



The Thoracic Oncology Program at Cleveland Clinic Florida, which includes specialists from the Maroon Cancer Center and the Departments of Pulmonary Medicine and Cardiothoracic Surgery, uses a multidisciplinary approach to cancer care. This allows us to focus our entire team's expertise and energy on providing the best outcomes for our patients. Patients with lung cancer, mesothelioma and rare tumors of the chest wall and mediastinum (mid-chest cavity), can benefit from this comprehensive, coordinated care.

CHOOSING CANCER CARE

Our team includes medical oncologists, radiation oncologists, radiologists, pathologists, pulmonologists and thoracic surgeons who work together to provide the most advanced medical and surgical treatment options available for lung cancer today. We've designed our services so that patients can see all of the specialists they need in an efficient and timely manner. While there is no one solution for treating lung cancer, there are many options. We help patients find the most effective treatments, allowing them to enjoy the best quality of life possible. Sometimes this means participating in a clinical trial which gives patients with all stages of lung

cancer the opportunity to participate in novel treatment protocols involving surgery, radiation and/or promising chemotherapeutic agents or biological agents, not widely available elsewhere.

With innovative treatments and excellent outcomes, Cleveland Clinic Florida lung cancer specialists are nationally recognized

USING THIS GUIDE

Please use this guide as a resource as you begin to learn about lung cancer and examine your treatment options. Remember, it is your right as a patient to ask questions, and to seek a second opinion.



Why Choose a Comprehensive Cancer Center?

The multidisciplinary approach used at top cancer centers like Cleveland Clinic Florida brings the expertise of several specialists, including surgeons, pathologists, oncologists, radiation therapists, nurses, social workers and others, to bear in customizing treatment for each patient. This collaboration also means that you will get the care you need right away, rather than waiting, sometimes weeks, between appointments with various specialists. Finally, while your tumor may be nonthreatening and treatment may be standardized, for many cancers there are significant differences in outcomes between centers.

Besides improved survival rates, comprehensive cancer centers often offer shorter hospital stays, reduced rates of complications, better management of side effects and access to the latest clinical trials.

The Leading Cause of Cancer Death

- Each year, lung cancer accounts for 15 percent of all cancer diagnoses in America.
- More patients die from lung cancer annually than from breast cancer, prostate cancer, and colon cancer all combined.
- Of those born today, one in 14 men and women will be diagnosed with cancer of the lung and bronchus (the large air tubes leading from the trachea, or windpipe, to the lungs) during their lifetime.
- Two out of three people diagnosed with lung cancer are over age 65.
- The most common age at diagnosis is 70 years.

What is lung cancer?

Like other cancers, lung cancer develops when normal processes of cell division and growth are disrupted, giving way to abnormal, uncontrollable growth. The cells grow into a mass, or tumor. Any abnormal growth in the body that directly invades surrounding tissues and organs, spreads to other parts of the body or has the potential to grow back after being removed is called “malignant,” or cancerous.

Lung cancer can take several years to develop. Cigarette smoking is the most common risk factor for developing lung cancer, and many individuals exposed to cigarette smoke – or some of its components – will end up with permanent abnormal changes in their lungs. Over many years, these changes can eventually trigger a cancerous tumor to develop within the lung.

However, 15 percent of all cases of lung cancer worldwide are diagnosed in people who have never smoked, and the underlying cause in these cases is not well understood. Many others have quit but still remain at risk for developing lung cancer.

Lung cancer is the most common malignancy worldwide, with more than 1 million cases diagnosed yearly. In the United States, an estimated 200,000 new cases were diagnosed in 2009 and more than 150,000 deaths were due to lung cancer – making it the leading cause of cancer death in both men and women.

How is lung cancer diagnosed and managed?

At Cleveland Clinic Florida, lung cancer is diagnosed and managed by collaboration among pulmonologists (lung specialists), pathologists (doctors who study tissue under the microscope), medical and radiation oncologists (cancer treatment specialists), and thoracic (chest) surgeons.

Usually, concern that a patient may have lung cancer starts when an abnormal finding is seen on a chest imaging study (chest X-ray or CT scan) or when the disease is advanced enough to cause symptoms, such as coughing, shortness of breath, chest pain, fatigue and/or weight loss.

Diagnosis requires a biopsy, or the removal of cells or tissues from the suspicious mass. Biopsies can be performed through a camera fed through the breathing tubes (called bronchoscopy) or from a needle inserted through the skin into the lung tumor. If these approaches are not successful, surgery may be required for an adequate diagnosis. The biopsy is important in determining whether or not it is cancer, and to determine which type of lung cancer is present.

All relevant information about the patient, including his or her health status, the kind of tumor and how far it has spread are brought together to design the most appropriate therapy for that individual's cancer. The ultimate goal is to provide the best care for the patient while being mindful of maintaining his or her quality of life.

LUNG CANCER SCREENING

Lung cancer screening means identifying lung cancer at an early stage prior to the development of symptoms. Recent evidence from the National Institute of Health shows that low-dose chest CT imaging may help save lives in those at highest risk of developing lung cancer. Cleveland Clinic Florida offers a comprehensive lung cancer screening program.



Staging lung cancer

Staging allows the physician to fully understand the extent of the patient's cancer to help make treatment decisions and determine expected outcomes. Doctors use specific terms to describe the stages of cancer, but a straightforward way of describing staging might be as follows:

- **Localized:** the cancer is confined to the lung
- **Regional:** the cancer has spread to lymph nodes (or glands) within the chest. Lymph nodes act as a filtering system outside the lung, collecting cancer cells that are beginning to migrate out of the lung
- **Distant:** the cancer has spread (or metastasized) to other parts of the body

Types of lung cancer

About 90 percent of lung cancers start in the lining of the bronchi (air passages branching off the trachea, or breathing tube). Lung cancer also can form in glands below the lining of the bronchi, frequently in the outer edges of the lungs. These lung cancers are one of two major types, small cell or non-small cell lung cancer, each of which grows and spreads in different ways:

NON-SMALL CELL LUNG CANCER

Non-small cell lung cancer is much more common, and usually grows and spreads more slowly than small cell lung cancer. There are three main types of non-small cell lung cancer, named for the type of cells in which the cancer develops:

1. **Adenocarcinoma** often starts growing near the outside surface of the lung and may vary in both size and growth rate. This is the most common type of lung cancer in both smokers and those who have never smoked.
2. **Squamous cell carcinoma** usually starts in one of the larger breathing tubes near the center of the chest. The size of these lung tumors can range from very small to quite large.
3. **Large cell carcinoma** often starts near the surface of the lung, grows rapidly and is usually quite extensive when diagnosed.

SMALL CELL LUNG CANCER

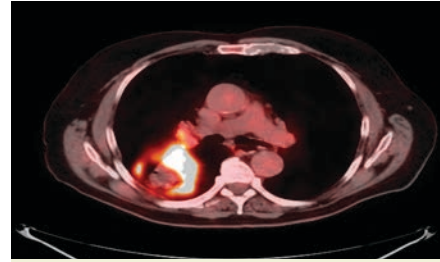
Small cell lung cancer is less common than non-small cell lung cancer accounting for about 15 percent of all lung cancers. This type of lung cancer grows fairly rapidly, is likely to be advanced by the time of diagnosis and spreads to other parts of the body quickly.

RARE CANCERS OF THE CHEST

There are more than a dozen kinds of uncommon tumors that can develop in the chest, which may or may not arise from the lung. Some of the less common types include carcinoid tumors (often located in a large airway), and malignant mesothelioma that develops from the pleura, or lining of the lung.

MESOTHELIOMA

Mesothelioma is a cancer that affects the mesothelium, the protective membrane that covers most of the body's internal organs. This rare cancer affects only about 3,000 people annually, usually in the part of the mesothelioma surrounding the lungs (pleura) but sometimes in the pericardium that covers the heart.

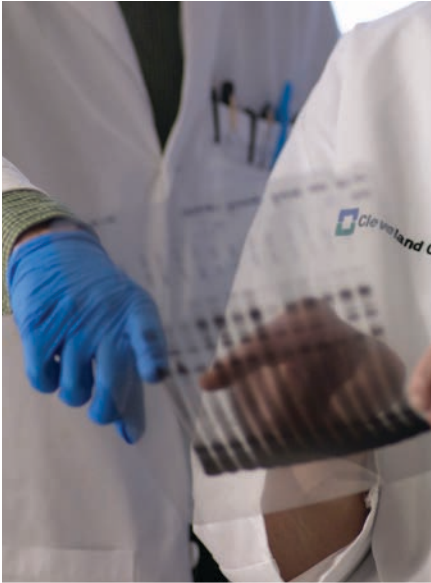


Metastatic Lung Cancer

For patients who have metastatic lung cancer (meaning it has spread outside the chest to other areas in the body), the goal of treatment is to control the burden of disease, prevent symptoms, maintain quality of life and potentially extend a person's life.

For patients well enough to tolerate it, the standard treatment at this stage is chemotherapy with a combination of a platinum-based drug and at least one other drug. In some cases, targeted drugs (which target specific weaknesses in tumors) may be substituted or added to chemotherapy. Chemotherapy at this stage has been proven to relieve symptoms, improve the quality of life and prolong survival. Radiation therapy is very effective at relieving a range of tumor-related symptoms, for example, pain relief from a metastasis to a bone, improving breathing by shrinking a tumor which is blocking an airway, stopping bleeding, or relieving any symptoms caused by disease spreading to the brain.

Your oncologist will help you choose your treatment based on your symptom burden and medical need so that chemotherapy and radiation can be selected at different points in time in order to maintain overall well-being, taking into account the specific characteristics of your cancer. The goal is always to give you the best chance at controlling your cancer of while minimizing the potential distressing side effects.



This type of cancer usually happens decades after exposure to asbestos. While most of those exposed to asbestos don't develop cancer, about 70 to 80 percent of those diagnosed with mesothelioma have worked with this type of insulation or fire-resistant material in building or manufacturing.

Mesothelioma can be hard to diagnose. The symptoms include shortness of breath and chest pain, which can easily be mistaken for other conditions, such as bronchitis. As with lung cancer, diagnosis is made after a physical exam, diagnostic testing and a biopsy. Treatment for mesothelioma requires highly individualized planning between surgeons, medical oncologists and radiation oncologists. Although treatment in the early stages may involve surgery, surgery alone is usually not curative. Radiation and chemotherapy also are commonly used to treat mesothelioma, whether or not the patient has surgery.

Treatment

Lung cancer is a very challenging cancer to treat. The most critical factor in determining the survival rate is the stage at the time of diagnosis. Unfortunately, most people are diagnosed when the disease has spread outside the chest (advanced or distant) or involves the nodes in the chest (regional). Also, the lungs are very sensitive organs and may not handle some forms of treatment easily. This helps explain why lung cancer has one of the poorest survival rates of all cancers. Two-year survival rate of those diagnosed with lung cancer is 25 percent. At five years, survival rate drops to 15 percent.

It is important to discuss the goals of lung cancer treatment with your doctor. Some treatments may be used to control the cancer. Others are used to improve quality of life and/or reduce symptoms. These treatments may be used alone or in combination.

CHEMOTHERAPY AND TARGETED THERAPIES

Chemotherapy is the use of drugs that are designed to kill rapidly growing cells such as cancer cells. Chemotherapy may be injected directly into a vein (by IV, or intravenously) or given through a catheter, which is a thin tube placed into a large vein and kept there until it is no longer needed. Some chemotherapy drugs are taken by pill.

Targeted agents are a newer class of drugs that are designed to act against specific weaknesses in cancer cells or surrounding supportive tissues such as blood vessels. These drugs can also be taken by pill or by IV.

In early stages of non-small cell cancer, chemotherapy may be used in conjunction with surgery to improve survival rates. In more advanced stages of non-small cell cancer and in all stages of small cell cancer, chemotherapy and targeted therapies are may be used to relieve symptoms and extend life.

These therapies affect both normal cells and cancer cells. Your doctors will try to prevent side effects as much as possible while treating the cancer appropriately. Side effects depend largely on the specific type of drug and the amount given. They can be different for each person and may be only temporary. Common side effects of chemotherapy include nausea and vomiting, hair loss, mouth sores and fatigue. Cleveland Clinic Florida doctors and nurses who specialize in cancer treatment can suggest ways to make any side effects more manageable and to help relieve symptoms that may occur during and after procedures.





RADIATION THERAPY

Radiation therapy is a form of high energy X-ray that kills cancer cells. It can be used as a primary treatment, or in combination with chemotherapy (with or without surgery) for curative intent. Radiation also plays an important role in the care of patients with advanced cancer by providing relief from pain, airway obstruction, shortness of breath, or coughing.

Three dimensional, conformal radiation therapy using a “high tech” linear accelerator is a focused treatment, meaning it is designed to maximize its effect on the cancer cells while minimizing any injury to normal cells. Occasionally, radiation may be delivered internally using catheters or tubes that channel a radioactive seed into the lung in close proximity to the tumor (brachytherapy).

An exciting, innovative technology for select lung tumors is stereotactic body radiation therapy or SBRT, sometimes called stereotactic radiosurgery. In patients with smaller tumors whom surgery is considered unsafe, high doses of SBRT can be used to destroy the tumor in 3 to 5 treatments. Lung cancer SBRT is now considered the standard of care for medically inoperable, early stage lung cancer. Cleveland Clinic radiation oncologists were some of the first in the world to use SBRT to treat lung cancers—now with over a decade of experience treating over 1,000 patients. Cleveland Clinic Florida has recently acquired some exciting new technology that helps us deliver SBRT more accurately, precisely and quickly. It is called the Varian Edge™ Radiosurgery System.

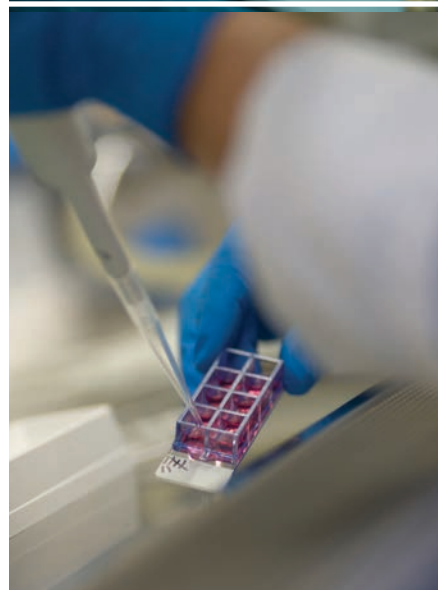
Varian Edge™ Based Stereotactic Body Radiation Therapy (SBRT): Only a few centers around the world offer Varian Edge technology. The Edge is a state-of-the-art linear accelerator with best in class radiosurgical capabilities. The Edge offers a 6 degrees of freedom treatment couch for accurate patient positioning, real-time tumor motion management, and the highest dose rate available, ensuring fast, precise delivery of high dose radiation.

Side effects of radiation therapy depend mainly on the part of the body that is treated and the treatment dose. Potential side effects of radiation therapy to the chest are a sore throat, difficulty swallowing fatigue, redness of the skin, and loss of appetite.

SURGERY

Surgery is still considered the “gold standard” for treating early stage lung cancer. Removing the tumor and surrounding lung tissue gives the best chance for cure for patients whose disease is localized. Surgery should be performed by specialized thoracic surgeons with particular expertise in treatment of lung cancer and other chest malignancies. Your surgeon will determine whether a tumor is resectable (removable). Not all tumors are resectable due to their location near – or if they have invaded – vital structures. Experience is critical to properly planning surgery and making certain that an appropriate treatment strategy and operation is chosen. Cleveland Clinic Florida’s thoracic surgeons perform over 300 surgeries per year. In some patients with multiple medical problems or poor lung function, surgery may not be the best option. This is carefully determined by our multi-disciplinary team including pulmonologists, medical oncologists and radiation oncologists who work collaboratively daily.

How much lung tissue will be removed and what type of surgical approach will be used depends on where the tumor is located in the lung, its size, patient’s body type/weight and any previous chest surgeries. All patients are considered first for minimally invasive surgery, although some complex cases may still require





a traditional, open approach. Cleveland Clinic Florida thoracic surgeons perform video-assisted thoracic surgery (VATS) and VATS lobectomy routinely as well as exploring the application of robotic surgery. Surgical resection of lung cancer is generally performed as:

- **Limited resection:** An operation to remove only a small portion of the lung is called a segmental resection.
- **Lobectomy:** Removal of large section of the lung, (there are three lobes of the lung on the right and two on the left), is called a lobectomy. This is the most common surgery performed for lung cancer.
- **Pneumonectomy:** The removal of an entire lung is called a pneumonectomy.

Recovery after thoracic surgery depends on the extent of the surgery, whether or not it is performed minimally invasively as well as the age and overall fitness of the patient. At Cleveland Clinic Florida, most patients return home within three to four days after lung cancer surgery.

Patients undergoing minimally invasive surgery (90 percent of the lung operations at Cleveland Clinic Florida are minimally invasive) can generally return to work three weeks after surgery. The risk of dying after surgery for lung cancer at Cleveland Clinic Florida is less than 1 percent overall.

CLINICAL TRIALS

For some patients, participating in a clinical trial may be the best treatment choice. Clinical trials are done to find out if new cancer treatments are safe and effective, or to see if they are better than the standard treatment. Many of today's standard treatments for cancer are based on earlier clinical trials. Patients who take part in a clinical trial may receive the standard treatment or be among the first to receive a new treatment.

Patients who take part in clinical trials also help improve the way cancer will be treated in the future. Even when clinical trials do not lead to effective new treatments, they often answer important questions and help move medical knowledge forward.

Life after treatment

The team at The Thoracic Oncology Program at Cleveland Clinic Florida helps patients understand what to expect after cancer treatment to help them and their loved ones plan for follow-up care, make lifestyle changes, and make important health-related decisions.

If lung cancer is localized or regional and treatment has been administered with the intention of curing the cancer, follow-up testing will be performed to ensure the cancer does not recur. You also will be assessed for side effects related to the treatment received, and treatment will be offered to help with any related symptoms.

Follow-up in patients whose lung cancer is metastatic and/or treatment was intended to improve the quality of life and extend life will be tested over time to determine how the cancer is responding to treatment, and to monitor for side effects from therapy. The length of treatment or the need to change therapies will be determined by these follow-up tests.

Patient Services

Special programs for lung cancer patients

PULMONARY REHABILITATION

Chronic diseases and disorders of the lungs and airways, as well as some of the invasive treatments for them, can take their toll on health and quality of life. Pulmonary rehabilitation programs use an array of tactics – from education and exercise to encouraging lifestyle changes – to help our patients manage their conditions.



PAIN MANAGEMENT

Pain can be a significant issue for people undergoing cancer treatment. Various cancer interventions, as well as the cancer itself, can cause pain. Effective pain management can help maintain or improve quality of life and even help reduce the risk of depression associated with pain.

SMOKING CESSATION

Smoking is a major cause of lung cancer, but quitting can be a challenging proposition for some chronic smokers. As smoking patterns vary from person to person, there is no “best” method for quitting. The most successful smoking cessation programs offer smokers a range of strategies. Cleveland Clinic Florida's smoking cessation programs uses various strategies to help patients modify smoking habits.

Contacting Cleveland Clinic Florida

STILL HAVE QUESTIONS ABOUT LUNG CANCER?

If after reviewing this guide you have additional questions, Cleveland Clinic Florida's Maroon Cancer Center can help. Oncology clinical nurse specialists and their staff can provide information and answer questions about cancer. Our specialists are available 8:30 a.m. to 4:30 p.m., Monday through Friday. Please call **954.659.5840**.

READY TO SCHEDULE AN APPOINTMENT WITH A SPECIALIST?

If you would like to set up a consultation with a Cleveland Clinic Florida specialist, please call the Appointment Center at **844.501.5990**.



About Cleveland Clinic Florida

Cleveland Clinic Florida, located in Weston, West Palm Beach, Palm Beach Gardens and Parkland, is a not-for-profit, multi-specialty, academic medical center that integrates clinical and hospital care with research and education. Cleveland Clinic Florida has 255 physicians with expertise in 55 specialties. The medical campus is fully integrated and includes diagnostic centers, outpatient surgery and a 24-hour emergency department located in the state-of-the-art hospital. Cleveland Clinic Florida ranked #1 among the best hospitals in the Miami-Fort Lauderdale metro area and fifth in Florida in *US News & World Report's* 2016-2017 ranking of Best Hospitals metro area rankings. Cleveland Clinic Florida is an integral part of Cleveland Clinic Ohio, where providing outstanding patient care is based upon the principles of cooperation, compassion and innovation. Physicians at Cleveland Clinic are experts in the treatment of complex conditions that are difficult to diagnose. For more information about Cleveland Clinic Florida, visit www.clevelandclinicflorida.org.