

# A Review on Lung Cancer with Emphasis on Current Treatment

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**Abstract:** Cancer is a broad term that refers to more than 277 types of cancer. It is a disease that results from a variety of causes, including mutations resulting from oncogene activation, tumor suppressor gene failure, or other factors. Mutations in these genes cause abnormal cell growth. Lung cancer is one of the leading causes of cancer in the world. Lung cancer, also known as lung cancer, is a lung disease caused by the uncontrolled growth of cells in tissues. Risk factors include smoking, exposure to radon gas, asbestos, secondhand smoke, and pollution. The two types of lung cancer are small cell lung cancer (SCLS) and non-small cell lung cancer (NSCLS). Common symptoms include cough, hemoptysis, weight loss, fatigue, fever or clubbing, hypercalcemia, myasthenic syndrome (muscle fatigue), and changes. Lung cancer is classified by histological type and stage using TNM (tumor, tumour, and metastasis). Treatment depends on the type of cancer and includes surgery, radiation and chemotherapy. Long-term intake of vitamin A, vitamin D, or vitamin E does not reduce the risk of lung cancer. Consuming more vegetables and fruits will reduce the risk. There is no clear link between diet and lung cancer. Most patients with advanced NSCLC who respond to surgery are treated with adjuvant chemotherapy. Histological diagnosis can be made by sputum cytology, thoracentesis, access to lymph nodes, bronchoscopy, transthoracic needle aspiration, video-assisted thoracoscopy or thoracotomy. Initial evaluation of metastatic disease is based on history and physical examination, chest examination, computed tomography, PET scan, and clear tissue of mediastinal involvement. Despite the interest in screening among scientists and doctors, there is no major organization recommending screening for early detection of lung cancer. Smoking is still an important part of primary prevention.

**Keywords:** Cancer, Tumor, Oncogenes, Lung cancer, Risk factor, Smoking, Chemotherapy

## I. INTRODUCTION

Cancer is defined as the abnormal growth of cells that tend to proliferate in an uncontrolled manner. This is a genetic disease. Cancer is the second leading cause of death worldwide. It is a group of more than 100 different and unique diseases. Most cancers are named according to the type of cell or organ in which they start. Cancer is a serious problem for human health. The highest rates among men are prostate cancer, lung and lung cancer, breast and rectal cancer, and lung cancer. The most common among women are breast cancer, lung cancer, bronchus, colon and rectum, uterine and thyroid gland cancers. If the cancer has spread, the new tumor has the same name as the original (primary) tumor. When cancer cells spread from one body to another, this is called metastasis.

Although the incidence of lung cancer is increasing in developing countries such as China and India, public health characteristics are important in the evaluation of lung cancer. Lung cancer is one of the few cancers for which screening is not recommended, even in high-risk groups. Lung cancer is cancer that starts in the cells that make up the lungs. It is not cancer that has spread to the lungs from another part of the body. This is important because treatment depends on the original location of the tumor. A type of tumor called a nodule, which arises from the cells lining the lungs, can lead to lung cancer. These cells normally produce contrast and appear as spherical masses on a chest X-ray. These tumors can be diagnosed using different types of studies, including magnetic resonance imaging (MRI), isotopes, X-rays, and computed tomography (CT). Small cell lung cancer (SCLC) and non-small cell lung cancer are two types of lung cancer. The presence of small nodules on large 3D lung CT scans should be diagnosed with computer-aided diagnostic (CAD) systems.

## **EPIDEMIOLOGY**

Despite recent advances in understanding of lung cancer genetics, the following topics, the role of the immune system in lung cancer control, and treatment development, lung cancer is still the leading cause of cancer in men and women. Lung cancer is more common in men than women and occurs most often in people between the ages of 50 and 70. Generally thought to be different from smoking, a diagnosis of lung cancer is twice as common in men, although women may be more affected by a greater number of epidermal tumors due to growth changes and the effects of estrogen. It is the second most commonly diagnosed cancer worldwide (after breast cancer) and its incidence continues to increase.

- Approximately 236,740 new lung cancer cases (117,910 men, 118,830 women), a new diagnosis every 2.2 minutes
- Approximately 130,180 lung cancer deaths (68,820 men, 61,360 women).

It is estimated that 238,340 people in the United States will be diagnosed with lung cancer by 2023. Lung cancer rates are highest in countries with the highest smoking rates; incidence rates vary more than 20-fold between regions. Lung cancer is the most common internal organ cancer, accounting for approximately one-third of all cancer cases. In 2013, more than 225,000 people in the United States were diagnosed with cancer and more than 150,000 died from the disease. Lung cancer rates have increased in men and women since the 1980s. This cancer has become the leading cause of death in the Middle East, Africa and Asia. Lung cancer rates vary among ethnic groups around the world. Early diagnosis of lung cancer is important in reducing the incidence of lung cancer. More people die from lung cancer each year than from colon, breast and lung cancer combined. The first symptom of lung cancer is pneumonia, and recurrence of the disease after treatment can sometimes be an early sign of pneumonia. Common symptoms of lung cancer include persistent or worsening cough, shortness of breath, chest pain, hoarseness, or unexplained weight gain.

## **TYPES OF LUNG CANCER**

Cancer is divided into two broad groups based on the appearance of its cells under the microscope.

- **Pneumonia:** Pneumonia is only seen in heavy smokers.
- **Non-small cell lung cancer:** Non-small cell lung cancer is a general term used for many types of lung cancer that behave similarly. Non-small cell carcinomas include squamous cell carcinoma, adenocarcinoma, and large cell carcinoma.

### **Small cell lung carcinoma (SCLC)**

Small lung cancer is a rare, fast-growing lung disease often caused by smoking. It is also called oat cell carcinoma. It usually starts in the respiratory tract (bronchi) and grows rapidly, forming large tumors that spread throughout the body. SCLC is a malignant tumor originating from cells with neuroendocrine properties and accounts for 15% of all cancers. In the United States, the survival rate for SCLC is 8% in women and 6% in men. Many people with this cancer do not survive 5 years after diagnosis. Even if the cancer has spread, treatment can often extend life by 6 to 12 months. In rare cases, if SCLC is diagnosed early, treatment can lead to long term recovery. The more you smoke and the sooner you start smoking, the greater your risk of SCLC. SCLC is diagnosed through a biopsy, which involves removing tissue from a lymph node or tumor for diagnosis.

Small cell tumors usually spread to:

- Lymph nodes
- Bones
- Brain
- Liver
- Adrenal glands

Lymph nodes and organs new cancer cells appear. Small lymph nodes can also cause fluid to build up in the lungs or the area around the lungs. It pushes air out of the lungs, causing them to burst. This is called hydropleural effusion.

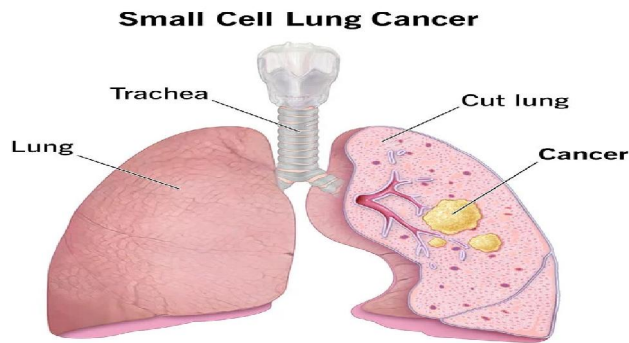
### **Symptoms of SCLC:**

Chest pain or discomfort  
Chronic cough  
Coughing up blood (hemoptysis)  
Fatigue

Hoarseness  
Loss of appetite  
Swollen neck vein  
Weight loss  
Wheezing  
Facial swelling

**Stages of SCLC:**

- Low stage: This means you have cancer in one lung that has spread to the area of the lung above your bone. Approximately one-third of small cell lung cancer patients have cancer in the area at diagnosis.
- Advanced stage: In the advanced stage, the cancer has spread to other parts of your lungs or to lymph nodes beyond the lungs. It can also spread to your bones, brain, and other organs.



**Non-small cell lung carcinoma (NSCLC):**

Non-small cell lung cancer is the most common type of lung cancer. It usually grows and spreads slower than small breast cancer. There are many types of statistics that help doctors evaluate a person's chances of recovering from NSCLC. These are called survival statistics.

There are three types of non-small cell lung cancer (NSCLC):

1. Adenocarcinoma usually occurs outside the lung (40% of lung cancers).
2. Squamous cell carcinoma usually occurs in the center of the lung, near the trachea (accounting for 25% of lung cancers).
3. Large cell carcinoma can occur anywhere in the lung (accounting for 10% of lung cancers).

**Adenocarcinoma**

Increasing in frequency. Most common type of lung cancer.

Clearly defined peripheral lesions

Glandular appearance under a microscopes

Easily seen on a CXR

Can occur in non-smokers

Slow metastatic in nature

Develop in brain, liver, adrenal or bone metastasis

**Squamous Cell Carcinoma**

Moderate to poor differentiation

More common in males

Most occur centrally in the large bronchi

Uncommon metastasis that is slow effects the liver, adrenal gland and lymph nodes.

Associated with smoking

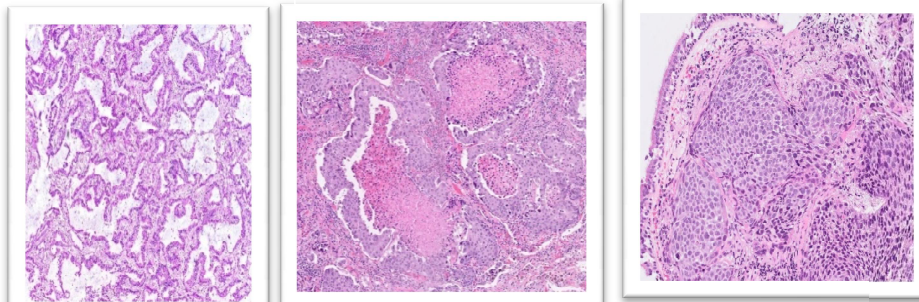
Not easily visualized on x-ray.

Large Cell Carcinoma

Poorly differentiated cells

Tends to occur in the outer part (periphery) of lung, invading sub-segmental bronchi or larger airways

Metastasis is slow but early metastasis occurs to the kidney, liver organs as well as the adrenal glands.



Adenocarcinoma Squamous cell carcinoma Large cell carcinoma

Pathological staging of non-small cell lung cancer requires examining the tumor, knowing the resection margins, and determining the lymph node status. At diagnosis, NSCLC patients are divided into three groups that reflect the nature of the disease and treatment.

Surgical tumors (mostly stage I, stage II and some stage III tumors).

Has the best prognosis depending on the tumor and the host.

Patients with resected disease who have contraindications to surgery are candidates for radical radiotherapy.

Postoperative cisplatin-based combination chemotherapy may provide a promising outcome for patients with stage II or IIA NSCLC.

Regionally advanced disease

Selected patients with locally advanced cancer may benefit from combination therapy.

Patients with unresectable or N2-N3 disease are treated with radiation therapy along with medical therapy.

Selected patients with T3 or N2 disease can be successfully treated with surgical resection and preoperative or postoperative treatment.

Distant metastatic disease

Chemotherapy and immunotherapy may be used. Radiotherapy can be used in hospital treatment.

### **Signs and Symptoms of Lung Cancer:**

Lung cancer usually does not cause any signs or symptoms in its early stages. Signs and symptoms of lung cancer often appear in the late stages of the disease. Lung cancer has two types of signs and symptoms.

Local – pertaining to the lungs.

Systemic — If the cancer has spread to other parts of the body.

Local symptoms and signs of cancer

Cough, fatigue

Shortness of breath

Blood in sputum

Lung infection,

hemoptysis Noise,

Weight Loss

Chest pain and chest tightness

Pleural effusion.

General signs and symptoms of cancer

Bone pain

Headache, mental changes or neurological symptoms.

Abdominal pain, increased liver function, hepatomegaly, abdominal pain (anorexia, cachexia), jaundice, hepatomegaly

### **RISK FACTORS**

Many factors increase the risk of lung cancer. Some risks can be controlled, for example, by quitting smoking. Other factors, such as your family history, are out of your control.

- **Smoking:** The risk of lung cancer increases as the number of cigarettes smoked per day and the number of years smoked increase. Quitting smoking at any age can reduce the risk of lung cancer.
- **Passive smoking:** Even if you do not smoke, your risk of lung cancer increases if you are exposed to second-hand smoke.
- **Previous radiation therapy:** If you have received radiation therapy to the liver for another type of cancer, your risk of breast cancer may increase.
- **Exposure to radon gas:** Radon gas is formed as a result of the natural decay of uranium in soil, rocks and water and becomes part of the air you breathe. Unsafe levels of radon can accumulate in any building, including homes.
- **Exposure to asbestos and other carcinogens:** Workplace exposure to asbestos and other substances known to cause cancer, such as arsenic, chromium and nickel, may increase the risk of cancer, especially in smokers.
- **Family history of lung cancer:** People whose parents, siblings or children have lung cancer are more likely to develop the disease.

Complications :

- **Shortness of breath:** If the cancer grows and blocks the airways, cancer patients may experience shortness of breath. Cancer can also cause fluid to build up around the lungs, making it difficult for the affected lungs to expand when breathing.
- **Coughing up blood:** Lung cancer can cause bleeding in the airways, which can lead to coughing up blood (coughing up blood). Sometimes bleeding can be serious.
- **Pain:** Advanced lung cancer can cause pain when it spreads to the pleura or other parts of the body, such as the bones.
- **Pleural effusion (pleural effusion):** Lung cancer can cause too much fluid to build up in the chest around the lungs (pleural space). Fluid in the chest can cause shortness of breath. Treatment can be delivered to the chest, reducing the risk of recurrence of pleural effusion.

### **Treatment of lung cancer:**

**Surgery:**

The purpose of surgery is to remove lymph nodes and lymph nodes near the chest. The tumor must be removed along with the border or margin of surrounding healthy tissue. "Negative margins" mean that when a doctor examines a lung or a lung that a surgeon has removed, there is no cancer in the healthy tissue surrounding the tumor. A surgical oncologist is a doctor who specializes in treating cancer through surgery. Thoracic surgeons are specially trained to perform lung cancer surgery.

**Lobectomy** - The lung has 5 lobes, 3 on the right and 2 on the left. Lobectomy is the removal of an entire lobe of the lung. It is now considered the best type of surgery even for small tumors. Clinical trials are ongoing to learn whether small-scale surgery has similar results for tumors 2 centimeters or smaller.

**Wedge resection** - If the surgeon cannot remove the entire lobe, the surgeon may remove the tumor surrounded by the edges of the healthy lung.

**Segmentectomy** - This is another way to remove the tumor when the entire lobe cannot be removed. During segmentectomy, the surgeon removes the part of the lung where cancer has developed. In general, segmentectomy removes more lung tissue and cancer than surgery.

**Lung Resection** - If the tumor is close to the chest, the surgeon will remove the entire lung. A pneumonectomy carries more risks than lobectomy, and your doctor should consider the health of your heart and lungs before performing this surgery.

**Radiation therapy:**

Radiation therapy uses X-rays or other substances to destroy cancer cells. If you need radiation therapy, see an oncologist. A radiation oncologist is a doctor who specializes in radiation therapy to treat cancer. The most common type of radiation therapy is called external beam radiation therapy, which is radiation emitted from a machine outside the body. Radiotherapy or planned therapy usually consists of specific treatments given over time. Treatment duration varies from a few days to several weeks.



Like surgery, radiation therapy cannot be used to treat cancer. Radiation therapy only destroys the tumor directly in the radiation path. It also makes the cells healthy in its own way. Therefore, it cannot be used to treat large areas of the body. The most common type of radiation is radiation modulated radiation therapy (IMRT). In some people, tumors require special radiation therapy, such as stereotactic radiation therapy (SBRT) or proton therapy. This type of radiation therapy uses CT scans or PET scans to accurately plan where the radiation will hit, reducing the risk of harm to the body. Although it is not suitable for every patient, it can be used in early disease and small tumors that cannot be operated on.

Some patients with Stage I NSCLC or those who are in poor condition may receive the following treatments: Stereotactic body radiation therapy instead of surgery.

Effects of Radiation Therapy:

Lung cancer patients receiving radiation therapy often experience fatigue and loss of appetite. If radiation therapy is given to the neck or mid-chest, side effects may include sore throat and difficulty swallowing. Patients may also feel a heat-like pain on the skin at the treatment site. Most side effects occur soon after treatment ends.

If radiation therapy irritates or irritates the lungs, patients may experience cough, fever, or shortness of breath months or years after radiation therapy is finished. Approximately 15% of patients develop this condition, called radiation pneumonitis. If symptoms are mild, radiation pneumonia does not require treatment and will disappear on its own. If the condition is severe, patients may need to take steroids such as prednisone (Rayos) to treat pneumonia.

Radiation therapy can also cause permanent scarring of the lung near the location of the original tumor. Inflammation often causes no symptoms. However, severe scarring can cause persistent cough and shortness of breath. Therefore, radiologists use chest CT scans to carefully plan treatment to reduce the risk of radiation-induced lung cancer.

Chemotherapy:

Chemotherapy usually uses drugs to destroy cancer cells by preventing them from growing, dividing and creating more cells. It has been shown to improve the length and quality of life of patients at all stages of lung cancer.

Chemotherapy regimens or programs often have specific numbers assigned to them. The type of lung cancer you have (such as adenocarcinoma or squamous cell carcinoma) may affect the medications recommended for treatment. When adjuvant chemotherapy is given after surgery, it is generally shorter in duration (e.g., 4 cycles) than in patients with stage IV cancer.

Drugs used to treat lung cancer include a combination of 2 or 3 drugs or 1 drug alone. Some drugs are:

Carboplatin (as a generic drug)

Cisplatin (as a generic drug)

Docetaxel (Taxotere)

Etoposide (as a generic drug)

Gemcitabine (Gemzar)

Album-bound paclitaxel (Abraxane)

Paclitaxel (Taxol)

Pemetrexed (Alimta)

Vinorelbine

Chemotherapy also damages healthy cells It contains blood cells, skin cells and nerves in the body. Side effects of treatment vary depending on the person and the dose used, but may include fatigue, low blood pressure, risk of infection, sore throat, nausea and vomiting, loss of appetite, diarrhea, numbness and tingling in the hands. Feet, hair loss. Some chemotherapy drugs for lung cancer do not cause hair loss. Your oncologist can often prescribe medications to help reduce many side effects. Nausea and vomiting are also generally tolerable. Learn more about preventing nausea and vomiting from cancer treatment. In most cases, side effects usually disappear after treatment ends.

The most common side effects of chemotherapy include:

Fatigue - Fatigue is tiredness or exhaustion, even if you have had enough sleep. This is the most common side effect of chemotherapy. Learn how to cope with fatigue.

Hair Loss - Some (but not all) medications can cause hair loss. Body hair may be lost in small areas or large patches at once. Hair loss usually begins after the first few weeks of treatment. It seems to increase 1-2 months after

chemotherapy. Your doctor can estimate your risk of hair loss based on the medication and dosage you take. Learn more about hair loss management. Medications can cause pain. These may include:

Pain from nerve damage such as headache, muscle pain, stomach ache, burning, numbness or tingling, often in the fingers and toes.

Targeted therapy :

Targeted therapy is a treatment that targets genes, proteins, or surrounding tissues that cause cancer and survival. This type of treatment stops cancer cells from growing and spreading and limits damage to healthy cells.

The purpose of all tumors is not the same. To find the best treatment options, doctors can check the genes, proteins and other factors in the tumor. In some lung cancers, many abnormal proteins are found in the cancer cells. This helps doctors provide the best treatment for each patient. Additionally, research continues to search for specific molecular targets and new treatments for them. Learn more about the basics of treatment.

Treatment plans for non-small cell lung cancer are changing rapidly due to the pace of scientific research. New plans are currently being worked on in clinical research. Talk to your doctor about other options available to you.

Immunotherapy:

Immunotherapy uses the body's natural defenses to fight cancer by improving the immune system's ability to kill cancer cells.

People receiving immunosuppressive therapy for non-small cell lung cancer may take a single drug, a combination of immunosuppressive drugs, or combined medications. Immunotherapy or immunotherapy plus chemotherapy is often the first-line treatment of choice when NSCLC does not respond to chemotherapy.

Atezolizumab (Tecentriq)

Durvalumab (Imfinzi)

Cemiplimab-rwlc (Libtayo)

Nivolumab (Opdivo)

Pembrolizumab (Keytruda)

Palliative and supportive care:

As mentioned above, palliative care and support are also important to help reduce symptoms and side effects. Radiation therapy or surgery may also be used to treat metastases that cause pain or other symptoms. Bone metastases that weaken bones can be treated with surgery, and metal implants can also be used to strengthen bones.

For most people, a diagnosis of metastatic breast cancer is stressful and overwhelming. We encourage you and your family to talk to your doctor, nurse, social worker, or other member of your healthcare team about how to do this. It may also be helpful to talk to other patients through a support group or other peer support program.

#### **Other Medications:**

Cancer treatment and other lung treatments cannot cure your cancer. But complementary therapies and other treatments can often be combined with doctor care to help reduce signs and symptoms. The American College of Chest Physicians recommends that cancer patients find comfort in the following:

Acupuncture: During an acupuncture treatment, the practitioner receives minimal training in the precise details of your body. Acupuncture may reduce pain and reduce side effects of cancer treatment, such as nausea and vomiting, but there is no evidence that acupuncture has any effect on your cancer.

Hypnosis: Hypnosis, usually performed by a therapist, takes you out of a state of relaxation and asks you to think positive and positive thoughts. Hypnosis can reduce anxiety, nausea, and pain in cancer patients.

Massage: During the massage, the therapist applies pressure to your skin and hand muscles. Massage may help reduce stress and pain in cancer patients. Some massage therapists are specially trained to work with cancer patients.

Meditation: Meditation is a period of quiet contemplation in which you focus on something, such as a thought, image, or sound. Meditation can reduce stress and improve quality of life in cancer patients.

Yoga: Yoga combines gentle stretching with deep breathing and meditation. Yoga may help cancer patients sleep better.

**Side effects of treatments:**

SURGERY	RADIATION	CHEMOTHERAPY
Weakness	fatigue	Anemia, thrombocytopenia
Hematoma	Decreased nutritional intake	Fatigue
Bleeding	Radiodermatitis	Hair loss
Respiratory system	Decreased hematopoietic function	Cold, pale skin

**II. CONCLUSION**

Early diagnosis is more suitable in lung cancer because treatment is started to prevent the formation of the disease. Therefore, this article has been written in detail about various machine learning methods for lung classification using CT scan images or X-ray images. Treatment can reduce symptoms and improve quality of life. New treatments may increase effectiveness and reduce side effects. Genetic Susceptibility First-degree relatives of people with lung cancer are two to three times more likely to have the disease. It increases with age and usually occurs after the age of 50. Occupational exposure to asbestos, arsenic, chromium, nickel, iron, radioactive substances and smoke.

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