



UNDERSTANDING Non-Small Cell Lung Cancer

AMERICAN COLLEGE OF
CHEST
PHYSICIANS®

A Guide for the Patient



® Lung Cancer Alliance

LUNG LOVE LEARN

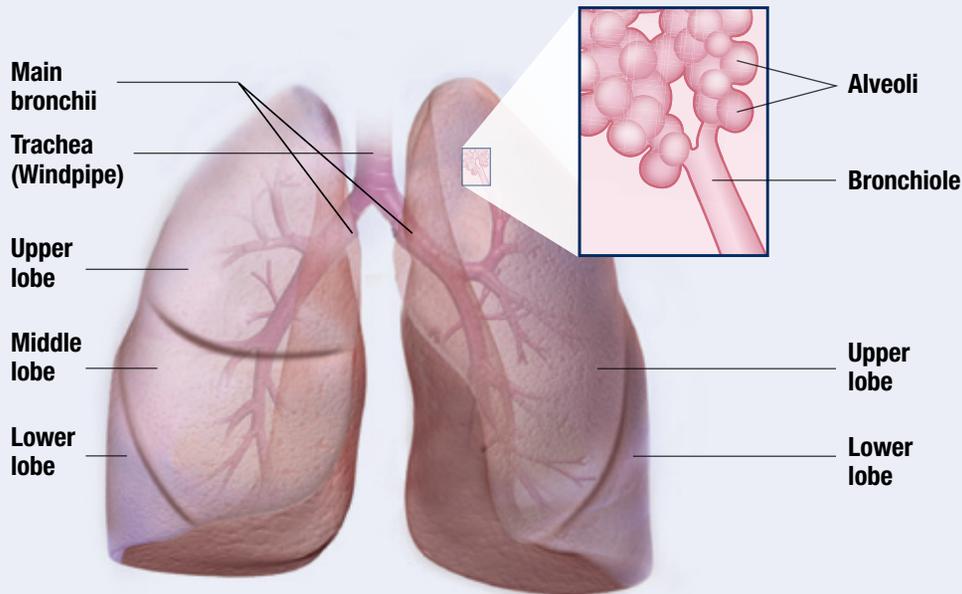
THE LUNG LOVE PROJECT™

The goal of this brochure is to help you better understand:

- Non-small cell lung cancer
- Available treatment options
- The role of your treatment team

The following image shows different parts that make up the lungs. Please use this picture to help guide you through the topics discussed in this brochure.

Anatomy of the Lungs



The content of this publication is for informational purposes only and is not intended to be a substitute for professional medical advice, diagnosis, or treatment. Only your doctor can provide you with advice on what is safe and effective for you. Models used in this brochure are for illustrative purposes only.

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In the United States, lung cancer is one of the most commonly diagnosed forms of cancer. There are two primary types of lung cancer: non-small cell lung cancer (NSCLC) and small cell lung cancer. NSCLC is the most common type of lung cancer, representing about 85% of all cases.

A history of smoking is the main risk factor for developing lung cancer. Cigarette smoke contains many carcinogens, which are substances that cause cancer.

Besides smoking, other risk factors include:

- Exposure to secondhand smoke (or passive smoking)
- Exposure to radon (an invisible, odorless, tasteless radioactive gas that occurs naturally in soil and rocks; radon may accumulate in basements with poor ventilation)
- A family history of lung cancer
- Prior radiation therapy
- Other lung illnesses (such as emphysema, chronic obstructive pulmonary disease [COPD], or tuberculosis)
- Exposure to industrial chemicals including asbestos, arsenic, beryllium, and uranium

IMAGING

Several imaging tests may be used to provide more information on areas of the lungs that do not look normal. Physicians sometimes refer to these abnormalities as tumors, spots, lesions, nodules, or masses. Imaging tools can help doctors tell whether the tissue is benign (not cancerous) or malignant (cancerous).



- **Chest X-ray:** shows where a tumor is located
- **CT (computed tomography) or “CAT” scanning:** can show tumors that may not be visible on a normal chest X-ray
- **PET (positron emission tomography) scanning:** shows how a tumor is using glucose (also known as sugar). Because tumors typically use more glucose than surrounding tissue, they appear as “hot spots” (bright areas) in these images
- **Endobronchial ultrasound:** can help diagnose cancer in cases where lymph nodes (organs that are part of the lymphatic system) close to the lungs are involved
- **MRI (magnetic resonance imaging):** creates detailed images of the body and can help determine whether a tumor has spread beyond its original location

Additional tests are needed to determine whether a tumor is cancerous.

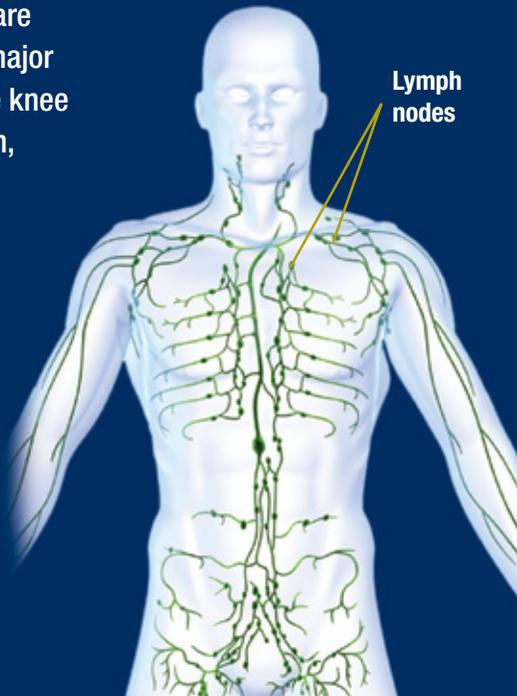
Lymphatic System

The lymphatic system is a collection of organs, *vessels*, and *nodes* that are found throughout the body. The two major functions of the lymphatic system are to: (1) collect excess fluid and return it to the blood, and (2) fight infection.

Lymph *vessels* are similar to blood vessels, and help to circulate lymph fluid throughout the body. Lymph fluid contains white blood cells, which help to fight infection.

Lymph *nodes* are small, oval-shaped organs within the lymphatic system. The purpose of lymph nodes is to trap and collect invading organisms that can be destroyed by white blood cells. Lymph nodes are found throughout the body, but major clusters can be found behind the knee and elbow joints, and in the groin, armpits, chest, and neck.

Cancer cells can break off from the main tumor and travel through the lymphatic system. Some of these cells can become trapped within a lymph node and start to grow. Determining whether there are cancer cells in lymph nodes can help a doctor estimate how far the cancer may have spread.



BIOPSIES

A biopsy is a procedure during which tissue is removed from the body for testing. The tissue can help doctors diagnose cancer and provide very specific information about the cancer (see *Histology and subtype*, page 10).

Usually, only one biopsy is necessary for diagnosing NSCLC. However, sometimes a second biopsy may be needed if additional tests are requested by the doctor.

There are several types of biopsy procedures:

- **Fine needle aspiration (FNA):** a thin, hollow needle is used to remove cells from a mass
 - Depending on the location of the tumor, FNA can be done during a bronchoscopy procedure (in which a camera-equipped tube is used to view the windpipe and other airways) or through the skin
 - This procedure may be guided by a CT scan
- **Core needle biopsy:** more tissue can be taken with this procedure than with FNA
 - This procedure may be guided by a CT scan or ultrasound
- **Surgical biopsy:** tissue is removed during a surgical procedure
 - Smaller tissue samples may be removed surgically during a bronchoscopy procedure; larger samples may require traditional surgery
- **Thoracentesis:** a hollow needle is inserted into the chest to remove fluid from the space around the lungs (also called the pleura)
- **Sputum analysis:** mucus, phlegm, and saliva are tested to detect abnormal cells that may be an early sign of lung cancer

STAGING

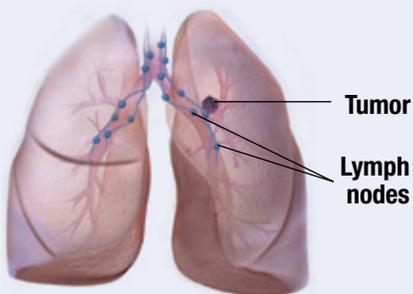
It is also important to know the stage of the cancer. Staging can help doctors create a treatment plan that is best for you. The TNM System is used to stage NSCLC.

- T stands for tumor—where the tumor is, and how big it is
- N stands for lymph nodes—whether the cancer has spread to lymph nodes, and where the affected lymph nodes are located
- M stands for metastasis—whether the cancer has spread beyond the lung to the other lung, the pleura, or other parts of the body

NSCLC is divided into four stages, based on the TNM System. In general, the tumor size, the tumor's spread inside or outside the chest cavity, and the lymph nodes involved will determine the cancer stage.

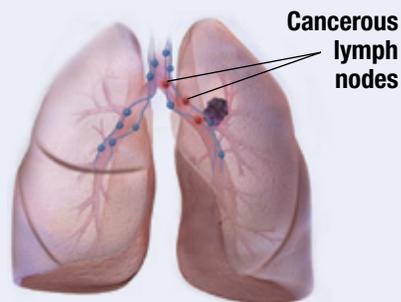
The terms “early stage” or “locally advanced” are sometimes used to refer to stage I, stage II, and some stage III tumors. The term “advanced” may be used to describe some stage III tumors and all stage IV tumors. Ask your doctor for more details about tumor staging, and how it may affect your choices for treatment.

Determining the stage of lung cancer involves many factors. However, the following key points may be used to describe each stage:



Stage I

The tumor is located only in one lobe of the lung.



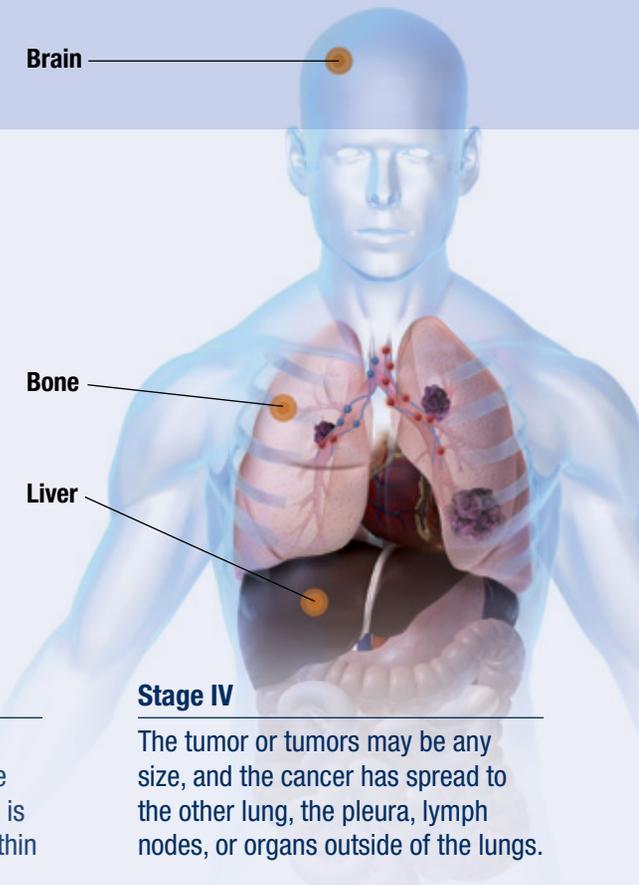
Stage II

The tumor or tumors are located only in one lobe of a lung, and may be larger than those in stage I. The cancer may have spread to nearby lymph nodes.



Stage III

The tumor or tumors are only in one lung, and may begin to invade areas surrounding the lung. There is increasing cancer involvement within the lymph nodes.



Stage IV

The tumor or tumors may be any size, and the cancer has spread to the other lung, the pleura, lymph nodes, or organs outside of the lungs.

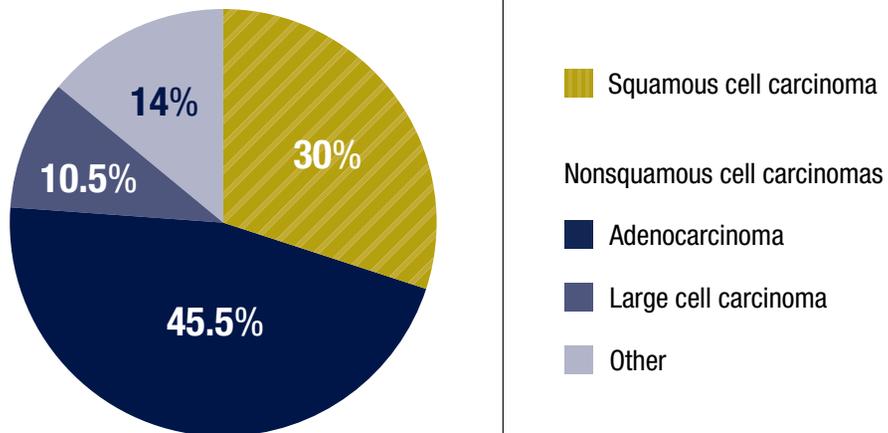
HISTOLOGY AND SUBTYPE

NSCLC is not the same disease in every person. The term “histology” refers to the structure of tumor cells when viewed under a microscope; this structure determines the subtype of the tumor.

There are many subtypes of NSCLC. Each subtype may respond differently to treatment. Identifying the subtype of NSCLC can help a doctor choose the best treatment for each patient. The most common subtypes of NSCLC are:

- Squamous cell carcinoma
- Nonsquamous cell carcinomas
 - Adenocarcinoma (includes bronchioloalveolar carcinoma, or BAC)
 - Large cell carcinoma
 - Other

Diagnoses of NSCLC Subtypes



BIOMARKERS

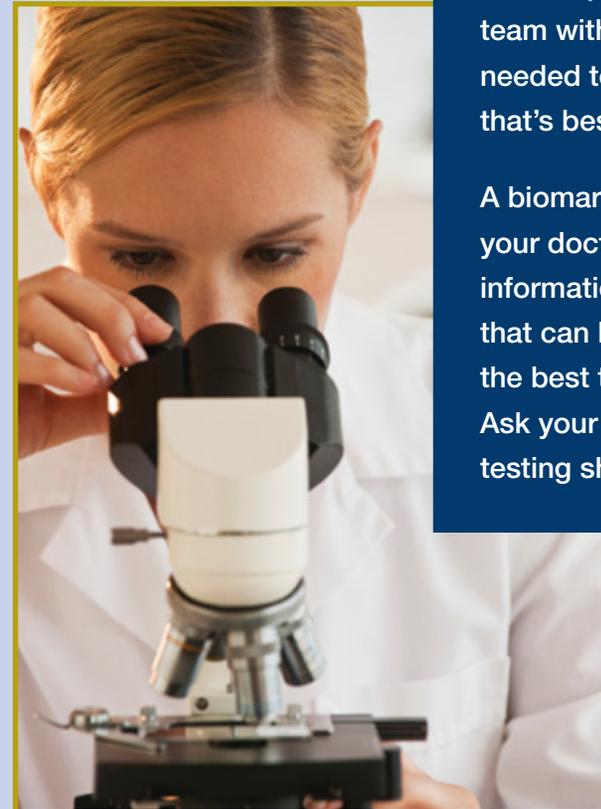
Tumor tissue removed during a biopsy procedure can be tested for several biomarkers. Biomarkers are features of the cancer cell that can give the doctor specific information about the tumor. These features may be specific proteins on the surface of the cell or genetic information within the cell.

Some biomarkers can help predict the course of disease, while others show whether a specific treatment can be effective.

Staging, Histology, and Biomarkers

The stage and histology of NSCLC provide your treatment team with important information needed to choose the treatment that's best for you.

A biomarker test may provide your doctor with additional information about your disease that can be used to help create the best treatment plan for you. Ask your doctor if biomarker testing should be done.



Treatment Options

Your treatment options will depend on:

- Stage of NSCLC
- Subtype of NSCLC
- Lung function
- Performance status (ability to perform activities of daily living)
- Overall general health (eg, conditions like high blood pressure, diabetes)
- Biomarkers

SURGERY

Types of surgery

- **Lobectomy:** removal of an entire lobe of a lung
- **Pneumonectomy:** removal of an entire lung
- **Wedge resection:** removal of the tumor and a small surrounding section of healthy tissue

All surgeries, other than a wedge resection, include testing of the lymph nodes associated with that portion of the lung.

Types of Surgical Procedures

Thoracotomy: a large incision is made in the chest to allow removal of cancerous tissue.

Video-assisted thoracic surgery (VATS): a series of small incisions allows insertion of a video camera along with small instruments for removing cancerous tissue.

CHEMOTHERAPY

Chemotherapy is a treatment with chemicals that kill rapidly growing and dividing cells including cancer cells. Chemotherapy may be given as a single drug or as multiple drugs at the same time, depending on the overall health of the patient, as well as the stage and type of NSCLC. Chemotherapy drugs commonly used to treat NSCLC include:

- Carboplatin
- Cisplatin
- Pemetrexed
- Vinorelbine
- Paclitaxel
- Docetaxel
- Gemcitabine



TARGETED THERAPY

While the goal of chemotherapy is to kill rapidly growing and dividing cancer cells, chemotherapy can also affect normal cells (eg, cells in the skin, lining of the digestive tract, hair follicles), which can cause unwanted side effects. To reduce damage to normal cells, newer drugs called targeted therapies attack cancer cells by interfering with processes that are more specific to the cancer cells. These processes include:

New blood vessel formation

Cancer cells rely on the development of new blood vessels to supply them with oxygen and nutrients. This process is called angiogenesis. Drugs that block angiogenesis starve cells of their blood supply, which helps to slow or stop tumor growth.

Stimulation from growth signals

Cancer cells may rely on signals that tell them to grow or divide uncontrollably. Drugs that block these signals may help to slow or stop tumor growth.

Targeted therapies include:

- Bevacizumab
- Erlotinib



SIDE EFFECTS OF DRUG THERAPY

Cancer treatments have the potential to cause various side effects. Side effects can occur when normal cells are damaged by cancer treatment. Not everyone will have the same side effects.

It is important to know that, in many cases, side effects can be managed with supportive care therapies. Discuss any side effects you experience with your doctor or nurse.

Common side effects of drug therapy may include, but are not limited to:

- Loss of appetite (anorexia)
- Nausea and vomiting
- Hair loss
- Constipation
- Shortness of breath (dyspnea)
- Tiredness (fatigue)
- Numbness or tingling in the hands and/or feet (neuropathy)
- Rash
- Low red blood cell count (can cause severe fatigue)
- Low white blood cell count (can increase the likelihood of infection)

RADIATION THERAPY

Like chemotherapy and targeted agents, radiation therapy can also kill cells that grow and divide quickly. Radiation therapy can be used to eliminate tumors altogether (curative therapy), or to reduce the size of tumors before surgery. It can also be used after surgery to kill stray cancer cells, or to manage pain caused by tumor growth (palliative care).

There are several types of radiation therapy:

- **External beam radiation (external beam):** use of carefully aimed doses of radiation at specific sections of the lungs or surrounding areas
- **Intensity Modulated Radiation Therapy (IMRT):** a type of *conformal* radiation, which means the beams of radiation are shaped to match the shape of the tumor. By helping protect normal tissue surrounding the tumor, this technique helps reduce side effects associated with radiation therapy
- **Stereotactic Body Radiation Therapy (SBRT):** also known as stereotactic radiosurgery (STRS). This is a newer type of treatment that can target small lung cancers that cannot be removed by surgery. SBRT can be given either in a one-day session with a single dose of radiation, or on a “fractionated” schedule in which smaller doses are given over time
- **Brachytherapy (internal or implant radiation therapy):** radioactive material is sealed in needles, seeds, wires, or catheters and placed directly into or near a tumor. This technique helps reduce side effects associated with radiation therapy

SIDE EFFECTS OF RADIATION THERAPY

Common side effects of radiation therapy include:

- Tiredness (fatigue)
- Skin irritation
 - Redness
 - Itching
 - Dryness
 - Infection
- Loss of appetite (anorexia)
- Inflammation of the esophagus (esophagitis)
- Inflammation of the lung(s) (pneumonitis)

Discuss any side effects you experience with your doctor or nurse.



COMBINATION THERAPY

For some patients, attacking cancer cells with different types of treatment may produce better results than using a single type of treatment. For example, a treatment regimen may contain chemotherapy and a targeted agent, chemotherapy and radiation, radiation and surgery, or surgery followed by chemotherapy. Your doctor can tell you whether a single treatment or combination therapy is the best option for you.

CLINICAL TRIALS

Clinical trials are an option for eligible patients to receive treatments that are still being evaluated by doctors and scientists. There are clinical trials for people in all stages of disease and for all NSCLC subtypes. Be sure to speak with your doctor about whether enrolling in a clinical trial is the right choice for you.

Lung Cancer Clinical Trial Matching Service

Lung Cancer Alliance works with EmergingMed to offer a free clinical trial matching service. By providing information about your diagnosis, such as the stage and kind of lung cancer you have, your treatment history, and other information, a Clinical Trial Specialist will identify specific clinical trials for which you may be eligible. These recommendations can help you begin a discussion with your doctor to determine if enrolling in a clinical trial is right for you.

Lung Cancer Clinical Trial Matching Service: 1-800-698-0931

www.emergingmed.com/networks/LungCancerAlliance

Members of your treatment team may include:

■ INTERVENTIONAL RADIOLOGIST

A radiologist who specializes in performing minor surgical procedures using guidance from imaging techniques

■ MEDICAL ONCOLOGIST

A doctor who specializes in diagnosing and treating cancer

■ ONCOLOGY NURSE

A nurse who specializes in helping patients with cancer. An oncology nurse may further specialize in the surgical or medical management of a patient's care

■ ONCOLOGY SOCIAL WORKER OR COUNSELOR

A social worker or counselor who specializes in helping patients and loved ones cope with the emotional impact of cancer, and who may help identify other needed resources

■ PATHOLOGIST

A doctor who specializes in diagnosing and classifying cancer by studying tissue, fluid, or blood samples

■ PATIENT NAVIGATOR

A nurse, social worker, or trained lay person who assists patients and loved ones on their journey through the healthcare system

■ PULMONARY REHABILITATION SPECIALIST

A specialist who uses special exercises to reduce symptoms caused by diseases of the lung (including lung cancer), and to manage treatment side effects that affect the lungs

■ PULMONOLOGIST

A doctor who specializes in diagnosing and treating all diseases and conditions involving the lungs, including cancer

■ RADIATION ONCOLOGIST

A doctor who specializes in treating cancer using radiation

■ THORACIC SURGEON

A doctor who performs surgeries in the chest region. Some thoracic surgeons specialize in lung cancer

Glossary

- **ANGIOGENESIS:** The process of creating new blood vessels. Once tumors reach a certain size, they produce chemicals that trigger the growth of new blood vessels to supply nutrients and oxygen.
- **BIOPSY:** Removal of a small piece of tissue for examination and analysis.
- **CANCER:** A group of diseases in which cells grow and divide uncontrollably, forming tumors. In some cases, the tumors can invade nearby tissues. Tumor cells may also travel through the bloodstream and lymphatic system to spread to more distant parts of the body.
- **CARCINOMA:** Cancer that arises from epithelial cells, which are cells that cover or line internal and external body surfaces.
- **CHEMOTHERAPY:** Treatment with a chemical, or a combination of chemicals, to slow or kill rapidly dividing cells.
- **CLINICAL TRIAL:** A research study conducted to determine whether investigational drugs or treatments are safe and effective in humans.
- **COMPUTED TOMOGRAPHY (CT):** An imaging technique that uses a computer to create a series of precise X-ray images of internal organs. CT scans show much more detail than standard X-rays. Also known as “CAT” scanning.
- **HISTOLOGY:** The microscopic structure of tumor cells that helps a doctor determine the subtype of a tumor.
- **LOBECTOMY:** Surgery that removes the lobe (a portion) of the lung that contains a tumor. The right lung is divided into three lobes; the left lung has two lobes.
- **LYMPH NODES:** Small, oval structures located throughout the body that together form part of the immune system.
- **MAGNETIC RESONANCE IMAGING (MRI):** The use of magnetic fields to create images of internal organs.
- **METASTASIS:** The spread of tumor cells to sites in the body beyond the location in which the tumor began.
- **PNEUMONECTOMY:** Surgical removal of an entire lung.
- **POSITRON EMISSION TOMOGRAPHY (PET) SCAN:** An imaging technique that detects rapidly dividing cells. This may help find cancers that are difficult to detect by other means (eg, X-ray, CT scan, MRI).
- **RADIATION THERAPY:** The use of focused beams of radiation to kill cancer cells and reduce tumor size.
- **RESECTION:** The surgical removal of part of a tissue or organ.
- **SIDE EFFECTS:** Any undesired effects of a drug or treatment on a patient.
- **SPUTUM:** A phlegm-like substance brought up from the lungs that contains mucus, cells, microorganisms, blood, and/or pus.
- **STAGING:** Description of a tumor based on its size, location, and extent of spread to other organs.
- **TNM SYSTEM:** Staging of tumors according to three factors—size and location of tumor (“T”), spread to lymph nodes (“N”), and spread to other organs (also known as metastasis, “M”). In lung cancer, a tumor is considered metastatic if it spreads to the other lung or the pleura (the thin sac covering the lung).
- **TUMOR:** Abnormal tissue that results from uncontrolled cell division. Tumors perform no useful bodily function, and may be either benign (not cancerous) or malignant (cancerous).

For More Information

Be sure to ask your treatment team about the following:

- Support groups available to you, your loved ones, and your caregivers
- Where you can get financial assistance
- Where you can get treatment-related assistance, such as transportation to appointments
- Where you can get more information about lung cancer

Lung Cancer Alliance can provide more information about lung cancer and current treatments. We can also help in discussing support options or providing referrals to other resources (such as financial and legal assistance). Please contact us using the following information:

- **Information Line**
1-800-298-2436
- **Web site**
www.lungcanceralliance.org
- **E-mail**
info@lungcanceralliance.org
- **Lung Cancer Alliance**
888 16th Street, NW
Suite 150
Washington, DC 20006



ABOUT LUNG CANCER ALLIANCE

Lung Cancer Alliance (LCA) is the only national nonprofit organization dedicated solely to providing support and education for people living with or at risk for the disease. LCA offers unique education and support programs focused on helping people directly affected by lung cancer. Our mission is clear: leading the movement to reverse decades of stigma and neglect by *empowering patients, elevating awareness, and changing health policy.*



ABOUT THE AMERICAN COLLEGE OF CHEST PHYSICIANS

The American College of Chest Physicians (ACCP) is an international medical society and the leading resource for improvement in pulmonary, critical care, and sleep medicine worldwide. The ACCP promotes the prevention and treatment of chest diseases through leadership, education, research, and communication. Its philanthropic arm, The CHEST Foundation, helps patients live and breathe easier through work in four key areas: tobacco prevention, humanitarian service, clinical research, and critical care/end-of-life care. By giving life to projects in local communities and across the world, The CHEST Foundation enables the ACCP to realize its vision of being the global leader in providing education in cardiopulmonary, critical care, and sleep medicine to optimize health and advance patient care.





Lung Cancer Alliance's (LCA's) services are made possible by generous support from people like you. Please consider giving back so that others may continue to receive these free services. LCA is a 501(c)(3) nonprofit organization. All donations are tax-deductible to the full extent permitted by law.

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