INTEGRATED CYTOLOGICAL AND IMMUNOCYTOCHEMICAL APPROACHES IN THE DIAGNOSIS OF LUNG CANCER

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Introduction. The global incidence of lung cancer continues to rise worldwide. Lung cancer remains one of the leading causes of mortality and accounts for approximately 18.4% of all cancer-related deaths. Despite significant advances in radiological imaging, most lung tumors are still diagnosed at advanced stages, which limits treatment effectiveness and worsens prognosis. Therefore, improving early and accurate diagnostic approaches remains a critical task in modern oncology [3].

Lung cancer demonstrates pronounced histological heterogeneity and aggressive clinical behavior. Non-small cell lung cancer constitutes approximately 85% of all cases, with adenocarcinoma and squamous cell carcinoma being the most common subtypes. Accurate differentiation of these histological variants, as well as reliable distinction between primary lung tumors and metastatic lesions, is essential for selecting optimal therapeutic strategies, particularly in the era of targeted and personalized medicine [2].

In modern medical practice, cytological examinations are widely used for tumor detection and evaluation. The primary aim of cytological analysis is the identification of malignant. Liquid-based cytology is a minimally invasive and rapid diagnostic method that enables detailed assessment of cellular

morphology and detection of malignant, inflammatory, reactive, and precancerous changes. However, cytological evaluation alone may be insufficient to reliably determine the histological subtype of lung tumors in certain cases. In this regard, immunocytochemical methods play a key role in the early diagnosis of lung cancer neoplasms [5].

Diagnostic and prognostic assessment of tumors is largely based on the identification of specific biomarkers. The most commonly used immunocytochemical markers in lung cancer include CK7, CK20, TTF-1, p40, Napsin A, and p63. Immunohistochemistry, based on specific antigen–antibody reactions, represents an essential component of diagnostic pathology and is crucial for determining and differentiating histological subtypes of lung cancer. The high mortality rate is primarily associated with the fact that lung tumors are often diagnosed at advanced stages, which are not amenable to surgical treatment. Only a small proportion of patients with lung cancer are diagnosed at an early, localized stage, for which surgical resection represents the optimal treatment option [4].

The combined application of liquid-based cytology and immunocytochemistry significantly improves diagnostic accuracy, facilitates reliable differentiation between small cell and non-small cell lung cancer, and enables distinction between primary lung tumors and metastatic malignancies. This integrated diagnostic approach reduces diagnostic errors, supports precise tumor classification, and assists in selecting appropriate targeted therapy neoplasms [1].

Conclusion. Liquid-based cytology is an effective and minimally invasive method for the initial diagnosis of respiratory system tumors. Its diagnostic value is substantially enhanced when combined with immunocytochemical analysis. The integrated use of these methods increases diagnostic reliability, optimizes treatment planning, and contributes to improved clinical outcomes in patients with lung cancer.

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