

Tuberculosis diagnostics: Emerging technologies and their impact on early detection

Robert Dufresne*

INTRODUCTION

TB is spread through airborne droplets, so close contact with someone who has active TB increases the risk of transmission. Malnutrition weakens the immune system, making it harder for the body to fight off infections like TB. Smoking damages the lungs and weakens the immune response, while heavy alcohol use increases susceptibility to TB by impairing the immune system. People with diabetes are at a higher risk of developing active TB. This is partly because diabetes can weaken the immune system and create a favourable environment for bacterial growth. Individuals living in crowded conditions, such as prisons, refugee camps, or informal settlements, are at higher risk of TB transmission due to close contact and poor ventilation. The immune system weakens with age, making older adults more susceptible to TB. Diagnosing TB involves a combination of clinical, radiographic, and laboratory methods. Early diagnosis is crucial for effective treatment and preventing the spread of the disease. The symptoms of TB can be nonspecific, making clinical diagnosis challenging. A healthcare provider will typically start with a detailed patient history and physical examination, focusing on symptoms such as prolonged cough, weight loss, and fever. The definitive diagnosis of TB is made through microbiological testing.

DESCRIPTION

The most common diagnostic method is the sputum smear microscopy, which involves examining sputum (mucus from the lungs) under a microscope for the presence of acid-fast bacilli (AFB), a characteristic feature of tuberculosis. However, this method is not always sensitive, particularly in individuals with HIV or in children. A more advanced method is where sputum samples are cultured in a laboratory to allow for the growth of tuberculosis. Culture is considered the gold standard for TB diagnosis, as it is more sensitive and can provide information on drug resistance.

In addition, molecular tests like the GeneXpert MTB/RIF test are increasingly used in many countries. This test can detect both TB and rifampicin resistance in less than two hours, significantly reducing the time needed for diagnosis and initiating treatment. Chest X-rays are often used to assess the extent of lung damage in suspected TB cases. They can show characteristic signs of TB such as lung infiltrates, cavities, and nodules. However, a normal chest X-ray does not rule out TB, especially in individuals with extra pulmonary TB or HIV-associated TB. The Tuberculin Skin Test (TST) is used to identify latent TB infection. A small amount of Purified Protein Derivative (PPD) is injected under the skin, and the site is checked for a reaction after 48 hours-72 hours.

CONCLUSION

A positive reaction suggests that the person has been exposed to TB bacteria at some point but does not necessarily indicate active disease. The treatment of TB involves a combination of antibiotics taken over a prolonged period. These drugs work synergistically to kill *Mycobacterium tuberculosis* and prevent the development of resistance. For Multidrug Resistant Tuberculosis (MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB), treatment is more complex and can last up to 18 months-24 months. Second-line drugs, such as fluoroquinolones and injectable drugs like amikacin, are used in these cases. However, the treatment of drug-resistant TB is associated with higher costs, longer treatment periods, and greater side effects.

ACKNOWLEDGEMENT

None.

CONFLICT OF INTEREST

The author's declared that they have no conflict of interest.

Department of Pulmonology, University of Murcia, Spain

Corresponding author: Robert Dufresne

e-mail: robert_dufresne@gmail.com

Received: 02-December-2024; Manuscript No: ajrm-25-156447; Editor

assigned: 04-December-2024; PreQC No: ajrm-25-156447 (PQ);

Reviewed: 18-December-2024; QC No: ajrm-25-156447 (R); Revised:

23-December-2024; Manuscript No: ajrm-25-156447 (R); Published:

30-December-2024; DOI: 10.54931/1747-5597.24.19.55