



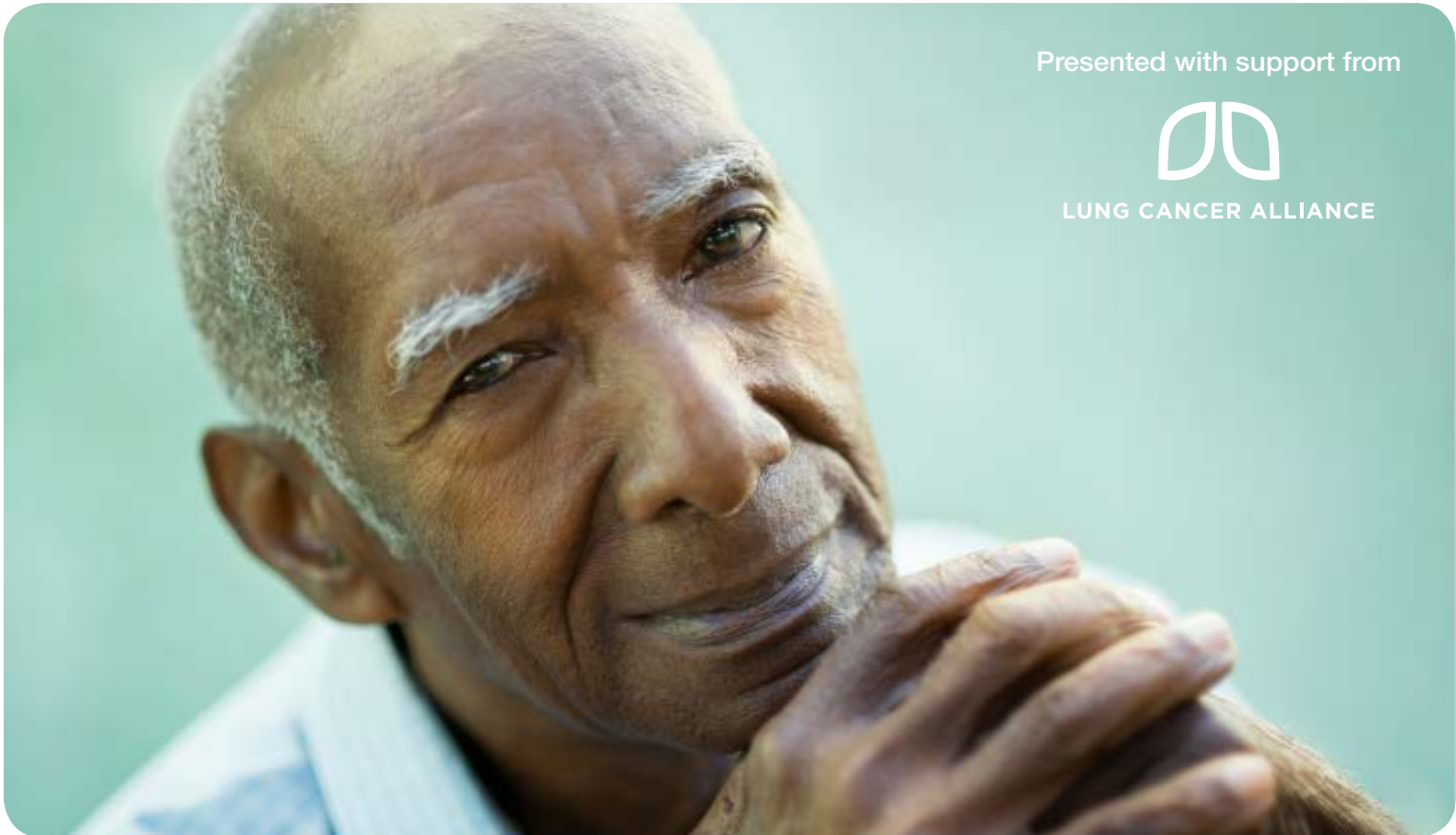
National  
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NCCN Guidelines for Patients®

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# Lung Cancer Screening



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# Lung Cancer Screening

Should you be screened for lung cancer? Cancer screening is testing for cancer before signs of cancer appear. This book describes who should be screened and the test used for screening. It also has a special guide to the screening process recommended by experts in lung cancer.

The National Comprehensive Cancer Network® (NCCN®) is a not-for-profit alliance of 25 of the world's leading cancer centers. Experts from NCCN® have written treatment guidelines for doctors who screen for lung cancer. These treatment guidelines suggest what the best practice is for cancer care. The information in this patient book is based on the guidelines written for doctors.

This book focuses on lung cancer screening. NCCN also offers patient books on non-small cell lung cancer, malignant pleural mesothelioma, and many other cancer types. Visit [NCCN.org/patients](http://NCCN.org/patients) for the full library of patient books as well as other patient and caregiver resources.

# Credits

NCCN® aims to improve the care given to patients with cancer. NCCN staff work with experts to create helpful programs and resources for many stakeholders. Stakeholders include health providers, patients, businesses, and others. One resource is the series of books for patients called the NCCN Patient Guidelines®. Each book presents the best practice for a type of cancer.

The patient books are based on clinical practice guidelines written for cancer doctors. These guidelines are called the NCCN Guidelines®. Clinical practice guidelines list the best health care options for groups of patients. Many doctors use them to help plan cancer treatment for their patients.

Panels of experts create the NCCN Guidelines. Most of the experts are from the 25 NCCN Member Institutions. Panelists may include surgeons, radiation oncologists, medical oncologists, and patient advocates. Recommendations in the NCCN Guidelines are based on clinical trials and the experience of the panelists.

The NCCN Guidelines are updated at least once a year. When funded, the patient books are updated to reflect the most recent version of the NCCN Guidelines for doctors. For more information about the NCCN Guidelines, visit [NCCN.org/clinical.asp](http://NCCN.org/clinical.asp).

NCCN staff involved in making the guidelines for patients and doctors include:

### **NCCN Patient Guidelines**

Dorothy A. Shead, MS  
*Director, Patient and Clinical  
Information Operations*

Laura J. Hanisch, PsyD  
*Medical Writer/  
Patient Information Specialist*

Lacey Marlow  
*Associate Medical Writer*

### **NCCN Guidelines**

Kristina M. Gregory, RN, MSN, OCN  
*Vice President/  
Clinical Information Operations*

Miranda Hughes, PhD  
*Oncology Scientist/  
Senior Medical Writer*

### **NCCN Marketing**

Susan Kidney  
*Graphic Design Specialist*

### **NCCN Drugs & Biologics Programs**

Rachael Clarke  
*Medical Copyeditor*

Lung Cancer Alliance is proud to collaborate with the National Comprehensive Cancer Network to sponsor and endorse the NCCN Guidelines for Patients® Lung Cancer Screening.



Lung Cancer Alliance (LCA) is the leading national non-profit committed to saving lives and accelerating research by empowering people living with or at risk for lung cancer. LCA provides live, professional support, referral and information services to patients, their loved ones and those at risk for lung cancer; conducts national awareness campaigns; advocates for federal research funding; and devises public health strategies to improve access to care and outcomes for all those impacted by the disease.



### **Supported by the NCCN Foundation®**

The NCCN Foundation supports the mission of the National Comprehensive Cancer Network® (NCCN®) to improve the care of patients with cancer. One of its aims is to raise funds to create a library of books for patients. Learn more about the NCCN Foundation at [NCCN.org/foundation](http://NCCN.org/foundation).

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National Comprehensive Cancer Network (NCCN)  
275 Commerce Drive • Suite 300  
Fort Washington, PA 19034  
215.690.0300

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## Who should read this book?

This book is about screening for lung cancer. People who are deciding if they should start a screening program may find this book helpful. It may help you discuss and decide with doctors what care is best.

## Does the whole book apply to me?

This book includes information for many situations. Your treatment team can help. They can point out what information applies to you. They can also give you more information. As you read through this book, you may find it helpful to make a list of questions to ask your doctors.

The recommendations in this book are based on science and the experience of NCCN experts. However, these recommendations may not be right for you. Your doctors may suggest another screening program based on your health and other factors. If other suggestions are given, feel free to ask your treatment team questions.

## Making sense of medical terms

In this book, many medical words are included. These are words that you will likely hear from your treatment team. Most of these words may be new to you, and it may be a lot to learn.

Don't be discouraged as you read. Keep reading and review the information. Don't be shy to ask your treatment team to explain a word or phrase that you do not understand.

Words that you may not know are defined in the text or in the *Dictionary*. Words in the *Dictionary* are underlined when first used on a page.

Acronyms are also defined when first used and in the *Glossary*. Acronyms are short words formed from the first letters of several words. One example is LDCT for **low-dose** computed tomography.

# Why get screened?







**Figure 1.1**  
The lungs

The lungs move important gases in and out of the blood.

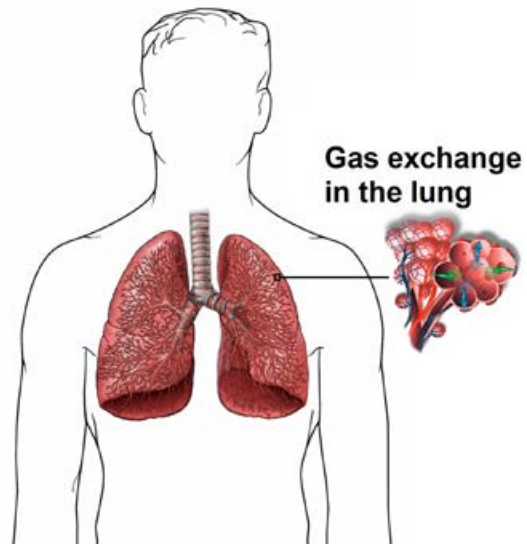
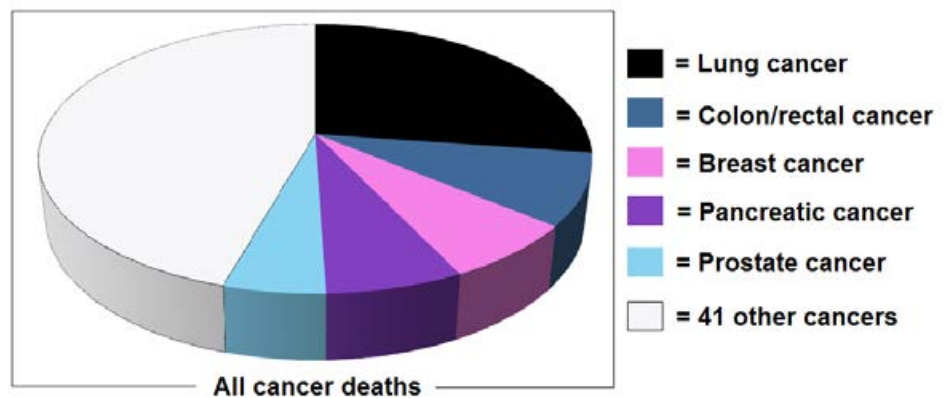


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**Figure 1.2**  
Cancer deaths in the U.S.

About 27 out of 100 deaths caused by cancer are due to lung cancer.



Source: Cancer Facts & Figures 2014.



## Am I at risk?





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

If you smoke tobacco, ask your doctor about counseling and drugs to help you quit.

### Radon

Uranium is a metallic chemical found in rocks and soil. As it decays, radon is made and gets into air and water. Miners of uranium have a high risk for developing lung cancer. Some studies of radon 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. For people who've had contact with radon, such as

uranium miners, the risk for lung cancer is higher for those who smoke than for those who don't smoke.

### Other cancer-causing agents

Besides radon, 10 other agents are known to cause lung cancer. Five are metallic chemicals: arsenic, beryllium, cadmium, chromium, and nickel. The others are asbestos, coal smoke, soot, silica, and diesel fumes. Among people who've had contact with these agents, the risk for lung cancer is higher for those who've smoked than for those who've never smoked.

### History of other cancers

Your risk for lung cancer may be increased if you've had other cancers. Having had small cell lung cancer increases your risk of developing cancer in other types of lung cells. Likewise, if you've had another smoking-related cancer, like head and neck cancer, your risk for lung cancer is increased. The risk for lung cancer increases after receiving radiation therapy in the chest for other cancers, especially if you smoke. Treatment of Hodgkin's lymphoma with alkylating agents—a type of cancer drug—increases the risk for lung cancer too.

### Family who've had lung cancer

If a close blood relative 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 or if multiple relatives have had lung cancer. Lung cancer in families may be due to a shared environment, genes, or both.

### History of lung disease

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 pulmonary fibrosis. Pulmonary fibrosis is major scarring of lung tissue that makes it hard to breathe.

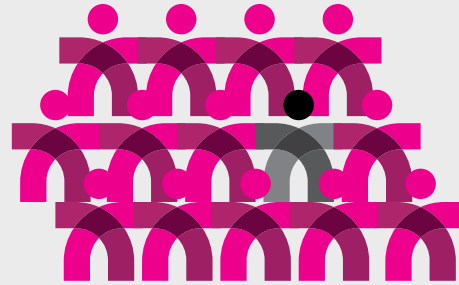
**Chart 2.1 Risk Factors**

Tobacco smoking
Contact with radon
Contact with asbestos or other cancer-causing agents
Having had certain other cancers
Having had family with lung cancer
Having had other lung diseases
Contact with second-hand smoke

**Second-hand smoke**

In 1981, a link between second-hand smoke and lung cancer was first suggested. Since then, many studies have found that second-hand smoke can cause lung cancer in people who don't smoke. The more contact you have with second-hand smoke, the higher your risk for lung cancer.

1 out of 14 people develop lung cancer.



**Review**

- Anything that increases your chances of lung cancer is called a risk factor.
- Tobacco smoking is the biggest risk factor for lung cancer.

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# Should I start now?



# 3 Should I start now?

- 14 Start before cancer symptoms appear
- 15 Decide with your doctor if you are at high risk
- 16 Get the best screening test
- 18 Review



## Start before cancer symptoms appear

The goal of lung cancer screening is to find lung cancer when treatments will work best. Treatments usually work best before there are symptoms of cancer. However, at this time, most lung cancer is found after symptoms appear.

Common symptoms of lung cancer are listed in **Chart 3.1**. See your doctor if you have these symptoms. Most often, they are caused by health problems other than lung cancer. If they are caused by lung cancer, talk with your doctor about treatment options. If you have no symptoms of lung cancer, a screening program may be right for you.

**Chart 3.1 Symptoms of lung cancer**

Coughing that lasts	Tiredness that lasts
Blood in lung mucus	Pneumonia
Shortness of breath	Hoarse voice
Wheezing	Pain when swallowing
Pain in chest area	High-pitch sound when talking

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## Decide with your doctor if you are at high risk

**Chart 3.2** lists the criteria for high-, moderate-, and low-risk groups. The risk groups are divided mostly by age and the amount of smoking. The amount of smoking is based on pack years. A pack year is defined as 20 cigarettes smoked every day for 1 year. It can be calculated by the number of cigarette packs smoked every day multiplied by the number of years of smoking.

The amount of smoking is based on pack years

Number of packs per day



× Years of smoking



= Pack years



For example:

1.5 packs a day

x 30 years

= 45 pack years

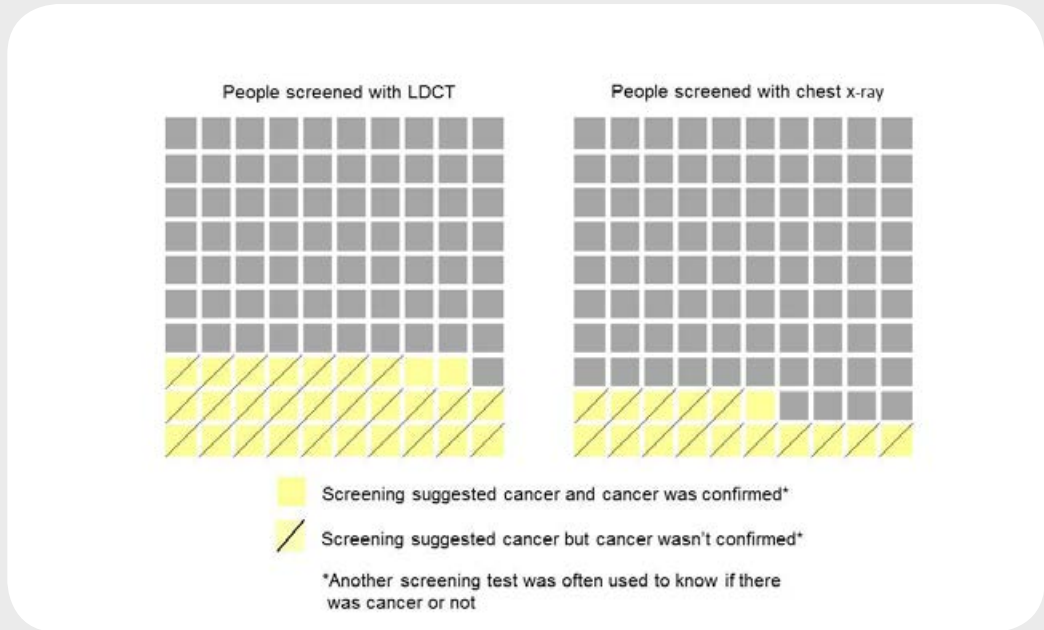
**Chart 3.2 Risk groups**

Risk criteria	Should I start lung cancer screening?
High risk <ul style="list-style-type: none"> <li>• ≥55 years old,</li> <li>• ≥30 pack years of smoking, and</li> <li>• Quit smoking &lt;15 years ago</li> </ul>	Screening is an option. Engage in shared decision-making with your doctor. In shared decision-making, you and your doctor share information, weigh the options, and agree on the best plan.
High risk <ul style="list-style-type: none"> <li>• ≥50 years old,</li> <li>• ≥20 pack years of smoking, and</li> <li>• One other risk factor (except for second-hand smoke)</li> </ul>	Screening is an option. Engage in shared decision-making with your doctor. In shared decision-making, you and your doctor share information, weigh the options, and agree on the best plan.
Moderate risk <ul style="list-style-type: none"> <li>• ≥50 years old, and</li> <li>• ≥20 pack years of smoking or second-hand smoke, and</li> <li>• No other risk factors</li> </ul>	No, not at this time.
Low risk <ul style="list-style-type: none"> <li>• &lt;50 years old, and/or</li> <li>• &lt;20 pack years of smoking</li> </ul>	No, not at this time.



**Figure 3.1**  
LDCT vs x-ray

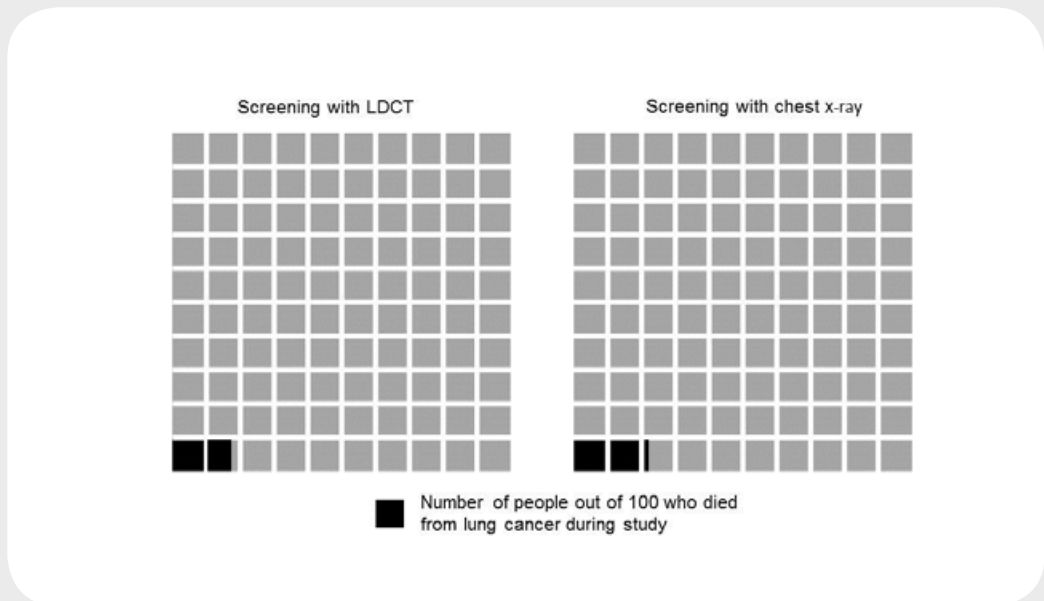
LDCT detected lung cancer better than an x-ray among people at high risk for lung cancer. However, a single LDCT test suggested that there may be cancer in more people who did not have lung cancer than an x-ray. In other words, LDCT finds cancer more often but also has more false alarms.



Source: National Lung Screening Trial

**Figure 3.2**  
LDCT saves lives

Chest x-rays did not reduce the chance of dying from lung cancer compared to no screening. In contrast, LDCT did reduce the number of deaths from lung cancer compared to x-rays.



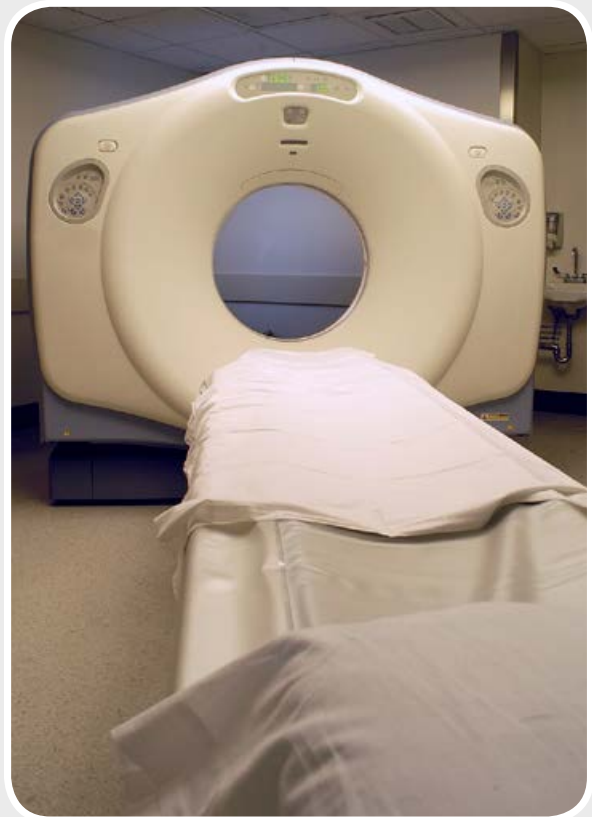
Source: National Lung Screening Trial

Getting an LDCT is easy. Before the test, you may be asked to stop eating or drinking for several hours. You also should remove any metal objects that are on your body. The machine is large and has a tunnel in the middle. **See Figure 3.3.** During the test, you will need to lie on a table that moves through the tunnel. Pillows or straps may be used to keep you still during the test. You will be alone, but a technician will operate the machine in a nearby room. He or she will be able to see, hear, and speak with you at all times.

As the machine takes pictures, you may hear buzzing, clicking, or whirring sounds. Earplugs are sometimes worn to block these sounds. A computer combines all pictures into one detailed picture. The test can be done in a few minutes, but the whole process takes about 30 minutes. You may not learn of the results for a few days since a radiologist needs to see and interpret the pictures. A radiologist is a doctor who's an expert in reading LDCT scans.

**Figure 3.3 CT scan machine**

**A CT machine is large and has a tunnel in the middle. During the test, you will lie on a table that moves slowly through the tunnel.**



## Review

- Lung cancer screening should be started before cancer symptoms appear.
- Only people at high risk for lung cancer should consider starting a screening program.
- Lung cancer screening should be done with spiral LDCT.



## What happens after the first test?





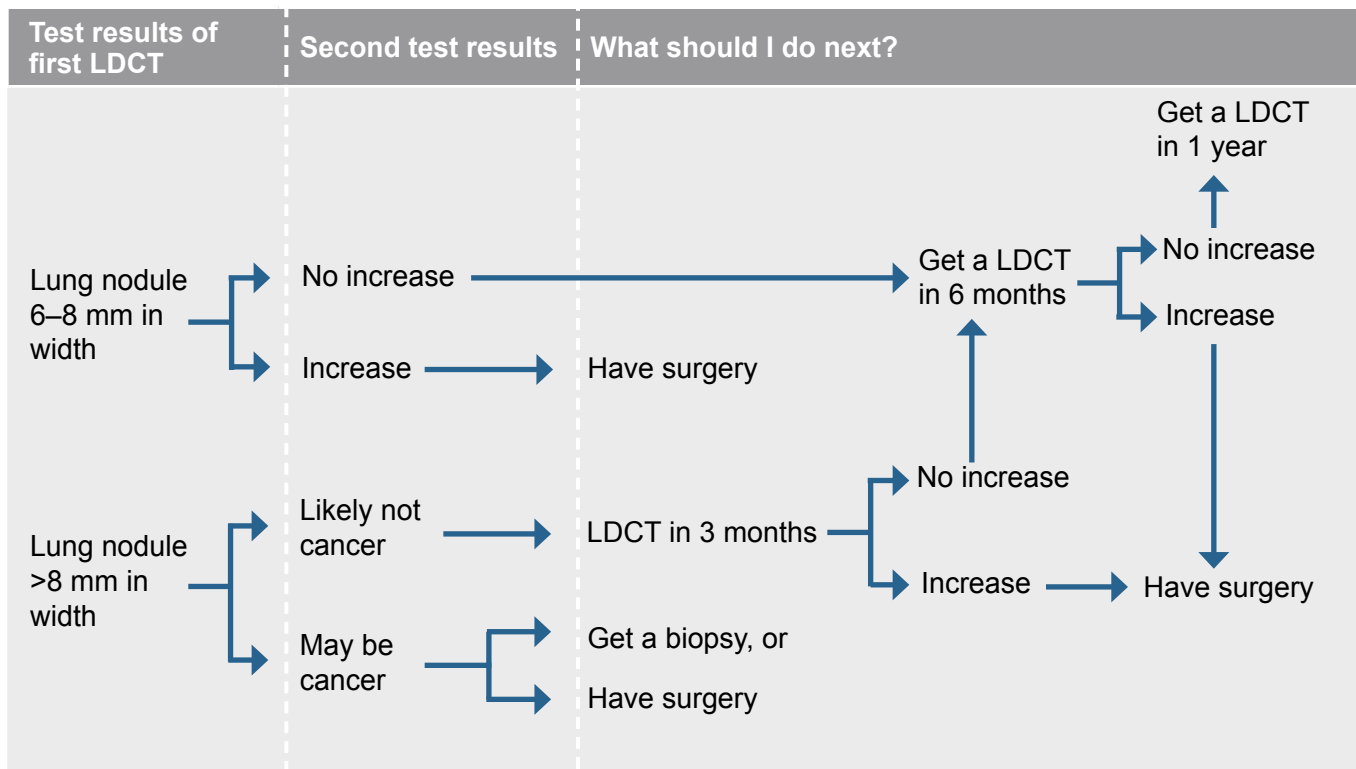


### 4.3 Next steps if solid or part-solid nodule

**Chart 4.3.1 Timing of 2<sup>nd</sup> screening test**

Test results of first LDCT	When should I get a 2 <sup>nd</sup> test?
Lung nodule <6 mm in width	Get a LDCT in 1 year
Lung nodule 6–8 mm in width	Get a LDCT in 3 months
Lung nodule >8 mm in width	Consider getting PET/CT (positron emission tomography/computed tomography) now

**Chart 4.3.2 Care after second test**





**Chart 4.3.1** lists when you should get your next screening test based on the results of the first LDCT test. If the lung nodule is smaller than 6 mm, your next LDCT should be in 1 year. Screening with LDCT should occur every year for at least 2 years. After 2 years, your doctors may want you to continue yearly screening. However, screening isn't recommended for people with poor health, who if diagnosed with cancer would not be able to receive curative treatment.

If the lung nodule is between 6 and 8 mm in width, your next LDCT should occur in 3 months. The nodule may be larger or more dense if it's cancer. For nodules larger than 8 mm, your doctors may want you to have a PET/CT right away or at most within 3 months. PET/CT may find if there's cancer quicker than LDCTs repeated over a period of time. It may also show signs of cancer spreading in the body.

Like LDCT, PET takes pictures of the inside of the body. However, PET shows how your cells are using a simple form of sugar. To create the pictures, a sugar radiotracer first needs to be put into your body. The radiotracer emits a small amount of energy that is detected by the machine that takes pictures. Cancer appears brighter in the pictures because cancer cells use sugar more quickly than normal cells. The PET scan may be done with the same or a different machine that does the CT scan.

**Chart 4.3.2** shows the recommended care based on comparing the second screening test to the first test. A second LDCT was suggested for solid or part-solid nodules 6 to 8 mm in width. Your doctors will assess a solid nodule for an increase in size and part-solid nodules for an increase in either size or density. If the nodule has increased, surgery to remove the nodule for testing is suggested. Read Part 5 for more information on surgery.

If the nodule looks the same, another LDCT in 6 months is suggested. If in 6 months the nodule has increased, surgery is recommended. If the nodule didn't increase, your next LDCT should be in 1 year. Screening with LDCT should occur every year for at least 2 years. After 2 years, your doctors may want you to continue yearly screening. However, screening isn't recommended for people with poor health, who if diagnosed with cancer would not be able to receive curative treatment.

PET/CT is suggested for nodules larger than 8 mm at baseline. If the PET/CT scan results suggest that the nodule is likely not cancer, a follow-up LDCT in 3 months, then in 6 months, and so forth is suggested as long as results are normal. If the follow-up LDCTs show growth in the nodule, surgery to remove the nodule for testing is suggested. Likewise, if the PET/CT after the first LDCT suggests that there's cancer, either a biopsy or surgery is suggested. Read Part 5 for more information.

## 4.4 Next steps if non-solid nodule

**Chart 4.4.1 Timing of 2<sup>nd</sup> screening test**

Test results of first LDCT	When should I get a 2 <sup>nd</sup> test?
Lung nodule $\leq 5$ mm in width	Get a LDCT in 1 year
Lung nodule 5.1–10 mm in width	Get a LDCT in 6 months
Lung nodule $>10$ mm in width	Get a LDCT in 3–6 months

**Chart 4.4.2 Care after second test**

Test results of first LDCT	Second test results	What should I do next?
Lung nodule $\leq 5$ mm in width	No increase	Get a LDCT in 1 year
	Increase	Get a LDCT in 3–6 months, or Consider having surgery
Lung nodule 5.1–10 mm in width	No increase	Get a LDCT in 1 year
	Increase	Have surgery
Lung nodule $>10$ mm in width	No increase	LDCT in 6–12 months, Get a biopsy, or Consider having surgery
	Increase	Have surgery

**Chart 4.4.1** lists when you should get your next screening test based on the results of the first LDCT test. Non-solid nodules may be cancer, but they may also be small areas of infection or inflammation that will resolve. Nodules that are large are more likely to be cancer than smaller nodules. The more likely there's cancer, the sooner the second test will be suggested. Lung nodules that are 5 mm or smaller in width should be assessed again in 1 year with LDCT. Another LDCT in 6 months is recommended for nodules wider than 5 mm but no wider than 10 mm. Nodules that are wider than 10 mm should be tested again in 3 to 6 months.

**Chart 4.4.2** lists the recommended care based on comparing the results of the second LDCT to the first LDCT. If the non-solid nodule has disappeared or gotten smaller, there is a good chance that it was just a small infection that resolved and was not cancer. If a nodule has grown or become more solid, it may be cancer and surgery probably should be considered. A nodule about the same size and density at follow-up suggests that it may be cancer, but it also may be something benign. Since some of these lung cancers grow very slowly, more follow-up testing may be recommended.

For a 10 mm or smaller nodule that didn't increase, a LDCT in 1 year is suggested. Screening should occur every year for at least 2 years. After 2 years, your doctors may want you to continue yearly screening. Screening isn't recommended for people with poor health, who if diagnosed with cancer would not be able to receive curative treatment.

There are three options if there were no increases in a nodule that was 10 mm or larger at baseline. Three options are given because a nodule of this size is more likely to be cancer than smaller nodules. First, another LDCT could be done. If cancer is present, the nodule will likely be larger or denser in 6 to 12 months. Instead of waiting, other options are a biopsy or surgery—both of which can confirm if cancer is present. Read Part 5 for more information.

Nodules that are larger or denser at follow-up may be cancer. Two options are given for a nodule that was smaller than 5 mm at baseline but increased in size or density. First, another LDCT could be done. If cancer is present, the nodule will most likely be even larger or denser in 3 to 6 months. The second option is surgery to remove the nodule and test for cancer. For nodules that were 5 mm or larger at baseline and have increased in size or density, surgery to remove the nodule for testing is suggested. Read Part 5 for more information.

## 4.5 Next steps if multiple nodules

**Chart 4.5.1 Timing of 2<sup>nd</sup> screening test**

Test results of first LDCT	When should I get a 2 <sup>nd</sup> test?
Non-solid nodules $\leq 5$ mm in width	Get a LDCT in 1 year
At least one non-solid nodule $> 5$ mm in width	Get a LDCT in 6 months
One or more dominant nodules with solid or part-solid portion	Get a LDCT in 3–6 months

**Chart 4.5.2 Care after second test**

Test results of first LDCT	Second test results	What should I do next?
All non-solid nodules $\leq 5$ mm	No increase	Get a LDCT in 1 year
	Increase	Get a LDCT in 3–6 months, or Consider having surgery
At least one non-solid nodule $> 5$ mm in width	No increase	Get a LDCT in 1 year
	Increase	Consider having surgery
Dominant nodule(s) with solid or part-solid portion	Decrease	Get a LDCT in 1 year
	Same or increase	See recommended care for solid or part-solid nodules

**Chart 4.5.1** lists when to get a second screening test if you have more than one nodule that may be cancer. If all of the nodules are non-solid and are 5 mm or smaller, it is recommended that you get an LDCT in 1 year. Nodules with cancer will likely be larger or denser by then. If any non-solid nodule is larger than 5 mm at baseline, an LDCT in 6 months should be done to assess for increases in size or density.

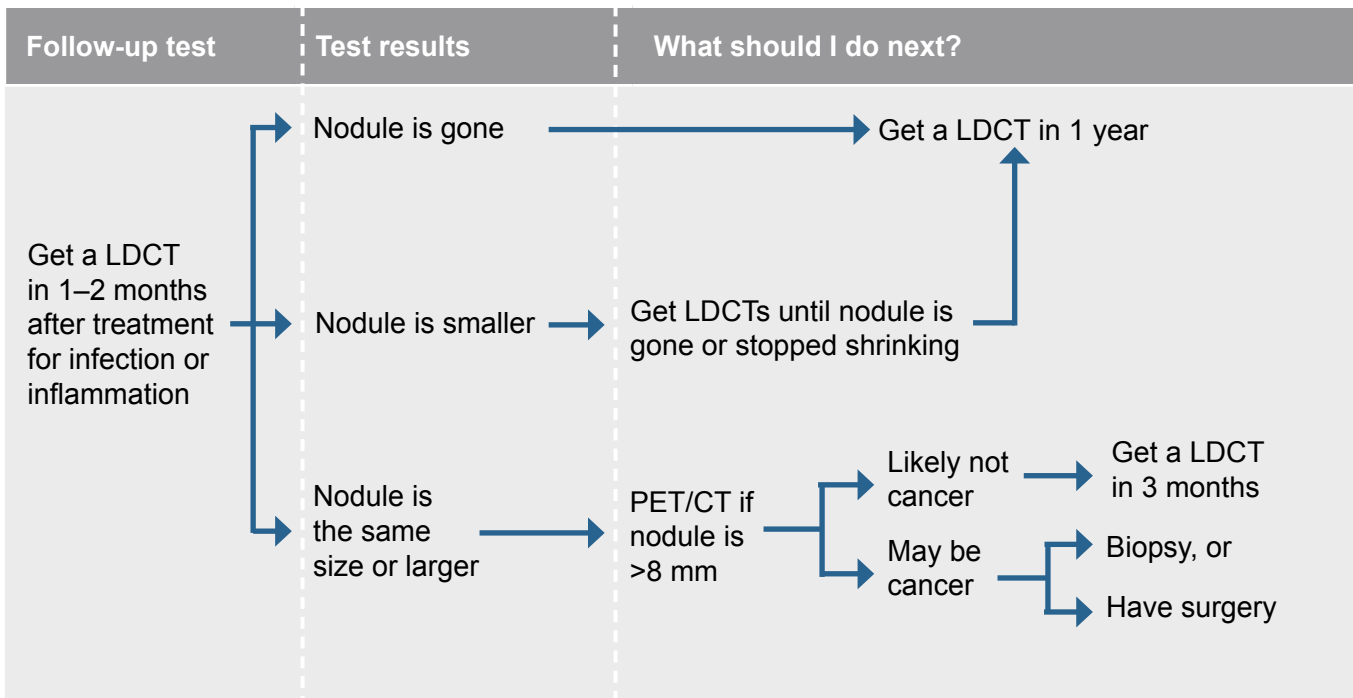
You may have part-solid nodules that have features that strongly suggest there's cancer. Such "dominant" features include spiky or pointy edges, a "bubbly" look, or a net-like pattern. These nodules should be assessed again in 3 to 6 months with LDCT.

**Chart 4.5.2** lists the recommended care based on comparing the results of the second LDCT to the first LDCT. If none of the multiple nodules increased in size or density, yearly screening is suggested. Screening should occur every year for at least 2 years. After 2 years, your doctors may want you to continue yearly screening. Screening isn't recommended for people with poor health, who if diagnosed with cancer would not be able to receive curative treatment.

For 5 mm or smaller nodules that did increase, two options are given. Another LDCT in 3 to 6 months can show if the nodules continued to increase or not. The second option is surgery to test for cancer. Likewise, surgery is recommended for non-solid nodules, if one was larger than 5 mm at baseline and increased in size or density by the second LDCT. Dominant nodules with solid or part-solid portions that stayed the same or increased should be treated according to the care recommended on page 22.

## 4.6 Next steps if new nodules appear

**Chart 4.6.1 Infection, inflammation, or cancer?**



During the screening process, a new nodule may appear. The nodule may be caused by an infection, inflammation, or cancer. If your doctors think the nodule is caused by cancer, the recommended care for the types of nodules described earlier should be followed.

**Chart 4.6.1** describes the suggested course of care if your doctors think there's an infection or inflammation. The nodule should be re-assessed with LDCT in 1 to 2 months. During this time, your doctors may treat the infection or inflammation. If the nodule is smaller or gone, it is not likely to be cancer. Screening with yearly or follow-up LDCT is suggested.

There may be cancer if the nodule is the same size or larger. A PET/CT is suggested rather than LDCT if the nodule is larger than 8 mm. PET/CT may find if there's cancer quicker than LDCTs repeated over a period of time. It may also show signs of cancer spreading in the body.

If the PET/CT suggests that cancer isn't likely, a LDCT in 3 months is recommended. A LDCT is done because some cancers may not be seen on a PET scan. If the PET/CT suggests that cancer is likely, a biopsy or surgery is recommended. Read Part 5 for more information.







# 5

## How can I know for sure it's lung cancer?



# 5 How can I know for sure it's lung cancer?

32	Biopsy
33	Surgery
35	Care after a biopsy or surgery
36	Review



To test for cancer, tissue from the nodule must be removed from your body. The tissue will then be sent to a lab and examined with a microscope to look for cancer cells. A biopsy removes small samples of tissue. Surgery removes the entire nodule for testing.

## Biopsy

Since a biopsy only removes a very small piece of the nodule, the results could be wrong. There may be cancer cells in another part of the nodule. Thus, your doctors may suggest surgery instead of a biopsy if your risk for cancer is high. Likewise, your doctors may suggest another biopsy or surgery if the first biopsy shows no cancer.

There are two types of biopsies used for lung nodules. Before either biopsy, you may be asked to stop eating, stop taking some medicines, or stop smoking. A sedative, local anesthesia, or both may be used. A biopsy is generally a safe test and takes about 30 to 60 minutes to complete.

### Percutaneous needle biopsy

This biopsy uses a very thin needle. Before or during the biopsy, CT may be used to find the right spot. Your skin will be cleaned and your doctors will make a small cut after numbing the area with local anesthesia. The needle will be inserted through the cut and into the nodule. During the biopsy, you may be asked to keep still and hold your breath at times. After the biopsy, you will be given a chest x-ray to check the results.

### Bronchoscopy

A bronchoscopy allows your doctor to biopsy a nodule using a bronchoscope. A standard bronchoscope is has a thin, long tube about as thick as a pencil. The tube has a very small light, camera, and open channel for taking biopsies. The light and camera allow your doctor to guide the bronchoscope down your mouth into your lungs. A small tool is inserted down the channel to remove tissue from the nodule.

The airways of the lungs get smaller as they extend toward the side of the body. Standard bronchoscopes are often too large to travel through these small

airways. A navigational bronchoscopy can be done instead to guide a probe and biopsy instrument to the site of the nodule.

For a navigational bronchoscopy, your doctor will plan how to reach the nodule using a picture made by CT. During the biopsy, you will lie on an electromagnetic plate. The bronchoscope will be fitted with another very small tube through which a sensor probe will be inserted. The electromagnetic plate allows your doctor to see and guide the sensor probe. When the nodule is in reach, the sensor probe will be removed and a small tool will be inserted to collect tissue.

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## Surgery

Surgery removes the nodule as well as a rim of normal-looking tissue around the nodule. The normal tissue is called the surgical margin. The whole nodule and the surgical margin will be examined for cancer cells.

### Surgery types

There is more than one type of surgery for lung nodules. **See Figure 5.1.** Often, a small part of a lobe will be removed to test for cancer. This surgery is called a wedge resection. If cancer is found, then a larger part of the lung may be removed. A segmentectomy removes a large part of a lobe, whereas a lobectomy removes the whole lobe.

A normal lung on the right side of the body has three lobes. The left-sided lung has two lobes. Removing one lobe typically reduces lung capacity by 20% to 25%. For example, if before surgery your lungs were able to take in 6 liters of air, then after removing one lobe your lungs would take in 4.5 to 4.8 liters. Thus, your surgeon will likely test your lung capacity to make sure that it is safe to remove part of your lung.

**Figure 5.1**  
Lung tumor surgeries

In the left column, a small piece of the lobe was removed by a surgery called a wedge resection. In the middle column, the results of a segmentectomy are shown. A lobe of the lung was removed in the right column by a surgery called a lobectomy.

Wedge resection   Segmentectomy   Lobectomy

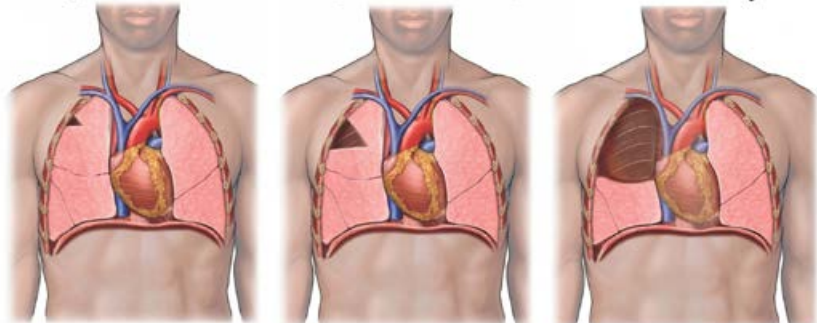


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## 5.1 Care after a biopsy or surgery

**Chart 5.1 Care after biopsy or surgery**

Screening test results	Test results of removed tissue	What should I do next?
The first nodule(s) found or new nodules first thought to be cancer	No cancer	Get a LDCT in 1 year
	Cancer	Start cancer treatment
New nodules first thought to be an infection or inflammation but then biopsied	No cancer	Get a LDCT in 3 months
	cancer	Start cancer treatment
New nodules first thought to be an infection or inflammation but then surgically removed	No cancer	Get a LDCT in 1 year
	Cancer	Start cancer treatment

**Chart 5.1** shows the recommended care after testing lung tissue for cancer. If cancer cells are found in the biopsy or surgical tissue, read the *NCCN Patient Guidelines: Non-Small Cell Lung Cancer*<sup>®</sup>. Treatment options are recommended for every stage of lung cancer.

When no cancer is found in the biopsy or surgical tissue, yearly screening is suggested. Yearly screening should occur every year for at least 2 years. After 2 years, your doctors may want you to continue screening. Screening isn't recommended for people with poor health, who if diagnosed with cancer would not be able to receive curative treatment.

The exception to yearly screening is for new nodules that are found during the screening process and first thought to be caused by an infection or inflammation. However, they are then biopsied based on PET/CT results but the PET/CT results suggest there's no cancer. In these cases, a LDCT in 3 months is suggested because the biopsy might have missed finding cancer.



# Making screening decisions



# 6 Making screening decisions

38	Where to go for screening
38	Find the best screening plan
40	Questions to ask your doctors
44	Websites   Review



## Where to go for screening

Your primary care doctor can help you decide whether to start cancer screening. This decision should take into account your chance for developing lung cancer and your health history. Since your doctor knows this information, he or she can make a good suggestion and help guide you to the right screening site. What to look for in a screening site is listed in [Chart 6.1](#).

Some sites require a doctor's prescription before the visit. Other sites will talk to you without a prescription to decide if you should be screened. They will ask questions about your health history and risk for lung cancer.

## Find the best screening plan

The best screening plan will have large benefits while the dangers are few and minor. Benefits should include better survival and quality of life, less testing and treatment, support to quit smoking, and lower costs. Before starting a screening plan, talk with your doctor about all the benefits and possible dangers of the plan. Some benefits and dangers of screening plans are listed in [Chart 6.2](#).



**Chart 6.1 Must-haves for screening sites**

Follows an organized plan—a proven protocol—that is updated to include new technology and knowledge like that from NCCN

Has a high-quality screening program with enough staff and resources

Is accredited to do CT scans by a certifying organization, such as the American College of Radiology

Has scans read by an American Board of Radiology board-certified radiologist who's an expert in lung cancer screening

Has modern multislice CT equipment that does high-quality, low-dose, and non-contrast spiral CT

Is partnered with a health center that has: 1) experience and excellence in biopsy methods; 2) board-certified pulmonologists; and 3) board-certified thoracic surgeons who are experts in lung cancer

**Chart 6.2 Screening programs**

Benefits	Dangers
Screening can reduce the number of deaths from lung cancer and other causes.	Screening doesn't always find cancer early enough to be cured.
Lung cancer found by screening is often an earlier stage of disease than cancer found because of symptoms.	Some people get treated even though the cancer grows so slowly that it won't cause death.
Patients whose cancer was found with screening more often can have minimally invasive surgery and have less lung tissue removed.	Some people get unneeded tests, treatment, or both because screening results were unclear or wrong.

## Questions about screening

1. Should I be screened for lung cancer?
2. What screening plan do you recommend for me?
3. What are the benefits and possible dangers of this screening plan?
4. Do you use low-dose computed tomography for screening?
5. Where will the screening take place? Will I have to go to the hospital?
6. Do you have a team of experts who are dedicated to lung cancer screening? Do they include pulmonologists, thoracic surgeons, and specialists in chest radiology?
7. Are the surgeons board certified in thoracic surgery? Do they have a major part of their practice dedicated to lung cancer surgery? Do they do VATS surgery?
8. Do I have to do anything to prepare for screening?
9. Should I bring someone with me?
10. How long will screening take?
11. What are the risks?
12. How soon will I know the results and who will explain them to me?
13. Who will talk with me about the next steps? When?

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## Questions about surgery

1. What type of surgery will I have?
2. What are the benefits and possible dangers of the surgery?
3. What should I do to prepare for surgery? Should I stop taking my medications? Should I store my blood in case I need a transfusion?
4. Are you board certified in thoracic surgery?
5. Is lung surgery a major part of your practice?
6. How many lung surgeries do you do per year?
7. What other types of surgery do you do? General surgery? Heart surgery?
8. How much will the surgery cost? How can I find out how much my insurance company will cover?
9. How long does the surgery last?
10. Do you test any lymph nodes before surgery? During surgery?
11. What will my lung capacity be after surgery? Will it change my life?
12. When will I be able to return to my normal activities?
13. How soon will I know the results and who will explain them to me?
14. If I have cancer, how likely is it that I'll be cancer-free after surgery? Will I need any other treatment?

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# Glossary

## Dictionary Acronyms

# Dictionary

**alkylating agent**

A type of cancer-killing drug.

**arsenic**

A very toxic metallic chemical.

**asbestos**

A mineral fiber used in housing and commercial materials.

**baseline test**

A starting point to which future tests are compared.

**benign**

Tissue without cancer cells.

**beryllium**

A hard, gray metallic chemical.

**biopsy**

Removal of small amounts of tissue or fluid to be tested for disease.

**bladder**

An organ that holds and expels urine from the body.

**board certified**

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

**bronchoscope**

A thin, long tube fitted with tools that is guided down the mouth.

**bronchoscopy**

Use of a thin tool guided down the mouth into the lungs.

**cadmium**

A heavy metallic chemical.

**calcium**

A mineral found in body tissues.

**cancer screening**

The use of tests to find cancer before signs of cancer appear.

**chromium**

A hard, semi-gray metallic chemical.

**chronic obstructive pulmonary disease (COPD)**

Trouble with breathing due to lung damage or too much mucus.

**computed tomography (CT)**

A test that combines many x-rays to make pictures of the inside of the body.

**curative treatment**

A medicine that cures disease or symptoms.

**diesel fumes**

Gases from fuel that is thick, heavy, and made from crude oil.

**early stage**

Cancer that has had little or no growth into nearby tissues.

**electromagnetic**

A force that attracts or repels and is produced by an electric current.

**esophagus**

The tube-shaped digestive organ between the mouth and stomach.

**follow-up testing**

A close watch by your doctors of possible cancer using tests.

**general anesthesia**

A controlled loss of wakefulness from drugs.

**genes**

Instructions in cells for making and controlling cells.

**ground-glass opacity**

A small mass of lung cells with low density.

**Hodgkin's lymphoma**

A cancer of white blood cells.

**inflammation**

Redness, heat, pain, and swelling from injury or infection.

**lobe**

A clearly seen division in the lungs.

**lobectomy**

The removal of an entire lobe of the lung.

**local anesthesia**

A loss of feeling in a small area of the body from drugs.

**low-dose computed tomography (LDCT)**

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

**lung**

An organ in the body made of airways and air sacs.

**lung capacity**

The amount of air the lungs can hold.

**lymph node**

A small group of disease-fighting cells.

**microscope**

A tool that uses lenses to see things the eyes can't.

**mucus**

A sticky, thick liquid that moisturizes or lubricates.

**navigational bronchoscopy**

Use of a thin tool guided down the mouth into the smallest airways of the lung.

**nickel**

A silvery-white metal.

**nodule**

A small mass of tissue.

**non-solid nodule**

A small mass of tissue of low density.

**pack years**

The number of cigarette packs smoked every day multiplied by the number of years of smoking.

**part-solid nodule**

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

**percutaneous needle biopsy**

Insertion of a needle through the skin into a mass to remove tissue for testing.

**pneumonia**

An infection causing the lungs to fill up with pus.

**positron emission tomography (PET)**

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

**pulmonary fibrosis**

Major scarring of lung tissue.

**pulmonologist**

A doctor who's an expert in lung diseases.

**radiation therapy**

Treatment with radiation.

**radiologist**

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

**radiotracer**

Radioactive material used to make images of the body.

**radon**

A gas without odor, taste, or color that is made from uranium as it decays.

**retractors**

A tool that holds back the edges of a surgical cut.

**risk factor**

Something that increases the chance of getting a disease.

**scar tissue**

Supportive fibers formed to heal a wound.

**second-hand smoke**

Inhaled smoke from a lit smoking product or that was exhaled from a smoker.

**sedative**

A drug that helps a person relax or go to sleep.

**segmentectomy**

Surgical removal of a large part of a lobe.

**silica**

A natural mineral mostly found in sand.

**small-cell lung cancer**

Lung cancer of small, round cells.

**solid nodule**

A small mass of tissue of high density.

**surgery**

An operation to remove or repair tissue.

**surgical margin**

The normal tissue around the tumor removed during surgery.

**thoracic surgeon**

A doctor who's an expert in surgery within the chest.

**thoracotomy**

Surgery done through a large cut to remove all or part of the lungs.

**tumor**

A mass of cells.

**uranium**

A silvery-white metallic chemical.

**video-assisted thoracic surgery (VATS)**

Use of thin tools inserted between the ribs to do work in the chest.

**wedge resection**

Surgical removal of a small part of a lobe.

**wheezing**

A coarse, whistling sound while breathing.

# Acronyms

**COPD**

chronic obstructive pulmonary disease

**CT**

computed tomography

**LDCT**

low-dose computed tomography

**mm**

millimeters

**PET**

positron emission tomography

**VATS**

video-assisted thoracic surgery

## NCCN Abbreviations and Acronyms

**NCCN®**

National Comprehensive Cancer Network®

**NCCN Patient Guidelines®**

NCCN Guidelines for Patients®

**NCCN Guidelines®**

NCCN Clinical Practice Guidelines in Oncology®

# NCCN Guidelines for Patients®

Patient-friendly translations of the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®)



- Acute Lymphoblastic Leukemia\*
- Caring for Adolescents and Young Adults (AYA)
- Chronic Myelogenous Leukemia
- Colon Cancer\*
- Esophageal Cancer
- Lung Cancer Screening
- Malignant Pleural Mesothelioma\*
- Melanoma\*
- Multiple Myeloma\*
- Non-Small Cell Lung Cancer\*
- Ovarian Cancer
- Pancreatic Cancer\*
- Prostate Cancer
- Soft Tissue Sarcoma\*
- Stage 0 Breast Cancer\*
- Stages I & II Breast Cancer\*
- Stage III Breast Cancer\*
- Stage IV Breast Cancer\*

\* Printed copies available.

Available online at [NCCN.org/patientguidelines](http://NCCN.org/patientguidelines)

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 Know What Your Doctors Know:  
 Non-Small Cell Lung Cancers

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**Ella Kazerooni, MD/Vice Chair**

*University of Michigan  
Comprehensive Cancer Center*

**Scott L. Baum, MD**

*University of Tennessee  
Health Science Center*

**Mark M. Dransfield, MD**

*University of Alabama at Birmingham  
Comprehensive Cancer Center*

**George A. Eapen, MD**

*The University of Texas  
MD Anderson Cancer Center*

**David S. Ettinger, MD**

*The Sidney Kimmel Comprehensive Cancer  
Center at Johns Hopkins*

**Lifang Hou, MD, PhD**

*Robert H. Lurie Comprehensive Cancer  
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Cancer Center*

**Donald Klippenstein, MD**

*Moffitt Cancer Center*

**Rohit Kumar, MD**

*Fox Chase Cancer Center*

**Rudy P. Lackner, MD**

*Fred & Pamela Buffett Cancer Center at  
The Nebraska Medical Center*

**Lorriana E. Leard, MD**

*UCSF Helen Diller Family Comprehensive  
Cancer Center*

**Ann N. C. Leung, MD**

*Stanford Cancer Institute*

**Samir S. Makani, MD**

*UC San Diego Moores Cancer Center*

**Pierre P. Massion, MD**

*Vanderbilt-Ingram Cancer Center*

**Bryan F. Meyers, MD, MPH**

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

**Gregory A. Otterson, MD**

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

**Kimberly Peairs, MD**

*The Sidney Kimmel Comprehensive Cancer  
Center at Johns Hopkins*

**Sudhakar Pipavath, MD**

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*Moffitt Cancer Center*

**Chakravarthy Reddy, MD**

*Huntsman Cancer Institute  
at the University of Utah*

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*Roswell Park Cancer Institute*

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**Matthew B. Schabath, PhD**

*Moffitt Cancer Center*

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Fred & Pamela Buffett Cancer Center at The Nebraska Medical Center  
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800.999.5465  
[nebraskamed.com/cancer](http://nebraskamed.com/cancer)

City of Hope Comprehensive Cancer Center  
Los Angeles, California  
800.826.4673  
[cityofhope.org](http://cityofhope.org)

Dana-Farber/Brigham and Women's Cancer Center Massachusetts General Hospital Cancer Center  
Boston, Massachusetts  
877.332.4294  
[dfbwcc.org](http://dfbwcc.org)  
[massgeneral.org/cancer](http://massgeneral.org/cancer)

Duke Cancer Institute  
Durham, North Carolina  
888.275.3853  
[dukecancerinstitute.org](http://dukecancerinstitute.org)

Fox Chase Cancer Center  
Philadelphia, Pennsylvania  
888.369.2427  
[foxchase.org](http://foxchase.org)

Huntsman Cancer Institute at the University of Utah  
Salt Lake City, Utah  
877.585.0303  
[huntsmancancer.org](http://huntsmancancer.org)

Fred Hutchinson Cancer Research Center/ Seattle Cancer Care Alliance  
Seattle, Washington  
206.288.7222 • [seattlecca.org](http://seattlecca.org)  
206.667.5000 • [fhcrc.org](http://fhcrc.org)

The Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins  
Baltimore, Maryland  
410.955.8964  
[hopkinskimmellcancercenter.org](http://hopkinskimmellcancercenter.org)

Robert H. Lurie Comprehensive Cancer Center of Northwestern University  
Chicago, Illinois  
866.587.4322  
[cancer.northwestern.edu](http://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  
[mayoclinic.org/departments-centers/mayo-clinic-cancer-center](http://mayoclinic.org/departments-centers/mayo-clinic-cancer-center)

Memorial Sloan Kettering Cancer Center  
New York, New York  
800.525.2225  
[mskcc.org](http://mskcc.org)

Moffitt Cancer Center  
Tampa, Florida  
800.456.3434  
[moffitt.org](http://moffitt.org)

The Ohio State University Comprehensive Cancer Center - James Cancer Hospital and Solove Research Institute  
Columbus, Ohio  
800.293.5066  
[cancer.osu.edu](http://cancer.osu.edu)

Roswell Park Cancer Institute  
Buffalo, New York  
877.275.7724  
[roswellpark.org](http://roswellpark.org)

Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine  
St. Louis, Missouri  
800.600.3606  
[siteman.wustl.edu](http://siteman.wustl.edu)

St. Jude Children's Research Hospital/ The University of Tennessee Health Science Center  
Memphis, Tennessee  
888.226.4343 • [stjude.org](http://stjude.org)  
901.683.0055 • [westclinic.com](http://westclinic.com)

Stanford Cancer Institute  
Stanford, California  
877.668.7535  
[cancer.stanford.edu](http://cancer.stanford.edu)

University of Alabama at Birmingham Comprehensive Cancer Center  
Birmingham, Alabama  
800.822.0933  
[www3.ccc.uab.edu](http://www3.ccc.uab.edu)

UC San Diego Moores Cancer Center  
La Jolla, California  
858.657.7000  
[cancer.ucsd.edu](http://cancer.ucsd.edu)

UCSF Helen Diller Family Comprehensive Cancer Center  
San Francisco, California  
800.689.8273  
[cancer.ucsf.edu](http://cancer.ucsf.edu)

University of Colorado Cancer Center  
Aurora, Colorado  
720.848.0300  
[coloradocancercenter.org](http://coloradocancercenter.org)

University of Michigan Comprehensive Cancer Center  
Ann Arbor, Michigan  
800.865.1125  
[mcancer.org](http://mcancer.org)

The University of Texas MD Anderson Cancer Center  
Houston, Texas  
800.392.1611  
[mdanderson.org](http://mdanderson.org)

Vanderbilt-Ingram Cancer Center  
Nashville, Tennessee  
800.811.8480  
[vicc.org](http://vicc.org)

Yale Cancer Center/ Smilow Cancer Hospital  
New Haven, Connecticut  
855.4.SMILOW  
[yalecancercenter.org](http://yalecancercenter.org)



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NCCN Guidelines for Patients®

# Lung Cancer Screening

Version 1.2015

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