

## Chapter 5

# Extra–Pulmonary TB: Changing Paradigm in Diagnosis

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### ABSTRACT

*Tuberculosis is considered a fatal respiratory disease commonly seen in developing countries. This chapter includes the global scenario of TB patients and brief description of TB history, its pathogenesis, types, diagnosis tests, emergence of MDR (multi drug resistance) and XDR (extensively drug resistance). The traditional chemotherapy of TB includes first and second line drug therapy. These lines of therapies face many difficulties such as low solubility, low bioavailability, and stability issues. Therefore, some new drugs were introduced in the market that showed effective results to the patients. Nanoparticulate drug delivery gained much focus in recent years due to its advantages and ideal characteristics. Numerous nanoparticles, liposomal formulations, and polymeric micelles were reported by the researchers with significant and considerable results. Inhalable formulations were also prepared by scientists that showed effective and remarkable anti-tuberculosis action on TB patients. Many efforts are awaited to completely eradicate TB from the planet.*

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# 1. INTRODUCTION

## 1.1 Global Scenario

Tuberculosis (TB) is an infectious respiratory disease caused by the bacteria, *mycobacterium tuberculosis* (MTB). The slow-growing acid-fast bacilli, MTB infect lungs, spleen, brain, kidneys and other organs (Sosnik, Carcaboso, Glisoni, Moreton, & Chiappetta, 2010). TB is mostly detected in people of developing countries and increasing the mortality rate rapidly. TB exists as a dreadful disease and comes in the list of top 10 death causing diseases globally. Understanding the pathophysiology and immune response of TB is an immense challenge to the scientists and medical supervisors (Sandhu, 2011). This disease becomes a burden on public health with the high death toll rate only second to deadly after HIV infections. To combat this disease, it is obligatory to understand the pathogenesis of TB in the hope of better management and treatment. According to World Health Organization (WHO) 28 million cases of TB were reported in India, which was about one fourth of the world. Out of this enormous ratio, about 4,23,000 death occurred due to TB excluding HIV patients and 87,000 cases were of HIV patients. Multi drug resistant (MDR) TB patient's population includes 1,47,000 cases in India as per the global TB statistics data 2017. In 2016, 95% deaths occurred due to TB in middle- and lower-income countries such as India, Pakistan, China, Philippines, South Africa, Indonesia and Nigeria. About 10.4 million TB patients were detected and 7.1 million people were died due to TB. About 53 million lives have been saved through TB diagnosis and treatment since year (WHO TB report 2017). In case of drug resistant TB, more than 0.6 million resistant cases were examined and screened for rifampicin (RIF), the first line drug of TB treatment and 0.49 million cases were of MDR-TB in India, China and Russia. These alarming facts gained the attention of world towards TB treatment and eradication to achieve superior public health. Still, we lack approaches to TB therapy as only 54% TB cases were cured, and this cure rate is not satisfactory. Therefore, it is not wrong to recognize it as a disease without boundaries leaving powerful impact on Indian population, as highest TB patient count was reported in our country. WHO has documented the fact that skillful efforts, newer diagnosis tools and funding can completely abolish TB from our planet by 2035.

Recently, newer advancement in bacteria genomics and molecular determinants are carried out to understand the Immunopathophysiology of this disease. Despite these steps such as knowledge of immunology and pathophysiology and recent discoveries at molecular level, TB exists as a vast and challenging burden to developing countries. The sources gap and lack of funding are the barriers to new inventions and diagnosis tests in this disease eradication pathway (Philips & Ernst, 2012). This book chapter focuses on TB, extra pulmonary tuberculosis (EPTB), knowledge of

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