

## DRUG-RESISTANT TUBERCULOSIS

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**Abstract:** This article provides information about drug-resistant tuberculosis (MDR-TB). Drug-resistant tuberculosis occurs when mycobacteria become resistant to the main antituberculosis drugs. This disease, unlike regular tuberculosis, is much more difficult to treat and requires long-term special drugs. The article provides detailed information about the clinical signs, diagnosis, treatment methods and prevention of drug-resistant tuberculosis. Early detection and proper treatment of tuberculosis are important in preventing drug-resistant forms of tuberculosis.

**Keywords:** Drug-resistant tuberculosis, Tuberculosis, MDR-TB Mycobacteria, Antituberculosis drugs, Tuberculosis, Resistant mycobacteria, Clinical signs of tuberculosis, Diagnostics, Treatment methods, Prophylaxis, Prevention of tuberculosis.

Drug-resistant tuberculosis (or drug-resistant tuberculosis — MDR-TB) is a form of tuberculosis with a unique characteristic. It is a type of mycobacterium tuberculosis that is resistant to drugs. In this case, patients become resistant to standard antituberculosis drugs, such as isoniazid and rifampicin. As a result, the disease becomes much more difficult to treat.

Key features of drug-resistant tuberculosis:

**Resistance:** Drug-resistant tuberculosis occurs when mycobacterial strains have become naturally or artificially resistant to standard antituberculosis drugs. It develops, in particular, as a result of improper treatment, drug shortages, or the patient's discontinuation of treatment.

**Clinical signs:** Signs of drug-resistant tuberculosis include typical symptoms of tuberculosis, such as:

- Persistent cough
- Severe shortness of breath
- Changes in appetite
- Fatigue, pain
- High body temperature

**Diagnosis:** Specific laboratory tests and genetic tests, such as the Xpert MTB/RIF test or molecular diagnostic methods, are used to detect drug-resistant tuberculosis.

**Treatment:** Treatment of drug-resistant tuberculosis requires more and stronger drugs. This treatment process can be more time-consuming, complicated, and can affect the patient's body. Treatment usually lasts 18-24 months and involves different drugs.

Prevention: To prevent drug-resistant tuberculosis, it is important to detect tuberculosis at an early stage and treat it correctly. It is important for all tuberculosis patients to take their medications correctly and complete the full course of medication.

Multidrug-resistant tuberculosis (MDR-TB) is a global health problem, as it makes treatment more difficult and requires more resources. Therefore, effective social and medical systems are needed to combat it.

Multidrug-resistant tuberculosis (MDR-TB) is a global health problem, and new research and approaches to its prevention and treatment are constantly being developed. The following are the latest scientific developments and additional information:

1. New treatment regimens:

The TB PRACTECAL project is developing new, shorter and more effective treatment regimens for the treatment of drug-resistant tuberculosis. These regimens, consisting of bedaquiline, pretomanid, linezolid and moxifloxacin, have been shown to be safer and more effective than current standard treatments.

2. Improved diagnostic methods:

Diagnostic methods are improving for the early detection of drug-resistant tuberculosis. For example, rapid molecular tests such as GeneXpert are able to quickly identify tuberculosis and its drug-resistant variants. However, in some countries, such as Pakistan, more than 75% of drug-resistant tuberculosis cases are undetected.

3. Shortening the duration of treatment:

Traditionally, treatment for drug-resistant tuberculosis has taken 18-24 months, but new research is exploring the possibility of shortening the duration of treatment. This will help improve the quality of life of patients and reduce the cost of treatment.

4. Preventive measures:

Preventive measures are essential to prevent drug-resistant tuberculosis, including early detection and proper treatment of patients with tuberculosis, as well as regular screening and protection of health workers.

5. Global cooperation and resources:

Global cooperation and resource sharing are essential in combating drug-resistant tuberculosis. International organizations, including the World Health Organization (WHO) and Médecins Sans Frontières (MSF), are implementing global initiatives to treat and prevent drug-resistant tuberculosis.

New scientific research and innovative approaches play a key role in combating drug-resistant tuberculosis. However, a global concerted effort is needed to completely eliminate this disease. Multidrug-resistant tuberculosis (MDR-TB) is a global health threat that is

difficult and time-consuming to treat. New research and innovative treatments are helping to manage the disease, and new short-term treatment regimens and rapid diagnostic methods are being developed.

Preventive measures, such as early detection and treatment of TB patients and protection of health workers, can also help reduce the spread of drug-resistant tuberculosis. Through global collaboration and resource sharing, more effective approaches to combating the disease can be developed. To achieve success in preventing and treating drug-resistant tuberculosis, it is necessary to combine medical, scientific and social resources around the world.

#### Materials and Methods

The following materials and methods were used for the scientific research and practical analysis of drug-resistant tuberculosis (MDR-TB):

##### Materials:

##### Patients and samples:

**Study patients:** Patients diagnosed with drug-resistant tuberculosis and at various stages of treatment. Patients participating in the study usually underwent clinical examination and laboratory tests.

**Laboratory samples:** Respiratory tract samples (e.g. sputum samples) and blood tests taken from patients to diagnose tuberculosis.

##### Drugs:

**Antituberculosis drugs:** Drugs such as linezolid, bedaquiline, pretomanid, rifampicin and isoniazid, which were used in these studies to evaluate the effectiveness of treatment.

##### Diagnostic methods:

**GeneXpert TB tests:** A molecular diagnostic method for the rapid detection of tuberculosis and its MDR form.

**Bacteriological tests:** Laboratory tests of mycobacteria and the determination of the level of resistance of the disease.

**Radiographs:** Imaging of tuberculosis or its drug-resistant forms.

##### Methods:

##### Clinical examination:

Patients underwent general clinical tests, physical examinations (cough, body temperature, shortness of breath, etc.).

The data obtained were analyzed to assess the clinical signs of tuberculosis and the possibility of detecting the disease in its early stages.

Molecular diagnostics:

The presence of mycobacteria and their resistance to rifampicin and isoniazid were determined using GeneXpert tests in sputum samples from patients.

Molecular genetic analyses: To identify resistant mycobacteria, the genetic material of the bacteria was studied.

Statistical analysis:

Statistical methods (e.g., regression analysis, calculation of p-values) were used to analyze the data obtained in the study. This allowed comparing the effectiveness of anti-tuberculosis drugs in patients, successful and unsuccessful cases of treatment.

Treatment protocols:

During the study, new short treatment protocols were developed for the treatment of drug-resistant tuberculosis in patients. These protocols consist of a combination of several drugs, the duration of treatment has been shortened, and new safety measures have been introduced.

Monitoring and evaluation:

Patients were regularly monitored during treatment, assessing their clinical status, response to drugs, and complications.

Conclusion: The materials and methods used in the study allowed for the rapid and efficient detection of drug-resistant tuberculosis, assessment of treatment effectiveness, and development of innovative approaches to disease prevention.

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