

## Lung Cancer

### Introduction

Lung cancer is the number one cancer killer of men and women. Over 165,000 people die of lung cancer every year in the United States. Most cases of lung cancer are related to cigarette smoking. Therefore, if you smoke, it is best to stop smoking as soon as possible.

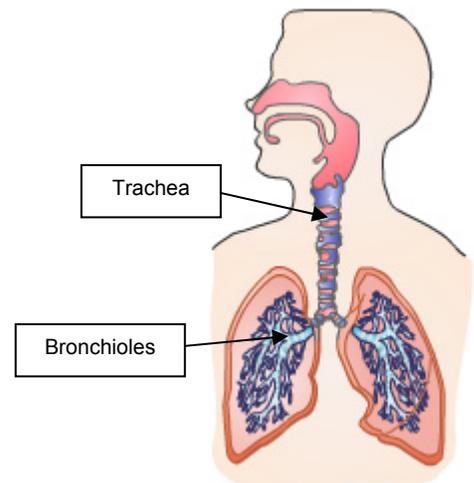


This reference summary will help you better understand lung cancer and the treatment options that are available.

### Anatomy

Your lungs are a pair of large organs in your chest. They are part of your respiratory system. Your right lung has three parts (lobes). Your left lung is smaller and has two lobes. A thin tissue (the pleura) covers the lungs and lines the inside of the chest. Between the two layers of the pleura is a very small amount of fluid (pleural fluid). Normally, this fluid does not build up.

Oxygen is vital for life. Without it, death occurs very rapidly. The lungs allow us to fill our blood with oxygen. When you breathe in, your lungs expand with air. When you breathe out, air goes out of your lungs.



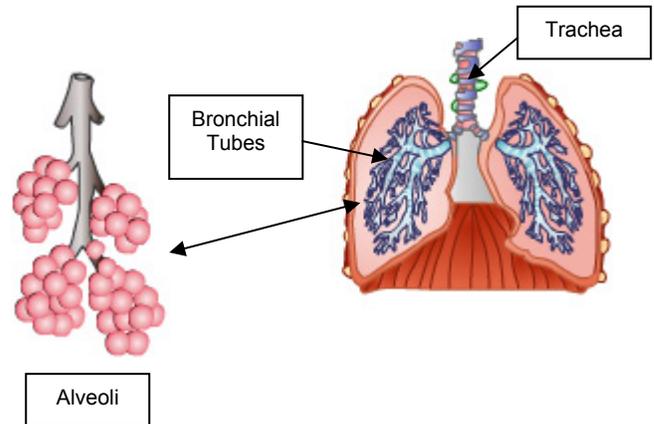
The air we breathe comes in close contact with the blood in the lungs. The blood fills up with oxygen and releases wastes, like carbon dioxide, back out into the air. When we breathe, the air goes through the mouth and nose.

From there, it goes to the air pipe, known as the trachea. From the trachea the air goes into smaller tubes, called bronchial tubes.

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Small balloon-like sacs called alveoli are at the end of the tubes. The walls of the alveoli are very thin. On the other side of the walls small blood vessels exist. The very thin wall of the alveoli allows the oxygen to go to the bloodstream and also allows CO<sub>2</sub> to go from the blood to your lungs to be exhaled.

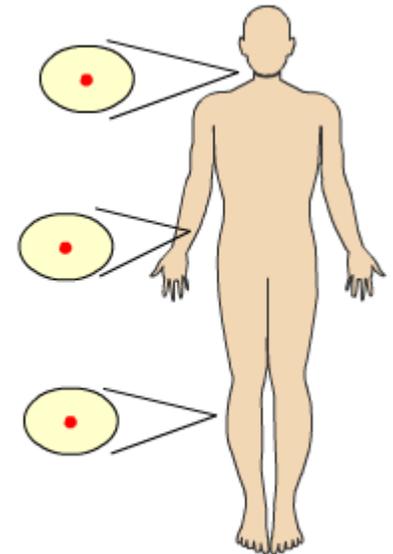


The inner lining of the bigger bronchial tubes secrete a special substance called mucus. The mucus helps trap dirt from the air. Mucus is continually expelled from the lungs. Just like with saliva, mucus is often swallowed, without us needing to think about it.

Very small brushes, known as cilia, continually push the mucus to the outside. The cilia are like the hairs, or bristles of a brush. If the mucus becomes sufficiently big, it is coughed out.

## Cancer and Its Causes

The body is made up of billions of small cells. Together, many cells make up organs, like the lungs, the heart, or the bones. Usually, when the cells get old or damaged, they die and are replaced by new cells. Sometimes, cells continue to grow and divide when they aren't needed, causing an abnormal growth called a tumor.



There are two kinds of tumors. If the tumor does not invade nearby body parts, it is called a benign tumor or a non-cancerous growth. Benign tumors are rarely life threatening. Benign tumors usually do not need to be removed. Benign tumors are not cancer.

If the tumor does invade and destroy nearby cells, it is called a malignant tumor or cancer. Malignant lung tumors may grow back after being removed. Cancer can be life threatening. Cancerous cells spread by breaking from the original tumor. They enter blood vessels or lymph vessels, which branch into all the tissues of the body.

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The cancer cells attach to other organs and form new tumors that may damage those organs. The spread of cancer is called metastasis.

Lymph is a nearly clear fluid produced by the body that drains waste from cells. It travels through special vessels and bean-shaped structures called lymph nodes.

Cancer treatments aim to kill or control cancerous cells.

Cancers in the body are given names, depending on where they first began. Cancer that begins in the lungs will always be called lung cancer, even if it has spread to another place such as the liver, bones, or brain. Although doctors can locate where a cancer started, the cause of cancer in a patient cannot usually be identified.

Cells contain hereditary, or genetic, materials called chromosomes. This genetic material controls the growth of the cell. Cancer tends to run in families, so people with close relatives that have cancer should be examined regularly for any sign of it. Cancer always develops from changes that occur in the chromosomes. When the genetic material in a cell becomes abnormal, it can lose the ability to control its growth. Sudden changes in genetic material can occur for a variety of reasons. This tendency may be inherited.



Experts also agree that smoking tobacco, chewing tobacco and being exposed to tobacco smoke can all lead to lung cancer.

Exposure to chemicals or other factors in the environment, like pollution or asbestos (old wall insulation in homes), might increase cancer risk, too.

## **Symptoms and Their Causes**

There are two main types of lung cancer: non-small cell and small cell. Non-small cell lung cancer is more common, slow growing, and does not spread to other organs rapidly.

Small cell lung cancer is not as common as non-small cell. But it is fast growing, and spreads very rapidly to other organs.

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Cigarette smoking or exposure to second-hand smoke causes the majority of lung cancer cases.

Cigarettes contain over 4000 chemicals; 40 of these chemicals can cause cancer. Smoking filtered or unfiltered cigarettes does not help prevent cancer. Chewing tobacco also causes cancer.

Pipe and cigar smoking increases the risk of lung cancer, although not as severely as cigarette smoking.

Exposure to pollution, radioactive materials, asbestos and other products also increases the chance of developing lung cancer.

Stopping smoking and avoiding exposure to cancer-causing environments, like chemicals, lowers your risk of developing lung cancer, even after years of smoking.

Early lung cancer often does not cause symptoms. But as the cancer grows, common symptoms may include:

- A cough that gets worse or does not go away
- Coughing up blood
- Hoarseness
- Shortness of breath, chest pain, or wheezing
- Weight loss with no known cause or loss of appetite

Other symptoms of lung cancer include:

- Swelling in the face or neck
- Repeated lung infections or bronchitis
- Fever
- General weakness - specifically in shoulder, arm, or hand.

## **Diagnosis**

Chest x-rays are very useful in determining whether there are any abnormalities in the lungs. Abnormal spots found during x-rays are called lesions.

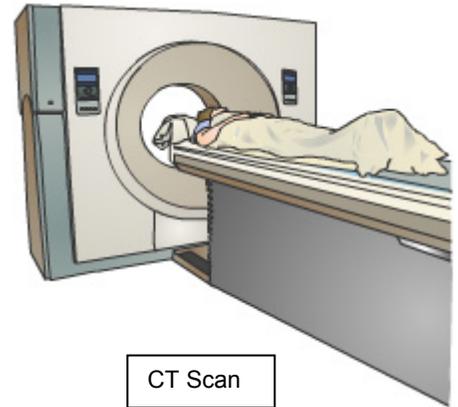
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A CAT scan of the lung, a more detailed x-ray of the lungs, helps determine the exact location of lesions found on a chest x-ray.

#### Finding Lung Cancer Cells:

The only sure way to know if lung cancer is present is for a pathologist to check samples of cells or tissue. The pathologist studies the sample under a microscope and performs other tests.



There are many ways to collect samples:

- Sputum cytology: sputum is coughed up from the lungs
- Thoracentesis: the doctor uses a long needle to remove pleural fluid from the chest.
- Bronchoscopy: The doctor inserts a thin, lighted tube through the nose or mouth into the lung for examination and possible removal of cells.
- Fine needle aspiration: the doctor uses a thin needle to remove tissue or fluid from the lung or lymph node.

After a biopsy of the lung lesion is done, the pathologist helps determine if the lesion is cancerous or not. If the lesion is found to be cancerous, the doctor will need more tests to see if the cancer has spread to other parts of the body, and to find out what stage the cancer is in. The further a cancer has spread, the higher the stage.

If it appears that the cancer has spread, further tests may be performed to determine the exact location of the cancer. A bone scan, a special radiological exam, may be done to check the bones.

Your doctor may recommend a CAT scan to check for cancer that may have spread to the abdomen and pelvis areas. They may also recommend you get an MRI of the head to check for cancer that may have spread to your brain. Blood tests may be necessary to check for anemia, liver, or kidney problems.

However lung lesions may not turn out to be cancerous. A lung lesion may indicate an old or new infection in the lungs.

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Lung lesions may also indicate benign tumors, as opposed to malignant tumors, which are cancerous. Benign tumors do not have cancer cells in them.

## Treatment

The treatment of lung cancer depends on the type of lung cancer and its stage. People with lung cancer may have surgery, chemotherapy, radiation therapy, targeted therapy, or a combination of treatments.

Cancer treatment is either local therapy or systemic therapy:

- *Local therapy:* Surgery and radiation therapy are local therapy. They remove or destroy cancer in the chest.
- *Systemic therapy:* Chemotherapy and targeted therapy are systemic therapies. The drugs enter the bloodstream and destroy or control cancer throughout the body.

### *Surgery*

Surgery for lung cancer removes the tissue that contains the tumor. The surgeon can remove part of the lung or the entire lung. Removal of a small part of the lung is a wedge resection, removal of a lobe of the lung is a lobectomy and a pneumonectomy is removal of the entire lung. The surgeon also removes nearby lymph nodes.

### *Radiation Therapy*

Radiation therapy uses high energy rays to kill cancer cells. It affects cells in the treated area. External radiation is the most common type of radiation therapy for lung cancer. Treatments are usually 5 days a week for several weeks. The side effects depend on the type of radiation therapy, the dose of radiation, and the part of your body that is treated.

### *Chemotherapy*

Chemotherapy uses drugs to kill cancer cells. The drugs/medication enters the bloodstream and can affect cancer cells all over the body.

Chemotherapy is given in cycles. You have a rest period after each treatment period. The side effects depend mainly on which drugs are given and how much. The drugs can harm normal cells that divide rapidly.

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### *Targeted Therapy*

Targeted therapy uses drugs to block the growth and spread of cancer cells. These drugs target, or alter, a specific molecule or pathway needed for the cancer cells growth. Some patients with non-small cell lung cancer that has spread receive a targeted therapy.

If the lung cancer has not spread and is relatively small, surgery may be necessary to take the cancer out.

Radiation therapy and chemotherapy may also be necessary to either try to cure the cancer or, at least, to slow its growth.

### **Summary**

Lung cancer is not a rare disease. Prevention of lung cancer is the most effective way to fight it. Not smoking is the single most important thing anyone can do to avoid lung cancer.



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