers are superior sulcus tumors. This type of tumor starts at the top of the lung. It easily grows into the chest wall.

This tumor may have grown next to your spine or nearby blood vessels. In this case, MRI of your spine and thoracic inlet is needed. The thoracic inlet is the center of a ring of bones at the top of the ribcage.

Figure 6
Brain MRI

MRI may show small tumors in the brain that aren't causing symptoms.



Bronchoscopy and biopsy

A bronchoscopy is a procedure that allows doctors to see inside of airways. It is also used to biopsy lung tissue and certain lymph nodes. Another type of biopsy may be done because of where the cancer is and your health. Common types of biopsies are described in this section.

For clinical stages I, II, and IIIA, a bronchoscopy is advised. Your doctor will likely biopsy the lymph nodes between the lungs (mediastinum). These nodes may not be biopsied if the lung nodule is small and deep in the lung.

For some stage IIIB and IIIC cancers, a bronchoscopy may not be needed. Instead, another type of lymph node biopsy will be done. Cancer may be diagnosed and staged with one biopsy of abnormal nodes furthest from the nodule.

If cancer is very likely, the biopsy might not be done until the day of surgery. It can be done right before the surgery as one procedure. Doing so reduces health risks and saves time and money.

A pathologist will study the biopsy samples with a microscope. He or she will confirm if cancer is present. If the cancer started in the lung, the type of lung cancer will be identified.

Standard bronchoscopy

A device, called a bronchoscope, is used to perform a bronchoscopy. **See Figure 7.** Part of the scope will be inserted into your body. This part looks like a thin, long tube about as thick as a pencil. It has a light, camera, and open channel. Small tools can be inserted into the channel to collect samples.

There are two types of standard bronchoscopes. A rigid bronchoscope is straight and doesn't bend. A flexible bronchoscope is thinner and longer and can

bend. Standard bronchoscopy can reach nodules in the inner part of the lung.

Radial EBUS bronchoscopy

Radial EBUS (endobronchial ultrasound) bronchoscopy provides a 360-degree view of airways. It is done with a flexible bronchoscope fitted with an ultrasound probe. Ultrasound uses high-frequency sound waves to make images. Your doctor will see the layers of the airways and nearby tissue in detail.

Figure 7 Bronchoscope

A bronchoscope is a tool doctors use to see inside your lungs. It is also used to collect samples of tissue or fluid. Part of it looks like a thin tube. This part will be inserted down your nose or mouth into your airways.



Public Domain: <https://visuals.nci.nih.gov/details.cfm?imageid=1950>

Radial EBUS confirms that the scope has reached a nodule. It can reach nodules that are deep in the lungs. When the scope is in place, the probe will be removed and a sampling tool will be inserted. The tool may be passed through a guide sheath to help get a good sample.

Navigational bronchoscopy

A navigational bronchoscopy is another method used to reach nodules deep in the lung. It uses a guidance system that helps doctors steer a scope to the nodule. Electromagnetic guidance allows tracking of the tools in real time using a “GPS-like” system. When the scope is in place, imaging methods like radial EBUS may be used to perform the biopsy.

EBUS-TBNA

EBUS-TBNA (**endobronchial ultrasound-guided transbronchial needle aspiration**) allows imaging and sampling at the same time. It removes good samples from central lung nodules and lymph nodes near the bronchi. Unlike radial EBUS bronchoscopy, it does not provide a 360-degree view or reach nodules deep in the lung.

TTNB

TTNA (**transthoracic needle biopsy**) can access nodules deep in the lungs. It may also be used when other biopsy methods won't work. It is also called a percutaneous needle biopsy.

Your doctor will guide a very thin needle through your skin and into the nodule. Imaging will be used to help guide the needle. There is a higher chance of lung collapse (pneumothorax) and bleeding compared to scoping methods.

EUS-FNA

EUS-FNA (**endoscopic ultrasound-guided fine-needle aspiration**) can access lymph nodes below the bronchi. Your doctor will guide a scope into your esophagus—the organ between the throat and stomach. An ultrasound probe will be used to see

lymph nodes. Then, a thin needle from the scope will be used to obtain a sample.

Mediastinoscopy

A mediastinoscopy can access lymph nodes in the middle of the chest. The device used—a mediastinoscope—is very much like a bronchoscope. It will be inserted through a cut made right above your breastbone. The Chamberlain method inserts the scope through a cut made alongside the breastbone. This method reaches lymph nodes on the left side of the chest.

Thoracoscopy

A thoracoscopy can access lymph nodes in the chest and neck. It is also called a VATS (**video-assisted thoracoscopic surgery**). The device used—a thoracoscope—is very much like a bronchoscope. It will be inserted through a cut between your ribs. Samples can be collected with different types of tools.

Pathology report

All lab results are included in a pathology report. This report will be sent to your doctor. Ask him or her for a copy. Your doctor will review the results with you. Take notes and ask questions.

Lung function tests

Surgery and radiation therapy may be treatment options. First, your doctors will need to know how well your lungs work. Three pulmonary function tests may be done.

- ▶ **Spirometry** involves blowing into a tube to measure how much air and how fast you breathe.
- ▶ A **gas diffusion test** involves breathing in a harmless gas and measuring how much you breathe out. It tells how much oxygen travels from your lungs into your blood.
- ▶ **Body plethysmograph** involves sitting in a small room and breathing into a tube. This test measures how much air your lungs can hold and how much air is left in your lungs after you exhale.



Learning to manage side effects is well worth the effort!

– Jon

Lung cancer survivor

Supportive care

Supportive care aims to improve your quality of life. It includes care for health issues caused by cancer or cancer treatment. It is also sometimes called palliative care. Palliative care is important for everyone, not just people at the end of life.

Treatment side effects

All cancer treatments can cause unwanted health issues. Such health issues are called side effects. Some side effects may be harmful to your health. Others may just be unpleasant.

Side effects depend on many factors. These factors include the treatment type, length or dose of treatment, and the person.

Ask your treatment team for a complete list of side effects of your treatments. Also, tell your treatment team about any new or worse symptoms you get. There may be ways to help you feel better. There are also ways to prevent some side effects.

Review

- A medical history is a report of all health events in your lifetime.
- Your doctor will study your body for signs of disease. He or she will touch parts of your body to see if anything feels abnormal.
- Ask your doctor for help to quit smoking.
- Blood tests are used to look for signs of cancer.
- Diagnostic CT may show if the cancer has spread in your body. PET/CT may detect cancer that CT did not.
- MRI can be used to see if the cancer has spread to your brain. MRI of the spine and thoracic inlet is needed if you have a superior sulcus tumor.
- A bronchoscopy is a procedure that assesses your airways. It is done for many stage I, II, and III lung cancers.
- A biopsy is needed to confirm that cancer is present. It is often used to help stage the cancer.
- Pulmonary function tests are needed if surgery or radiation therapy is a treatment option.
- Supportive care aims to improve your quality of life. It is important for everyone, not just people at the end of life.

4

Treatment guide

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This chapter presents the treatment options for stage I, II, and III lung cancer. It also reviews some key parts of survivorship plans. Discuss with your doctor which options are right for you.

Overview

Doctors plan treatment based on many factors. One factor is the number of primary tumors. A primary tumor is the first mass of cancer cells. Most people have one primary tumor. Treatment of one primary tumor is the focus of this chapter.

Primary treatment is the main treatment used to rid your body of cancer. Primary treatment for lung cancer can be surgery, radiation therapy, or chemoradiation. As shown in [Guide 5](#), options for primary treatment partly depend on the cancer stage. Options also depend on your health.

Guide 5. Primary treatment

Primary treatment	Used for which stage?
Surgery	<ul style="list-style-type: none"> • Stage I • Stage II • Stage III (N0 or N1) • Not many stage III (N2)
Radiation therapy	<ul style="list-style-type: none"> • Stage I • Stage II in lung only
Chemoradiation	<ul style="list-style-type: none"> • Stage IIB outside of lung • Stage III (N0, N1) • Many stage III (N2) • All stage III (N3)

When possible, surgery is used as the primary treatment. If you are unable or refuse to have surgery, radiation therapy or chemoradiation may be an option.

Surgery

Your surgeon will remove the lung tumor and lymph nodes. He or she will try to remove the tumor with some normal-looking tissue around its edge. This tissue is called the surgical margin.

The removed tissue will be studied by a pathologist. This doctor will assess if there are cancer cells in the surgical margin. Lymph nodes will be assessed for cancer, too.

Adjuvant treatment is given after surgery to treat any remaining cancer. It is also called postoperative treatment. Options are based on the results of surgery. Your doctor may find more or less cancer than first thought. These findings may change TNM scores and the cancer stage.

In this section, treatment options are grouped by the clinical T and N stage:

- T1–T3 tumors (no invasion) (N0 or N1)
- T3–T4 superior sulcus tumors (N0 or N1)
- Invasive T3 and all T4 tumors (N0 or N1)
- T1–T3 (N2)

T1–T3 tumors (no invasion) (N0 or N1)

The growth and spread of these tumors are limited. T3 tumors have not grown into the bronchus or chest wall. The cancer has not spread far throughout lymph nodes if at all. These tumors are often treated with surgery.

Adjuvant treatment varies by pathologic staging and margin status as shown in [Guide 6](#). If chemotherapy is needed, you may get it before surgery to shrink the tumor.

Margins are cancer-free

For stages I and IIA, cancer-free margins are often a sign that all the cancer was removed. If you are likely cancer-free, start your survivorship plan.

For stages IB and IIA, your doctor may think surgery left behind some cancer cells. Cancer cells may remain if you had a wedge resection or the cancer cells look very abnormal. In these cases, chemotherapy may be given.

For stages IIB and III, chemotherapy is advised when the margins are cancer-free. For these stages, the cancer is more likely to have spread beyond the

surgical site. Chemotherapy will treat any cancer cells that remain in your body.

Margins have cancer

Some tumors will be removed with cancer in the margins. Cancer in the surgical margins means that there are likely some cancer cells in your body.

For stages I and II, a second surgery may be done. After surgery, stages IB and II may be treated with chemotherapy.

Instead of surgery, radiation therapy for stage I and chemoradiation for stage II is an option. For stage III, chemoradiation is used for adjuvant treatment.

For adjuvant chemoradiation and chemotherapy, the timing of the treatments can differ. Chemotherapy and radiation may be given at the same time. They may

Guide 6. Adjuvant treatment for T1–T3 tumors (no invasion) (N0 or N1)

Pathologic stage	Margin status	What are the options?
Stage IA (T1, N0)	No cancer in margins	<ul style="list-style-type: none"> Start survivorship plan (see Guide 7)
	Cancer in margins	<ul style="list-style-type: none"> Surgery (preferred) Radiation therapy
Stage IB (T2a, N0) Stage IIA (T2b, N0)	No cancer in margins	<ul style="list-style-type: none"> Start survivorship plan (see Guide 7) Chemotherapy if high risk
	Cancer in margins	<ul style="list-style-type: none"> Surgery (preferred) ± chemotherapy Radiation therapy for IB Chemoradiation for stage IIA
Stage IIB (T1, N1; T2, N1; T3 no invasion, N0)	No cancer in margins	<ul style="list-style-type: none"> Chemotherapy
	Cancer in margins	<ul style="list-style-type: none"> Surgery + chemotherapy Chemoradiation
Stage III (T3 no invasion, N1)	No cancer in margins	<ul style="list-style-type: none"> Chemotherapy
	Cancer in margins	<ul style="list-style-type: none"> Chemoradiation

also be given back-to-back if cancer in the margins can only be seen with a microscope.

T3–T4 superior sulcus tumors (N0 or N1)

Superior sulcus tumors are a distinct subset of lung cancers that start at the top of the lung. The T stage is either T3 or T4. Surgery is often an option for T3 tumors. The N stage must be N0 or N1. It is less likely an option for T4 tumors with N0 or N1 disease.

When surgery is planned, chemoradiation is first given. It may shrink the tumor and make surgery possible or easier. For T4 tumors, your doctor will reassess if surgery can be done. A chest CT with or without contrast is advised. PET/CT, MRI, or both may also be used.

If surgery can't be done, complete chemoradiation. If you have surgery, you will likely get chemotherapy next. It will reduce the chances of the cancer returning.

Invasive T3 and all T4 tumors (N0 or N1)

Some stage IIB and III cancers are invasive tumors. Invasive T3 tumors have grown into the chest wall or bronchi. T4 tumors are large, invasive, or have formed secondary tumors in another lobe. Surgery may be an option if the N stage is N0 or N1.

Surgery as the first treatment is preferred by NCCN experts. But, your doctor may advise getting chemoradiation or chemotherapy before surgery. These treatments may shrink the cancer and make surgery possible or easier.

Options for adjuvant treatment are based on cancer in the margins. For cancer-free margins, chemotherapy is given if you didn't have it before. Or, you may start your survivorship plan.

When cancer is in the margins, a second surgery may be an option. After surgery, you will be given chemotherapy if you didn't have it before. You may

get a radiation boost if you had chemoradiation before surgery.

Instead of a second surgery, chemoradiation may be an option if you didn't have it before. These two types of treatment can be given at the same time. They may also be given back-to-back if a microscope is needed to see the cancer in the margins.

T1–T3 (N2)

Some stage IIIA and IIIB cancers have spread to N2 nodes. N2 nodes are between the lungs but near to the lung with cancer. Some are right below the windpipe. Most often, N2 disease that is confirmed by biopsy can't be treated with surgery.

N2 confirmed by biopsy

Your doctor may decide that induction treatment is an option. Induction treatment may shrink the cancer enough for surgery. It is used only in certain conditions. T3 tumors must not have invaded other tissue.

Induction treatment consists of chemotherapy with or without radiation therapy. It may stop the cancer from getting worse. If it does, surgery may be done. After surgery, you may get radiation therapy if you didn't have it before. Chemotherapy may be given before radiation therapy.

N2 confirmed after surgery

Sometimes N2 disease is found only after surgery. Options for adjuvant treatment are based on cancer in the surgical margins. If margins are cancer-free, chemotherapy alone or chemoradiation back-to-back is given.

When cancer is in the margins, chemoradiation is an option. These two types of treatment can be given at the same time. They may also be given back-to-back if a microscope is needed to see the cancer in the margins.

Radiation therapy

Instead of surgery, radiation therapy may be an option for stage I and some stage II cancers. The cancer must be only in lung tissue. Stage II cancers that grew or spread beyond lung tissue may be treated with chemoradiation instead.

Radiation therapy treats cancer within a confined area like the lung. Conventional methods, such as 3D-CRT, may be used. A newer type of radiation therapy—SABR—is also an option. For stage IA, ablation may be an option for some people.

For stage IB and II, your doctor may want you to get chemotherapy after radiation. Chemotherapy can treat cancer cells that radiation did not. Large tumors and very abnormal-looking cancer cells may have spread to places outside the radiation field.

Chemoradiation

Instead of surgery, chemoradiation may be an option for stage II and III cancers. Stage III cancers with N3 disease can't be treated with surgery. Not enough of the cancer will be removed. Many stage III cancers with N2 disease have also spread too much. Chemoradiation is an option for stage II or other stage III cancers that grew or spread outside the lung.

Chemoradiation treats cancer in the lung and throughout the body. The two types of treatment should be received during the same time frame. When used together, chemoradiation may greatly reduce the extent of the cancer. On the downside, side effects may be severe.

Durvalumab is a standard treatment given after chemoradiation. It's an option when there's no cancer growth during 2 or more cycles of chemoradiation. Durvalumab may control the cancer for a longer period of time.



Multiple primary tumors

Two or more unrelated masses of cancer cells are called multiple primary tumors. Treatment is partly based on the N stage.

N stage is N0 or N1

- The cancer has not spread to lymph nodes or has spread to nodes close to the lung.
- No treatment is needed for tumors that appeared at the same time and won't cause symptoms soon.
- Other tumors should be treated with surgery if possible. Radiation and ablation are other options for local treatment.
- If local treatments aren't options, chemotherapy is standard treatment.

N stage is N2 or N3

- The cancer has spread to nodes in the middle or other side of the chest, near the collarbone, or in the neck.
- These cancers are treated like metastatic lung cancer.

Survivorship plan

Guide 7 lists the health care for a survivorship plan. These plans start when treatment is done and there are no signs of cancer. The plan should address your whole health and well-being. Talk with your doctor and make a plan together.

Cancer tests

Tests will be given to find any new lung tumors early. These tests include a medical history, physical exam, and chest CT scan with or without contrast. Time frames for testing are listed in Guide 7. Your doctor will decide when testing is needed within a time frame. Screening tests for other cancers are also very important.

General health tests

Besides cancer tests, tests of your general health are advised. After going through treatment for cancer, it may be hard to think about taking care of “less important” issues. However, your general health can have a big impact on your well-being. Get your blood pressure, cholesterol, and glucose checked on a regular basis. Some people also need bone density testing.

Disease prevention

Take steps to prevent diseases. Such steps can include getting immunization shots for the flu, herpes, and other diseases. Dental cleaning and exams on a regular basis can prevent disease, too.

Guide 7. Survivorship plan

Type of care	When is this care needed?
Medical history and physical exam	<p>Radiation was not part of treatment</p> <ul style="list-style-type: none"> • Every 6 months for 2–3 years <ul style="list-style-type: none"> ◦ If normal results, then repeat every year <p>Radiation was part of treatment</p> <ul style="list-style-type: none"> • Every 3–6 months for 3 years <ul style="list-style-type: none"> ◦ If normal results, then repeat every 6 months for 2 years <ul style="list-style-type: none"> - If normal results, then repeat every year
Chest CT ± contrast	<p>Radiation was not part of treatment</p> <ul style="list-style-type: none"> • Every 6 months for 2–3 years <ul style="list-style-type: none"> ◦ If normal results, then repeat every year <p>Radiation was part of treatment</p> <ul style="list-style-type: none"> • Every 3–6 months for 3 years <ul style="list-style-type: none"> ◦ If normal results, then repeat every 6 months for 2 years <ul style="list-style-type: none"> - If normal results, then LDCT every year
General health tests (eg, bone density)	<ul style="list-style-type: none"> • As needed
Prevent other diseases (eg, flu shot)	<ul style="list-style-type: none"> • As needed
Healthy lifestyle (eg, healthy diet, no smoking)	<ul style="list-style-type: none"> • As needed

Healthy lifestyle

Start or keep a healthy lifestyle. Limit your use of alcohol. Protect yourself from the sun. Maintain a healthy weight. There is proof that healthy living can improve your treatment results.

Healthy eating is important. Eat a balanced diet. Eat the right amount of food. Drink enough fluids. A registered dietician—an expert in creating a healthy diet—can help. He or she can help you get the food you need during and after treatment.

Many patients benefit from some exercise. Exercise tones muscles, lowers stress, and improves health. Exercise programs differ between people based on their needs. Talk with your treatment team about which exercises would be best for you.

Being hooked on nicotine is one of the hardest addictions to stop. The stress of lung cancer may make it harder or easier to quit. Quitting is important since smoking can limit how well cancer treatment works. Talk with your treatment team about ways to quit.



The people that are truly there for you are your angels!

– Jon

Lung cancer survivor

Review

- ▶ Treatment for lung cancer is partly based on if there is one or more primary tumors. For one primary tumor, the main treatment may be surgery, radiation therapy, or chemoradiation.
- ▶ During surgery, the lung tumor and lymph nodes will be removed. You may receive more treatment after surgery to stop the cancer from coming back.
- ▶ Instead of surgery, radiation therapy may be an option for early cancers. Chemotherapy may follow.
- ▶ Instead of surgery, chemoradiation may be an option for stage II cancer that has grown or spread outside the lung and stage III cancer.
- ▶ Make a survivorship plan with your treatment team. Health care should include cancer testing and tests for other diseases. It's important to prevent disease with good health care and healthy living.

5

Making treatment decisions

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Having cancer is very stressful. While absorbing the fact that you have cancer, you have to learn about tests and treatments. In addition, the time you have to accept a treatment plan feels short. Parts 1 through 4 described the cancer and treatment options. This chapter aims to help you make decisions that are in line with your beliefs, wishes, and values.

It's your choice

The role each person wants in choosing his or her treatment differs. You may feel uneasy about making treatment decisions. This may be due to a high level of stress. It may be hard to hear or know what others are saying. Stress, pain, and drugs can limit your ability to make good decisions. You may feel uneasy because you don't know much about cancer. You've never heard the words used to describe cancer, tests, or treatments. Likewise, you may think that your judgment isn't any better than your doctors'.

Letting others decide which option is best may make you feel more at ease. But, whom do you want to make the decisions? You may rely on your doctors alone to make the right decisions. However, your doctors may not tell you which option to choose if you have multiple good options. You can also have loved ones help. They can gather information, speak on your behalf, and share in decision-making with your doctors. Even if others decide which treatment you will receive, you still have to agree by signing a consent form.

On the other hand, you may want to take the lead or share in decision-making. Most patients do. In shared decision-making, you and your doctors

share information, weigh the options, and agree on a treatment plan. Your doctors know the science behind your plan but you know your concerns and goals. By working together, you are likely to get a higher quality of care and be more satisfied. You'll likely get the treatment you want, at the place you want, and by the doctors you want.

Questions to ask your doctors

You may meet with experts from different fields of medicine. Strive to have helpful talks with each person. Prepare questions before your visit and ask questions if the person isn't clear. You can also take notes and get copies of your medical records.

It may be helpful to have your spouse, partner, family member, or a friend with you at these visits. A patient advocate or navigator might also be able to come. They can help to ask questions and remember what was said. Suggested questions to ask are listed on the following pages.



Get the best advice, then follow your gut!

– Anonymous

Lung cancer survivor

What's my diagnosis and prognosis?

It's important to know that there are different types of cancer. Cancer can greatly differ even when people have a tumor in the same organ. Based on your test results, your doctor can tell you which type of cancer you have. He or she can also give a prognosis. A prognosis is the likely course and outcome of a disease based on tests. Be aware, it is based on what your doctor has seen in patients like you. Knowing the prognosis may affect what you decide about treatment.

1. Where did the cancer start? In what type of cell? Is this cancer common?
2. What is the cancer stage? Does this stage mean the cancer has spread far?
3. What tests do you recommend for me?
4. Where will the tests take place? How long will the tests take and will any test hurt?
5. What if I am pregnant?
6. How do I prepare for testing?
7. Should I bring a list of my medications?
8. Should I bring someone with me?
9. How often are these tests wrong?
10. Would you give me a copy of the pathology report and other test results?
11. Who will talk with me about the next steps? When?

What are my options?

There is no single treatment practice that is best for all people. There is often more than one treatment option along with clinical trial options. Your doctor will review your test results and recommend treatment options.

1. What will happen if I do nothing?
2. Can I just carefully monitor the cancer?
3. Do you consult NCCN recommendations when considering options?
4. Are you suggesting options other than what NCCN recommends? If yes, why?
5. Do your suggested options include clinical trials? Please explain why.
6. How do my age, health, and other factors affect my options? What if I am pregnant?
7. Which option is proven to work best?
8. Which options lack scientific proof?
9. What are the benefits of each option? Does any option offer a cure or long-term cancer control? Are my chances any better for one option than another? Less time-consuming? Less expensive?
10. What are the risks of each option? What are possible complications? What are the rare and common side effects? Short-lived and long-lasting side effects? Serious or mild side effects? Other risks?
11. How do you know if treatment is working?
12. What are my options if treatment doesn't working?
13. What can be done to prevent or relieve the side effects of treatment?

What does each option require of me?

Many patients consider how each option will practically affect their lives. This information may be important because you have family, jobs, and other duties to take care of. You also may be concerned about getting the help you need. If you have more than one option, choosing the option that is the least taxing may be important to you.

1. Will I have to go to the hospital or elsewhere? How often? How long is each visit?
2. What do I need to think about if I will travel for treatment?
3. Do I have a choice of when to begin treatment? Can I choose the days and times of treatment?
4. How do I prepare for treatment? Do I have to stop taking any of my medicines? Are there foods I will have to avoid?
5. Should I bring someone with me when I get treated?
6. Will the treatment hurt?
7. How much will the treatment cost me? What does my insurance cover?
8. Will I miss work or school? Will I be able to drive?
9. Is home care after treatment needed? If yes, what type?
10. How soon will I be able to manage my own health?
11. When will I be able to return to my normal activities?

Deciding between options

Deciding which option is best can be hard. Doctors from different fields of medicine may have different opinions on which option is best for you. This can be very confusing. Your spouse or partner may disagree with which option you want. This can be stressful. In some cases, one option hasn't been shown to work better than another. Some ways to decide on treatment are discussed next.

2nd opinion

The time around deciding a treatment is very stressful. People with cancer often want to get treated as soon as possible. They want to make their cancer go away before it spreads farther. While cancer can't be ignored, usually there is time to think about and choose which option is best for you.

You may wish to have another doctor review your test results and suggest a treatment plan. This is called getting a 2nd opinion. You may completely trust your doctor, but a 2nd opinion about which option is best can help.

Copies of the pathology report, imaging, and other test results need to be sent to the doctor giving the 2nd opinion. Some people feel uneasy asking for copies from their doctors. However, a 2nd opinion is a normal part of cancer care.

When doctors have cancer, most will talk with more than one doctor before choosing their treatment. What's more, some health plans require a 2nd opinion. If your health plan doesn't cover the cost of a 2nd opinion, you have the choice of paying for it yourself.

If the two opinions are the same, you may feel more at peace about the treatment you accept to have. If the two opinions differ, think about getting a 3rd opinion. A 3rd opinion may help you decide between your options. Choosing your cancer treatment is a

very important decision. It can affect your length and quality of life.

Support groups

Besides talking to health experts, it may help to talk to other people who have walked in your shoes. At support groups, you can ask questions and hear about the experiences of other people with lung cancer. Find a support group at the websites listed in the next section.

Compare benefits and downsides

Every option has benefits and downsides. Consider these when deciding which option is best for you. Talking to others can help identify benefits and downsides you haven't thought of. Scoring each factor from 0 to 10 can also help since some factors may be more important to you than others.

Websites

American Cancer Society

cancer.org/cancer/lung-cancer.html

American Lung Association

lung.org

Bonnie J. Addario Lung Cancer Foundation

lungcancerfoundation.org

Caring Ambassadors Program, Inc.

lungcancerap.org

Dusty Joy Foundation (LiveLung)

LiveLung.org

Free ME from Lung Cancer

freeMEfromLungCancer.org

Lung Cancer Action Network (LungCan)

LungCAN.org

Lung Cancer Alliance

lungcanceralliance.org

Lung Cancer Circle of Hope

lungcancercircleofhope.org

Lung Cancer Initiative of North Carolina

lungcancerinitiativenc.org

Lung Cancer Research Foundation

lcrf.org

LUNGevity Foundation

LUNGevity.org

National Cancer Institute (NCI)

cancer.gov/types/lung

National Coalition for Cancer Survivorship

canceradvocacy.org/toolbox

NCCN for Patients®

nccn.org/patients

Help Services

American Lung Association

Join the [Better Breathers Club](#) to learn ways to cope with lung disease.

Bonnie J. Addario Lung Cancer Foundation

Join the monthly [Lung Cancer Living Room](#) to get key information and support.

Caring Ambassadors

[Order](#) free educational materials on lung cancer.

Dusty Joy foundation (LiveLung)

Join online or in-person [support groups](#).

Free ME from Lung Cancer

Learn basics [About Lung Cancer](#).

Lung Cancer Action Network (LungCAN)

Learn about many patient services at [Access Patient Services](#).

Lung Cancer Alliance

Call 1.800.298.2436 or email support@lungcanceralliance.org for help with treatment.

Lung Cancer Initiative of North Carolina

Meet fellow survivors through a local [Survivor's Meet & Mingle](#).

Lung Cancer Research Foundation

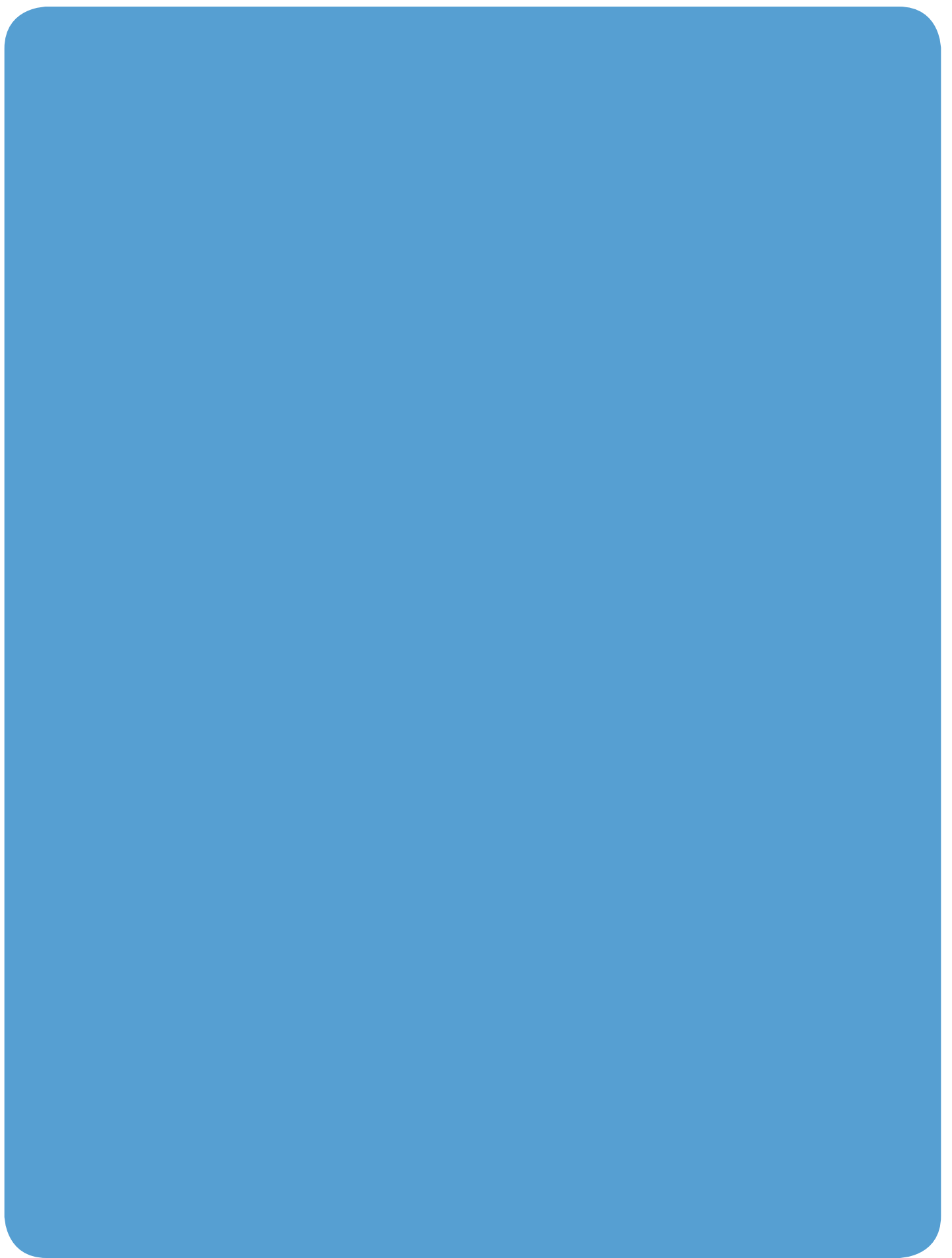
Get matched to clinical trials in 60 seconds with [Antidote](#).

LUNGevity Foundation

Receive one-on-one support through the [LifeLine Support Partners](#) program.

Review

- Shared decision-making is a process in which you and your doctors plan treatment together.
- Asking your doctors questions is vital to getting the information you need to make informed decisions.
- Getting a 2nd opinion, attending support groups, and comparing benefits and downsides may help you decide which treatment is best for you.



Words to know

3D-CRT

three-dimensional conformal radiation therapy

ablation

A treatment that destroys very small tumors with heat or cold.

adenocarcinoma

A cancer of cells that line organs and make fluids or hormones.

adjuvant treatment

Treatment that is given to lower the chances of the cancer returning.

AJCC

American Joint Committee on Cancer

alveoli

The tiny sacs in the lungs where gases are transferred in and out of the blood.

AML

acute myeloid leukemia

biopsy

A procedure that removes fluid or tissue samples to be tested for a disease.

board certified

A status for doctors who finished training in a specialized field of medicine.

body plethysmograph

A test of how much air is in your lungs after inhaling or exhaling.

bronchioli

Small airways within the lungs.

bronchoscope

A device that is guided down the throat to work inside the airways.

bronchoscopy

A procedure to work inside the airways with a device that is guided down the throat.

bronchus

One of the two main airways that extends into the lungs.

cancer screening

Routine testing to find cancer before signs of cancer appear.

cancer stage

A rating of the outlook of a cancer based on its growth and spread.

carcinoma

A cancer of cells that line the inner or outer surfaces of the body.

CBC

complete blood count

chemistry profile

A lab test of the amount of 8 chemicals in a sample of blood. Also called metabolic panel.

chemoradiation

A cancer treatment with both cell-killing drugs and high-energy rays.

chemotherapy

Cancer drugs that stop the cell life cycle so cells don't increase in number.

chest wall

The layer of muscle, bone, and fat that protects the vital organs.

chronic obstructive pulmonary disease (COPD)

Lung damage or too much mucus that makes breathing hard.

clinical stage

The rating of the extent of cancer before treatment is started.

clinical trial

A type of research that assesses how well health tests or treatments work in people.

complete blood count (CBC)

A lab test that measures the parts of the blood.

computed tomography (CT)

A test that uses x-rays from many angles to make a picture of the insides of the body.

contrast

A dye put into your body to make clearer pictures during imaging.

COPD

chronic obstructive pulmonary disease

CT

computed tomography

DNA

deoxyribonucleic acid

diagnosis

An identification of an illness based on tests.

EBRT

external beam radiation therapy

EBUS

endobronchial ultrasound

EBUS-TBNA

endobronchial ultrasound-guided transbronchial needle aspiration

ECOG

Eastern Cooperative Oncology Group

endobronchial ultrasound–guided transbronchial needle aspiration (EBUS-TBNA)

A procedure that removes lung tissue with a needle on an imaging device guided down the windpipe.

endoscopic ultrasound–guided fine needle aspiration (EUS-FNA)

A procedure that removes fluid with a needle on an imaging device guided through a natural opening.

esophagus

The tube-shaped organ between the mouth and stomach.

EUS

endoscopic ultrasound

EUS-FNA

endoscopic ultrasound-guided fine-needle aspiration

excision

An operation that removes a tumor but not too much healthy tissue.

external beam radiation therapy (EBRT)

Radiation therapy received from a machine outside the body.

FDG

fluorodeoxyglucose

gas diffusion

A test that uses harmless gas to measure how much you breathe out.

gene

Coded instructions in cells for making new cells and controlling how cells behave.

GGN

ground-glass nodule

GGO

ground-glass opacity

IGRT

image-guided radiation therapy

IMRT

intensity-modulated radiation therapy

image-guided radiation therapy (IGRT)

A treatment with radiation that is aimed at tumors using imaging tests during treatment.

immunotherapy

A treatment with drugs that help the body find and destroy cancer cells.

intensity-modulated radiation therapy (IMRT)

Treatment with radiation that uses small beams of different strengths.

invasion

The growth of cancer cells from where it started into another tissue.

large-cell lung carcinoma

A cancer of lung cells that lack features to classify as another type of lung cancer.

LDCT

low-dose computed tomography

lobe

A clearly seen division in an organ.

lobectomy

An operation that removes a whole lobe of an organ.

low-dose computed tomography (LDCT)

A test that uses small amounts of radiation to make pictures of the insides of the body.

lymph

A clear fluid containing white blood cells.

lymph node

A small, bean-shaped, disease-fighting structure.

magnetic resonance imaging (MRI)

A test that uses radio waves and powerful magnets to make pictures of the insides of the body.

mediastinoscope

A device that is guided through a small cut to do work inside the chest.

mediastinoscopy

A procedure to do work in the chest with a device passed through a small cut in the skin.

mediastinum

The area of the chest between the lungs.

medical history

A report of all your health events and medications.

metastasis

The spread of cancer from the first tumor to a new site.

MRI

magnetic resonance imaging

multiple primary tumor

One or more unrelated masses of cancer cells.

mutation

Abnormal changes in coded instructions within cells (genes).

navigational bronchoscopy

A procedure to do work in the smallest airways with a device guided down the windpipe.

NCCN

National Comprehensive Cancer Network

nodule

A small mass of tissue.

non-small cell lung cancer (NSCLC)

A cancer that starts in lung cells that are not small.

non-solid nodule

A small tissue mass of low density.

NSCLC

non-small cell lung cancer

parietal pleura

The outer layer of the tissue lining around the lungs.

part-solid nodule

A small tissue mass with areas of low and high density.

pathologic stage

A rating of the extent of cancer based on tests given after treatment.

pathologist

A doctor who's an expert in testing cells to find disease.

PET

positron emission tomography

physical exam

A review of the body by a health expert for signs of disease.

pleura

The tissue lining around the lungs.

pleural cavity

The space between the two layers of the lung's lining.

pleural fluid

The space between the two layers of tissue lining around the lungs.

pneumonectomy

An operation that removes the entire lung.

positron emission tomography (PET)

A test that uses radioactive material to see the shape and function of body parts.

positron emission tomography/computed tomography (PET/CT)

A test that uses two picture-making methods to show the shape and function of tissue.

primary tumor

The first mass of a certain type of cancer cells.

prognosis

The likely course and outcome of a disease based on tests.

proton therapy

Radiation therapy that uses protons to treat a disease. Also called hadron therapy.

pulmonary function tests

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

pulmonologist

A doctor who's an expert in lung diseases.

radial endobronchial ultrasound (EBUS) bronchoscopy

A procedure to do work inside the lung with an imaging device guided down the windpipe.

radiation oncologist

A doctor who's an expert in treating cancer with radiation.

radiation therapy

A treatment that uses intense energy to kill cancer cells.

respiratory system

The group of organs that transfers gases in and out of the body.

risk factor

Anything that increases the chance of an event.

SABR

stereotactic ablative radiotherapy

SBRT

stereotactic body radiation therapy

secondary tumor

A mass of cancer cells that formed from the first mass of cancer cells.

segmentectomy

An operation that removes a large part of a lobe.

side effect

An unhealthy or unpleasant physical or emotional response to treatment.

sleeve lobectomy

An operation to remove an entire lobe and part of the bronchus.

small cell lung cancer

A cancer of small, round lung cells.

solid nodule

A small mass of tissue of high density.

spirometry

A test that uses a tube to measure how fast you breathe.

squamous cell carcinoma

A type of cancer of thin and flat cells that line the surface of organs.

stereotactic ablative radiotherapy (SABR)

Treatment with high-dose radiation within one or a few sessions. Also called SBRT.

superior sulcus tumor

A mass of cancer cells that starts at the top of the lung and easily grows into the chest wall.

supportive care

Health care that includes symptom relief but not cancer treatment. Also sometimes called palliative care.

surgical margin

The normal-looking tissue around a tumor that was removed during an operation.

surgery

An operation to remove or repair a part of the body.

thoracic radiologist

A doctor who's an expert in reading imaging tests of the chest.

thoracic surgeon

A doctor who's an expert in operating on organs inside the chest.

thoracoscopy

A procedure to do work in the chest with a device passed through a small cut in the skin. Also called VATS.

three-dimensional conformal radiation therapy (3D-CRT)

A treatment with radiation that uses beams matched to the shape of the tumor.

trachea

The airway between the throat and airway into the lungs. Also called the windpipe.

transthoracic needle biopsy (TTNB)

A procedure that removes tissue samples with a thin needle guided through the ribs.

TTNB

transthoracic needle biopsy

ultrasound

A test that uses sound waves to take pictures of the inside of the body.

VATS

video-assisted thoracic surgery

video-assisted thoracic surgery (VATS)

A procedure to do work in the chest with a device passed through a small cut in the skin. Also called thoracoscopy.

visceral pleura

The inner layer of tissue lining around the lungs.

wedge resection

An operation that removes a small part of a lobe.

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For disclosures, visit www.nccn.org/about/disclosure.aspx.

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800.789.7366
penmedicine.org/cancer

Fred & Pamela Buffett Cancer Center
Omaha, Nebraska
800.999.5465
nebraskamed.com/cancer

Case Comprehensive Cancer Center/
University Hospitals Seidman Cancer
Center and Cleveland Clinic Taussig
Cancer Institute
Cleveland, Ohio
800.641.2422 • UH Seidman Cancer Center
uhhospitals.org/seidman
866.223.8100 • CC Taussig Cancer Institute
my.clevelandclinic.org/services/cancer
216.844.8797 • Case CCC
case.edu/cancer

City of Hope National Medical Center
Los Angeles, California
800.826.4673
cityofhope.org

Dana-Farber/Brigham and
Women's Cancer Center
Massachusetts General Hospital
Cancer Center
Boston, Massachusetts
877.332.4294
dfbwc.org
massgeneral.org/cancer

Duke Cancer Institute
Durham, North Carolina
888.275.3853
dukecancerinstitute.org

Fox Chase Cancer Center
Philadelphia, Pennsylvania
888.369.2427
foxchase.org

Huntsman Cancer Institute
at the University of Utah
Salt Lake City, Utah
877.585.0303
huntsmancancer.org

Fred Hutchinson Cancer
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Cancer Care Alliance
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206.288.7222 • seattlecca.org
206.667.5000 • fredhutch.org

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410.955.8964
hopkinskimmelfcancercenter.org

Robert H. Lurie Comprehensive
Cancer Center of Northwestern
University
Chicago, Illinois
866.587.4322
cancer.northwestern.edu

Mayo Clinic Cancer Center
Phoenix/Scottsdale, Arizona
Jacksonville, Florida
Rochester, Minnesota
800.446.2279 • Arizona
904.953.0853 • Florida
507.538.3270 • Minnesota
www.mayoclinic.org/cancercenter

Memorial Sloan Kettering
Cancer Center
New York, New York
800.525.2225
mskcc.org

Moffitt Cancer Center
Tampa, Florida
800.456.3434
moffitt.org

The Ohio State University
Comprehensive Cancer Center -
James Cancer Hospital and
Solove Research Institute
Columbus, Ohio
800.293.5066
cancer.osu.edu

Roswell Park Comprehensive
Cancer Center
Buffalo, New York
877.275.7724
roswellpark.org

Siteman Cancer Center at Barnes-
Jewish Hospital and Washington
University School of Medicine
St. Louis, Missouri
800.600.3606
siteman.wustl.edu

St. Jude Children's Research Hospital
The University of Tennessee
Health Science Center
Memphis, Tennessee
888.226.4343 • stjude.org
901.683.0055 • westclinic.com

Stanford Cancer Institute
Stanford, California
877.668.7535
cancer.stanford.edu

University of Alabama at Birmingham
Comprehensive Cancer Center
Birmingham, Alabama
800.822.0933
www3.ccc.uab.edu

UC San Diego Moores Cancer Center
La Jolla, California
858.657.7000
cancer.ucsd.edu

UCSF Helen Diller Family
Comprehensive Cancer Center
San Francisco, California
800.689.8273
cancer.ucsf.edu

University of Colorado Cancer Center
Aurora, Colorado
720.848.0300
coloradocancercenter.org

University of Michigan
Rogel Cancer Center
Ann Arbor, Michigan
800.865.1125
mcancer.org

The University of Texas
MD Anderson Cancer Center
Houston, Texas
800.392.1611
mdanderson.org

University of Wisconsin
Carbone Cancer Center
Madison, Wisconsin
608.265.1700
uwhealth.org/cancer

Vanderbilt-Ingram Cancer Center
Nashville, Tennessee
800.811.8480
vcc.org

Yale Cancer Center/
Smilow Cancer Hospital
New Haven, Connecticut
855.4.SMILOW
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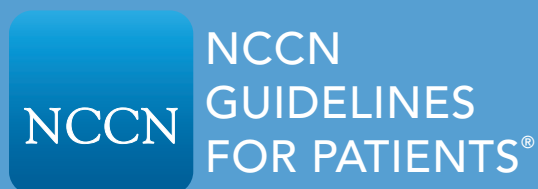
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Lung Cancer

Early and Locally Advanced

2019

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