

## **The Use of Modern Laboratory Methods for the Diagnosis of Tuberculosis in the Samarkand Regional Tuberculosis Dispensary**

**Pardaeva U. D., Turdibekov H. I.**

Samarkand State Medical University, Department of Phthisiology and Pulmonology

**Abstract:** In order to study modern laboratory methods for the diagnosis of tuberculosis in the Samarkand Regional tuberculosis dispensary, and their impact on intensive epidemiological indicators, existing laboratory methods and new innovative methods for the diagnosis of tuberculosis were analyzed. The use of high-tech laboratory methods for the diagnosis of tuberculosis based on PCR has allowed reducing morbidity and mortality from tuberculosis and improving the quality of life of patients.

**Keywords:** tuberculosis, mycobacterium tuberculosis, epidemiological indicators, molecular genetic methods, drug resistance.

The relevance of the study corresponds to the modern requirements of the fight against tuberculosis (TB), since timely detection, correct diagnosis and treatment is a guarantee of cure and recovery of the patient. Resolution of the President of the Republic of Uzbekistan, dated 01/20/2023 No. PP-12 ON MEASURES FOR THE FURTHER DEVELOPMENT OF THE SERVICE OF PHTHISIOLOGY AND PULMONOLOGY IN 2023-2026. Purposeful work is being carried out in the republic to protect the health of the population and protect against tuberculosis infection, prevent the spread of tuberculosis and non-specific lung diseases. The coverage of express genetic and molecular diagnostics that determines the resistance of tuberculosis mycobacterium to drugs of the 1st series, as well as simultaneously anti-tuberculosis drugs of the 1st and 2nd series - up to 120 thousand studies. Improving the quality of life and teaching the basics of preventing exacerbation of patients with nonspecific lung diseases by organizing "schools of asthma and chronic obstructive pulmonary diseases" at multidisciplinary central polyclinics [5].

«The New Diagnostic Methods» Group of the Stop TB Partnership, the Foundation for Innovative Diagnostic Methods (FIND), the Global Laboratory Initiative (GLI), the World Health Organization (WHO), the Company «HainLifescienceGmbH» and non-governmental agencies have developed 11 new diagnostic methods for TB and MDR-TB [1, 2, 3].

The developed methodological recommendations provide the latest data on molecular genetic express methods for detecting resistance to the main drugs isoniazid and rifampicin, which allow for 2 days to identify multi-resistant tuberculosis (GenoTypeMTBDRplus, GenoTypeMTBDRplus 2.0 with MBT-) and tuberculosis with broad drug resistance (GenoType MTBDRSI) and differentiate tuberculosis strains from atypical mycobacterioses (GenoType Mycobacterium CM)[4]. Under the leadership of our government and the Republican Scientific Center for Pulmonology and Tuberculosis, large-scale work is being carried out to combat tuberculosis. According to the order of the Ministry of Health of the Republic of Uzbekistan (No.

383 dated 10/24/2014), new innovative high-tech diagnostic methods, successful treatment and prevention regimens for TB have been gradually introduced throughout the republic and in particular in our Samarkand region. Rapid molecular biological methods for the diagnosis of TB, which are based on the detection of mutations in the genes of *Mycobacterium tuberculosis* (MBT) with the phenomenon of drug resistance (LU), provide great opportunities.

**The aim of the study** was to study the types of modern laboratory methods for diagnosing TB in the Samarkand regional tuberculosis dispensary, and their effects on intensive epidemiological indicators.

**Materials and methods of research.** The existing laboratory methods and new innovative methods of TB diagnosis were analyzed. At the stage of primary medical and diagnostic institutions, the bacterioscopic method of investigation of Tsil-Nielsen staining was mainly used in the diagnosis of tuberculosis, and at the stage of a specialized medical and diagnostic center, in addition to repeated simple microscopy, pathological material was seeded on dense nutrient media with subsequent determination of drug sensitivity, which took a long time (up to 12 weeks or more).

Since 2015, the luminescent microscopy (LM) method and cultural methods have been effectively used according to the diagnostic algorithm: automated analysis of tests based on polymerase chain reaction (PCR) GeneXpert MTB/RIF (Xpertc), 2018 Geno Tour MTBDRplus (HAIN-test), since 2019 the automated BACTEC MGIT 960 system.

One of the main advantages of molecular genetic methods is their high informativeness and speed, that is, in a short period of time it is possible to obtain an accurate result with simultaneous determination of sensitivity to rifampicin. Patients who have applied to the dispensary for examination with suspected pulmonary TB, sputum is examined by luminescent microscopy with a more accurate result of 10% more compared to the simple method. The study of the pathological material of patients with extrapulmonary tuberculosis is carried out for the purpose of diagnosis and differential diagnosis of TB outside the pulmonary localization. In patients with suspected resistance to antibacterial drugs and severe condition, in addition to sputum microscopy, a highly sensitive, specific and fast method, the GeneXpert MTB/RIF and HAIN-test method are used to urgently identify the causative agent of TB while simultaneously determining its resistance to rifampicin.

At the stage of inpatient treatment, the patient's pathological material (sputum, bronchial lavage, fistula discharge and surgical material, various fluids; pleural, cerebrospinal, abdominal, urine) is examined to identify MBT DNA by PCR methods, which make it possible to obtain a result within no more than 24 hours, where the phenomenon of cross-contamination of samples is excluded. Before starting treatment, patients undergo molecular genetic methods for diagnosing MBT to rifampicin (the presence of resistance to rifampicin does not exclude the possibility of resistance to isoniazid as well), and when determining a plurality of MDR to reserve series drugs to fluoroquinolones. Taking into account the widespread occurrence of MDR-TB cases and widespread drug resistance (XDR-TB), in order to obtain data on the entire spectrum of MBT resistance, simultaneous testing of drug sensitivity to anti-tuberculosis drugs (PTP) of the I and II series is carried out.

Also, to determine the drug sensitivity of MBT, the BACTEC MGIT 960 apparatus with liquid nutrient media to PTP of the I series (isoniazid, rifampicin, pyrazinamide, streptomycin, ethambutol) is used and II series (ethionamide, protionamide, levofloxacin, ofloxacin, amikacin, cycloserine, capreomycin).

Analyzing the data of epidemiological indicators of the Samarkand tuberculosis dispensary for the period from 2012 to 2018, one can see a clear decrease in mortality (4.7 times), sickness (1.3), morbidity (1.16 times) (Table).

**Table. The main epidemiological indicators of tuberculosis in the Samarkand region:**

№	Study Period	Morbidity	Sickness	Mortality
1	2012	49.5	124.28	5.59
2	2017	51.9	107.0	1.1
3	2018	42.55	96.8	1.2

In significantly improving epidemiological indicators, the use of accelerated, high-tech diagnostic methods is of no small importance. The use of high-tech laboratory methods for the diagnosis of TB based on PCR has accelerated the process of determining the pathogen in a short period of time. The phased implementation and effective use of the above measures, both at the initial stage in the process of examining a patient in a dispensary for disease detection and differential diagnosis, and in determining treatment regimens and monitoring, allowed reducing morbidity and mortality from TB and improving the patient's quality of life.

**Conclusions:** Thus, the use of new diagnostic methods made it possible:

1. Getting results in the shortest possible period of time.
2. Conclusions on the presence of MBT are based on the detection of pathological DNA, which guarantees correct diagnosis.
3. Determination of LU based on mutations in associated genes, makes it possible to timely correct chemotherapy.
4. A timely prescribed full-fledged course of chemotherapy significantly reduces the duration of treatment, and a high positive dynamics of the disease is achieved.
5. Improvements in the epidemiological indicators of the disease should be emphasized: such as infection, morbidity, morbidity and mortality.
6. Reduction of disability, which is directly related to saving financial resources.
7. Improving the quality of life and teaching the basics of preventing exacerbation of patients with nonspecific lung diseases.

### Literature

1. Global Tuberculosis report, WHO 2012. Source: Global tuberculosis database, WHO, 2011.
2. Global WHO tuberculosis report 2012. WHO document WHO/HTM/TB/2012. Geneva, 2012.
3. Guidelines for Programmatic Management of Drug-Resistant Tuberculosis.. WHO Geneva, 2011. [In Russ]
4. A.H. Alyonova, T.S. Abildaev, A.S. Zhumadilov, etc. The structure and algorithms of the latest molecular genetic technologies for rapid diagnosis of tuberculosis and drug resistance in the Republic of Kazakhstan: Methodological recommendations. Almaty, 2013. [In Russ]
5. Resolution of the President of the Republic of Uzbekistan, dated 01/20/2023 No. PP-12 ON MEASURES FOR THE FURTHER DEVELOPMENT OF THE SERVICE OF PHTHISIOLOGY AND PULMONOLOGY IN 2023-2026.
6. Pardayeva U.D. Uzbekistan on the path of integration in the field of higher education into world society - in the context of globalization // Issues of science and education. – 2020. – №. 16 (100). – Pp. 36-41. [In Russ]
7. Pardaeva U.D. Aspects of modern pedagogical technologies at the stage of training a qualified medical specialist // Pedagogy and psychology of innovation. – 2019. – №. 7 (3). – Pp. 29-45. [In Russ]

8. Pardayeva U.D., Kim A.A., asatulayev A.F. Integration of uzbekistan's educational system into global globalization // *Thematics Journal of Education*. – 2022. – Vol. 7, № 1. – P. 33-37.
9. Pardayeva U.D. Modern views on the course of tuberculous meningitis // *Science and Education*. – 2022. – Vol. 3, № 11. – P. 205-212.