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[Lung Cancer - Non-Small Cell - Treatment Options](#) [1]

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ON THIS PAGE: You will learn about the different ways doctors use to treat people with NSCLC. To see other pages, use the menu.

This section tells you the treatments that are the standard of care for this type of cancer. “Standard of care” means the best treatments known. When making treatment plan decisions, patients are also encouraged to consider clinical trials as an option. A clinical trial is a research study that tests a new approach to treatment. Doctors want to learn if it is safe, effective, and possibly better than the standard treatment. Clinical trials can test a new drug, a new combination of standard treatments, or new doses of standard drugs or other treatments. Your doctor can help you consider all your treatment options. To learn more about clinical trials, see the [About Clinical Trials](#) [3] and [Latest Research](#) [4] sections.

Treatment overview

In cancer care, different types of doctors often work together to create a patient’s overall treatment plan that combines different types of treatments. This is called a [multidisciplinary team](#) [5]. Cancer care teams also include a variety of other health care professionals, including physician assistants, oncology nurses, social workers, pharmacists, counselors, dietitians, and others.

Patients should have a sense that their doctors have a coordinated plan of care and are working effectively with one another. If patients do not feel that the members of their health care team are communicating effectively with them or each other about the goals of treatment and the plan of care, patients should discuss this with their doctors or seek additional medical opinions before treatment.

There are 5 basic ways to treat NSCLC:

- Surgery
- Radiation therapy
- Chemotherapy
- Targeted therapy
- Immunotherapy

Each treatment option is described below, followed by an outline of common treatment plans by the stage of NSCLC. Treatment options and recommendations depend on several factors, including the type and stage of cancer, possible side effects, and the patient's preferences and overall health. Your care plan may also include treatment for symptoms and side effects, an important part of cancer care. Take time to learn about all of your treatment options and be sure to ask questions about things that are unclear. Also, talk about the goals of each treatment with your doctor and what you can expect while receiving the treatment. Learn more about [making treatment decisions](#) [6].

Surgery

A surgical oncologist is a doctor who specializes in treating cancer using surgery. For lung cancer, a thoracic surgeon is specially trained to perform lung cancer surgery. The goal of surgery is the complete removal of the lung tumor and the nearby lymph nodes in the chest. The tumor must be removed with a surrounding border or margin of healthy lung tissue. A "negative margin" means that when the pathologist examines the lung, or piece of lung that has been removed by the surgeon, no cancer was found in the healthy tissue surrounding the tumor.

The following types of surgery may be used for NSCLC:

- **Lobectomy.** The lungs have 5 lobes, 3 in the right lung and 2 in the left lung. The removal of an entire lobe of the lung in a procedure called a lobectomy is currently thought to be the most effective type of surgery, even when the lung tumor is very small.
- **A wedge resection.** If the surgeon cannot remove an entire lobe of the lung, the surgeon can remove the tumor, surrounded by a margin of healthy lung.

- **Segmentectomy.** This is another way to remove the cancer when an entire lobe of the lung cannot be removed. In a segmentectomy, the surgeon removes the portion of the lung where the cancer developed.
- **Pneumonectomy.** If the tumor is close to the center of the chest, the surgeon may have to remove the entire lung.

The time it takes to recover from lung surgery depends on how much of the lung is removed and the health of the patient before surgery. Talk with your health care team about what to expect before your surgery, including recovery time and possible side effects. Learn more about the basics of [cancer surgery](#) [7].

Adjuvant therapy

Adjuvant therapy is treatment that is given after surgery to lower the risk of the lung cancer returning. Adjuvant therapy may include radiation therapy, chemotherapy, targeted therapy, or immunotherapy. Each therapy is described below. It is intended to get rid of any lung cancer cells that may still be in the body after surgery. It also can decrease the risk of recurrence, though there is always some risk that the cancer will come back.

Along with staging, other tools can help determine prognosis and help you and your doctor make decisions about whether adjuvant therapy would be helpful in your treatment. The website Adjuvant! Online (www.adjuvantonline.com [8]) is a tool that your doctor can access to interpret a variety of factors that are important for making treatment decisions. This website should only be used with the help of your doctor.

Radiation therapy

Radiation therapy is the use of high energy x-rays or other particles to destroy cancer cells. If you need radiation therapy, you will be asked to see a specialist called a radiation oncologist, a doctor who specializes in giving radiation therapy to treat cancer. The most common type of radiation treatment is called external-beam radiation therapy, which is radiation given from a machine outside the body. A radiation therapy regimen (schedule) usually consists of a specific number of treatments given over a set period of time. This can vary from just a few days of treatment to several weeks.

Like surgery, radiation therapy cannot be used to treat widespread cancer. Radiation only destroys cancer cells directly in the path of the radiation beam. It also damages the healthy cells in its path; for this reason, it cannot be used to treat large areas of the body.

Sometimes, CT scans (see [Diagnosis](#) [9]) are used to plan out exactly where to direct the radiation to lower the risk of damaging healthy parts of the body. This is called intensity modulated radiation therapy (IMRT) or stereotactic body radiation therapy (SBRT). It is not an

option for all patients, but it may be used for patients with early disease and small tumors when surgery is not an option.

Listen to a Cancer.Net Podcast on [ASCO's recommendations for radiation therapy for NSCLC](#) [10].

Side effects of radiation therapy

Patients with lung cancer who receive radiation therapy often experience fatigue and loss of appetite. If radiation therapy is given to the neck or center of the chest, patients may also develop a sore throat and have difficulty swallowing. Patients may also notice skin irritation, similar to sunburn, where the radiation was directed. Most side effects go away soon after treatment is finished.

If the radiation therapy irritates or inflames the lung, patients may develop a cough, fever, or shortness of breath months and sometimes years after the radiation therapy ends. About 15% of patients develop this condition, called radiation pneumonitis. If it is mild, radiation pneumonitis does not need treatment and goes away on its own. If it is severe, a patient may need treatment for radiation pneumonitis with steroid medications, such as prednisone (multiple brand names). Radiation therapy may also cause permanent scarring of the lung tissue near where the original tumor was located. Typically, the scarring does not cause symptoms. However, severe scarring can cause a permanent cough and shortness of breath. For this reason, radiation oncologists carefully plan the treatments using CT scans of the chest to lessen the amount of healthy lung tissue exposed to radiation (see above).

Learn more about the basics of [radiation therapy](#) [11].

Chemotherapy

Chemotherapy is the use of drugs to destroy cancer cells, usually by stopping the cancer cells' ability to grow and divide. It has been shown to improve both the length and quality of life for people with lung cancer of all stages. Chemotherapy is given by a medical oncologist, a doctor who specializes in treating cancer with medication.

Systemic chemotherapy gets into the bloodstream to reach cancer cells throughout the body. Common ways to give chemotherapy include an intravenous (IV) tube placed into a vein using a needle or in a pill or capsule that is swallowed (orally). Most chemotherapy used for lung cancer is given by IV injection.

A chemotherapy regimen usually consists of a specific number of cycles given over a set period of time. The type of lung cancer you have, such as adenocarcinoma or squamous cell carcinoma, affects which drugs are used for chemotherapy.

Common drugs used to treat lung cancer include either 2 or 3 drugs together or 1 drug by itself. Most therapies cause side effects that can generally be managed by the health care team.

Some common drugs include:

- Carboplatin (Paraplatin) or cisplatin (Platinol)
- Docetaxel (Docefrez, Taxotere)
- Gemcitabine (Gemzar)
- Nab-paclitaxel (Abraxane)
- Paclitaxel (Taxol)
- Pemetrexed (Alimta)
- Vinorelbine (Navelbine)

The side effects of chemotherapy depend on the individual and the dose used, but they can include fatigue, risk of infection, nausea and vomiting, hair loss, loss of appetite, diarrhea, and hair loss. Nausea and vomiting are often avoidable; learn more about [preventing nausea and vomiting caused by cancer treatment](#) [12]. These side effects usually go away once treatment is finished.

Chemotherapy may also damage healthy cells in the body, including blood cells, skin cells, and nerve cells. This may cause low blood counts, an increased risk of infection, hair loss, mouth sores, and/or numbness or tingling in the hands and feet. Your medical oncologist can often prescribe drugs to help relieve many of these side effects. Hormone injections are also used to prevent white and red blood cell counts from becoming too low.

Learn more about the basics of [chemotherapy](#) [13] and [preparing for treatment](#) [14]. The medications used to treat cancer are continually being evaluated. Talking with your doctor is often the best way to learn about the medications prescribed for you, their purpose, and their potential side effects or interactions with other medications. Learn more about your prescriptions by using [searchable drug databases](#) [15].

Targeted therapy

Targeted therapy is a treatment that targets the cancer's specific genes, proteins, or the tissue environment that contributes to cancer growth and survival. This type of treatment blocks the

growth and spread of cancer cells while limiting damage to healthy cells.

Recent studies show that not all tumors have the same targets. To find the most effective treatment, your doctor may run tests to identify the genes, proteins, and other factors in your tumor. For some lung cancers, abnormal proteins are found in unusually large amounts in the cancer cells. This helps doctors better match each patient with the most effective treatment whenever possible. In addition, many research studies are taking place now to find out more about specific molecular targets and new treatments directed at them. Learn more about the basics of [targeted treatments](#) [16].

For NSCLC, the following types of targeted therapy may be used, particularly in [clinical trials](#) [3]. Talk with your doctor about possible side effects for a specific medication and how they can be managed.

- **Anti-angiogenesis therapy.** [Anti-angiogenesis therapy](#) [17] is focused on stopping angiogenesis, which is the process of making new blood vessels. Because a tumor needs the nutrients delivered by blood vessels to grow and spread, the goal of anti-angiogenesis therapies is to “starve” the tumor. The following anti-angiogenic drugs may be options for lung cancer:
 - Bevacizumab (Avastin) is an anti-angiogenic drug given along with chemotherapy for lung cancer. The risk of serious bleeding for patients taking bevacizumab is about 2%. However, it is more common for patients with squamous cell carcinoma, so bevacizumab is not recommended for patients with this type of NSCLC.
 - Ramucirumab (Cyramza), which is approved for NSCLC along with the chemotherapy docetaxel.
- **Epidermal growth factor receptor (EGFR) inhibitors.** Researchers have found that drugs that block EGFR may be effective for stopping or slowing the growth of lung cancer.
 - Erlotinib (Tarceva) is a drug that blocks EGFR. This drug has been shown to work better than chemotherapy if the lung cancer has a mutation in the *EGFR* gene. It is approved by the U.S. Food and Drug Administration (FDA) for patients with locally advanced and metastatic NSCLC and as a maintenance therapy for patients with NSCLC that has not grown or spread after at least 4 cycles of chemotherapy. This medication is a pill that can be taken by mouth. The side effects of erlotinib include a rash that looks like acne, and diarrhea.
 - Gefitinib (Iressa) is another drug that blocks EGFR. This treatment was only available

in Europe and Asia but now is also available in the United States.

- Afatinib (Gilotrif) was approved by the FDA in 2013 as an initial treatment for NSCLC. It is a type of drug called a tyrosine kinase inhibitor (TKI) that works by stopping uncontrolled cell growth caused by a mutation in the *EGFR* gene.
 - Osimertinib (Tagrisso) has been approved for NSCLC when other types of targeted therapies called TKIs have not worked.
 - Necitumumab (Portrazza) may be an option along with chemotherapy for squamous cell lung cancers.
- **Drugs that target other genetic changes.** Researchers have found that targeting other genetic changes in lung tumors may help stop or slow the growth of NSCLC. One example is anaplastic lymphoma kinase (ALK) inhibitors. Mutations in the *ALK* gene are found in about 5% of patients with NSCLC. Another example are drugs that target changes in a gene called *ROS1*.
- Crizotinib (Xalkori) is another type of targeted therapy approved by the FDA for advanced NSCLC that has a mutation in the *ALK* or *ROS1* genes.
 - Ceritinib (Zykadia) is an additional targeted therapy for NSCLC with an *ALK* gene mutation. It is approved by the FDA for patients when the cancer worsens while they are receiving crizotinib or if they cannot take crizotinib.
 - Alectinib (Alecensa) is another option for NSCLC with changes in the *ALK* gene after crizotinib has not worked.

Immunotherapy

Immunotherapy, also called biologic therapy, is designed to boost the body's natural defenses to fight the cancer. It uses materials made either by the body or in a laboratory to improve, target, or restore immune system function. For example, the PD-1 pathway may be critical in the immune system's ability to control cancer growth. Blocking this pathway with PD-1 and PD-L1 antibodies has stopped or slowed the growth of NSCLC for some patients.

- Nivolumab (Opdivo) is the first of these types of drugs to be approved for NSCLC.

- Pembrolizumab (Keytruda) is another type of these drugs recently approved for NSCLC that has spread after patients have received other treatments.

Learn more about the basics of [immunotherapy](#) [18].

Getting care for symptoms and side effects

Cancer and its treatment often cause side effects. In addition to treatment to slow, stop, or eliminate the cancer, an important part of cancer care is relieving a person's symptoms and side effects. This approach is called palliative or supportive care, and it includes supporting the patient with his or her physical, emotional, and social needs.

Palliative care is any treatment that focuses on reducing symptoms, improving quality of life, and supporting patients and their families. Any person, regardless of age or type and stage of cancer, may receive palliative care. It works best when palliative care is started as early as needed in the cancer treatment process. People often receive treatment for the cancer and treatment to ease side effects at the same time. In fact, patients who receive both often have less severe symptoms, better quality of life, and report they are more satisfied with treatment.

Palliative treatments vary widely and often include medication, nutritional changes, relaxation techniques, emotional support, and other therapies. You may also receive palliative treatments similar to those meant to eliminate the cancer, such as chemotherapy, surgery, or radiation therapy. Talk with your doctor about the goals of each treatment in your treatment plan.

The following treatments may be given to help relieve the symptoms of NSCLC:

- A tumor in the chest that is bleeding or blocking the lung passages can be shrunk with radiation therapy.
- During a bronchoscopy (See [Diagnosis](#) [9]), lung passages blocked by cancer can be opened to improve breathing.
- A surgeon can use a laser to burn away a tumor or place a stent to prop open an airway.
- Medications are used to treat cancer pain. Most hospitals and cancer centers have pain control specialists who provide pain relief, even for severe cancer pain. Many drugs used to treat cancer pain, especially morphine, can also relieve shortness of breath caused by cancer. Learn more about [managing cancer pain](#) [19].
- Medications can be used to suppress cough, open closed airways, or reduce bronchial

secretions.

- Prednisone or methylprednisolone (multiple brand names) can reduce inflammation caused by lung cancer or radiation therapy and improve breathing.
- Extra oxygen from small, portable tanks can help make up for the lung's reduced ability to extract oxygen from the air.
- Medications are available to strengthen bones, lessen bone pain, and help prevent future bone metastases.
- Appetite stimulants and nutritional supplements can improve appetite and reduce weight loss.

Before treatment begins, talk with your health care team about the possible side effects of your specific treatment plan and palliative care options. And during and after treatment, be sure to tell your doctor or another health care team member if you are experiencing a problem so it can be addressed as quickly as possible. Learn more about [palliative care](#) [20].

Treatment of NSCLC by stage

- **Stage I and II NSCLC.** In general, stage I and stage II NSCLC are treated with surgery. Surgeons cure many patients with an operation. Before or after surgery, a patient may meet with a medical oncologist. Some patients with large tumors or signs that the tumor has spread to the lymph nodes may benefit from chemotherapy. Chemotherapy may be given before the surgery, called neoadjuvant chemotherapy or induction chemotherapy. Or, chemotherapy may be given after surgery, called adjuvant chemotherapy, to reduce the chance the cancer will return. Radiation therapy may be used to treat, and can sometimes cure, a lung tumor when surgery is not recommended.
- **Stage III NSCLC.** More than 30,000 patients are diagnosed with stage III disease every year and there is no single best treatment for all of these patients. Treatment options depends on the size and location of the tumor and the lymph nodes that are involved. The options generally include:
 - Radiation therapy

- Chemotherapy
- Surgery

- In general, patients with stage III NSCLC receive at least 2 different types of treatment, sometimes 3. A combination of chemotherapy and radiation therapy is usually recommended. Chemotherapy and radiation therapy may be given together, which is called concurrent chemoradiotherapy. Or, they may be given one after the other, called sequential chemoradiotherapy.

Surgery may be an option after initial chemotherapy or chemotherapy with radiation therapy. Sometimes, surgery may be the first treatment, particularly when cancer is found in the lymph nodes unexpectedly after a person has originally been diagnosed with stage I or stage II cancer. If this occurs, surgery is generally followed by chemotherapy and often radiation therapy.

- **Metastatic or stage IV NSCLC.** If cancer spreads to another part in the body from where it started, doctors call it metastatic cancer. If this happens, it is a good idea to talk with doctors who have experience in treating it. Doctors can have different opinions about the best standard treatment plan. Also, clinical trials might be an option. Learn more about getting a [second opinion](#) [21] before starting treatment, so you are comfortable with your treatment plan chosen.

Patients with stage IV NSCLC typically do not receive surgery or radiation therapy. Occasionally, doctors may recommend surgery for a metastasis in the brain or adrenal gland if that is the only place the cancer has spread. Patients with stage IV disease have a very high risk of the cancer spreading or growing in another location. Most patients at this stage of NSCLC receive only chemotherapy.

- **Radiation therapy for brain metastases.** Chemotherapy is often not as effective as radiation therapy or surgery to treat NSCLC that has spread to the brain. For this reason, NSCLC that has spread to the brain is treated with radiation therapy, surgery, or both. Most patients with brain metastases from NSCLC receive radiation therapy to the entire brain. This can cause side effects such as hair loss, fatigue, and redness of the scalp. With a small tumor, a type of radiation therapy called stereotactic radiosurgery can focus radiation only on the tumor in the brain and lessen the side effects.
- **Chemotherapy.** The goals of chemotherapy are to shrink the cancer, relieve discomfort caused by the cancer, prevent the cancer from spreading further, and lengthen a patient's

life. Chemotherapy can rarely make metastatic lung cancer disappear. However, doctors know from experience that the cancer will usually return. Therefore, patients with stage IV disease are never considered “cured” of their cancer no matter how well chemotherapy works. Treatment often continues as long as it is controlling the cancer’s growth. Chemotherapy has been proven to improve both length and quality of life for patients with stage IV NSCLC. If the cancer worsens or causes too many severe side effects, the treatment may be stopped, and patients would continue to receive palliative care.

- **Palliative care.** Palliative care will also be important to help relieve symptoms and side effects. Radiation therapy or surgery may also be used to treat metastases that are causing pain or other symptoms. Bone metastases that weaken major bones can be treated with surgery, and the bones can be reinforced using metal implants.

For most patients, a diagnosis of metastatic cancer is very stressful and, at times, difficult to bear. Patients and their families are encouraged to talk about the way they are feeling with doctors, nurses, social workers, or other members of the health care team. It may also be helpful to talk with other patients, including through a support group.

Learn more about [ASCO’s recommendations for the treatment of stage IV NSCLC](#) [22].

Remission and the chance of recurrence

A remission is when cancer cannot be detected in the body and there are no symptoms. This may also be called having “no evidence of disease” or NED.

A remission may be temporary or permanent. This uncertainty causes many people to worry that the cancer will come back. While many remissions are permanent, it’s important to talk with your doctor about the possibility of the cancer returning. Understanding your risk of recurrence and the treatment options may help you feel more prepared if the cancer does return. Learn more about [coping with the fear of recurrence](#) [23].

If the cancer does return after the original treatment, it is called recurrent cancer. It may come back in the same place (called a local recurrence), nearby (regional recurrence), or in another place (distant recurrence). Most often, when there is recurrence, it is stage IV disease.

When this is a recurrence, a cycle of testing will begin again to learn as much as possible about the recurrence. After testing is done, you and your doctor will talk about your treatment options. Often the treatment plan will include the treatments described above such as surgery, chemotherapy, and radiation therapy, but they may be used in a different combination or given at a different pace. Your doctor may also suggest clinical trials that are studying new ways to treat this type of recurrent cancer. Whichever treatment plan you choose, palliative care will be important for relieving symptoms and side effects.

People with recurrent cancer often experience emotions such as disbelief or fear. Patients are encouraged to talk with their health care team about these feelings and ask about support services to help them cope. Learn more about [dealing with cancer recurrence](#) [24].

If treatment fails

Recovery from cancer is not always possible. If the cancer cannot be cured or controlled, the disease may be called advanced or terminal.

This diagnosis is stressful, and advanced cancer is difficult to discuss for many people. However, it is important to have open and honest conversations with your doctor and health care team to express your feelings, preferences, and concerns. The health care team is there to help, and many team members have special skills, experience, and knowledge to support patients and their families. Making sure a person is physically comfortable and free from pain is extremely important.

Patients who have advanced cancer and who are expected to live less than 6 months may want to consider a type of palliative care called hospice care. Hospice care is designed to provide the best possible quality of life for people who are near the end of life. You and your family are encouraged to think about where you would be most comfortable: at home, in the hospital, or in a hospice environment. Nursing care and special equipment can make staying at home a workable alternative for many families. Learn more about [advanced cancer care planning](#) [25].

After the death of a loved one, many people need support to help them cope with the loss. Learn more about [grief and loss](#) [26].

The [next section in this guide is About Clinical Trials](#) [3]. It offers more information about research studies that are focused on finding better ways to care for people with cancer. Or, use the menu to choose another section to continue reading this guide.

Links

[1] <http://www.cancer.net/cancer-types/lung-cancer-non-small-cell/treatment-options>

[2] <http://www.cancer.net/about-us>

[3] <http://www.cancer.net/node/19156>

[4] <http://www.cancer.net/node/19160>

[5] <http://www.cancer.net/node/25356>

[6] <http://www.cancer.net/node/24582>

[7] <http://www.cancer.net/node/24720>

[8] <http://www.adjuvantonline.com/>

[9] <http://www.cancer.net/node/19153>

[10] <http://www.cancer.net/node/33176>

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