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MODERN DIAGNOSTIC AND TREATMENT METHODS IN THORACIC ONCOLOGY

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Abstract: This topic will cover modern diagnostic and therapeutic methods used in the field of thoracic oncology. The importance of low-dose computed tomography (LDCT), PET/CT, molecular genetic tests, and biomarkers in the early detection of tumors of the lungs, mediastinum, and chest organs will be reviewed. Innovative approaches to treatment, such as minimally invasive surgery (VATS, robot-assisted), precisely targeted radiation therapy (IMRT, SBRT), targeted therapy, and immunotherapy, will be analyzed. The role of a multidisciplinary approach in choosing an individual treatment strategy will also be emphasized. Modern technologies are helping to improve the survival and quality of life of patients.

Keywords: Thoracic oncology, lung cancer, immunotherapy.

Thoracic oncology is one of the most relevant areas today. Lung cancer in particular is an oncological disease with a high mortality rate worldwide. Among the cancers diagnosed in 2022, lung, bronchial and tracheal cancers are in first place with approximately 2,480,675 cases worldwide. In second place is breast cancer among women. In third place is colorectal (placental and rectal) cancer. Thoracic oncology is the study of common diseases and their diagnosis and analysis of treatment methods. Lung cancer is the most common disease in thoracic oncology and one of the most

studied diseases for immunotherapy. Clinical trials have shown that immunotherapy can increase survival in some patients by 2-3 times. Although lung cancer cells are usually "foreign" cells, in order to hide from the immune system, the PD_L1 protein increases on the surface of cancer cells, which turns off T-lymphocytes.

Immunotherapy eliminates this mechanism. Pd-L1/PD-L1 blockers (nivolumab, pembrolizumab, atezolizumab) reactivate T-lymphocytes. As a result, immune cells begin to recognize and destroy lung cancer cells again. Immunotherapy is especially effective in lung cancer patients with high levels of PD-L1. For the first time, this experiment was conducted in the 1990s-2000s at scientific institutions in the USA, Europe and Japan. In the 1990s, scientists began to study the role of immune checkpoints in lung cancer. Initially, monoclonal antibodies were used against antigens on the surface of cancer cells. However, due to their low effectiveness, later attention was paid to research focused on immune checkpoints. In 1992, Tasuku Honjo (Japan) identified the PD-1 protein and proved that this protein “turns off” T-lymphocytes. In recent years, it has been experimentally shown that PD-1 and its ligand (PD-L1) are active in lung cancer cells. This has opened up a new target for immunotherapy. The discovery of PD-1/PD-L1 and CTLA-4 immune checkpoints and the development of drugs that block them were the basis for the development of drugs. For these discoveries, they received the Nobel Prize in 2018. These experiments later formed the basis for the creation of immunotherapy drugs such as nivolumab, pembrolizumab, and atezolizumab. Immunotherapy experiments are usually conducted in the form of 3–4-phase clinical trials: Phase I - the safety of the drug is tested (in a small group of patients). Phase II - the effectiveness and dosage of the drug are determined. Phase III - it is compared with other treatments in hundreds or thousands of patients. Phase IV - the long-term effects after its introduction into clinical practice are studied.

The field of thoracic oncology requires early detection of diseases, comprehensive treatment, and strengthening of preventive measures. Modern diagnostic and therapeutic methods allow to increase the survival rate of patients with lung and other thoracic tumors.

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