Lung Cancer: Diagnosis, Staging and Treatment

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

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

Lung cancer can develop after many years of 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

Lung Tumors that are Cancer (Malignant):

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

- Hemoptysis (coughing up blood)
- Malaise (feeling of discomfort, illness or lack of well-being)
- Weight loss
- Dyspnea (hard to breathe 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 will need to find out if the problem is from cancer or something else. Your doctor may ask about your personal and family medical history. Your doctor also may order blood tests, and one or more of the following tests:

- **Physical exam** - Your doctor will check your general health, listen to how you breathe and check your lungs for fluid. Your doctor may also check for swollen lymph nodes and a swollen liver.

- **Chest x-ray** - X-ray pictures taken of your chest to look for tumors or abnormal fluid.

- **CT scan** - Your doctor may order a CT scan to take pictures of tissue inside your chest. 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 way to know if lung cancer cells are present is for a pathologist to check samples of fluid, cells or tissue. A pathologist studies the sample under a microscope and performs other tests to check for cancer cells.
There are many ways to collect samples. Your doctor may order one or more of the following tests to collect samples:

- **Thoracentesis** - Your doctor uses a long needle to remove fluid (pleural fluid) from the lung sac in your chest. The lab checks the fluid for cancer cells.

- **Bronchoscopy** - Your doctor inserts a thin, lighted tube (bronchoscope) through your nose or mouth into your lung. This test lets your doctor see your lungs and air passages. Your doctor may take a sample of cells with a needle, brush, or other tool. Your doctor may also wash the area with water to collect cells in the water.

- **Endobronchial Ultrasound (EBUS)** - Your doctor inserts a scope and uses an ultrasound to help check for lung cancer and to see if the cancer has spread to nearby lymph nodes.

- **Fine-needle biopsy** - Your doctor uses a thin needle to remove tissue or fluid from your lung or lymph node(s). Your doctor may use a CT scan or other x-ray to guide the needle to a lung tumor or lymph node.

- **Thoracoscopy** - Your surgeon makes several small incisions in your chest and back and uses a thin tube with a light to look at your lungs and nearby tissues. If an abnormal area is seen, a biopsy may be done to check for cancer cells.

- **Thoracotomy** - Your surgeon makes a long incision in your chest to remove lymph nodes and other tissues.

- **Mediastinoscopy** - Your surgeon makes an incision at the top of your breastbone and uses a thin, lighted tube to see inside your chest. Your surgeon may take samples of tissue and lymph nodes.

**Staging**

To plan your treatment, your doctor needs to know the type of lung cancer and the amount (stage) of the disease present. Staging is done to find out whether the cancer has spread, and if so, to what parts of your 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 your 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 is used to see if the cancer has spread to your lung, liver, adrenal glands, brain or other organs. Contrast medicine will be used to help these areas show up more clearly. You will be given contrast medicine by mouth or by injection into your arm or hand.

- **MRI** - The MRI uses a powerful magnet linked to a computer. It shows detailed pictures of your brain, bones and other tissues on a computer screen.

- **PET scan** - A PET scan can be used to find cancer that has spread. This test takes pictures of how your body uses a small amount of radioactive material called a tracer. The tracer is put into your blood through an IV placed in your hand or arm. The tracer goes to areas in your body that have a lot of cell activity. Cancer cells have more activity than normal cells, so areas with cancer will look brighter on the scan.

**Types of Lung Cancer**

There are 2 major types of lung cancer, **non-small cell lung cancer (NSCLC)** and **small cell lung cancer (SCLC)**. These types of lung cancers are named for how the cancer cells look under a microscope (non-small or small), and are treated differently.

- Only a low number of lung cancers are **small cell lung cancers**. This type of cancer tends to spread quickly.

- Most lung cancers are **non-small cell lung cancers**. This type of cancer spreads slower than a small cell lung cancer.

- A low number 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 (NSCLC)

- **Adenocarcinoma** starts in cells that line the alveoli (air sacs) and make mucus. It is often caused by tobacco smoking, but can also be found in nonsmokers, women and younger people.

- **Squamous cell carcinoma** starts in the thin, flat cells in the lungs, most often caused by tobacco smoking. It also is called epidermoid carcinoma.

- **Large cell carcinoma** starts in certain types of large cells in the lungs.

- **Bronchoalveolar cancer** starts in the outer region of the lung in glands that make mucus.

Stages of Non-Small Cell Lung Cancer (NSCLC)

Staging of NSCLC is based on the size of the lung tumor and if the cancer cells have spread to your lymph nodes or other tissues or organs. It may be hard to understand the stages of NSCLC. Below is a general description of each stage. Talk to your doctor for more information about each stage.

- **Stage I** – cancer is only located in one area of your lung and has not spread to any of your lymph nodes.

- **Stage II** – cancer is located in your lung and nearby lymph nodes.

- **Stage III** – cancer is located in your lung and in the lymph nodes in the middle of your chest. This stage has 2 subtypes:
  
  ▶ **Stage IIIA** – cancer has spread only to the lymph nodes on the same side of your chest where the cancer started.

  ▶ **Stage IIIB** – cancer has spread to the lymph nodes on the opposite side of your chest from where the cancer started, or is above your collarbone.

- **Stage IV** – cancer has spread to both of your lungs, to the fluid around your lungs or to another part of your body, such as your liver or other organs. This is also called metastatic disease.
Stages of Small Cell Lung Cancer (SCLC)
There are 2 stages of SCLC:

- **Limited stage** - cancer is found in an area of the lung that can be treated within a radiation field.
- **Extensive stage** - cancer is found in more than one area of the lung or outside the lung in other organs.

Treatment for Lung Cancer

**Non-Small Cell Lung Cancer**

Treatment options for NSCLC lung cancer may include surgery, chemotherapy, radiation therapy, immunotherapy or a combination of these treatments. The treatment choices are different for each stage of cancer. Your doctor or a member of your health care team will talk with you about the treatment option that is best for you.

Treatment for NSCLC is based on the stage of your cancer.

**Stage I**
- Surgery may be done to remove the cancer and lymph nodes.

**Stage II**
- Surgery may be done to remove the cancer and lymph nodes. Other treatments such as chemotherapy and/or radiation may be used after surgery. Treatment given after surgery is called **adjuvant therapy**.

**Stage III**
- **Stage IIIA** – surgery may be done to remove the cancer and lymph nodes, followed by chemotherapy. Treatment may also include radiation therapy.
- **Stage IIIB** – a combination of chemotherapy and radiation therapy are used, and may be followed by immunotherapy.

**Stage IV**
- Most often, treatment includes chemotherapy, immunotherapy or a combination of these therapies. Radiation therapy may be done to help relieve symptoms and reduce discomfort (palliative treatment). In some cases, surgery may be done to help relieve pain and symptoms.
Small Cell Lung Cancer

The treatment options are different for limited and extensive stage SCLC. Treatment options may include chemotherapy, radiation, a combination of chemotherapy and radiation, immunotherapy or clinical trials. Your doctor or a member of your health care team will talk with you about the treatment options that are best for you.