

Lung Cancer

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Key points

- Introduction to lung cancer
- Lung cancer symptom appraisal, differences between patients with and without smoking history.
- Air pollution; A culprit of lung cancer
- Immunotherapy in lung cancer (LC)

Lung cancer is the major cause of cancer mortality worldwide and has the highest morbidity among all cancers. It is estimated that approximately 228,820 new cases of lung cancer will be diagnosed in the United States in 2020 and up to 135,720 patients will die of the disease. Overall 15% of lung cancer patients are diagnosed with small-cell lung cancer. Almost all cases of SCLC are associated with tobacco smoking. Classical features of SCLC are rapid disease progression and a tendency to the early development of widespread metastases. As a result, nearly 80-85% of patients present with extensive-stage small-cell lung cancer (ES-SCLC) at the time of diagnosis. SCLC usually shows high sensitivity to initial chemotherapy and radiotherapy. For several decades, the standard of care for patients with ES-SCLC were chemotherapy regimens based on platinum drug combinations and have shown survival benefit. However, despite initial good clinical response to treatment, the median survival rarely exceeds 1 year. Most patients with ES-SCLC eventually progress and surrender to recurrent disease with only 10–20% surviving beyond 2 years.¹

Symptoms and Diagnosis

Low net-survival of lung cancer is often attributed to late-stage detection; treatment can offer encouraging diagnosis when lung cancer is detected at an earlier stage. However, most of the patients are still diagnosed when their lung cancer has advanced to stage III/IV where one-year net-survival is very low. There are a number of potential differences between lung cancer patients who have never smoked (hereafter referred to as 'never-smokers') and those who are currently or have previously smoked ('ever-smokers'). First, there are biologically distinct pathways towards lung cancer caused by tobacco smoking compared with other exposures or genes. Tobacco smoke damages the DNA in lung epithelial cells, leading to tumor development and progression. In contrast, never-smokers' cancers are more likely to be caused by environmental substances (e.g. pollution), occupational substances (e.g. carcinogenic chemicals) or genetic predisposition. These

differences in aetiology contribute to different forms of cancer. Ever-smokers have higher levels of squamous cell lung cancers that grow in the centre of the lungs (bronchi) compared to never smokers who are more likely to have adenocarcinomas that grow in the outer part of the lung. This can mean that never-smokers are less likely to experience noticeable symptoms at an early stage of disease, which is likely to contribute to delays in diagnosis.²

Air Pollution

Air pollution is a global health problem, especially in the context of rapid economic development and the expansion of urbanization. Herein, we discuss the detrimental outcomes of outdoor and indoor pollution on the lungs. Ambient particulate matter (PMs) from industrial and vehicle exhausts is associated with lung cancer. Workers exposed to asbestos, polycyclic aromatic hydrocarbons (PAHs), and toxic metals are also probable to develop lung cancer. Indoors, cooking fumes, second-hand smoke, and radioactive products from house decoration materials play part in the development of lung cancer. Bacteria and viruses can also be injurious to health and are important risk factors in lung inflammation and cancer. Specific effects of lung

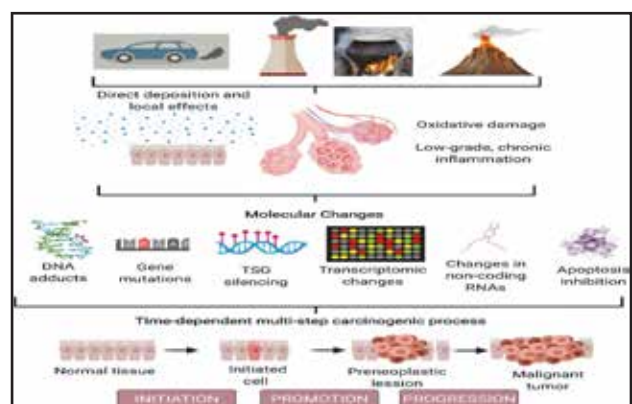


Figure 1: Outdoor and Indoor air pollution sources³

cancer caused by air pollution are discussed in detail, including inflammation, DNA damage, and epigenetic regulation. In addition, advanced materials for personal

protection, as well as the current government policies to prevent air pollution, are outlined. This review provides a basis for future research on the relationship between lung cancer and air pollution.³

Immunotherapy in lung cancer

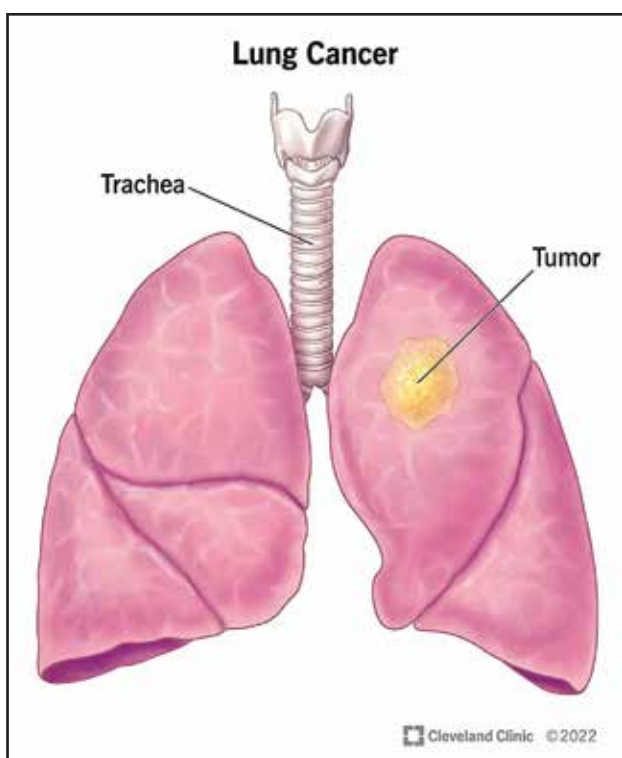
The persistent nature of any cancer is often attributed to its extensive mutational collection equipping the cancer cells with mechanisms to develop resistance to commonly used treatment strategies. It is not astonishing that lung cancer, with its major histologic subtypes, is among the top five tumor types carrying the highest number of somatic mutations. In the first decade of 21st century, median OS of patients diagnosed with advanced NSCLC and SCLC was one year. The discovery of actionable driver genomic alterations and development of targeted therapies led to evident improvement in OS of a subset of NSCLC patients. The survival of the vast majority of patients with NSCLC without an actionable genomic driver and virtually all patients with SCLC remained limited and platinum-based chemotherapy was the central component of first-line therapy for these patients.⁴

Conclusions

Lung cancer treatment initiation times have seen an upward trajectory in recent years. Black patients encountered significantly longer treatment initiation times, regardless of treatment modality or disease stage. Prolonged initiation times appear to contribute to existing health care by disproportionately affecting medically underserved communities.⁵

References

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