

Lung Cancer Screening



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KEYWORDS

- Lung neoplasms • Early detection of cancer • Practice guidelines • Decision making
- Tomography, X-ray computed • Tobacco use

KEY POINTS

- Lung cancer is the leading cause of cancer death in the United States (US).
- More than 80% of lung cancer deaths are attributed to tobacco use highlighting the importance of primary prevention.
- A US trial showed that screening high-risk patients with low-dose computed tomography scans reduced lung cancer mortality by 20% compared with chest radiography.
- The US Preventive Services Task Force recommends annual lung cancer screening for high-risk patients (30 pack-years, current or quit within 15 years) aged 55 to 80 years.
- The Centers for Medicare and Medicaid will cover screening but requires programs to engage patients in shared decision-making, offer smoking cessation, and report data to a central registry.

INTRODUCTION

Lung cancer is the second most frequently diagnosed cancer in the United States and the leading cause of cancer death. In 2016, 224,390 new lung cancer cases were expected along with 158,080 lung cancer-related deaths.¹ More than 80% of these deaths are attributable to tobacco exposure making primary prevention the most effective cancer control strategy.² Although the 5-year survival for early stage lung cancers exceeds 50%, most cancers are detected at advanced stage when survival is poor.³ Consequently, screening has been proposed as a strategy for reducing lung cancer mortality. Controlled trials have shown chest radiography and sputum cytology to be ineffective screening tests,⁴ but screening with low-dose computed tomography (LDCT) can significantly reduce lung cancer mortality.⁵

This review focuses on the LDCT screening trials, particularly the National Lung Screening Trial (NLST), the subsequently issued screening guidelines, and challenges

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and strategies for implementing screening programs in community practice. The review begins by briefly discussing the clinical presentation, pathology, staging, treatment options, survival, and primary prevention strategies for lung cancer.

CLINICAL PRESENTATION

Patients with early stage lung cancers are usually asymptomatic, presenting with lung nodules or a mass discovered incidentally on a chest radiograph or computed tomography (CT) scan. The clinical presentation with advanced disease is mostly related to the local tumor invasion, regional spread, distant metastasis, and paraneoplastic syndromes. These patients most commonly present with cough (50%–75%), hemoptysis (25%–50%), dyspnea (25%), and chest pain (20%).⁶

PATHOLOGY

Although recent guidelines emphasize immunohistochemical categories,⁷ lung cancers have traditionally been classified histologically as small cell lung cancer (SCLC) or non-SCLC, with the latter group including adenocarcinoma, squamous cell carcinoma, and large cell carcinoma. Recent data from the Surveillance, Epidemiology, and End Results Program (SEER) registry show that adenocarcinoma (45%), squamous cell carcinoma (23%), and small cell carcinoma (13%) account for most US lung cancers.³

STAGING

Lung cancer is staged with the Tumor Node Metastasis (TNM) system.⁸ The TNM system is also used for SCLC, though 90% of patients with these cancers present with advanced disease.

TREATMENT OPTIONS

Patients with early stage NSCLC and no contraindications for surgery should undergo surgical resection.⁹ Nonsurgical candidates can be offered stereotactic body radiation therapy or radiofrequency ablation. Patients with early stage cancers with high-risk features or those with ipsilateral nodal involvement should receive adjuvant chemotherapy. Patients with SCLC and clinically limited stage are candidates for curative-intent chemoradiation.¹⁰ Treatment recommendations for more advanced-stage cancers are beyond the scope of this review.

SURVIVAL

The overall average 5-year survival of US patients with lung cancer is 17.7%; however, survival varies markedly by stage at diagnosis ([Fig. 1](#)).³ The average 5-year survival for patients with localized disease is 55.2%, though only 16.0% of patients are diagnosed at this stage.

CANCER CONTROL STRATEGIES

Primary Prevention

Smoking prevention and cessation are the best strategies for reducing lung cancer mortality and all deaths due to tobacco-related diseases.^{11,12} Pharmacotherapy and behavioral interventions can help patients quit smoking.¹³ However, as the prevalence of tobacco smoking continues to decrease, the incidence of lung cancer among non-smokers seems to be increasing.¹⁴ This finding has prompted strategies to mitigate

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