RADIOMICS AND ARTIFICIAL INTELLIGENCE IN THE DIAGNOSIS OF PULMONARY PATHOLOGY

O. L. Bororova, M. I. Gumeniuk, O. Ya. Dziublyk, G. B. Kapitan, M. I. Lynnyk, R. E. Sukhin, V. A. Yachnyk

Abstract

The article is devoted to modern methods of chest imaging and their development in the context of the COVID-19 pandemic and new challenges in pulmonology. The authors analyze traditional methods — X-ray, ultrasound, and magnetic resonance imaging (MRI) — emphasizing their advantages and limitations. Particular attention is given to high-resolution computed tomography (HRCT), which provides the most accurate assessment of anatomical structures and pathological changes but remains dependent on the subjective interpretation of the physician.

In this context, radiomics is considered — an innovative approach that combines CT, mathematical modeling, and machine learning algorithms to transform images into quantitative features. Radiomic features allow the detection of hidden pathophysiological changes, prediction of disease progression, and creation of a digital "fingerprint" of pathology. The use of deep learning and convolutional neural networks (CNN) is highlighted as crucial, demonstrating high accuracy in diagnosing tuberculosis, COVID-19, and other pneumonias. Additionally, the potential of radiomics in oncology is emphasized, where it enables non-invasive determination of tumor phenotypes and supports personalized therapy selection. The importance of data standardization and the advancement of artificial intelligence algorithms is also noted to ensure their reliability and clinical applicability.

The article demonstrates that the future of lung disease diagnostics lies in the integration of highly sensitive CT methods with radiomics and artificial intelligence. This opens new opportunities for more precise differential diagnosis, disease progression prediction, and personalized therapy, while simultaneously requiring solutions to challenges of data standardization and algorithm reliability.

Key words: radiomics, artificial intelligence, computed tomography, lung lesions.

Ukr. Pulmonol. J. 2026;34(2):28–36.

Olena L. Bororova
Shupyk National Healthcare University of Ukraine, Kyiv, Ukraine
Respiratory Medicine and Phthisiopulmonology Department
MD, PhD, Assinstant Professor
SO "National Scientific Center of Phthisiatry, Pulmonology and Allergology named after F.G. Yanovski National Academy of Medical Sciences of Ukraine", Department of technologies of treatment of nonspecific lung diseases
Kyiv, Ukraine
MD, PhD, junior reserch assosiate
10, M. Amosova str., 03038, Kyiv, Ukraine
Tel.: +380 44 2703561
elena_bororova@ukr.net
https://orcid.org/0000-0003-2930-6735