Opinion

Mechanisms of resistance to immunotherapy in lung cancer

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INTRODUCTION

Lung cancer remains one of the most prevalent and deadly cancers worldwide. Understanding its pathology, risk factors, diagnosis, treatment options, and preventive measures is crucial for improving outcomes and reducing mortality rates associated with this disease. This article explores the multifaceted nature of lung cancer, its impact on public health, and ongoing research efforts aimed at enhancing detection and treatment. Lung cancer, characterized by the uncontrolled growth of abnormal cells in the lungs, is the leading cause of cancer-related deaths globally, accounting for approximately 1.8 million deaths annually. It is generally classified into 2 main types: Non Small Cell Lung Cancer (NSCLC) and Small Cell Lung Cancer (SCLC). NSCLC is more common, comprising about 85% of cases, while SCLC is known for its rapid growth and aggressive nature. Lung cancer typically arises from the epithelial cells lining the airways. The disease begins when genetic mutations lead to changes in cell behavior, resulting in uncontrolled proliferation. Key mutations often involve oncogenes (such as KRAS and EGFR) and tumor suppressor genes (such as TP53). These mutations can result from various factors, including environmental exposures, smoking, and genetic predispositions. The most significant risk factor for lung cancer is tobacco use.

DESCRIPTION

Cigarette smoking accounts for approximately 85% of all cases. Both the duration and intensity of smoking increase the risk, with the risk being higher in individuals who start smoking at a young age. Exposure to radon gas, asbestos, and other carcinogens significantly contributes to lung cancer risk. For instance, radon, a naturally occurring radioactive gas, is the second leading cause of lung cancer in the U.S. after smoking. Family history can play a role in lung cancer susceptibility. Certain genetic mutations may increase the risk, although this area is still under research. Conditions such as Chronic Obstructive Pulmonary Disease (COPD) and tuberculosis can increase the likelihood of developing lung cancer. Chronic inflammation in the lungs may lead to cellular changes that promote cancer development. Early-stage lung cancer often presents with no symptoms, making early detection challenging. It is essential for individuals exhibiting these symptoms, especially those at high risk, to seek medical evaluation. Chest X-rays and CT scans are commonly used to identify abnormal masses in the lungs. A CT scan provides more detailed images, helping to determine the size and shape of a tumor. The definitive diagnosis is made through a biopsy, where a sample of lung tissue is taken for histological examination.

CONCLUSION

Various methods include bronchoscopy, needle biopsy, and surgical biopsy. In cases of NSCLC, molecular testing for specific mutations (e.g., EGFR, ALK, ROS1) can guide treatment decisions. Once diagnosed, lung cancer is staged to assess its extent and guide treatment options. Staging includes evaluating tumor size, lymph node involvement, and the presence of metastasis (spread to other organs). Treatment for lung cancer depends on several factors, including cancer type, stage, patient health, and preferences. Surgical intervention may involve removing part of the lung (lobectomy) or the entire lung (pneumonectomy). Surgery is typically considered for early-stage lung cancer. This treatment uses high-energy rays to kill cancer cells. It may be employed as a primary treatment or adjuvantly post-surgery to eliminate remaining cancer cells.

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CONFLICT OF INTEREST

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