

Advances in Research on the Comorbidity of Chronic Obstructive Pulmonary Disease and Lung Cancer

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Abstract

Chronic obstructive pulmonary disease (COPD) and lung cancer are highly prevalent respiratory diseases worldwide, and their comorbidity significantly worsens patient prognosis. Epidemiological evidence indicates that COPD is an independent risk factor for lung cancer beyond shared smoking exposure, with emphysema increasing lung cancer risk by approximately 2.3-fold. High-risk subgroups include elderly males, patients with mild-to-moderate airflow limitation, and never-smokers with COPD. The major driving factors comprise smoking, genetic susceptibility (e.g., 15q25 region, TERT variants), and ambient air pollution (oxidative stress and inflammation). Mechanistically, chronic inflammation with M2 macrophage polarization and CD8⁺ T-cell exhaustion establishes a pro-tumor microenvironment, while aberrant activation of EGFR/NF- κ B/HIF-1 α pathways links airway remodeling to malignant transformation. Overlapping respiratory symptoms often delay diagnosis, necessitating integrated assessment using pulmonary function tests, low-dose CT, and bidirectional screening (lung cancer screening in COPD patients and vice versa). Treatment requires individualized approaches—chemotherapy, immunotherapy, radiotherapy, or surgery—while managing COPD exacerbation risk, chemotherapy resistance driven by hypoxia, and variable responses to immune checkpoint inhibitors. Prognosis is influenced by COPD severity, phenotype, and therapeutic modality. Given the strong association, screening strategies should incorporate spirometry and quantitative CT emphysema metrics to refine risk stratification, enabling earlier detection and tailored intervention. This review synthesizes current evidence on epidemiology, risk factors, pathophysiological crosstalk, diagnostic challenges, and management strategies, aiming to provide a comprehensive framework for improving clinical outcomes in COPD–lung cancer comorbidity.

Keywords

Chronic Obstructive Pulmonary Disease, Lung Cancer, Comorbidity, Inflammatory Microenvironment, Driving Mechanisms, Screening Strategy, Immunotherapy, Prognosis