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Small cell lung cancer in a young non-smoking woman: A distinct disease profile highlighting the need for molecular characterization

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ABSTRACT

Small cell lung cancer (SCLC) is strongly associated with smoking, and its occurrence in non-smoking patients, particularly in young women, is rare and poorly understood. We report a 39-year-old non-smoking female who presented with extensive-stage SCLC with liver and brain metastases. No history of tobacco exposure, chronic illness, or familial cancer predisposition was found. The patient was treated with carboplatin and etoposide, followed by cranial radiotherapy, and remains under treatment. Non-smoking SCLC represents a distinct and underexplored subset with rapid disease progression, limited therapeutic options, and high mortality. Further genomic profiling studies are needed to identify potential driver alterations and guide personalized therapy in this rare and aggressive cancer subtype.

Keywords: Small cell lung cancer, molecular characterization, non-smoking patients.

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Introduction

Small cell lung cancer (SCLC) accounts for approximately 15% of all lung cancers and is the subtype most strongly linked to tobacco exposure [1]. Despite this, a small number of patients with SCLC are lifelong non-smokers, and their clinical features remain poorly characterized [2, 3]. Unlike non-small cell lung cancer (NSCLC) in never-smokers, where specific driver mutations have been identified, molecular subtypes of non-smoking SCLC are largely unknown, and personalized treatment strategies are lacking [2].

We present a case of a young, non-smoking woman with extensive-stage SCLC to contribute to this limited body of literature and emphasize the importance of exploring potential molecular drivers in this distinct subgroup.

Case Report

A 39-year-old woman with no history of smoking presented with fever, cough, and chest discomfort. Thoracic computed tomography revealed a 10.4 × 4.3 cm mass in the left lung (Figure 1). PET/CT demonstrated a hypermetabolic lesion with a SUVmax of 27 and multiple mediastinal lymph nodes (SUVmax 18). Liver metastases were evident, and brain CT confirmed multiple metastatic lesions (Figure 1). Bronchoscopic biopsy of the pulmonary mass confirmed SCLC. The patient had no known occupational exposures,

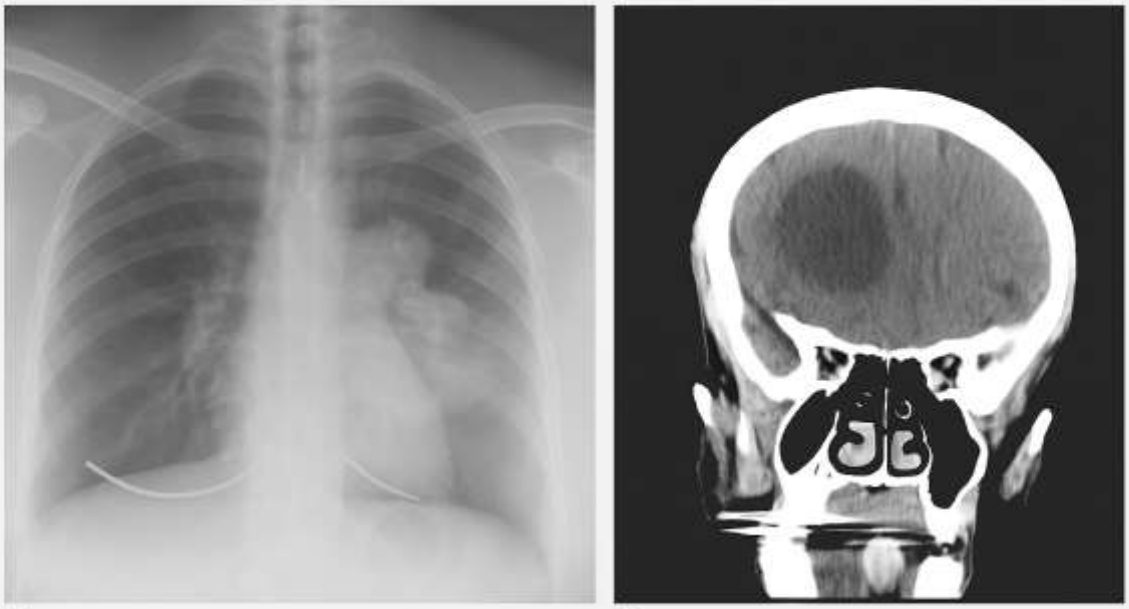

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Figure 1. (A) Chest X-ray showing a large left-sidedd pulmonary mass. (B) Coronal brain CT demonstrating a metastatic lesion in right frontal lobe.

comorbidities, or family history of cancer. She was treated with carboplatin and etoposide chemotherapy, followed by cranial radiotherapy after the first cycle. Her systemic therapy is ongoing with close clinical monitoring.

Discussion

SCLC in never-smokers represents a rare and distinct entity with unique demographic and possibly genetic features [4]. While tobacco exposure accounts for the majority of cases, alternative risk factors such as passive smoking, prior radiation, occupational carcinogens, and germline predisposition have been described, but none were present in our patient [5].

Published literature suggests that non-smoking SCLC predominantly affects younger women, often with extensive-stage disease at diagnosis and poor prognosis [6]. However, due to its rarity, this subgroup remains underexplored in terms of molecular characterization [7]. Unlike NSCLC, where actionable mutations (e.g., EGFR, ALK, ROS1) have led to significant therapeutic advances, SCLC lacks well-defined driver mutations [8]. A few studies have identified TP53, RB1, and MYC alterations in non-smoking cases, but their clinical relevance remains unclear [9].

Further research using next-generation sequencing in such cases may reveal targetable pathways or immunogenic profiles that could facilitate personalized therapy. Awareness of this subgroup is essential for improving diagnostic approaches and identifying candidates for molecular studies.

Conclusion

Non-smoking SCLC, though rare, may represent a biologically distinct disease, particularly affecting younger women. Comprehensive molecular profiling in such

cases could uncover novel therapeutic targets and improve outcomes. Clinicians should consider genetic testing and biobanking for future research whenever feasible.

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Ethics Approval: *This case report was conducted in accordance with the principles outlined in the Declaration of Helsinki.*

Informed Consent: *The patient was informed about the case report and provided their informed consent.*

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