

A review on Current treatment and practices Against lung Cancer



**Daffodil**  
*International*  
**University**

## **Project On**

A review on Current treatment and practices Against lung Cancer

## **Submitted To**

The Department of Pharmacy,  
Faculty of Allied Health Sciences,  
Daffodil International University

In the partial fulfillment of the requirements for the degree of Bachelor of Pharmacy

## **Submitted By**

Student ID: 183-29-1381

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Daffodil International University

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## APPROVAL

This project, A review on Current treatment and practices Against lung Cancer, submitted to the Department of Pharmacy, Faculty of Allied Health Sciences, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Pharmacy and approved as to its style and contents.

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## DECLARATION

I, at this moment, announce that I am carrying out this project study under the supervision of "Mr. Mohammad Touhidul Islam," Senior Lecturer, Department of Pharmacy, Faculty of Allied Health Sciences, Daffodil International University, Impartial Compliance with the Bachelor of Pharmacy Degree Requirement (B. Pharm). This project, I declare, is my original work. I also state that neither this project nor any part thereof has been submitted for the Bachelor's award or any degree elsewhere.

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I take this opportunity to thank all Department faculty members for their help and support. I also thank my parents for their unceasing encouragement, support, and attention. I am also grateful to my partner, who supported me through this venture.

I also place on record my sense of gratitude to one and all who directly or indirectly have put their hand in this venture.

Tushar Kumar Bhowmik

**Author**

***DECLARATION***

*I dedicate this work to my parents and my teachers and my friends.*

## Abstract

**Purpose:** Lung cancer is a type of cancer that starts in the cells that line the airways in the lungs. It is the main reason why both men and women die from cancer. Small and non-small cell lung cancer are the two primary forms. These two types grow and are cared for in different ways. My aim for this study was to see the current treatment and practices to prevent lung cancer.

**Methods:** A literature review.

**Results:** A review of many articles on lung cancer indicates survival rates that are poor. If lung cancer could be found sooner, more people would be able to live. In most countries, the 5-year survival rate is between 10% and 20%, but in Japan, it's 33%, in Israel, it's 27%, and in the Republic of Korea, it's 25%. The results are often worse in poorer countries.

**Conclusions:** 1.7% of all deaths in Bangladesh, or 12,174 people, were affected by lung cancer. Bangladesh has a death rate of 10.24 per 100,000 people.

**Keywords.** Cancer, Drug, Antiviral, Treatment.

## Table of content

### Chapter One: Introduction

S.I	Topic	Page No
1.	Introduction	01-36

### Chapter Two: Conclusion

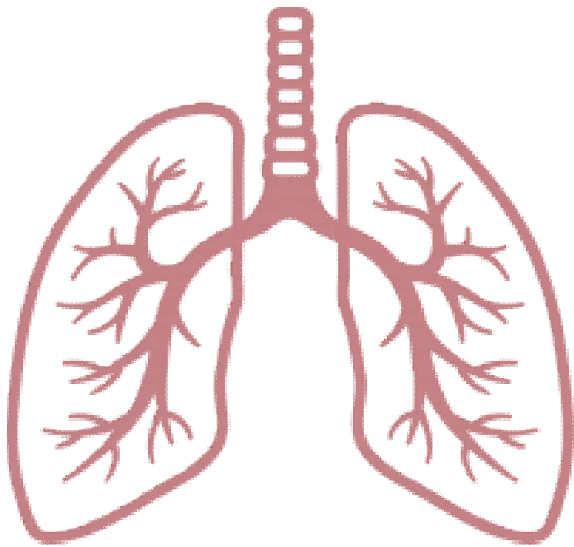
S.I	Topic	Page No
1.	Conclusion	38-38

### Chapter Three: Reference

S.I	Topic	Page No
1.	Reference	40-49

### List Of Figures-

S.I	Figure name	Page No
1.	Cancer	04-04
2.	Wilhelm Fabry	06-06
3.	Stomach cancer	09-09
4.	Lymphoma	11-11
5.	Kidney cancer	11-11
6.	Liver cancer	13-13
7.	Ovarian cancer	14-14
8.	Lung cancer	16-16



# *Introduction*



# *Cancer*

## Introduction

Cancer refers to a category of diseases characterized by the formation of abnormal cells, which can invade other body regions or spread across the body [1]. The presence of a lump, irregular bleeding, a protracted cough, unexplained weight loss, and a change in bowel motions are some of the possible indications and symptoms. These symptoms may be an indication of Cancer, but there are other possible explanations for them as well. Over one hundred different forms of Cancer may occur in humans. The use of tobacco products is responsible for around 22 percent of all fatalities from Cancer [2-5]. Another 10% are attributable to being overweight, having an unhealthy diet, not getting enough exercise, or consuming too much alcohol [6-7]. Other risk factors include the possibility of being exposed to ionizing radiation, certain infectious diseases, and environmental contaminants. In the poor world, illnesses such as *Helicobacter pylori*, hepatitis B, hepatitis C, human papillomavirus infection, Epstein–Barr virus, and human immunodeficiency virus are responsible for 15% of all cases of Cancer (HIV) [8]. At least in part, these substances exert their effects on cells via altering the genes that they contain [9]. Before Cancer may begin, there are typically multiple genetic alterations that need to take place [10]. It is estimated that between 5 and 10 percent of malignancies are caused by inherited genetic abnormalities. Cancer can be diagnosed by the observation of particular signs and symptoms or through the performance of screening procedures. After that, more diagnostic imaging studies and a biopsy are often performed to confirm the diagnosis. If you don't smoke, maintain a healthy weight, drink alcohol in moderation, eat plenty of vegetables, fruits, and whole grains, get vaccinated against certain infectious diseases, reduce the amount of processed meat and red meat you eat, and spend less time in direct sunlight, you can lower your risk of developing certain cancers [11]. Cervical and colorectal cancers both benefit from screening procedures that allow for early diagnosis [12]. There is some debate on whether or not breast cancer screening is beneficial. The ancient Greek word *o*, which means both crab and tumor, is the source of our modern term. Hippocrates and Galen, two ancient Greek physicians, were among the first to recognize that crabs resemble some malignancies, which, like crabs, have enlarged veins. The present medical sense of the word first appeared in English about the year 1600. Cancers are a broad group of illnesses characterized by uncontrolled, unregulated cell development that can metastasize (spread to other regions of the body). Among neoplasms, they are a subgroup. An abnormal development of cells, also known as

a neoplasm or tumor, typically takes the shape of a lump or mass, but it can also be widely dispersed. The cancerous cells that make up a tumor exhibit all six of the markers. All malignant tumors must have these features. A few examples are as follows:

- Explicit signals are required for cell division and proliferation.
- Prolonged expansion and branching, despite warnings to the contrary
- Prevention of Cell Death
- Multiplication of cells is theoretically infinite.
- Facilitating the Development of Blood Vessels
- Tissue invasion and metastasis creation

Malignant progression refers to the series of actions that normal cells take to transform into cancerous ones.



Fig 1: Cancer [Courtesy -Google]

Cancer therapy options include radiation treatment, surgery, chemotherapy, and targeted therapy. The ability to effectively manage pain and other symptoms is essential to recovery. Palliative care is very helpful to patients in the latter stages of a life-threatening disease. Depending on the kind of cancer and the stage of the illness at the time treatment is begun, the prognosis for survival varies widely. Children under the age of 15 who are diagnosed with cancer have an average five-year survival rate of 80% in the industrialized world [13]. According to [14], the five-year survival rate for Americans with cancer is 66%. In 2015, cancer was diagnosed in around 90.5 million people worldwide [15]. The global cancer burden in 2019 was projected to be 23.6 million annual new cases and 10 million annual deaths. Both of these figures represent increases of 26% and 21% over the previous decade [16]. Most common male cancers are those of the lung, prostate, intestines, and stomach [20] The four most common types of cancer in women are breast cancer, colorectal cancer, lung cancer, and cervical cancer. On average, non-melanoma skin cancers account for around 40% of all new cancer diagnoses each year. Most frequent childhood cancers are brain tumors and acute lymphoblastic leukemia [17], with non-Hodgkin lymphoma being more common in Africa. In 2012, around 165,000 children under the age of 15 were diagnosed with cancer [18]. [19-20] Higher rates of cancer are often seen in industrialized countries, and there is a robust association between age and the development of cancer [21]. The rates are increasing because more people in the developing countries are living to old ages and because of other changes in their way of life [22]. Estimates put the yearly global cost of cancer at \$1.16 trillion in 2010 [23].

## History

Cancer has always existed alongside humans. Cancer was first mentioned by Hippocrates (460–370 BCE), who used the Greek term (crab or crayfish). The veins are "extended on all sides like the animal the crab has its foot, whence it gets its name" (24), which is how a solid malignant tumor looks when sliced open [25]. When asked about the veins, Galen said, "the veins spread on all sides like the animal the crab has its feet." As a student of Descartes, the Dutch scholar Francois de la Boe Sylvius believed that all illness was the consequence of chemical processes and that cancer was caused by acidic lymph fluid. Lymph fluid with an acidic pH, Sylvius reasoned, must be the root of the cancer problem. His contemporaries, including Nicolaes Tulp, thought cancer was communicable and a toxin that spreads slowly [28]. In 1761, physician John Hill linked

tobacco snuff usage to the development of nasal cancer. Following this, in 1775, British physician Percivall Pott reported that chimney sweeps were prone to a kind of scrotal cancer known as "chimney sweeps' carcinoma." [29]. The microscope's extensive usage in the 18 ("metastasis"). An English physician called Campbell De Morgan put out this theory in the years between 1871 and 1874 [30].



Fig 2 : Wilhelm Fabry[Courtesy -Google]

## **Signs and symptoms**

There are no warning signs or symptoms in the early stages of Cancer. Indicators and symptoms manifest themselves as the tumor expands or ulcerates. The conclusions that may be drawn are different depending on the type of Cancer and where it was found. There aren't many distinctive symptoms. Many commonly manifest themselves in patients who also suffer from other diseases. Cancer is notoriously difficult to diagnose and is sometimes called a "great imitator." After receiving a cancer diagnosis, a person may experience feelings of anxiety or depression. People who have Cancer have nearly twice the chance of taking their own lives [31].

## **Local symptoms**

The tumor's size or any ulceration might be responsible for triggering localized symptoms. The mass effects of lung cancer, for example, can block the bronchus, resulting in coughing or pneumonia; esophageal cancer can cause the esophagus to narrow, resulting in difficulty swallowing or even pain; and colorectal cancer may lead to narrowing or blockages in the bowel, resulting in changes in bowel habits. If there is a tumor in the breasts or testicles, it may feel like a lump. Bleeding from an ulcer may cause a variety of symptoms, including spitting up blood (common with lung cancer), anemia, or rectal bleeding (common with colon cancer), blood in the urine (common with bladder cancer), or abnormal vaginal bleeding (common with bladder cancer) (endometrial or cervical Cancer). Cancer's later stages may bring some pain to the afflicted region, although the main tumor is seldom painful. Fluid buildup in the chest or belly is a common complication of several cancers.

### **Systemic symptoms**

Systemic symptoms may emerge when the body reacts to the tumor. Hodgkin's disease, leukemia, cancer of the liver, and cancer of the kidney are all malignancies that may induce a persistent fever. Paraneoplastic syndromes are a collection of symptoms that manifest across the body and are thought to be induced by hormones or other chemicals secreted by the tumor. For example, you may have changes in your skin, sudden weight loss, or extreme weariness. [32] The term "cachexia" refers to the progressive muscular wasting and weakening that may result from a systemic inflammatory condition brought on by some malignancies. [33] Hyponatremia, which may cause changed mental state, vomiting, headaches, or seizures; and hyperphosphatemia, which can cause altered mental state, diarrhea, and dehydration; are all examples of common paraneoplastic disorders [34].

### **Metastasis**

Metastatic illness describes cancer that has metastasized to other parts of the body. Metastatic tumors get their name from the fact that they have expanded beyond the primary tumor. Metastasis is the process by which cancer cells travel to various organs and tissues from their original site. [35] Cancer that has spread throughout the body, or metastasized, is the leading cause of cancer-related fatalities [36]. Metastasis occurs most often in advanced stages of cancer and may occur through the blood, the lymphatic system, or both. Most metastases start with a local invasion, then

spread via the lymphatic system and blood, then to other organs, and finally to a new tissue, where they may proliferate and form new blood vessels (angiogenesis). The likelihood that cancer may spread to other organs varies from cancer type to cancer type; nonetheless, metastases are most often discovered in the lungs, liver, brain, and bones [35].

## **Causes**

Cellular DNA mutations are what eventually cause cancer to arise. The DNA of a cell is crammed into countless numbers of distinct genes, each of which has a set of instructions telling the cell what tasks to carry out as well as how to develop and divide. Through the generations of the cell, these instructions are transmitted. The cell may stop carrying out its normal duties as a result of the flaws in the instructions, which may open the door for the cell to develop cancer.

## **Cancer types**

- a) Skin Cancer
- b) Brain Cancer
- c) Throat Cancer
- d) Lymphoma
- e) Multiple Myeloma
- f) Lung Cancer
- g) Childhood Cancers
- h) Cervical Cancer
- i) Stomach Cancer
- j) Leukemia
- k) Prostate Cancer
- l) Kidney Cancer
- m) Thyroid Cancer
- n) Colon Cancer
- o) Bladder Cancer
- p) Head and Neck Cancers
- q) Pancreatic Cancer
- r) Bone Cancer



- s) Uterine Cancer
- t) Testicular Cancer
- u)
- v) Melanoma
- w) Anal Cancer
- x) Breast Cancer
- y) Squamous Cell Carcinoma
- z) Neuroblastoma
- aa) Liver Cancer
- aa) Blood Cancer
- bb) Mouth cancer
- cc) Endometrial
- dd) Ocular Melanoma
- ee) Ovarian Cancer
- ff) Intestinal Cancer
- gg) Autoimmune Disease

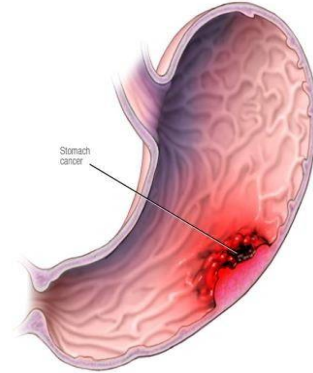


Fig 3: Stomach cancer [Courtesy -Google]

## Skin cancer

Mutations to the DNA in cells are the root cause of Cancer. Skin cancers are malignancies that begin in the skin, and the DNA within a cell is packed into many different genes. Melanoma is the most aggressive form of skin cancer, but the other two types, basal-cell Cancer (BCC) and squamous-cell Cancer (SCC), are both nonmelanoma skin cancers (NMSC) [36]. Basal-cell cancer grows slowly and can damage surrounding tissue, but it is unlikely to spread to distant areas or result in metastasis. Changes in the size, shape, color, borders, a number of colors, itchiness, or bleeding of a mole are all indicators that further investigation is warranted. More than 90% of cases are caused by exposure to ultraviolet radiation from the Sun, which raises the risk of all three main types of skin cancer. Exposure has increased, in part because of a thinner ozone layer [38]. Tanning beds are another common source of ultraviolet radiation. For melanomas and basal-cell cancers, exposure A cell's natural activity can be disrupted, and Cancer can develop if the instructions are incorrect.



## **Lymphoma**

Lymphoma refers to a class of malignancies that begin in lymphocytes and spread to the blood and lymph systems (a type of white blood cell). Today, most people only use the term to describe malignant tumors rather than all benign ones [41]. The symptoms may include a generalized swelling of the lymph nodes, a high body temperature, profuse sweating, a lack of appetite, a rash, and extreme fatigue. In most cases, swelling of the lymph nodes does not cause any discomfort. Nighttime is when the sweats are most likely to occur. Lymphomas can be broken down into a wide variety of subgroups [42]. Non-Hodgkin lymphoma (NHL) accounts for 90% of lymphoma diagnoses [43–44], whereas Hodgkin lymphoma (HL) accounts for 10% of diagnoses. Multiple myeloma and immunoproliferative disorders are two more groups that the World Health Organization (WHO) considers to be lymphoma [45]. Tumors of the hematopoietic and lymphoid tissues include both lymphomas and leukemias. Infection with the Epstein-Barr virus and a family history of Hodgkin lymphoma are both risk factors. Infection with the human T-lymphotropic virus, immunosuppressant drugs, and some pesticides have all been linked to an increased risk of developing non-Hodgkin lymphoma. Consuming excessive quantities of red meat and smoking both have been linked to an increased risk. Lymph node biopsy is commonly used to make a diagnosis when enlarged lymph nodes are observed. Tests on the patient's blood, urine, and bone marrow may also help with the diagnosis. Medical imaging can then be used to check for cancer metastases and identify their locations. Spreading lymphoma frequently affects vital organs such as the lungs, liver, and brain. Chemotherapy, radiotherapy, proton therapy, targeted therapy, and surgery are all potential treatment options. Plasmapheresis is used to remove protein from the blood when it becomes too thick due to the increased protein production by lymphoma cells in cases of non-Hodgkin lymphoma. For certain personalities, a cautious wait may be the best strategy. Outcomes vary by subtype, with some being curable and therapy extending longevity in most cases [46]. In the US, the five-year survival rate for all Hodgkin lymphoma subtypes is 85%, whereas it is 69% for non-Hodgkin lymphomas. An estimated 305,000 persons died from lymphoma, and 566,000 were diagnosed with the disease in 2012. Approximately three to four percent of all malignancies fall into this category, making it the seventh most prevalent kind overall. Third most prevalent kind of Cancer among children. Developed nations have a higher incidence rate than less developed nations [47].

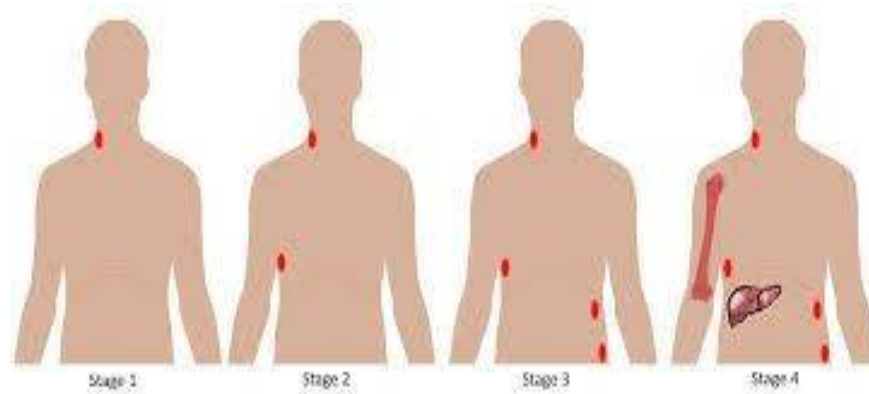


Fig 4: Lymphoma [Courtesy -Google]

## Kidney cancer

Renal cortical tumors arise when normally functioning cells in one or both kidneys suffer mutation and unchecked growth, leading to a mass. Symptoms may appear in either kidney. This leads to a cancer of the kidneys. A tumor may be malignant or benign, depending on the circumstances. Since it may spread to other parts of the body, a malignant tumor is considered cancerous. An indolent tumor may be cancerous, but it is less likely to metastasize (spread to other parts of the body). The word "benign" used to describe a tumor means that it can grow but is unlikely to metastasize [48].

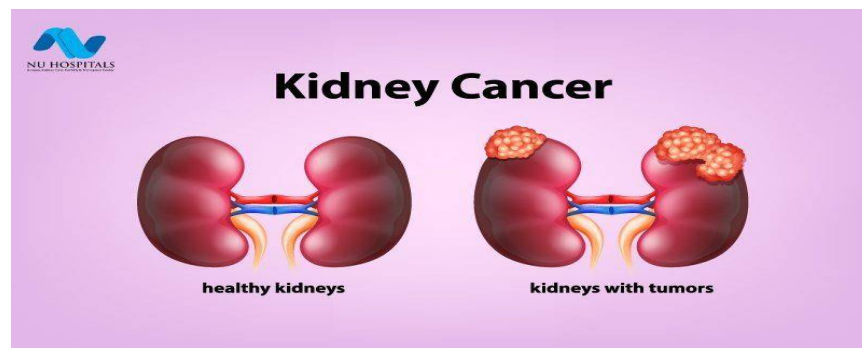


Fig 5: Kidney cancer [Courtesy -Google]

## **Melanoma**

Melanoma is a kind of skin cancer that originates in the cells that produce pigments, which are known as melanocytes [49]. Malignant melanoma is another name for melanoma; however, this name is redundant. Melanomas are most commonly found on the skin, although they can also develop in the mouth, stomach, or eye in extremely rare cases (uveal melanoma). The back is the most common location for them males, whereas the legs are the most common location for them in women. Moles are the source of around one-quarter of all melanomas. A change in the appearance of a mole, such as an increase in size, uneven margins, a change in color, itching, or disintegration of the skin, may be an indication of melanoma. In people who have low quantities of the pigment melanin in their skin, ultraviolet light (UV) exposure is the key factor in the development of melanoma [50]. The sun isn't the only place that emits ultraviolet radiation; tanning beds and other artificial sources do, too. People who have a history of afflicted family members, a large number of moles, or weak immunological function are more likely to be impacted [51]. There are also a variety of uncommon hereditary diseases, such as xeroderma pigmentosum, that raise the likelihood of having the condition [52]. A diagnosis is made by performing a biopsy and doing an analysis on any skin lesion that exhibits indicators that it may be malignant.

## **Liver cancer**

Liver cancer refers to malignancies that begin in the liver (also known as hepatic Cancer, primary hepatic Cancer, or primary hepatic malignancy). Primary liver cancer develops in the liver itself; secondary liver cancer develops elsewhere in the body (meaning cancer that has spread from elsewhere to the liver, known as liver metastasis). Overall, primary liver cancer is the sixth most frequent form of cancer and the fourth greatest cause of cancer-related mortality globally. Nearly 782,000 individuals died from it in 2018, out of a total of 841,000 cases. Hepatitis B and C are associated with higher incidence of liver cancer in parts of the globe, such Asia and sub-Saharan Africa [53]. Cirrhosis from hepatitis B or C or alcohol is the most prevalent cause of liver cancer, although additional causes include aflatoxin, non-alcoholic fatty liver disease, and liver flukes. Hepatocellular carcinoma (HCC) is more common in males than in women and is often diagnosed in those aged 55 to 65.

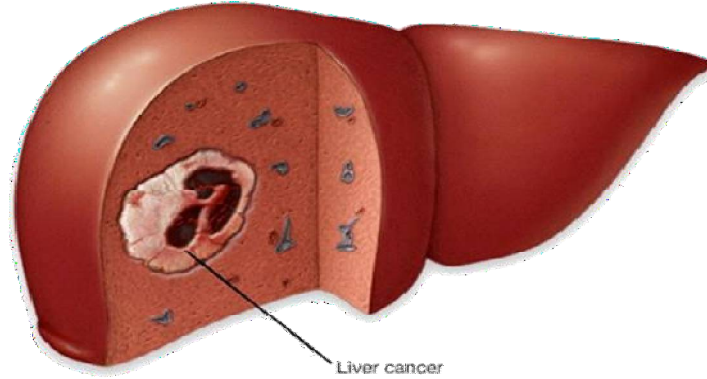


Fig 6: Liver cancer [Courtesy -Google]

Medical imaging and blood testing may help make a preliminary diagnosis, and a tissue biopsy can confirm it. Because of the heterogeneity of its causes, liver cancer prevention strategies exhibit similar diversity. Hepatocellular carcinoma (HCC) and intrahepatic cholangiocarcinoma are the most typical forms (IHC) [54-55]. Vaccination against hepatitis B, treatment for hepatitis B and hepatitis C, decreased alcohol use, less exposure to aflatoxin for agricultural workers, and control of obesity and diabetes are all examples of such measures. Patients with chronic liver disease should have routine screenings. In order to detect hepatocellular carcinoma, people with chronic liver disease should have ultrasound imaging screening every six months.

## Ovarian Cancer

Ovarian cancer, which develops in or on the ovary and leads to malignant cells that may infiltrate and spread to other areas of the body, often has no or very mild symptoms in its early stages but becomes more obvious as the cancer worsens [58]. Bloating, pelvic discomfort, abdominal swelling, constipation, lack of appetite, and changes in the gut lining are all possible signs [59].



Fig 7: Ovarian cancer [Courtesy -Google]



*Lung cancer*

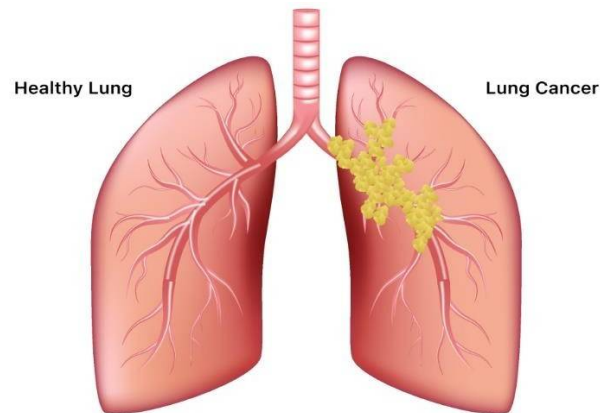


Fig 8: Lung cancer [Courtesy -Google]

Unchecked cell development in lung tissue is what makes lung cancer what it is: a malignant tumor [61]. To put it simply, lung carcinomas develop from changed, malignant cells that were formerly epithelial cells or epithelial tissues. In light of the fact that around 98–99% of all cases of lung cancer are carcinomas, the disease is sometimes called by that name (lung carcinoma) [60]. Lung sarcomas, albeit relatively rare, are produced by the malignant transformation of connective tissues, which begin from mesenchymal cells. Muscle, bone, nerve, and fatty tissue are all examples of connective tissue. Lung cancer may also develop rarely from lymphomas (from the lymphoid cell lineage) and melanomas (from the melanocyte cell lineage). This unchecked expansion has the potential to metastasis (spread outside the lung) if allowed to continue unchecked, either to neighboring tissue or farther afield through hematogenous, bloodborne transmission. Primary lung malignancies, sometimes referred simply as lung cancers, are mostly carcinomas. Lung cancer may be divided into two main categories: small-cell lung carcinoma (SCLC) and non-small-cell lung carcinoma (NSCLC). Coughing (often with blood), losing weight, having difficulty breathing, and experiencing chest discomfort are some of the most frequently reported signs of lung cancer. Long-term cigarette use is the primary cause of lung cancer in the majority of patients (85%). Radiographs of the chest and computed tomography (CT) scans may detect lung cancer [66]. Biopsy, often conducted under bronchoscopy or CT guidance, confirms the diagnosis [67]. Preventative measures focus primarily on reducing exposure to potential

dangers like tobacco use. Somewhere between 10 and 15 percent of instances include non-smokers. [68] In many instances, both hereditary and environmental factors (such as radon gas and asbestos exposure) are to blame. Most instances do not respond to treatment, therefore there is no hope of a cure. Surgery, chemotherapy, and radiation are all commonly used therapies. Surgery has a place in the treatment of non-small cell lung cancer (NSCLC), although chemotherapy and radiation therapy are usually more effective for small cell lung cancer (SCLC)[69]. In the year 2020, 2.2 million individuals were diagnosed with lung cancer and 1.8 million people died from the disease. The median age at diagnosis is 70, making it the most common cause of cancer-related death in both sexes [70-71]. Furthermore, it is the most common kind of lung cancer. Survival rates at five years range from 10% to 20% worldwide, with the exception of Japan (33%), Israel (27%), and the Republic of Korea (25%). In the underdeveloped world, the survival rate is usually lower [72].

### **1.6.A Short History of Lung Cancer**

The leading cause of death for both men and women in the United States in 1999 was lung cancer, which claimed the lives of over 158,900 individuals. Lung cancer kills more than a million people every year. Huge volumes of prospective epidemiologic data have firmly identified cigarette smoking as the primary cause of lung cancer. Research suggests that cigarette smoke is responsible for between 75% and 80% of all incidences of lung cancer in the USA (Hecht, 1999). There can be little question that lung cancer is a devastating and widespread health problem throughout the globe. This condition has not always persisted. Before around 150 years ago, this disease was quite rare. Malignant lung tumors made up just 1% of all cancers in autopsy performed in 1878 at the Institute of Pathology, University of Dresden, Germany. About 10% by 1918, and over 14% by 1927. An increase in malignant lung tumors was noted around the turn of the century and after World War I, according to the authoritative Springer Handbook of Special Pathology published in 1930. The incidence of lung tumors in women was discovered to be increasing, despite the fact that males were shown to be at greater risk of developing these cancers. Patients typically lived between 6 months and 2 years after their diagnoses, and almost all had a previous history of chronic bronchitis. What might have brought about such a dramatic increase in a previously uncommon illness? The 1918 flu pandemic, exposure to gas during World War I, and employment requiring benzene or gasoline are only few of the probable reasons described at detail in the manual. Lung



cancer rates rose at the same rate in countries with fewer automobiles, less industry, less paved roads, and among workers who were not exposed to benzene or gasoline, disproving the conventional wisdom of the time. There was a short mention of cigarette smoking as a probable cause, but it was also mentioned that not all studies find a connection between smoking and lung cancer. After everything was said and done, the importance of smoking was minimized, and it was suspected, but not proven, that environmental variables cause lung cancer. However, the 1929 research by German doctor Fritz Lickint (perhaps too late to be included in the handbook) showed that smokers were disproportionately represented among those with lung cancer. This prompted Hitler to launch his anti-smoking campaign, which in turn sparked widespread anti-tobacco activism throughout Germany. Researchers had a drastically different knowledge of what causes lung cancer by the time an updated manual was released in 1969. One-fourth of the book was dedicated to analyzing smoking's relevance. Significant differences in lung cancer incidence between urban and rural locations show that air pollution may play a role. In the 1930s, when doctors first saw an uptick in cases of this "strange" condition, they began to assume that smoking cigarettes was to blame. Since then, it has been shown that arsenic-containing compounds in wine producers' environments, asbestos in construction workers, and nickel and chromium in mine and smelter workers' environments may all lead to lung cancer. About two decades after print media coverage started, smoking's role as a major contributor to disease was recognized. Müller, a German researcher who conducted a case-control study in 1940, found that "the extraordinary surge in tobacco consumption was the single most significant factor of the rising incidence of lung cancer" (Müller, 1940). There has been a shift in the primary cause of cancer death in the United States, with lung cancer now taking the top spot from stomach cancer. In 1943, the German Institute for Tobacco Hazards Research reported that just 3% of those diagnosed with lung cancer had never smoked. In the 1950s, more evidence between smoking and lung cancer was compiled by Doll and Hill in England and Cuyler Hammond and Ernest Wynder in the United States. However, it took a long time for the truth to be generally accepted. There are many medical professionals who are among the millions of Americans who smoke cigarettes but either don't realize the dangers or just refuse to quit. In this context, it's important to remember that two major personalities, although crucial in bringing attention to the connection between environmental contaminants and cancer, failed to recognize the role that smoking plays in causing the illness. Professionally, Dr. Wilhelm C. Hueper got his start in the business world. Over time, he alienated

the higher management by voicing legitimate concerns about the possible link between factory employees' exposure to chemicals during manufacturing operations and the rising incidence of cancer among factory workers. However, he maintained that smoking was not a contributing factor in the development of lung cancer in humans. Rachel Carson's *Silent Spring* warns of the impending disaster of cancer due to environmental chemicals, but makes no mention of cigarette smoking. Tobacco smoke has become not just the most serious environmental carcinogen but also the only one where we could achieve (and in many regions have achieved) zero exposure since cigarette use became prevalent right before the turn of the century. Because they had to be rolled by hand, cigarettes were first quite expensive. In 1876, tobacco giant Allen & Ginter offered a prize for the creation of a machine that could speed up this process. Since the introduction of James Albert Bonsack's cigarette-making machine was met with resistance by Allen & Ginter, the company feared an oversaturation of the market. In a standard workday of 10 hours, the machinery could produce 70,000 cigarettes. But James Buchanan Duke didn't think twice about purchasing two of them, and he went on to enormous financial success as a result. In 1889, "Buck" Duke took the helm as the American Tobacco Company's first president. Throughout World War I, the popularity of smoking grew. As a coping mechanism, smoking became more popular, both at home and in the trenches, among both men and women. You ask me what we need to win this war," Admiral John J. "Black Jack" Pershing is said to have said. Despite the fact that hundreds of millions of individuals continued to "enjoy" smoking over the following several decades, the first report from the Surgeon General in 1964 helped bring awareness to the risks of cigarettes. There seemed to be a plateau in the pace of rise of lung cancer diagnoses, at least among men. Yet, environmental variables were long thought to have a role in the development of one specific kind of lung cancer. As early as the year 1500, people were talking about this problem. Silver, nickel, cobalt, bismuth, and arsenic were mined in the Schneeberg and Joachimsthal regions of Germany and Czechoslovakia, respectively. Joachimsthaler (literally "from Joachimsthal") or simply "Thaler" referred to coins minted from Joachimsthal's pure silver. Workers in these mines almost often became ill with a deadly disease known as "Bergkrankheit" (mountain sickness). Between 1876 and 1938, the illness generally affected a mine's workforce for a quarter century, resulting in the deaths of 60%-80% of the miners during that time. The miners who toiled in the "death pits" grew sick themselves. Therefore, miners with lung cancer were legally entitled to compensation in both Germany (1926) and Czechoslovakia (1932). Lung cancer was originally blamed on

"radium emanation," but later other chemical components of the extracted ore were shown to be at fault. Measurements published in a German physics journal in 1924 confirmed the presence of high concentrations of radon gas in the air of the mines, with the highest being greater than 18,000 picocuries per liter, which was necessary for the production of an atomic bomb and the maintenance of a nuclear arsenal. Uranium mining in the United States was centered on the Colorado Plateau. In light of what happened in Europe, mining companies should have known the risks their workers would face. However, the Atomic Energy Commission was not given responsibility for protecting people; instead, it was up to the individual governments, which lacked the expertise and resources to deal with the problem. Even though it should have been obvious by then that lung cancer was caused by working in insufficiently ventilated uranium mines, the issue was not addressed due to apathy, bureaucratic conservatism, and government censorship. The mining industry argued that "ventilating the mines was unneeded and too costly," despite the fact that 4,000-5,000 Americans had died or would die of lung cancer as a result of being exposed to radioactive dust while working in inadequately ventilated uranium mines. A public health emergency has been declared, but compensation has been slow in arriving. There has been a shift in the subtypes of lung cancer during the last several decades. In smokers, squamous cell carcinoma, which begins in the epithelium lining the airways, has traditionally been the most prevalent form of lung cancer. In 1961, researchers noticed a shift toward adenocarcinomas in less central locations, but it has only been in the last two decades that this tendency has been largely confirmed. The enhanced quality of cigarettes is likely to blame for this. The "tar fraction" of tobacco smoke was thought to be the most cancer-causing component of cigarettes when it was shown in skin painting experiments to induce cancer in animals. Many people believe that the introduction of filters and low-tar cigarettes will help cut cancer rates. People's behaviors changed, so it didn't. To fulfill their need for nicotine, people who smoke filters may inhale more deeply and keep the smoke in their lungs for longer. Tobacco-specific nitrosamines and volatile gas-phase carcinogens may be more prevalent than polycyclic aromatic hydrocarbons after being filtered out. Even while polycyclic aromatic hydrocarbons do generate squamous cell carcinomas in the lungs of animals, all data between smoking and lung cancer comes from human experience. Similar to how the carcinogenicity of radon was proved for people long before such conclusions could be derived from information gathered on animals, modern testing techniques have made it possible to detect and measure radon in indoor environments. Neither cigarette smoking nor radon would

have likely been found as a Cancer generating agent unless the incidence of a previously uncommon disease climbed in line with increasing consumption of a widely diffused and highly addictive chemical or was linked to a certain occupation. The concept that experimental toxicology has brought so little to our understanding of the disease is remarkable. Smoke from tobacco products has not been proved to cause lung cancer in experimental animals in a large number of studies [73–77].

## **Symptoms**

In its earlier stages, lung cancer often does not exhibit any signs or symptoms. Lung cancer's signs and symptoms often only become apparent when the illness has progressed significantly.

Among the possible signs and symptoms of lung cancer are the following:

- A new persistent cough
- Expelling any quantity of blood by coughing
- Problems breathing,
- chest discomfort, and hoarseness
- weight loss without dieting
- bone soreness
- headaches

## **What Causes Lung Cancer?**

Lung cancer is a disease that may affect anyone. Cells in the lungs can become cancerous if they mutate or alter in some way. This mutation, which is a change that is made that is irreversible in the DNA sequence of a gene, can be brought on by a number of different reasons. This alteration in lung cells occurs in the majority of cases when a person breathes in hazardous or poisonous chemicals. You are still at risk for developing lung cancer even if the last time you were exposed to these drugs was a long time ago. If you have been exposed to any of the compounds mentioned below, it is important that you discuss the matter with your physician and take the necessary precautions to lower your risk and protect your lungs [78].

## **Smoking**

Lung cancer is most commonly caused by smoking cigarettes. Ninety percent of all instances of lung cancer may be traced back to this factor. Chemicals in tobacco smoke have been linked to lung cancer. If you are a smoker, stopping is the best decision you can make for your lungs. Cigarette smoke has negative health effects on more than just smokers. For ex-smokers, the chance of developing lung cancer is lower but not eliminated. Smoking has negative effects on non-smokers as well. It is known that secondhand smoke exposure can increase the likelihood of developing lung cancer and other diseases [79].

## **Radon**

The second largest cause of lung cancer is radon exposure. The radioactive gas radon is found naturally in soil, and it is invisible, odorless, and tasteless. As it rises from the ground, it finds its way into structures through even the tiniest of openings. As many as one in every 15 houses in the United States has elevated radon levels. Those who smoke cigarettes and are also exposed to radon are at an extremely high risk of developing lung cancer [80].

## **Hazardous Chemicals**

Lung cancer is one of the potential outcomes of being exposed to certain dangerous substances. Asbestos, uranium, arsenic, cadmium, chromium, nickel, and some petroleum compounds all pose serious health risks to workers. Ask your employer and your doctor if there is any chance you are being exposed to harmful substances while on the job [81].

## **Particle Pollution**

To put it simply, particle pollution is the presence of a wide variety of microscopic solid and liquid particles in the air we breathe. Exposure to particle pollution, such as that found in exhaust smoke, has been linked to an increased risk of lung cancer [82].

## **Genes**

Whether or whether someone will acquire lung cancer may also depend on their genes. Inheriting a genetic predisposition to lung cancer increases your chances of developing the disease. Let your doctor know about any history of lung cancer in your family [83-84].

## **Types of lung cancer**

The subtype of lung cancer you have provides insight into the first cell of origin for your disease. Your doctor can then better decide on the best course of therapy based on this information. Primary lung cancer is a kind of Cancer that begins in the lungs. It is called secondary lung cancer if it occurs after the disease has already progressed to another part of the body. Primary lung cancers can be broken down into two broad categories:

01. small cell lung cancer (SCLC)
02. non-small cell lung cancer (NSCLC)

The most common type is non-small cell lung cancer.

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

This subtype of lung cancer accounts for approximately 15–20 out of every 100 lung cancers, or approximately 15%–20% overall. The most common cause of it is tobacco usage. These tumors have a propensity to spread relatively early on in their development. Cancers of the small cells of the lung are also categorized as neuroendocrine tumors. Rare tumors of the neuroendocrine system are referred to as neuroendocrine tumors (NETs). These tumors form in cells of the neuroendocrine system. The neuroendocrine cells of the lung are the origin of the tumor that is characteristic of small cell lung cancer.

### **Non-small cell lung cancer (NSCLC)**

Non-small cell lung cancer accounts for around 80–85 out of every 100 cases of lung cancer that are diagnosed in the UK (NSCLC). Adenocarcinoma, squamous cell carcinoma, and big cell carcinoma are the three primary subtypes of cancerous cells. They are categorized together due to the fact that they exhibit similar behaviors and have comparable reactions to the same treatments.

### **Adenocarcinoma**

The mucus-producing gland cells that line the inside of your airways are the starting point for this type of asthma, which is the most prevalent form.

### **Squamous cell cancer**

This kind originates in the flat cells that line the surface of your airways and can be identified by their characteristic appearance. It has a predilection for expanding toward the middle of the lung.

### **Large cell carcinoma**

When viewed through a microscope, the cancer cells have a rounded and massive appearance [85-88].

## **Diagnosis**

In diagnosing lung cancer in otherwise healthy patients For those with a high risk of developing lung cancer, annual low-dose CT scans may be a good idea. Older persons who have smoked heavily for a long period of time or who quit within the past 15 years are typically offered lung cancer screening. Talk to your doctor about your risk of developing lung cancer. By consulting with one another, you can determine if screening for lung cancer is warranted [89].

### **Tests to diagnose lung cancer**

If the doctor suspects that you have lung cancer, he or she can order a battery of exams to screen for malignant cells and rule out other illnesses.

Among the possible diagnostic procedures are:

- a) Imaging tests. An X-ray of your lungs may reveal an abnormal mass, or nodule. Microscopic lesions in your lungs may not show up on an X-ray, but a CT scan will.
- b) Cytology of the Sputum (Part B) Sputum samples from persons who are coughing up sputum may include cancer cells in the lung.
- c) A Tissue Sample (biopsy). Biologic samples of abnormal tissue are extracted by biopsy.
- d) Mediastinoscopy, which requires an incision at the back of the neck and the insertion of surgical tools behind the breastbone, is another option for obtaining tissue samples from lymph nodes.

- e) Needle biopsy is another technique for obtaining tissue samples, in which a needle is inserted through the patient's chest wall and into the lung tissue under X-ray or CT guidance.
- f) Lymph nodes and other sites where Cancer has progressed, like the liver, may also be biopsied [90-91].

#### Tests to determine the extent of the Cancer

After a diagnosis of lung cancer has been made, your medical practitioner will seek to establish how far the Cancer has progressed (its stage). The stage of your Cancer is helpful to both you and your doctor in deciding what treatment will be most effective. The staging process may involve imaging examinations that provide your physician the ability to search for signs that the Cancer has spread to other parts of your body. These exams include computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), and bone scans. It is important that you discuss with your physician which treatments are suitable for you because not every test is suitable for every individual. [92] Roman numerals ranging from 0 to IV denote the stages of lung cancer, with the lowest stages signifying Cancer that is confined to the lung. When the Cancer has reached stage IV, it is believed to be in an advanced stage and has spread to other parts of the body.

### **Treatment**

How lung cancer is treated depends on a number of factors, including the patient's performance status, the stage of the illness, and the sort of cells the cancer is made of. Treatment for cancer often consists of a combination of palliative care, surgery, chemotherapy, and radiation treatment. Targeted therapy for lung cancer is rising in importance as a therapeutic option for patients with advanced disease [93]. In certain cases, it is also suggested that the person stop smoking and start an exercise routine.

#### **Surgery**

Squamous-cell carcinoma, observed as a white area near the bronchi, in a pneumonectomy specimen. If tests show that the patient has NSCLC, the next step is to determine whether or not the cancer is still in an operable stage (i.e., has remained localized) or whether or not it has spread



throughout the body. Neither a CT scan nor a PET-CT involves any intrusive procedures, therefore they may both be used to help rule out cancer or lymph node involvement in the mediastinum. Once PET-CT has confirmed the presence of disease in the mediastinal lymph nodes, a biopsy may be performed to collect tissue from the nodes for use in staging. The accuracy of a PET-CT scan prevents it from being used for this purpose alone. Several methods are available for obtaining a sample, including transthoracic needle aspiration, transbronchial needle aspiration (with or without endobronchial ultrasonography), endoscopic ultrasound with needle aspiration, mediastinoscopy, and thoracoscopy. Needle aspiration and endoscopic ultrasonography are two further methods. Blood and lung function tests are used to establish whether or not a patient is healthy enough for surgery. Pulmonary function tests may rule out surgery if they demonstrate a severely diminished breathing reserve. Patients with early-stage NSCLC often have lobectomy, or the surgical removal of a lung lobe. A sub lobar excision, or wedge resection, may be done in place of a complete lobectomy in individuals who are not physically able to endure the procedure. Wedge resection, unlike lobectomy, has a greater risk of recurrence. Using radioactive iodine brachytherapy to treat the area around a wedge resection may reduce the likelihood of cancer recurrence. Pneumonectomy, in which a complete lung is removed, is an extremely rare procedure. [94] Video-assisted thoracoscopic surgery (VATS) and VATS lobectomy are two minimally invasive surgical options for treating lung cancer. It has been shown that VATS lobectomy yields the same or similar outcomes as open lobectomy, with much less postoperative risk. SCLC is often treated with chemotherapy or radiation, or both. However, research into surgery's role in SCLC is now underway. Surgery, when combined with chemotherapy and radiation therapy, may improve patient outcomes in early-stage small cell lung cancer. The effectiveness of lung cancer operations (resections) for patients in NSCLC stages I to IIA is debatable; however, preliminary evidence suggests that a combined approach of lung cancer resection and removal of the mediastinal lymph nodes (also known as mediastinal lymph node dissection) may improve survival compared to lung resection and a sample of mediastinal nodes. When a lung is removed and a few mediastinal nodes are taken as a sample, the opposite is true [95].

### **Radiotherapy**

Patients diagnosed with NSCLC who are not surgical candidates may be able to benefit from radiotherapy, which is often delivered in combination with chemotherapy. By definition, radical

radiotherapy is a kind of very powerful radiation therapy. This strategy has evolved into the more advanced continuous hyperfractionated accelerated radiation therapy (CHART). This technique employs the rapid delivery of a substantial radiation dosage. In radiosurgery, a very precise and high dosage of radiation is delivered to a patient while they are under the watchful eye of a computer. Postoperative thoracic radiation (also known as adjuvant treatment) is not frequently used after thoracic surgery in an effort to cure non-small cell lung cancer. Some individuals with mediastinal N2 lymph node involvement may benefit from radiation therapy after surgery. Radiation therapy to the chest is recommended as a secondary treatment after surgery for potentially curable instances of SCLC. When these therapies should be given is unknown (the optimal time to offer radiotherapy and chemotherapy in order to improve survival rates) [96] Brachytherapy, also known as localized radiation, may be delivered directly inside the airway to clear the passage in the case that a malignant tumor blocks a part of the bronchus. Since fewer radiation doses are administered to the patient and the medical staff during brachytherapy, treatment times are reduced. However, compared to external beam radiation, brachytherapy has much weaker evidence in its favor. Radiotherapy to the brain, known as prophylactic cranial irradiation, is used to reduce the risk of the cancer spreading to other regions of the body. Colon cancer cell invasion (PCI) is a part of small cell lung cancer (SCLC). Applying PCI increases the three-year survival rate from 15% to 20%; in patients with severe illness, it increases the one-year survival rate from 13% to 27%. Patients with non-small cell lung cancer (NSCLC) with a solitary brain metastasis have few treatment options, and it is unclear whether radiosurgery or surgery would be more beneficial [97]. Recent developments in targeting and imaging technologies have allowed stereotactic radiation to be used to treat early-stage lung cancer. This kind of radiotherapy uses stereotactic techniques to deliver substantial radiation doses gradually over the course of a series of outpatient treatments. Patients who are unable to undergo surgical therapy owing to the existence of additional medical issues are its major target population. Low-dose radiation treatment to the chest may be used to alleviate symptoms in individuals with non-small cell lung cancer (NSCLC) or small cell lung cancer (SCLC) (palliative radiotherapy). In terms of palliative care, there is no proof that a higher dosage of radiation improves survival rates.

## **Chemotherapy**

Each tumor subtype requires its own unique treatment regimen. Even in the early stages of the disease, chemotherapy and radiation remain the cornerstones of treatment for SCLC. Standard therapies for small cell lung cancer include etoposide and cisplatin/carboplatin. Individually or in combination, the anticancer drugs carboplatin, gemcitabine, paclitaxel, vinorelbine, topotecan, and irinotecan are very effective against cancer. It is recommended that patients with advanced NSCLC, who are otherwise healthy enough to do so, take chemotherapy. There are two medications used often; one is platinum-based (either cisplatin or carboplatin). Etoposide, vinorelbine, etoposide, gemcitabine, paclitaxel, docetaxel, pemetrexed,[98] and paclitaxel are other often prescribed drugs. In addition to possibly increasing the risk of serious adverse effects like nausea, vomiting, anemia, and thrombocytopenia, platinum-based drugs and combinations that include platinum therapy do not appear to be more beneficial for extending survival compared to other nonplatinum medications, especially in people over the age of 70. At this time, we do not have enough information to determine whether chemotherapy approach is superior in terms of improving patients' quality of life. A lack of evidence also exists about the efficacy of second-line chemotherapy for individuals with NSCLC whose first treatment was ineffective. When administered after curative surgery, adjuvant chemotherapy is meant to further improve the prognosis. Biopsies taken from lymph nodes following surgery for non-small cell lung carcinoma aid in determining the stage of the illness. If stage II or III disease is diagnosed, survival rates are improved by 4% at five years with adjuvant chemotherapy (with or without postoperative irradiation). The combination of vinorelbine and cisplatin is more effective than any prior therapies. Adjuvant chemotherapy poses ethical questions since it has not been shown in clinical studies to improve survival for people with stage IB cancer. Patients with NSCLC who are candidates for surgical removal may benefit from chemotherapy before to surgery. Chemotherapy is one option for treating non-small cell lung cancer, however palliative care is also available. [99] When applied to advanced patients, appropriate chemotherapy improves survival and quality of life above supportive care alone. Keeping up with chemotherapy during lung cancer palliation, if the patient is well enough, may increase survival by 1.5 to 3 months, reduce symptoms, and improve quality of life. Better outcomes are observed with newer medications. According to the NSCLC Meta-Analyses Collaborative Group, chemotherapy may be an option for patients with advanced NSCLC who are both willing and able to receive treatment [100].

### **Targeted and immunotherapy**

Several drugs that focus on certain molecular pathways have been developed for the treatment of advanced lung cancer. Erlotinib, gefitinib, afatinib, dacomitinib, and osimertinib are all tyrosine kinase inhibitors that work on the epidermal growth factor receptor (EGFR). These EGFR inhibitors have the potential to improve the prognosis for people with EGFR M+ lung cancer by halting the disease's development. No data suggest that EGFR inhibitors enhance survival rates for patients. Patients with EGFR mutations may benefit more from gefitinib treatment than from chemotherapy in terms of quality of life. Immunotherapy has shown promise against both small cell and non-small cell lung cancers [101]. It is possible that the immune system's capacity to destroy tumor cells is diminished when NSCLC cells express PD-L1 because of its interaction with PD-1 on the surfaces of T cells. Atezolizumab is a monoclonal antibody that targets PD-L1. Nivolumab and Pembrolizumab are two monoclonal antibodies that target programmed cell death protein 1. Ipilimumab is a monoclonal antibody that specifically targets cytotoxic T-lymphocyte-associated protein 4 (CTLA-4), a surface antigen. Bevacizumab, a monoclonal antibody, is an angiogenesis inhibitor that works by blocking the activity of vascular endothelial growth factors. Phase 3 clinical studies including Pembrolizumab included KEYNOTE-024, KEYNOTE-042, KEYNOTE-189, and KEYNOTE-407. Similarly, CHECKMATE-227 and CHECKMATE 9LA investigated Nivolumab and Ipilimumab. Bone metastases may respond well to zoledronic acid plus the monoclonal antibody denosumab, which binds to receptor activator of nuclear factor kappa-B ligand.[102].

### **Bronchoscopy**

In order to address airway obstruction or bleeding, bronchoscopy can be used to perform a number of procedures. Rigid bronchoscopy, balloon bronchoplasty, stenting, and microdebridement are all potential treatments for airway obstruction caused by Cancer [103]. To remove the tumor blocking the airway, a bronchoscope is used to inject laser light into the airway, a procedure known as laser photo section.

### **Palliative care**

Even while undergoing chemotherapy, patients benefit from the addition of palliative care to their treatment plan. By taking these measures, patients and doctors are given more time to talk about

their treatment options and more chances to make educated choices. Palliative care has the potential to reduce unnecessary yet high-priced medical interventions at any point in the course of an illness, not just at the end of life. Hospice care may be an option for those who are at the end stages of a terminal illness.

### **Noninvasive interventions**

Stopping smoking is the best treatment for reducing the risk of dying from lung cancer, and it is recommended for persons who already have the disease. When it comes to helping those who have been diagnosed with lung cancer finally kick the habit of smoking, there is conflicting information about which programs work best.[104] Slight evidence suggests that non-invasive supportive care therapies that prioritize patients' well-being may increase their quality of life while battling lung cancer. Some interventions may be helpful, although the evidence is weak. These include nurse follow-ups, psychotherapy, psychosocial therapy, and educational programs. Those suffering from the psychological effects of lung cancer may find relief via counseling. While reflexology could have temporary benefits, In the case of people with lung cancer, there is no proof that nutritional therapies or exercise regimens improve quality of life in a meaningful or lasting way. People recovering from lung surgery who have NSCLC may find benefit in engaging in an exercise program. People with NSCLC who have undergone radiotherapy, chemotherapy, chemoradiotherapy, or palliative care may also benefit from fitness training. Possible improvements in outcomes have been linked to exercise training prior to lung cancer surgery. If persons with advanced lung cancer can benefit from exercise training or exercise programs, this information is lacking [105]. It's possible that a home-based component of a specialized physical rehabilitation program will help the patient recover faster and better. Whether or not prehabilitation done at home (before surgery) reduces the number of complications and length of stay in the hospital remains unknown. Recovery from treatment and general lung health may be enhanced by home-based physical rehabilitation.

### **Lung Cancer Prevention**

Lung cancer prevention may involve reducing exposure to risk factors and increasing exposure to protective factors.

There are a number of things that can increase your chances of developing lung cancer:

- a) Cigarette, cigar, and pipe smoking,
- b) passive smoking,
- c) genetic predisposition,
- d) HIV infection
- e) Environmental variables
- f) Heavy smokers using beta carotene supplements

The following are protective factors for lung cancer:

- a) Not being a smoker
- b) The decision to stop smoking
- c) Workplace risk factors are mitigated, which is a positive outcome.
- d) Significantly Reduced Radon Exposure

It is not clear if the following decrease the risk of lung cancer:

- a) Diet
- b) Physical activity

The following do not decrease the risk of lung cancer:

- a) Nonsmokers who take beta carotene supplements
- b) Supplements containing vitamin E
- c) Clinical trials for cancer prevention are used to investigate potential strategies for avoiding the disease.
- d) Clinical studies are looking at potential new methods of preventing lung cancer [106-107].

## Tests for lung cancer

Lung cancer can be detected using a battery of tests. If you're feeling sick, your first stop should be the doctor. They take a look at you and may suggest additional testing or a specialist if they think it's necessary.

### CT scan for lung cancer

Lung cancer may be detected and metastasized examined with the use of a CT scan.

### Chest x-ray for lung cancer

An x-ray of the chest may be able to detect lung cancer. Plus, it's a great tool for figuring out whether the lung cancer has spread.

### Endobronchial ultrasound for lung cancer

Endobronchial ultrasound is useful in the diagnosis of lung cancer. To what extent the cancer has spread to other organs may also be determined.

### PET-CT scan for lung cancer

A PET-CT scan can help doctors determine the stage of lung cancer and whether or not it has spread to other parts of the body.

### MRI scan for lung cancer

Utilizing both magnetism and radio waves, an MRI scan may produce cross-sectional images of the human body. These kinds of tests are useful for diagnosing lung cancer and gauging the extent of the disease.

### Surgical biopsy for lung cancer

In some cases, a surgical biopsy can help diagnose lung cancer. For a microscopic analysis of the lungs, a small sample of tissue is taken for study.

#### Mediastinoscopy for lung cancer

The mediastinoscopy procedure is used to inspect the chest cavity. A positive result from this test indicates that cancer cells have progressed to the lymph nodes in the neck.

#### Biopsy through the skin for lung cancer

This testing method is formally known as a percutaneous lung biopsy. Your doctor will place a needle into your lung to acquire a tissue sample.

#### Testing for gene mutations in lung cancer

Multiple subtypes of lung cancer are associated with alterations (mutations) in certain genes. Sending a biopsy to a lab can help find genetic abnormalities.

#### Neck lymph node ultrasound and biopsy for lung cancer

Lymph node biopsy detection of lung cancer cells.

## Stages of Lung Cancer

### Stage 1

The lung is the sole site where the tumor is visible in the first stages of the disease. Potentially larger (4 centimeters or less). Outside of the chest, there have been no signs of metastasis to the lymph nodes. Malignancies diagnosed at stage 1 almost always require surgical removal of the affected tissue. Radiation therapy is an option for patients who aren't good surgical candidates. Most people at stage 1 don't need additional treatments like chemotherapy, targeted therapy, or immunotherapy.



## **Stage 2**

Larger tumors are a hallmark of stage 2 lung cancer (more than 4 centimeters). On the other hand, there are signs that the cancer has spread to nearby lymph nodes but has not yet spread beyond the lung. Treatment for stage 2 lung cancer typically begins with surgery and may progress to chemotherapy, targeted medicines, or immunotherapies. Chemotherapy and radiation therapy are common therapeutic options for patients who are not surgical candidates.

## **Stage 3**

Stage 3 lung cancer is characterized by the spread of the illness to distant lymph nodes in the chest. However, there is also the possibility that large tumors have already metastasized to the lymph nodes. Patients with stage 3 cancer typically have access to a wide range of treatment choices. This may involve a combination of treatments, including as immunotherapy, chemotherapy, surgery, radiation, or targeted therapies.

## **Stage 4**

Lung cancer has reached stage 4 when it has spread beyond the chest cavity, where it was initially diagnosed. Most commonly impacted regions include the second lung, bones, brain, and adrenal glands (a gland on top of the kidneys). The tumor kind determines the available treatment options. One or more of chemotherapy, targeted therapy, and immunotherapy, or any combination thereof, may be employed.

## **Treatment Expertise for All Stages**

The Memorial Sloan Kettering Cancer Center was a pioneer in and a leader in the development of treatments for lung cancer (MSK). MSK offers the most cutting-edge medical treatments available anywhere in the globe. Lobectomy, for instance, has been established as the gold standard treatment for stage 1 non-small cell lung cancer thanks to an extensive study sponsored by Memorial Sloan Kettering Cancer Center. The procedure involves surgically removing the affected lung lobe in its entirety from the patient's chest. The left lung has only two lobes while the right lung has three. In addition, MSK played a crucial role in pinpointing when patients in stages 2 and 3 of cancer should begin receiving chemotherapy. In 2021, MSK made significant strides toward curing some of the deadliest cancers, giving patients a new reason to hope. In 2021, a new

pharmaceutical will be developed thanks to clinical trials monitored mostly by researchers and physicians at MSK. The United States Food and Drug Administration (FDA) has authorized the use of a drug that inhibits the growth of cancer cells by targeting a protein called KRAS. For decades, this protein was considered "undruggable," despite the fact that it may be responsible for one out of every four cases of lung cancer. Some individuals with non-small cell lung cancer in stages 3 or 4 may benefit from this new medicine, sotorasib (Lumakras™)[108].

### **Lung Cancer: Future Prospects**

Given that tobacco use is the single most important risk factor for developing lung cancer, trends in smoking behavior over the next few decades will have a profound impact on the disease's future course, which we will discuss in greater depth below. However, there are a variety of other factors that contribute to the development of lung cancer. A review of the epidemiological data accumulated over the previous three decades demonstrates that some shifts are foreseen apart from shifts in smoking rates. An increasing number of people who have passed away from lung cancer in the United Kingdom and the United States of America has been continuously rising along with rises in the number of people who smoke cigarettes. However, male mortality rates have plateaued and are presently declining, while female mortality rates continue to rise. There has been a clear increase in the number of women who smoke cigarettes since the end of World War II, which accounts for the entire increase in death rates among women. Changes in male mortality rates, however, are trickier to account for. While it was predicted that shifts in smoking habits would limit the decline in male mortality, the opposite has occurred. Further investigation finds that death rates by age group are rising for those in their later years while falling for those under 60. Simply put, changes in smoking behavior are not adequate on their own. When looking for causes of lung cancer beyond smoking, it can be helpful to compare how the disease is experienced in different parts of the world. The overall death rates in different countries remain highly different from one another, even after accounting for individuals' propensities for smoking. For instance, the United Kingdom and Germany do much worse than France and Italy. The use of tobacco and the manner in which it is smoked may have contributed, but it is also possible that pollution from factories and the use of coal have played significant roles. Second, there appears to be a link between the concentration of chemical, petroleum, shipbuilding, and paper industries and the rate of lung cancer deaths in the United States, as shown by studies conducted on a county-by-county scale

(Maisonet al. 1975). Deeper investigations that zero in on specific occupational pollutants also convey this point clearly. Asbestos, for instance, increases the chance of developing lung cancer when combined with cigarette smoking. When compared to those who have only been exposed to smoke, those who have also been exposed to asbestos have an 80-90 times greater risk (Selikoff et al. 1968). All of the available data supports the conclusion that industrial and environmental pollutants are major risk factors for the development of lung cancer. While each of these factors probably doesn't pose much of a threat on its own, they have a cumulative effect that greatly influences which smokers will get lung cancer. Because of rising public and political will to cut down on environmental and industrial pollution, laws mandating cleaner air have been passed. As a result, both outdoor and indoor air pollution have decreased significantly during the past few years. course of the past 30 years, and this improvement occurred before there was any noticeable shift in smoking patterns. Therefore, there must be a segment of the population that is currently comprised of people who have smoked cigarettes and been exposed to filthy air for a considerable amount of time simultaneously. These individuals have a significantly elevated chance of developing lung cancer; Younger smokers, however, will be at a lower risk of developing the disease as a result of advancements in air quality. This would clarify why death rates are falling across the board for people under the age of 60 even while there is an increased prevalence of illnesses among the elderly. The information presented here allows for two main conclusions. To begin, a decline in smoking rates may lead to a reduction in lung cancer deaths sooner and at a higher rate than might be expected. The vulnerable population group will eventually reach old age and pass away, which is why this is the case. Second, countries where cigarette use is on the rise may see an increase in lung cancer rates; however, this tendency may be mitigated if not only smoking but also environmental pollution are addressed [109].

**Aim of this study**

Lung cancer is a form of Cancer that begins in the airway-lining cells of the lungs. It is the leading cause of cancer deaths in both men and women. The two basic types of lung cancer are small cell lung cancer and non-small cell lung cancer. These two varieties are cultivated and maintained differently.

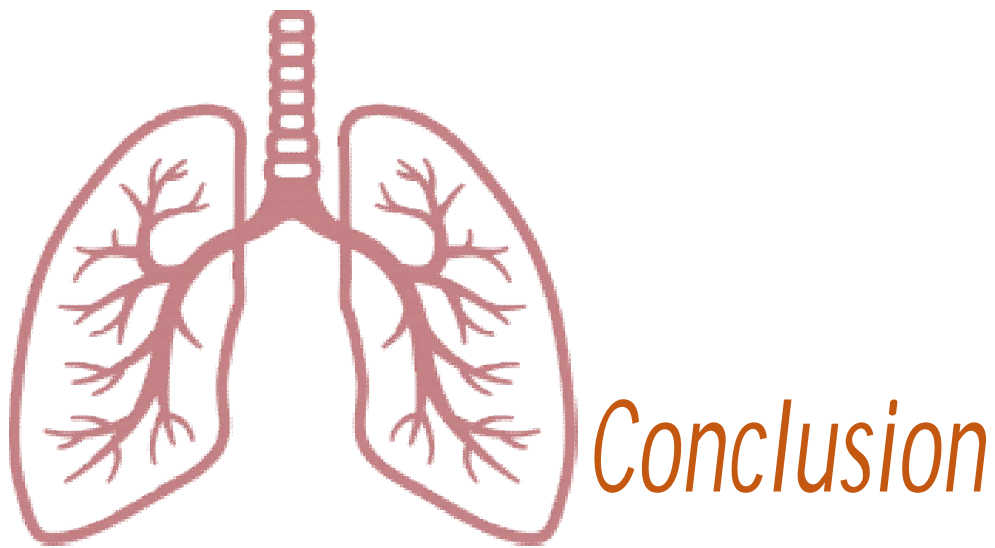
My aim of this study:

To see the current situation of Bangladesh.

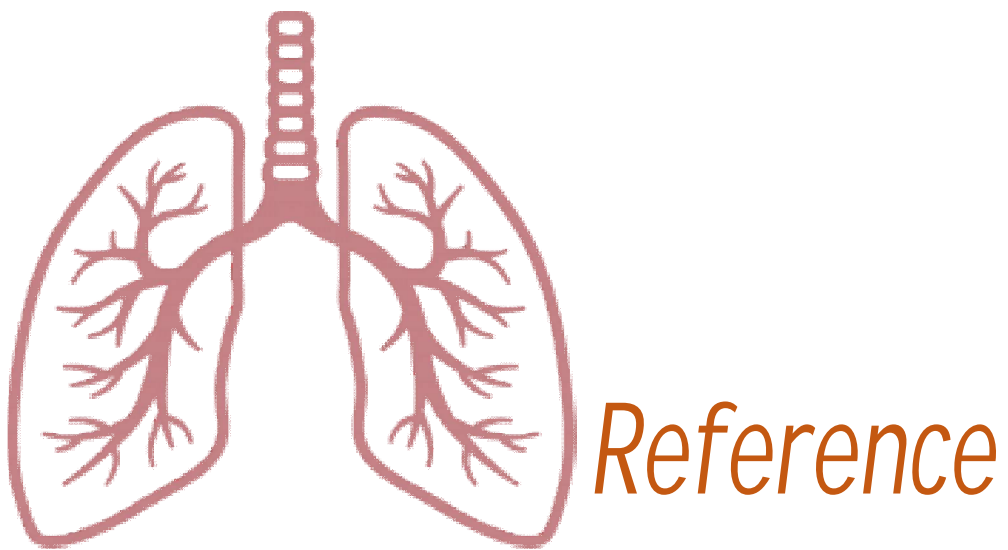
To see what people, think about lung cancer in Bangladesh.

To find out Current treatment and practices to prevent lung Cancer future prospective.

To open a new area of higher studies.



In Bangladesh, around 13 to 15 lakh people living with Cancer, and approximately 2 lakh more are diagnosed with the disease yearly. In general, lung cancer and Cancer of the mouth and oropharynx are the two types of Cancer that affect guys the most often. And it's getting worse every single day. According to the most recent WHO data from 2020, 1,7% of all deaths in Bangladesh, or 12,174 people, were caused by lung cancer. Bangladesh has a death rate of 10.24 per 100,000 people, when age is taken into account.



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