International Journal of Research and Development in Engineering Sciences
ISSN: 2582 - 4201(Online) , http://www.ijrdes.com/ , Conference Proceedings
International Conference on Emerging Trends in Engineering, Technology and Management 2025
11-12th April 2025 , www.icetm.in , ICETM 2025 , Hybrid Mode
Viswam Engineering College (Autonomous) , Madanapalle , Andhra Pradesh , India
Conference Proceedings , https://doi.org/10.63328/IJRDES-V7C1-ICETM2025
Regular Issue, Vol. 7, ICETM 2025 , Pages: 128 – 135 , ISBN : 978-81-984440-5-9
Received: 28 January 2025 ; *Accepted:* 29 April 2025 ; *Published:* 19 August 2025
https://doi.org/10.63328/IJRDES-V7CIP19
https://www.youtube.com/watch?v=jqztreXlilI
https://archive.org/details/jsp-ijrdes-v7c1p19
Conference Paper : Original – Applied Research – Experimental Research Paper

A Review on Lung Cancer Identification and Prediction using Machine Learning

J.V. G. Prakasa Rao Pyla [1] , Dr. D. Mabuni [2]

[1] Research Scholar, Department of Computer Science & Technology, Dravidian University, Kuppam, Andhra Pradesh, India ; prakash.pyla@gmail.com
[2] Assistant Professor , Department of Computer Science & Technology, Dravidian University, Kuppam, Andhra Pradesh, India ; mabuni.d@gmail.com

* *Corresponding Author : J.V.G. Prakasa Rao ; prakash.pyla@gmail.com*

Abstract: Lung cancer is accountable for more deaths each year than all of the other leading cancers - breast, colon and prostate diseases – combined, and is the leading cause of cancer death worldwide. A major problem to manage this disease is that there are no detectable symptoms early on and most of the time the disease is diagnosed at later and more advanced stage when it can no longer be treated effectively. Traditional screening modalities (chest x-ray and sputum cytology) have shown poor success rates and although improvements in imaging/staging technology have occurred, five year survival rates are still not high. Machine learning (ML) and artificial intelligence (AI) algorithms are emerging as a potential solution to enhance the early detection, classification and prediction of lung cancer status. Several recent ML models such as deep learning, support vector machines and ensemble models for the identification and prediction of lung cancer are explored. We report their performance, data sets investigated, and shortcomings and discuss these findings in the context of future work directed towards clinically useful diagnostic systems.
Keywords: Lung Cancer, Machine Learning, AI, Ages, Human Beings.

1. Introduction

Lung cancer, once considered a rare condition at the turn of the twentieth century, has grown into the leading cause of cancer mortality worldwide [1]. Early documentation by Adler in 1912 recorded fewer than 400 verified cases globally; within decades, the widespread adoption of tobacco accelerated by wartime culture transformed lung cancer into an epidemic. Pioneering clinicians such as Dr. Alton Ochsner were among the first to formally link heavy cigarette smoking to the rapid rise in incidence observed during the mid-twentieth century. Today, the disease claims over 150,000 lives annually in the United States alone, with five-year survival rates of approximately 16% in the U.S., 5% in the U.K., and 8% in India figures that have shown only modest improvement despite decades of clinical research [2]. The primary histological subtypes are Non-Small Cell Lung Cancer (NSCLC), which accounts for roughly 85% of cases, and Small Cell Lung Cancer (SCLC), each requiring distinct diagnostic and therapeutic strategies. Against this backdrop, machine learning (ML) has attracted considerable attention as a tool to augment clinical decision-making.

By analyzing patterns in imaging data, genomic profiles, and electronic health records, ML models offer the potential to detect lung cancer earlier and stratify patient risk more accurately than conventional methods. This review surveys the current landscape of ML-based approaches for lung cancer identification and prediction, discussing algorithmic advances, benchmark datasets, and open research challenges. See Figure 1 for an illustration of a lung cancer tumor. University, saw his first case of lung

ISSN: 2582 - 4201(Online) , http://www.ijrdes.com/ , IJRDES, Vol. 7, ICETM 2025 , https://doi.org/10.63328/IJRDES-V7CIP19

cancer autopsy and was told by the doctor that he would likely see no more by that time. Incredibly, he didn't see a second case, this time at New Orleans Charity Hospital, until 17 years later. This contrasted with the progression of the epidemiological change in the incidence of lung cancer which followed the increased use of tobacco in the years to come. Within 6 months of this, another eight cases occurred at the same hospital, and all were men heavy smokers, so he deemed it an epidemic. In fact, lung cancer is now responsible for the deaths of over 150,000 people throughout the world annually, more than breast, colon and prostate cancer combined. Whereas its incidence has declined in the developed world, it is an unknown size epidemic in the poor world because it's very contagious. Adtant progress has been made in imaging, diagnosis and staging this disease and the 5 year survival rate is still dismal at 16% in the United States, 5% in the United Kingdom and 8% in India. This quick health scan is designed to highlight successes throughout time and across locations for combatting this disease.

Lung cancer [Figure. 1] has progressed from an ailment that was recorded in the past century to as the main cause of cancer deaths all over the world. Adler recorded all occurrences of lung cancer where they had occurred in the world in his “Primary Malignant Growths of the Lungs and Bronchi” in 1912. He only confirmed 374 cases. As mentioned earlier, Pershing's description of tobacco as "a wartime necessity" is communist in tone and the general institutional attitude of the early 20th century towards smoking. This is said to have popularized smoking among soldiers in WWI. I'm no slower with a cigarette than I am the same with gunfire. Actually, lung cancer is a fairly rare disease, but Ochsner surgeon in 1910 was given the opportunity to observe a post mortem examination of a patient who had died of lung cancer. So he didn't return to see another patient until half a century later at New Orleans' Charity Hospital. During the following six months, there were eight additional cases (all of which were heavy smokers men). We tend to refer to two principal types of cancer in the lungs as lung cancer: Non-Small Cell lung cancer and small cell lung cancer.

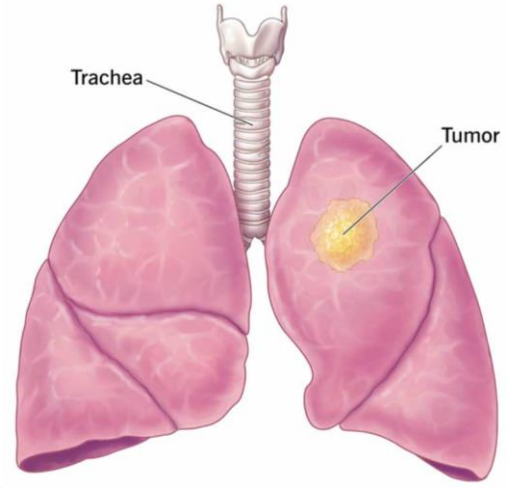

Figure. 1 Lung Cancer Tumour

Today, higher than 150,000 people worldwide lost their lives to lung cancer every year, which is higher than the number of people who lost their lives to breast, colon, or prostate cancers combined. Until now, despite the declining numbers in the industrial world, an unknown scale epidemic of some magnitude is sweeping the poor world and it is the planet's greatest avoidable respiratory disease. At the same time, 5-year survival rates of this disease are unfavourably high, around 16% in the U.S., 5% in the U.K. and 8% in India, despite progress made in imaging technology and diagnostic procedures and staging methodology. The aim of this short summary is to recognise that there are some hopeful signs of progress in the battle against this disease [2]. Both men and women in the United States currently have lung cancer as their primary cancer killer.' It could be responsible for almost 6% of all U.S. deaths.

2. Related Work

Machine learning has been applied to lung cancer research across a range of tasks, from nodule detection in CT scans to survival prediction and treatment response Modeling. Early computational approaches relied on hand-crafted radiomics features extracted from imaging data, which were then fed into classical classifiers such as support vector machines (SVMs) and random forests.

Kuruvilla and Gunavathi (2014) demonstrated that neural network-based classifiers could distinguish malignant from benign lung nodules with accuracy exceeding 93%, outperforming traditional rule-based systems on benchmark datasets [3]. Subsequent work leveraged the representational power of convolutional neural networks (CNNs).

Shen et al. (2017) proposed a multi-scale CNN architecture that jointly learns nodule characteristics at different resolutions, achieving competitive sensitivity on the LIDC-IDRI dataset one of the largest publicly available annotated lung CT repositories. The introduction of the LUNA16 challenge further standardized evaluation, enabling direct comparison across methods and accelerating progress in false-positive reduction for nodule detection.

Beyond imaging, ensemble methods and gradient boosting algorithms have been applied to structured clinical data—including patient demographics, smoking history, and laboratory values to predict cancer stage and five-year survival probability.

Ardila et al. (2019) showed that a deep learning model trained on low-dose CT screening data could match or

ISSN: 2582 - 4201(Online) , http://www.ijrdes.com/ , IJRDES, Vol. 7, ICETM 2025 , https://doi.org/10.63328/IJRDES-V7CIP19

surpass the diagnostic performance of experienced radiologists, particularly in detecting interval cancers missed on prior scans. These findings collectively indicate that ML-based systems, when trained on sufficiently large and diverse datasets, can serve as effective decision-support tools in lung cancer diagnosis and risk stratification.

2.1. The Symptoms

Early lung cancer may not have specific symptoms; these will often be mistaken for smoking. When symptoms are great enough to encourage the patient to see a doctor, then the disease is likely untreatable. The symptoms of most cases of lung cancer are similar to those of other less-serious diseases. Some people have symptoms early on with the disease while many don't have symptoms until it has progressed. There are some symptoms associated with it, but if you have any they may be just one or few of these. Needs a diagnosis by a health professional

Common presenting symptoms include the following as The most frequently reported symptoms are a persistent or worsening cough (sometimes with haemoptysis), chest discomfort or pain, unexplained weight loss, and breathlessness. Constitutional signs such as fatigue, anorexia, and generalized weakness may also be present, particularly in metastatic disease. Lymphadenopathy, hoarseness, and recurrent respiratory infections are additional indicators that warrant further investigation [4]. Symptoms may vary depending on tumour location and subtype:

- **rib pain Cough**: may be persistent, non-productive, productive or with blood
- **Respiratory**: frequent respiratory infections, or shortness of breath or wheezing.
- **Any part**: pain or weakness. Fever or whole body weakness, fatigue, loss of appetite.
- **Also Common**: hoarseness, enlargement of the lymph nodes, or weakness or loss of weight.

2.2. Stages

Chest computed tomography (CT Scan) was later invented in the late 1970s. Several studies [Figure. 2] have explored the accuracy of CT staging based on the post-lysis (histopathological) staging of the disease. The post-lysis (histopathological) disease staging has been used as the standard for reference diagnosis and several studies have evaluated the accuracy of the CT based clinical staging. From these investigations it emerged that the use of size as threshold for CT could not take the place of proof of pathological diagnosis, that is, confirm the presence of lymph node tumours. The problem with this is that CT scans find what appears to be too many "false positives" in all of the studies. However, even with these advances, computed tomography (CT) remains the best imaging technique to stage lung cancer. This test can be used to assess the size of the mediastinal lymph nodes as well as presence or absence of the tumour in the vascular system and the mediastinum/chest wall [4]. Clinically however, post obstructive pneumonitis may impact on the accuracy of the diagnosis. However, many (some estimate 40%) lymph nodes detected on the CT scan as malignant ultimately prove to be healthy when they undergo pathological examination; this percentage differs, depending on each patient's disease category. Another method of staging lung cancer is positron emission tomography (PET) that looks at the biological activity of the neoplastic cells. The absorption of glucose by cells and rate of glycolysis are increased in lung cancer cells compared to normal cells. Highly metabolising cells take up the radioactive glucose analogue 2-[18F]fluoro-2-deoxy-d-glucose (FDG) that can be detected on the PET scanner. There have been a number of reports of using radiotherapy and FDG in the evaluation of patients with lung cancer.

The pooled data set contains information from 4,793 people who underwent CT scanning for staging the mediastinum. Meta-Analytic data suggests that mediastinal staging with CT has moderate diagnostic yield with pooled values of the sensitivity at 0.60 (95% CI: 0.51-0.68) and the specificity at 0.81 (95% CI: 0.74-0.86). In contrast, PET imaging is more accurate with pooled sensitivity of 0.85 (95% CI, 0.79-0.89), and similar test specificity. This is another consistent finding that has been identified with PET vs. CT for mediastinal nodal assessment (with pairwise analysis) [5]. According to one randomized experiment, 20% of patients that appear to be respectable can be avoided from unneeded thoracotomies. Both false positive and false negative rates are seen with PET, but the overall accuracy of PET for the detection of intra- and extra-thoracic disease is far greater than CT.

Thus, the general rule with any modality used in tissue is to confirm abnormalities, if possible. Medical technology has come to the rescue and, in recent years, tissue has been taken with help of the late-breaking methods such as T.B.N.A. (transbronchial needle aspiration), endoscopic ultrasound guided procedures, and of course percutaneous procedures etc. Nevertheless, it is the most widely cited reference standard technique for the histopathological diagnosis because of the high diagnostic accuracy and almost none procedural issues that occur after its use.

Staging of cancer is often based on the size of the main tumour, how far the tumour has grown into the surrounding tissue and whether there are any lymph nodes or distant organs involved. Staging procedures are different with various types of cancer. There are lots of possible sizes and spreads for each

ISSN: 2582 - 4201(Online) , http://www.ijrdes.com/ , IJRDES, Vol. 7, ICETM 2025 , https://doi.org/10.63328/IJRDES-V7CIP19

stage (Figure .2) that could be included in that group. For example, if a cancer is in stage III, the initial tumour could be smaller than that of a cancer in stage II, but be in a more advanced stage for other reasons. Often the cancer is staged by the following:

Stage 0 (in-situ): Value: cancer is in the top lining of the lung or bronchus. It hasn't spread to other parts of the lung or outside of the lung.
Diagnosis Stage I - Cancer is only in the lung.

Stage II: Cancer is bigger than stage I, has enlarged affected lymph nodes inside the lungs or more than one tumor in the same lobe of the lung.

Stage III: The cancer is greater than 2 cm in size, has spread to adjacent lymph nodes or organs and/or there is more than one tumour in a separate lobe of the same lung.

Stage IV: Cancer has grown into the other lung, into the fluid around the lung, into the fluid around the heart or to other organs in the body.

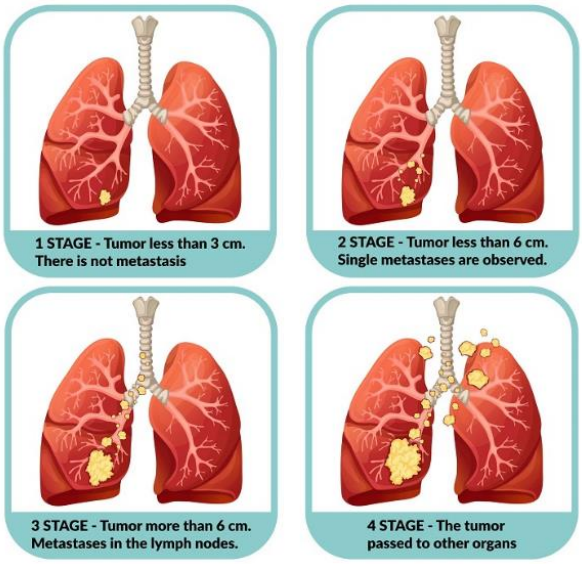

Figure. 2 Various Stages on Lung Cancer

Limited vs. Extensive stage

So you may find doctors talk about the "limited" or "widespread" stage of small cell lung cancer, where stage I-IV are what they are referring to. This will be dependent on if/when there is a single radiation field that will cover the area or not.

a) Limited-stage SCLC is restricted to one lung and might occasionally be in the lymph nodes in the center of the chest or above the collar bone on the same side.
b) The small cell lung cancer (SCLC) is spread to another lung or to the other lung (or) to lymph nodes on the opposite side of body (or) to both lungs, once it is classified as "extensive."

2.3. Treatment

Treatment has not made significant advances over the past 50 years – while surgery, radiation, chemotherapy or a combination of these remain the standards. Lung cancer growth in early 20th century was no different than many other diseases no cure. Methods, including pre-operative staging, have also been significantly improved over the last 50 years and surgery is the most useful method that does have a chance of cure [6]. New knowledge of the design of fields and more precise targeting has allowed the provision of more intensive dose treatments in radiotherapy. Improvements in chemotherapy have been motivated primarily by growing understanding of successful chemotherapy programmes, enabling successful management of side-effects and by increased focus on how to maintain and promote the quality of life of patients receiving chemotherapy.

Treatment for lung cancer may vary by physiologic type of the tumour and extent (stage): in the case of small-cell lung cancer, the combination of chemo and radiation therapy is used and this is a more aggressive type of cancer. They include large cell carcinoma, squamous cell carcinoma and adenocarcinoma (also known as non-small cell carcinoma) which are best responded to surgery. But treatment in this manner only works in about 1/3 of cases. The chest radiograph and the sputum cytology test are the only two tests known to be reliable as a tool for early detection of "silent stage" lung cancer to date.

Sputum cytology best detects tumours in the larger centers areas and radiographs, in the early stages, have the best chance for picking up tumours on the periphery. The processing of sputum samples by the Saccomanno technique is recommended, as are full-sized (36×43 cm) chest radiographs taken at around 140 kV.

FEATURES	NORMAL CELLS	CANCER CELLS
SHAPE	Regular	Irregular, variations in size and shape
GROWTH AND CELL DIVISION	Controlled	Uncontrolled
APOPTOSIS	Present	Absent
COMMUNICATION WITH NEAR BY CELLS	Present	Absent
NUCLEUS	Small and light	Large and dark
ANGIOGENESIS (BLOOD VESSEL FORMATION)	When new tissues are formed	Continuous
REPAIR	Present	Absent
SPREAD	No	Yes
GLYCOLYSIS	Aerobic glycolysis	Leads to lactic acidosis
RNA & DNA SYNTHESIS	Normal	Increased synthesis of RNA and DNA
CATABOLISM OF PYRIMIDINE	Normal	Decreased
TUMOUR SUPPRESOR GENE	Present	Lost
CONTACT INHIBITION	Present	Absent

Table 1: Difference between Normal Cell and Cancer Cells

In the 1950s and 1960s in the U.S., and the U.K., many observational and non-randomized controlled studies were conducted to test the use of chest

ISSN: 2582 - 4201(Online) , http://www.ijrdes.com/ , IJRDES, Vol. 7, ICETM 2025 , https://doi.org/10.63328/IJRDES-V7CIP19

radiography (either with or without sputum cytology) as a screening tool for lung cancer without good results. Screening using either test was not shown to reduce lung cancer deaths, and mortality from the lung cancer is the most preferred and applicable endpoint for evaluating the benefits of screening (in the past, with early screening, survival was a possible endpoint, but could be confounded by biases created by screening). Most concurred that lung cancer was a more aggressive form of disease than was others or that early detection methods and treatments were less than optimal.

The ramifications of the paradigm of early detection of hidden but still "good" prospects that would benefit the patient is supported by few clinical examples, and the end result is grim. In the early 1970s, lung cancer incidence and mortality began to slowly increase and, at the same time, the U.S. National Institutes of Health (NIH) started to fund three randomized clinical trials (RCTs) of radiographic and cytological lung cancer screening in the U.S. The studies conducted at the LUMC in Amsterdam, at the Memorial Sloan Kettering Cancer Centre in the US and at Johns Hopkins Medical Institutions in the US were the main outcome measures to lung cancer death.

The purpose of this paper is to talk about the experimental results of the Mayo Clinic experiment, popularly credited as the Mayo Lung Project (MLP) and analyze and interpret the results. In addition to the Mayo data, data from the Hopkins and Memorial trials are included. Future methods of treatment may be targeted therapy using specific tumour antagonists. The care of lung cancer patients and the co-ordination of treatment requires a coordinated approach and is provided by a lung cancer team.

The multidisciplinary team is mostly comprised of pulmonologists, thoracic surgeons, radiation and medical oncology doctors, diagnostic imaging specialists, histopathology experts, oncology nurses who specialize in supportive care and doctors who specialize in thoracic malignancies. Anybody, that gets their diagnosis of lung cancer, should be covered by any such action that's taken by the aforementioned company.

2.3.1. Radiotherapy

Unfortunately, radiotherapy has not yet shown itself to be a very successful method of cure. It has been shown to decrease the number of tumour failures and tumour progression in locally advanced disease, but while trials have been carried out on higher doses ranging up to 80 Gy, the 5 year survival following such treatment is only 7-10%. The standard dose of radiation therapy currently used for non-small cell lung cancer (NSCLC) is 60 Gy, a dose believed to be in the therapeutic range and to have minimal radiation dose to the lung and esophagus. Of all the different ways of dose escalation, hyper fractionation has shown the best results. One of the most important British Medical Research Council (BMRC) trials [7] showed that continuous hyper fractionated accelerated radiotherapy (CHART) - where 1.5 Gy is given every 8 hours for 54 Gy - resulted in more endings and 30% at 2 years compared with conventional fractionation when given at 1.5 Gy every 24 hours for 54 Gy. The daily hyper fractionation protocol was, however, soon followed by challenging logistical difficulties to achieve the daily dose level that was common in this protocol, which made it too cumbersome for use in the clinical setting.

Due to the limited amount of money, "grouping" of individual patients was necessary again. The weekend leave (or CHARTWEL) has proven as effective as CHART and they have dispensed with CHART so far. Chemotherapy is used along with radiation therapy, and that has some advantages over radiation alone in terms of survival rates median survival and long-term survival.

There have not been any comparative investigations performed that would show that a combination of both methods is superior, though. It is unknown, however, which therapy is best to be given first or whether the order of the drugs has some effect, as a meta-analysis published by the NSCLC Collaborative Group in 1995 found a 4% advantage after 2 years and a 2% advantage after 5 years (46). Combining chemotherapy with radiation appears to be more effective than chemotherapy alone or radiation alone, although little evidence exists to back this up. There is, to date, only one randomized controlled study and this confirmed that simultaneous therapy resulted in a 4-month median extension in survival (by 16 months and 12 months, respectively).

Apparently precision delineation of the radiation field – with support from a 3D planning of treatment on a CT scan – is going to revolutionise radiotherapy by delivering the radiation treatment to the tumour with greater accuracy and at a higher dose without becoming harmful to the patient. Furthermore PET imaging is an integral part of the pre-treatment which is essential to pave the way for successful radical therapy because it plays a pivotal role in accurate diagnosis of malignancy within the target tissue for radiation in the proper planned radiation field [8].

Symptom management like palliation of bone pain due to metastases, superior vena cava syndrome and haemoptysis is done commonly, and it has been shown that short-course palliative radiotherapy is effective for a significant percentage of patients. Machine learning in radiotherapy planning is an emerging field of interest, where machine learning models are being developed to automate organ-at-risk segmentation; to predict the occurrence of radiation pneumonitis; and to individualize dose

ISSN: 2582 - 4201(Online) , http://www.ijrdes.com/ , IJRDES, Vol. 7, ICETM 2025 , https://doi.org/10.63328/IJRDES-V7CIP19

fractionation, depending on the characteristics of the tumour and normal tissue.

2.3.2. Chemotherapy

Advanced NSCLC has a poor natural history, with patients with the disease only surviving about 4-6 months. Abysmal response rates (10-15%) were seen in early chemotherapy trials and the above 50% response rate was seen in SCLC. This resulted in survival benefits of around 6-weeks compared to optimal supportive care; and a greater survival rate in 1-year (46%).

This benefit was only observed when using cisplatin-directed chemotherapy, but not when using other chemotherapeutic agents, or combination chemotherapy with long-acting alkylator before. Previous studies with other drug regimens (e.g., combination chemotherapy cyclophosphamide (Cytoxan), vinblastine and methotrexate [CMF] used early in the course of the disease) yielded similar clinical results as BSC. The improvement in last decade towards new therapeutic option has extended the median survival by 7–10 months and have improved the 1-year survival rate by 35–40%.

Modern platinum-based combination therapies that include vinorelbine or gemcitabine or taxanes provide numerous benefits such as outpatient treatment, greater tolerability (fewer drug-related side effects of nausea, vomiting, and alopecia) and better maintenance of patient quality of life [8]. The results of tumour trials may not be generally applicable activity because when people are placed into clinical trials, they are younger, healthier with high performance status, and in centers where their treatment is specialized, managed mostly by specialized tumour doctors.

These criteria of selection limit the applicability of these findings to a certain subset of patients and not the overall patient population who are suffering from advanced disease. Even though, by 2000, lung cancer was becoming a disease of the elderly, only 20% of elders are involved in therapy studies. In addition, most trials have looked for an acceptable performance status (ECOG 0-1) and yet there are many patients who will have a poor ECOG (grade 2 or 3). There has to be a more serious consideration into aging population and the development of effective treatment plan for individuals with lower performance level.

Higher quality of life is also associated with chemotherapy, and there is no benefit of chemotherapy with respect to lifespan for lower quality of life patients of PS. One good thing to learn is there's a new course of action to help kiddles solve the issues - a targeted therapy. Over-expression of the epidermal Growth Factor receptor (EGFR) and its ligands have previously been witnessed in various therapies of cancer and mutations in its have been reported in the NSCLC. EGFR missignaling has been shown to be involved in the initiation and progression of NSCLCs. There are two EGFR inhibitors, gefitinib and erlotinib, taken by mouth that inhibit the activity of the EGFR tyrosine kinase in the cell. Both have shown similar anti-neoplastic effects with there being an acceptable toxicity in the patients with advanced NSCLC who have failed standard chemotherapy. In patients with relapsed disease two randomized phase II Clinical Investigations have reported on the objective regression of tumours and better results from palliative treatment using 2 doses of gefitinib. The survival and symptom control results were also better for the erlotinib arm of a randomized trial that compared erlotinib with placebo in treatment-refractory, stage IV NSCLC. Overexpression of the EGFR is a common abnormality in the NSCLC patient, that is therapeutically relevant in primary care of never-smoker and BAC female patients.

EGFR activating mutations can be detected in about 10% of tumours, and only exist in minority of cases in NSCLC. Interestingly, even high clinical response rates stem from a prevalence of mutations that is lower than clinical response, indicating that there are possibly others predictive biomarkers. There are several targeted therapies being studied for treating lung cancer. Currently, research is ongoing looking for inhibitors of tyrosine kinases that target EGFR, which is an antibody (such as, cetuximab) already used to treat colorectal cancer.

Similarly, bevacizumab is a monoclonal antibody against VEGF which is highly effective in the treatment of colorectal cancer, and is being tested for other purposes such as lung cancer. In addition, clinical trials are also investigating using antiangiogenic drug thalidomide with chemotherapy in NSCLC and SCLC patients. It is the most difficult to treat form of lung cancer, due to the lack of progress in small-cell lung cancer, and the intractability of the disease. The 1970s saw the development of several correct single chemotherapeutic agents which, when used with two other three agents, offer some promise to SCLC.

Treatment with randomized trials. This is the case if the spread of the disease was not great, because the median survival time was much longer, 18-20 months, than it was in a patient not treated (5 months). Those who were so ill with disseminated disease, did even more outstanding recovery, weeks to 6 to 9 on treatment. The best results were obtained in patients with good performance status, and normal levels of serum sodium, alkaline phosphatase and urea. Such standards generally do not vary over time, although different combinations of drug agents, e.g. etoposide-carboplatin, have made treatment more tolerable for the patients today. Prophylactic cranial irradiation and radiotherapy to the chest will help to prevent neurological problems associated with brain

ISSN: 2582 - 4201(Online) , http://www.ijrdes.com/ , IJRDES, Vol. 7, ICETM 2025 , https://doi.org/10.63328/IJRDES-V7CIP19

metastases, yet it is useful in only treatment responsive cases.

Despite numerous clinical trials, with or without induction, maintenance and/or support with hematopoietic growth factors, there has been no improvement in the survival rate. Individuals in this group are highly symptomatic, and likely have high attrition rates, with substantial improvement in symptoms upon treatment, making this group clinically useful. As in NSCLC, treatment with chemotherapy at the time of progression is of poor benefit (low response rates, short duration of disease control). Curiously, SCLC is much more responsive to treatment than is NSCLC, and the majority of research has focused on NSCLC.

2.4. Methods

The methods and strategies for recruiting participants for all three studies funded by the NCI were detailed previously. Over 10,000 men took part in each study and all were considered to be at high risk for lung cancer (age 45 years or older, regular heavy tobacco smokers). Full-sized chest radiograph films were used in the radiological screening process (either posteroanterior and lateral projections or stereoscopic views). Sputum specimens, collected on 3 days (inducible, spontaneous) were examined by cytological examination using the Saccomanno method.

Prior to the MLP, a preliminary radiologic and cytologic screening (prevalence) was conducted with the participants of the MLP. Negative initial screening participants were randomly assigned to either a study or a control group - the study group got a chest radiograph and sputum cytology test every 4 months for 6 years, while the control group was advised to undergo a chest radiograph and sputum cytology test at least once per year.

Screening average for the two groups was 1 to 5.5 years (average three years) in post. In all the trials, annual radiologic screening was offered to male patients in both the Hopkins and Memorial trials, and every four months, cytologic screening was offered to male patients in the Hopkins trial. Once a year, yearly radiologic screening was provided to the control sample.

In all three trials [Figure. 3] all deaths were recorded and analyzed by a committee of statisticians, doctors, pathologists from the hospitals engaged in the trials and from the University of Cincinnati where the statistics were collected. Lung cancer was confirmed or proven if there was either a concordant clinical presentation or a histologic/cytologic confirmation of malignancy [Figure 3]. A diagnosis was considered to be "probable" if just histologic or cytologic confirmation or only a compatible presentation was available. 100% of lung cancer cases were confirmed in the MLP. Both of the other two studies had some “issues” but had minimal effect on the findings [9].

If the diagnosis was established as a cancer of the lung by thoracotomy or autopsy the diagnostic criteria were satisfactory. In each of the three controlled studies, however, most of the lung cancers were not curable.

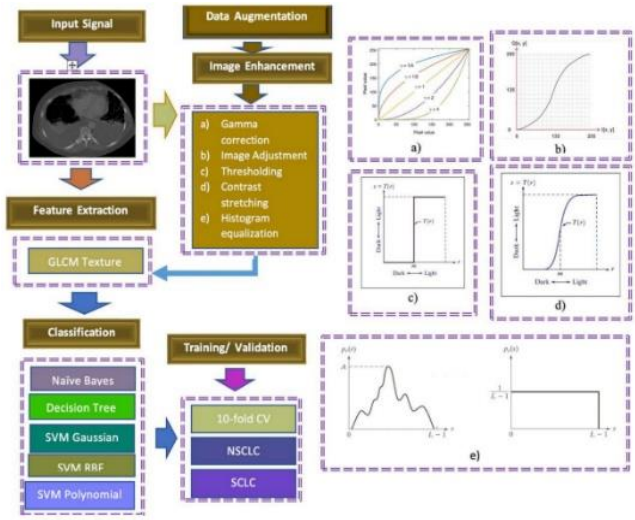

Figure. 3 Proposed work to Implementation Progress

Common methods for demonstrating the presence of cancer in patients were cytologic examination of body fluids, and biopsy of an enlarged cervical lymph node, liver, etc. Sadly, lung cancer is a "mischievous" disease and may occur in any form of cancer. It would have been difficult to give this diagnosis to the cases called ‘borderline' in these three studies that were specifically on the diagnosis of lung cancer.

3. Conclusion

In conclusion, lung cancer was a virtually untreatable disease 100 years ago. The most important breakthrough in medical knowledge concerning this form of cancer has been the discovery of the prime cause of the disease: tobacco. Imaging procedures, surgical, chemotherapy and radiotherapy techniques have developed greatly in recent years and are aiding in the treatment of this disease to a greater extent. However, this progress is not enough to have an effect on survival. However, the team of researchers who work in the field of cancer research have not lost sight of what they hope will be improved cases of survival in the future decades. When it comes to mortality, no other diagnostic or therapeutic will be as impactful as elimination of tobacco products from the market. True as Johnston's statement, “I have never heard of it, Hippocrates.” The 100-year study on chest diseases hopefully will enable lung cancer to be a footnote in medicine.

ISSN: 2582 - 4201(Online) , http://www.ijrdes.com/ , IJRDES, Vol. 7, ICETM 2025 , https://doi.org/10.63328/IJRDES-V7CIP19

References

[1]. Witschi H. Profiles in toxicology: a short history of lung cancer. Toxicol Sci 2001;64:4–6.

[2]. Ochsner A. Corner of history: my first recognition of the relationship of smoking and lung cancer. Prev Med 1973;2:611–614.

[3]. Doll R, Hill AB. Smoking and carcinoma of the lung. BMJ 1950;2:739–748.

[4]. U.S. Public Health Service. Surgeon General's advisory committee on smoking and health. Washington, DC: U.S. Government Printing Office; 1964. Publication No. 1103.

[5]. K. R. Kuppireddy, "Logistic Regression based Hepatocellular Carcinoma Liver Cancer Detection," *International Journal of Computational Science and Engineering Research*, vol. 2, no. 1, p. 1, Feb. 2025, doi: 10.63328/ijcser-v2ri1p1.

[6]. Gordon T, Crittenden M, Haenszel W. Cancer mortality trends in the United States, 1930–1955. Natl Cancer Inst Monogr 1961;6:131–350.

[7]. Cancer Statistics Branch Division of Cancer Prevention and Control, National Cancer Institute, National Institutes of Health. Cancer rates and risks. Washington, DC: U.S. Government Printing Office; 1996.

[8]. B. P. Pakala and N. K, "Enhancing breast cancer diagnosis using explainable models," *International Journal of Computational Science and Engineering Research*, vol. 2, no. 4, p. 62, Dec. 2025, doi: 10.63328/ijcser-v2ri4p12.

[9]. Liu BQ, Peto R, Chen ZM, Boreham J, Wu YP, Li JY, Campbell TC, Chen JS. Retrospective proportional mortality study of one million deaths. BMJ 1998;317:1411–1422.

[10]. Parkin DM, Pisani P, Lopez AD, Masuyer E. At least one in seven cases of cancer is caused by smoking: global estimates for 1995. Int J Cancer 1994;59:494–504.

[11]. D N Keerthana , Nandini Kakarakayala , Susmitha Kondapalli , Vydehi Chamiraju , Sahithya Kunchepu , " Breast Cancer Detection using DCNN and MSVM " ,International Journal of Computational Science and Engineering Research, vol. 1, no. 2, May. 2024, doi: https://doi.org/10.63328/IJCSER-V1RI2P5

[12]. Pisani P, Parkin DM, Bray F, Ferlay J. Esitmates of the worldwide mortality from 25 cancers in 1990. Int J Cancer 1999;83:18–29.

[13]. S. K, S. K. A, and K. Varshini V., "Artificial Intelligence-Driven Diagnosis of Lung Cancer with Enhanced Efficiency," *International Journal of Research and Development in Engineering Sciences*, vol. 7, no. 5, p. 1, Sep. 2025, doi: 10.63328/ijrdes-v7ri5p1.

[14]. H. Kondamarri, S. I. Khalivulla, R. Gottam, and S. M, "Phytogenic synthesis of Beta vulgaris-Derived silver nanoparticles against A549 lung cancer cells and anticancer activity," *International Journal of Research and Development in Engineering Sciences*, vol. 7, no. 5, p. 15, Sep. 2025, doi: 10.63328/ijrdes-v7ri5p4.

[15]. C Manoj Kumar , Sindaluri Devisree , E Harshitha , E Gayatri , P Hema Mahuri, "Detection of Lung Cancer using SVM Algorithm and Comparing With K-Means Accuracy ",International Journal of Computational Science and Engineering Research, vol. 1, no. 3, p. 13, July. 2024, doi: https://doi.org/10.63328/IJCSER-V1RI3P4

Declaration

Conflicts of Interest: The authors declare no conflict of interest.

Author Contribution: All authors wrote the main manuscript text and also consent to the submission.

Plagiarism : Similarity Check - 3 % , AI Plagiarism : 0 %

Ethical approval: Not applicable.

Consent to Participate: All authors consent to participate.

Funding: Not applicable, and No funding was received

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Personal Statement: We declare with our best of knowledge that this research work is purely Original Work and No third party material used in this article drafting. If any such kind material found in further online publication, we are responsible only for any judicial and copyright issues.

Acknowledgements: We thank everyone who inspired our work.

Cite this Paper:

J.V. G. Prakasa Rao Pyla 1 , Dr. D. Mabuni 2 , " A Review on Lung Cancer Identification and Prediction using Machine Learning ", International Conference on Emerging Trends in Engineering, Technology and Management 2025, ICETM 2025 , International Journal of Research and Development in Engineering Sciences , vol. 7 , Conference Issue 1, p. 128 - 135, August 2025, DOI: https://doi.org/10.63328/IJRDES-V7CIP19