

General Information About Non-Small Cell Lung Cancer

Non-small cell lung cancer is a disease in which malignant (cancer) cells form in the tissues of the lung.

The lungs are a pair of cone-shaped breathing organs that are found within the chest. The lungs bring oxygen into the body and take out carbon dioxide, which is a waste product of the body's cells. Each lung has sections called lobes. The left lung has 2 lobes. The right lung, which is slightly larger, has 3 lobes. A thin membrane called the pleura surrounds the lungs. Two tubes called bronchi lead from the trachea (windpipe) to the right and left lungs. The bronchi are sometimes also involved in lung cancer. Tiny air sacs called alveoli and small tubes called bronchioles make up the inside of the lungs.

There are several types of non-small cell lung cancer.

Each type of non-small cell lung cancer has different kinds of cancer cells. The cancer cells of each type grow and spread in different ways. The types of non-small cell lung cancer are named for the kinds of cells found in the cancer and how the cells look when viewed under a microscope:

- Squamous cell carcinoma: Cancer that begins in squamous cells, which are thin, flat cells that look like fish scales. This is also called epidermoid carcinoma.
- Adenocarcinoma: Cancer that begins in cells that have glandular (secretory) properties.
- Large cell carcinoma: Cancer in which the cells are large and look abnormal when viewed under a microscope.
- Adenosquamous carcinoma: Cancer that begins in cells that look flattened when viewed under a microscope. These cells also have glandular (secretory) properties.
- Pleomorphic, sarcomatoid, or sarcomatous carcinoma: A group of cancers in which the cells look abnormal when viewed under a microscope.
- Carcinoid tumor: A slow-growing neuroendocrine tumor (cancer that begins in cells that release a hormone in response to a signal from the nervous system).
- Salivary gland carcinoma: Cancer that begins in salivary gland cells in large airways of the lung.
- Unclassified carcinoma: Cancer that does not fit into a specific group.

Certain factors affect prognosis (chance of recovery) and treatment options.

The prognosis (chance of recovery) and treatment options depend on the following:

- The stage of the cancer (whether it is in the lung only or has spread to other places in the body).
- The tumor size.
- The type of lung cancer.
- Whether there are symptoms.
- The patient's general health.

For most patients with non-small cell lung cancer, current treatments do not cure the cancer.

If lung cancer is found, participation in one of the many clinical trials being done to improve treatment should be considered. Clinical trials are taking place in most parts of the country for patients with all stages of non-small cell lung cancer.

Staging

After lung cancer has been diagnosed, tests are done to find out if cancer cells have spread within the lungs or to other parts of the body.

The process used to find out if cancer has spread within the lungs or to other parts of the body is called staging. The information gathered from the staging process determines the stage of the disease. It is important to know the stage in order to plan treatment. The following tests and procedures may be used in the staging process:

- **Physical exam and history:** An exam of the body to check general signs of health, including checking for signs of disease, such as lumps or anything else that seems unusual. A history of the patient's health habits and past illnesses and treatments will also be taken.
- **Radiologic exams:** The use of radiation or other imaging methods to find signs of cancer. Radiologic tests for non-small cell lung cancer include:
 - **Chest x-ray:** An x-ray of the organs and bones inside the chest. An x-ray is a type of energy beam that can go through the body and onto film, making a picture of areas inside the body.
 - **CT scan (CAT scan):** A procedure that makes a series of detailed pictures of areas inside the body, taken from different angles. The pictures are made by a computer linked to an x-ray machine. A dye may be injected into a vein or swallowed to help the organs or tissues show up more clearly. This procedure is also called computed tomography, computerized tomography, or computerized axial tomography.
 - **PET scan (positron emission tomography scan):** A procedure to find malignant tumor cells in the body. A small amount of radionuclide glucose (sugar) is injected into a vein. The PET scanner rotates around the body and makes a picture of where glucose is being used in the body. Malignant tumor cells show up brighter in the picture because they are more active and take up more glucose than normal cells do.
- **Laboratory tests:** Medical procedures that test samples of tissue, blood, urine, or other substances in the body. These tests help to diagnose disease, plan and check treatment, or monitor the disease over time.
- **Lymph node biopsy:** The removal of all or part of a lymph node. A pathologist views the tissue under a microscope to look for cancer cells. One of the following types of biopsies may be done:
 - **Excisional biopsy:** The removal of an entire lymph node.
 - **Incisional biopsy:** The removal of part of a lymph node.
 - **Core biopsy:** The removal of part of a lymph node using a wide needle.
 - **Needle biopsy:** The removal of part of a lymph node using a thin needle. This procedure is also called a fine-needle aspiration biopsy.
- **Bronchoscopy:** A procedure to look inside the trachea and large airways in the lung for abnormal areas. A bronchoscope (a thin, lighted tube) is inserted through the nose or mouth into the trachea and lungs. Tissue samples may be taken for biopsy.
- **Mediastinoscopy:** A surgical procedure to look at the organs, tissues, and lymph nodes between the lungs for abnormal areas. An incision (cut) is made at the top of the breastbone and a thin, lighted tube is inserted into the chest. Tissue and lymph node samples may be taken for biopsy.
- **Anterior mediastinotomy or Video-assisted Thoracoscopy:** A surgical procedure to look at the organs and tissues between the lungs and between the breastbone and spine for abnormal areas. An incision (cut) is made next to the breastbone and a thin, lighted tube is inserted into the chest. Tissue and lymph node samples may be taken for biopsy.

The following stages are used for non-small cell lung cancer:

Occult (hidden) stage

In the occult (hidden) stage, cancer cells are found in sputum (mucus coughed up from the lungs), but no tumor can be found in the lung by imaging or bronchoscopy, or the primary tumor is too small to be assessed.

Stage 0 (carcinoma in situ)

In stage 0 (carcinoma in situ), cancer is limited to the lung and is found only in a few layers of cells. It has not grown through the top lining of the lung.

Stage I

In stage I, the cancer is in the lung only, with normal tissue around the tumor. Stage I is divided into stages IA and IB, based on the size of the tumor.

Stage II

In stage II, cancer has spread to nearby lymph nodes or to the chest wall (the ribs and muscles that make up the area of the body between the neck and the abdomen), the diaphragm (the thin muscle below the lungs and heart that separates the chest from the abdomen), the mediastinal pleura (the thin membrane that covers the outside of the lungs in the area near the heart), or the parietal pericardium (the outer layer of tissue that surrounds the heart). Stage II is divided into stage IIA and stage IIB, based on the size of the tumor and whether it has spread to the lymph nodes.

Stage III

In stage III, cancer has either:

- spread to the lymph nodes in the mediastinum (the middle area between the lungs that contains the heart, major blood vessels, and other structures); or
- spread to the lymph nodes on the opposite side of the chest or in the lower neck.

Stage III is divided into stage IIIA (which is sometimes treated with surgery) and stage IIIB (which is rarely treated with surgery).

Stage IV

In stage IV, cancer has spread to other parts of the body or to another lobe of the lungs.

Recurrent Non-Small Cell Lung Cancer

Recurrent non-small cell lung cancer is cancer that has recurred (come back) after it has been treated. The cancer may come back in the brain, lung, or other parts of the body.

Treatment

At diagnosis, patients can be divided into 3 treatment groups based on the stage of the cancer:

(1) Non-small cell lung cancer that can be treated with surgery.

Stage 0, stage I, and stage II non-small cell lung cancer can often be removed by surgery. Chemotherapy and/or Radiation therapy may be used to treat patients who have other medical problems and cannot have surgery.

(2) Non-small cell lung cancer that has spread to nearby tissue or to lymph nodes.

Non-small cell lung cancer that has spread to nearby tissue or to lymph nodes can be treated with one of the following:

- Radiation therapy alone.
- Radiation therapy and chemotherapy or other kinds of treatment.
- Surgery alone.

(3) Non-small cell lung cancer that has spread to other parts of the body or to another lobe of the lungs.

Radiation therapy may be used as palliative therapy to shrink the cancer and to relieve pain in patients who have non-small cell lung cancer that has spread to other parts of the body. Chemotherapy and/or Radiation therapy may be used to treat some patients.

Four types of standard treatment are used:

Surgery

Three types of surgery are used:

- Wedge resection: A surgical procedure to remove a triangle-shaped slice of tissue. It may be used to remove a tumor and a small amount of normal tissue around it.
- Lobectomy: A surgical procedure to remove a whole lobe (section) of the lung.
- Pneumonectomy: Surgery to remove one whole lung.

Chemotherapy

Chemotherapy is a cancer treatment that uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping the cells from dividing. When chemotherapy is taken by mouth or injected into a vein or muscle, the drugs enter the bloodstream and can reach cancer cells throughout the body (systemic chemotherapy). When chemotherapy is placed directly into the spinal column, an organ, or a body cavity such as the abdomen, the drugs mainly affect cancer cells in those areas (regional chemotherapy). The way the chemotherapy is given depends on the type and stage of the cancer being treated.

Radiation therapy

Radiation therapy is a cancer treatment that uses high-energy x-rays or other types of radiation to kill cancer cells. There are two types of radiation therapy. External radiation therapy uses a machine outside the body to send radiation toward the cancer. Internal radiation therapy uses a radioactive substance sealed in needles, seeds, wires, or catheters that are placed directly into or near the cancer.

Radiosurgery is a method of delivering radiation directly to the tumor with little damage to healthy tissue. It does not involve surgery and may be used to treat certain tumors in patients who cannot have surgery.

The way the radiation therapy is given depends on the type and stage of the cancer being treated.

Ablative therapy – laser, Argon Plasma Coagulation (APC), radiofrequency (RF)

Ablative therapy is a cancer treatment that uses a focused energy source to kill cancer cells.

New types of treatment and prevention are being tested in clinical trials. These include the following:

Photodynamic therapy (PDT)

Photodynamic therapy (PDT) is a cancer treatment that uses a drug and a certain type of laser light to kill cancer cells. A drug that is not active until it is exposed to light is injected into a vein. The drug collects more in cancer cells than in normal cells. Fiberoptic tubes are then used to deliver the laser light to the cancer cells, where the drug becomes active and kills the cells. Photodynamic therapy causes little damage to healthy tissue. It is used mainly to treat tumors on or just under the skin or in the lining of internal organs.

Chemoprevention

Chemoprevention is the use of drugs, vitamins, or other substances to reduce the risk of developing cancer or to reduce the risk cancer will recur (come back).

Biologic therapy

Biologic therapy is a treatment that uses the patient's immune system to fight cancer. Substances made by the body or made in a laboratory are used to boost, direct, or restore the body's natural defenses against cancer. This type of cancer treatment is also called biotherapy or immunotherapy.

New treatments

New combinations of treatments are being studied in clinical trials.

This summary section refers to specific treatments under study in clinical trials, but it may not mention every new treatment being studied. Information about ongoing clinical trials is available from the [NCI Web site](#).

Treatment Options by Stage

Occult Non-Small Cell Lung Cancer

Tests are done to find the main tumor (cancer). Lung cancer that is found at this early stage can usually be cured by surgery. Tests may include the following:

- Chest x-ray: An x-ray of the organs and bones inside the chest. An x-ray is a type of energy beam that can go through the body and onto film, making a picture of areas inside the body.
- Bronchoscopy: A procedure to look inside the trachea and large airways in the lung for abnormal areas. A bronchoscope (a thin, lighted tube) is inserted through the nose or mouth into the trachea and lungs. Tissue samples may be taken for biopsy.
- CT scan (CAT scan): A procedure that makes a series of detailed pictures of areas inside the body, taken from different angles. The pictures are made by a computer linked to an x-ray machine. A dye may be injected into a vein or swallowed to help the organs or tissues show up more clearly. This procedure is also called computed tomography, computerized tomography, or computerized axial tomography.

Stage 0 Non-Small Cell Lung Cancer

Treatment of stage 0 non-small cell lung cancer may include the following:

- Surgery to remove a small portion of the lung where the cancer cells are found.
- Clinical trials of photodynamic therapy using an endoscope.

Stage I Non-Small Cell Lung Cancer

Treatment of stage I non-small cell lung cancer may include the following:

- Surgery to remove a small portion of the lung or a lobe of the lung.
- External radiation therapy (for patients who cannot have surgery or choose not to have surgery).
- Chemotherapy following surgery.
- Clinical trials of chemoprevention following other therapy.

Stage II Non-Small Cell Lung Cancer

Treatment of stage II non-small cell lung cancer may include the following:

- Surgery to remove the tumor (a small portion of the lung, a lobe of the lung, or an entire lung).
- External radiation therapy (for patients who cannot have surgery or choose not to have surgery).
- Chemotherapy with or without other treatments following surgery.
- Clinical trials of external radiation therapy following surgery.

Stage III Non-Small Cell Lung Cancer (Stages IIIA and IIIB)

Treatment of stage IIIA non-small cell lung cancer may include the following:

- Surgery alone.
- External radiation therapy alone.
- Chemotherapy combined with other treatments.
- Surgery and external radiation therapy.
- Clinical trials of radiation therapy and combined treatments.

Treatment of stage IIIB non-small cell lung cancer may include the following:

- External radiation therapy alone.
- Chemotherapy combined with external radiation therapy.
- Chemotherapy combined with external radiation therapy, followed by surgery.
- Chemotherapy alone.
- Clinical trials of radiation therapy and combined treatments.

Stage IV Non-Small Cell Lung Cancer

Treatment of stage IV non-small cell lung cancer may include the following:

- External radiation therapy as palliative therapy, to relieve pain and other symptoms and improve the quality of life.
- Chemotherapy.
- Ablative therapy and/or internal radiation therapy.
- Clinical trials of chemotherapy.
- Clinical trials of biologic therapy.

Treatment Options for Recurrent Non-Small Cell Lung Cancer

Treatment of recurrent non-small cell lung cancer may include the following:

- External radiation therapy as palliative therapy, to relieve pain and other **symptoms** and improve the quality of life.
- Chemotherapy alone.
- Surgery (for some patients who have a very small amount of cancer that has spread to the brain).
- Ablative therapy or internal radiation therapy.
- Radiosurgery (for certain patients who cannot have standard surgery).
- Clinical trials of biologic therapy or other new treatments.