

# Lung Cancer: Diagnosis, Staging and Treatment

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Cancer begins in our cells. Cells are the building blocks of our tissues. Tissues make up the organs of the body. Normal, healthy cells grow and divide to form new cells as the body needs them. When normal cells grow old or become damaged, they die, and new cells take their place.

Sometimes, this process goes wrong. New cells form when the body does not need them, and old or damaged cells do not die as they should. The build-up of extra cells often forms a mass of tissue called a growth or tumor.

Lung cancer develops over many years after exposure to cancer-causing agents called carcinogens. The leading cause of lung cancer is smoking. Other strong risk factors are:

- Second-hand smoke
- Radon
- Asbestos
- Chemicals
- Radiation
- Genetics
- Diet

## **Malignant lung tumors:**

- May be a threat to life
- May grow back after being removed
- Can invade nearby tissues and organs
- Can spread to other parts of the body (metastasis)

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**This handout is for informational purposes only. Talk with your doctor or health care team if you have any questions about your care.**

## Symptoms

- Hemoptysis (coughing up blood)
- Malaise (feeling of discomfort, illness or lack of well-being)
- Weight loss
- Dyspnea (hard to breath or short of breath)
- Hoarseness
- Cough
- Chest pain
- Symptoms that do not go away

## Diagnosis

If you have a symptom that may be a sign of lung cancer, your doctor must find out whether it is from cancer or something else. Your doctor may ask about your personal and family medical history. Your doctor may order blood tests, and you may have one or more of the following tests:

- **Physical exam** - Your doctor will check your general health, listen to your breathing, and check for fluid in the lungs. Your doctor may feel for swollen lymph nodes and a swollen liver.
- **Chest x-ray** - X-ray pictures of your chest to look for tumors or abnormal fluid.
- **CT scan** - Doctors often use a CT scan to take pictures of tissue inside the chest. An x-ray machine linked to a computer takes several pictures. During this test, the CT scanner rotates around you as you lie on a table. The table passes through the center of the scanner. The pictures may show a tumor, abnormal fluid, or swollen lymph nodes.

## Finding Lung Cancer Cells

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

There are many ways to collect samples. Your doctor may order one or more of the following tests to collect samples:

- **Thoracentesis** - The doctor uses a long needle to remove fluid (pleural fluid) from the lung sac in the chest. The lab checks the fluid for cancer cells.
- **Bronchoscopy** - The doctor inserts a thin, lighted tube (a bronchoscope) through the nose or mouth into the lung. This allows an exam of the lungs and the air passages that lead to them. The doctor may take a sample of cells with a needle, brush, or other tool. The doctor also may wash the area with water to collect cells in the water.
- **Endobronchial Ultrasound (EBUS)** - The doctor inserts a scope and uses an ultrasound to help check for lung cancer and to find out if the cancer has spread to nearby lymph nodes.
- **Fine-needle aspiration** - The doctor uses a thin needle to remove tissue or fluid from the lung or lymph node. Sometimes the doctor uses a CT scan or other imaging method to guide the needle to a lung tumor or lymph node.
- **Thoracoscopy** - The surgeon makes several small incisions in your chest and back. The surgeon looks at the lungs and nearby tissues with a thin, lighted tube. If an abnormal area is seen, a biopsy may be needed to check for cancer cells.
- **Thoracotomy** - The surgeon opens the chest with a long incision. Lymph nodes and other tissue may be removed.
- **Mediastinoscopy** - The surgeon makes an incision at the top of the breastbone. A thin, lighted tube is used to see inside the chest. The surgeon may take tissue and lymph node samples.

## Staging

To plan your treatment, your doctor needs to know the type of lung cancer and the amount (stage) of the disease. Staging is done to find out whether the cancer has spread, and if so, to what parts of the body. Lung cancer spreads most often to the lymph nodes, brain, bones, liver, and adrenal glands.

When cancer spreads from the first place it was found to another part of the body, the new tumor has the same kind of cancer cells and the same name as the original cancer. For example, if lung cancer spreads to the liver, the cancer cells in the liver are actually lung cancer cells. The disease is metastatic lung cancer, not liver cancer. For that reason, it is

treated as lung cancer, not liver cancer.

To stage your disease, your doctor may order blood tests, and you may have one or more of the following tests:

- **CT scan** - A CT scan may show cancer that has spread to your lung, liver, adrenal glands, brain, or other organs. You will be given contrast material by mouth or by injection into your arm or hand. The contrast material helps these tissues show up more clearly.
- **Bone scan** - A bone scan may show cancer that has spread to your bones. You will receive an injection of a small amount of a radioactive substance. It travels through your blood and collects in your bones. A machine called a scanner detects and measures the radiation. The scanner makes pictures of your bones on a computer screen or on film.
- **MRI** - Your doctor may order MRI pictures of your brain, bones, or other tissues. MRI uses a powerful magnet linked to a computer. It makes detailed pictures of tissue on a computer screen or film.
- **PET scan** - Your doctor uses a PET scan to find cancer that has spread. You receive an injection of a small amount of radioactive sugar. A machine makes computerized pictures of the sugar being used by cells in the body. Cancer cells use sugar faster than normal cells and areas with cancer look brighter on the pictures.

## Types of Lung Cancer

The types of lung cancer are treated differently. The most common types are named for how the lung cancer cells look under a microscope.

- About 13 percent of lung cancers are **small cell** lung cancers. This type tends to spread quickly.
- Most lung cancers (about 85 percent) are **non-small cell** lung cancers. This type spreads more slowly than small cell lung cancer.
  - ▶ Almost 87% of lung cancers are **non-small cell** lung cancer and are named for the type of cells in the cancer.
  - ▶ About 13% of **non-small cell** lung cancers are found in non-smokers, most often in women and younger people.

## Types of Non-Small Cell Lung Cancer

- Adenocarcinoma begins in cells that line the alveoli and make mucus. It is caused by tobacco smoking; however, it is also commonly found in nonsmokers, women and younger people.
- Squamous cell carcinoma begins in the thin, flat cells in the lungs, most often caused by tobacco smoking. It also is called epidermoid carcinoma.
- Large cell carcinoma begins in certain types of large cells in the lungs.
- Bronchoalveolar cancer develops in the outer region of the lung in glands that make mucus.

## Stages of Small Cell Lung Cancer

Small cell lung cancer is described using two stages:

- **Limited stage** - cancer is found in only one area of the lung.
- **Extensive stage** - cancer is found in more than one area of the lung or outside the lung in other tissues.

The treatment options are different for limited and extensive stage small cell lung cancer.

## Stages of Non-Small Cell Lung Cancer

Non-small cell lung cancer is based on the size of the lung tumor and whether cancer has spread to the lymph nodes or other tissues.

- **Stage IA** - The lung tumor is an invasive cancer. It has grown through the innermost lining of the lung into deeper lung tissue. The tumor is no more than 3 centimeters across (less than 1 ¼ inches). It is surrounded by normal tissue and the tumor does not invade the bronchus. Cancer cells are not found in nearby lymph nodes.
- **Stage IB** - The tumor is larger or has grown deeper, but cancer cells are not found in nearby lymph nodes. The lung tumor is one of the following:
  - ▶ The tumor is more than 3 centimeters across.
  - ▶ It has grown into the main bronchus.

- ▶ It has grown through the lung into the pleura.
- **Stage IIA** - The lung tumor is no more than 3 centimeters across. Cancer cells are found in nearby lymph nodes.
- **Stage IIB** - The tumor is one of the following:
  - ▶ Cancer cells are not found in nearby lymph nodes, but the tumor has invaded the chest wall, diaphragm, pleura, main bronchus, or tissue that surrounds the heart.
  - ▶ Cancer cells are found in nearby lymph nodes, and one of the following:
    - The tumor is more than 3 centimeters across
    - It has grown into the main bronchus.
    - It has grown through the lung into the pleura.
- **Stage IIIA** - The tumor may be any size. Cancer cells are found in the lymph nodes near the lungs and bronchi, and in the lymph nodes between the lungs but on the same side of the chest as the lung tumor.
- **Stage IIIB** - The tumor may be any size. Cancer cells are found on the opposite side of the chest from the lung tumor or in the neck. The tumor may have invaded nearby organs, such as the heart, esophagus, or trachea. More than one malignant growth may be found within the same lobe of the lung. The doctor may find cancer cells in the pleural fluid.
- **Stage IV** - Malignant growths may be found in more than one lobe of the same lung or in the other lung. Or cancer cells may be found in other parts of the body, such as the brain, adrenal gland, liver, or bone.

You can find pictures of the stages of lung cancer and information about their treatment choices by visiting the NCI website at (<http://www.cancer.gov/cancertopics/types/lung>).

## Treatment

People with **limited stage small cell** lung cancer usually have radiation therapy and chemotherapy. For a very small lung tumor, a person may have surgery and chemotherapy.

People with **extensive stage small cell** lung cancer are typically treated with chemotherapy only and do not have surgery.

People with **non-small cell** lung cancer may have surgery, chemotherapy, radiation therapy, or a combination of treatments. The treatment choices are different for each stage. Some people with **advanced stage non-small cell** lung cancer may receive targeted therapy.

Adapted from What You Need To Know About Lung Cancer, National Cancer Institute (<http://www.cancer.gov>)