

# Tackling Tuberculosis: Understanding, Treatment, and Prevention

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## Introduction

Tuberculosis (TB), an ancient disease that has plagued humanity for millennia, continues to be a significant global health challenge in the 21<sup>st</sup> century. Despite remarkable progress in medical science, TB remains a leading cause of morbidity and mortality worldwide. In this article, we will delve into the intricacies of TB, exploring its causes, symptoms, diagnosis, treatment, and prevention strategies.

Tuberculosis is spread from one person to the next through the air when people who have active TB in their lungs cough, spit, speak, or sneeze. People with latent TB do not spread the disease. Active infection occurs more often in people with HIV/AIDS and in those who smoke. Diagnosis of active TB is based on chest X-rays, as well as microscopic examination and culture of body fluids. Diagnosis of latent TB relies on the Tuberculin Skin Test (TST) or blood tests.

Prevention of TB involves screening those at high risk, early detection and treatment of cases, and vaccination with the Bacillus Calmette-Guerin (BCG) vaccine. Those at high risk include household, workplace, and social contacts of people with active TB. Treatment requires the use of multiple antibiotics over a long period of time. Antibiotic resistance is a growing problem, with increasing rates of Multiple Drug-Resistant Tuberculosis (MDR-TB).

## Description

In 2018, one quarter of the world's population was thought to have a latent infection of TB. New infections occur in about 1% of the population each year. In 2022, an estimated 10.6 million people developed active TB, resulting in 1.3 million deaths, making it the second leading cause of death from an infectious disease after COVID-19. As of 2018, most TB cases occurred in the regions of South-East Asia (44%), Africa (24%), and the Western Pacific (18%), with more than 50% of cases being diagnosed in seven countries: India (27%), China (9%), Indonesia (8%), the Philippines (6%), Pakistan (6%), Nigeria (4%), and Bangladesh (4%). By 2021, the number of new cases each year was decreasing by around 2% annually. About 80% of people in many Asian and African countries test positive, while 5–10% of people in the United States test positive *via* the tuberculin test. Tuberculosis has been present in humans since ancient times.

## Understanding tuberculosis

Tuberculosis is caused by *Mycobacterium tuberculosis*, a bacterium that primarily affects the lungs but can also target other parts of the body, such as the kidneys, spine, and brain. It spreads through the air when an infected individual coughs, sneezes, or talks, releasing droplets containing the bacteria. People with weakened immune systems, such as those living with HIV/AIDS, malnutrition, or diabetes, are particularly vulnerable to TB infection.

## Symptoms

The symptoms of TB can vary depending on the area of the body affected. In pulmonary TB, which affects the lungs, common symptoms include a persistent cough, chest pain, coughing up blood, fatigue, fever, and night sweats. Extrapulmonary TB, affecting other organs, may present with symptoms related to the specific organ involved, such as back pain in spinal TB or blood in the urine in renal TB.

## Diagnosis

Diagnosing TB requires a combination of medical history, physical examination, and laboratory tests. The most common diagnostic tool is the Mantoux tuberculin skin test, where a small amount of tuberculin protein is injected under the skin, and the reaction is observed after 48-72 hours. Additionally, chest X-rays, sputum tests, and molecular tests like GeneXpert are used to confirm TB infection and determine drug resistance.

## Treatment

TB treatment typically involves a combination of antibiotics taken over several months. The most commonly used drugs include isoniazid, rifampicin, ethambutol, and pyrazinamide. This multi-drug therapy is essential to prevent the development of drug-resistant strains of TB, which are much more challenging to treat. Adherence to the prescribed treatment regimen is crucial to prevent relapse and the emergence of drug resistance.

## Prevention

Preventing the spread of TB requires a multi-faceted approach. Vaccination with the Bacillus Calmette-Guerin (BCG)

vaccine can provide protection against severe forms of TB, particularly in children. However, the BCG vaccine's effectiveness in preventing pulmonary TB, the most common form of the disease, is variable. Other preventive measures include identifying and treating latent TB infection in high-risk populations, improving ventilation in crowded spaces, and promoting infection control measures in healthcare settings.

### Challenges and future directions

Despite significant progress in TB control efforts, several challenges persist. These include the emergence of drug resistant TB strains, inadequate access to healthcare services in underserved communities, stigma associated with the disease, and limited funding for TB research and prevention programs.

Addressing these challenges requires a concerted effort from governments, healthcare providers, researchers, and communities worldwide.

### Conclusion

Tuberculosis remains a formidable global health threat, but with continued investment in research, prevention, and treatment, significant strides can be made towards its control and eventual eradication. By raising awareness, improving access to healthcare services, and implementing evidence based interventions, we can work together to combat TB and ensure a healthier future for all.