

Tuberculosis in the African continent: A comprehensive review[☆]

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Abstract

Tuberculosis continues to be a major global health problem, causing an estimated 8.8 million new cases and 1.45 million deaths annually. New drugs in the 1940s made it possible to beat the disease, and consequently, the number of cases reduced drastically. Fast-forward a few decades, drug-resistant strains of varied virulence are reported consistently, disease is again on the rise and the treatment has not kept pace. Tuberculosis is the leading cause of death among HIV-infected persons in many resource-constrained settings however, it is curable and preventable. The unprecedented growth of the tuberculosis epidemic in Africa is attributable to several factors, the most important being the HIV epidemic. Analysis of molecular-based data have shown diverse genetic backgrounds among both drug-sensitive and MDR TB isolates in Africa presumably due to underlying genetic and environmental differences.

The good news is that there have been important advances recently in TB drugs and diagnostics. Despite the availability of revolutionary tests that allow for faster diagnosis and of new drugs and regimens that offer better and safer treatment it is now becoming clearer that national efforts on TB control should be enhanced and focus on improving the quality of prevention, diagnosis, treatment and care services; strengthening program management, implementation and supervision. This review is an assessment of the trend in TB in Africa.

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I have only traveled to Africa once, in 2006 to Gambia, for a tuberculosis meeting. The Gambia is the smallest country in the continent in the Western most part of the continent. We spent 10 wonderful days and felt that the country was unique. In this review I have tried to outline some key issues in regards to the current Tuberculosis problems and while reading I found the site AllAfrica: African news and information for a global audience extremely helpful.

We searched in PubMed, Safari and Google Scholar (Jan 1, 1980–Dec 31, 2012), for English language publications with the terms “tuberculosis”, “*Mycobacterium tuberculosis*” plus “Africa”, “TB in Africa”, and reviewed

studies cited by articles identified by this search strategy and selected those that we identified as relevant. Some review articles are cited to provide readers with more details and references than this review can accommodate.



The Gambia. A house on the river Gambia taken during our boat ride.

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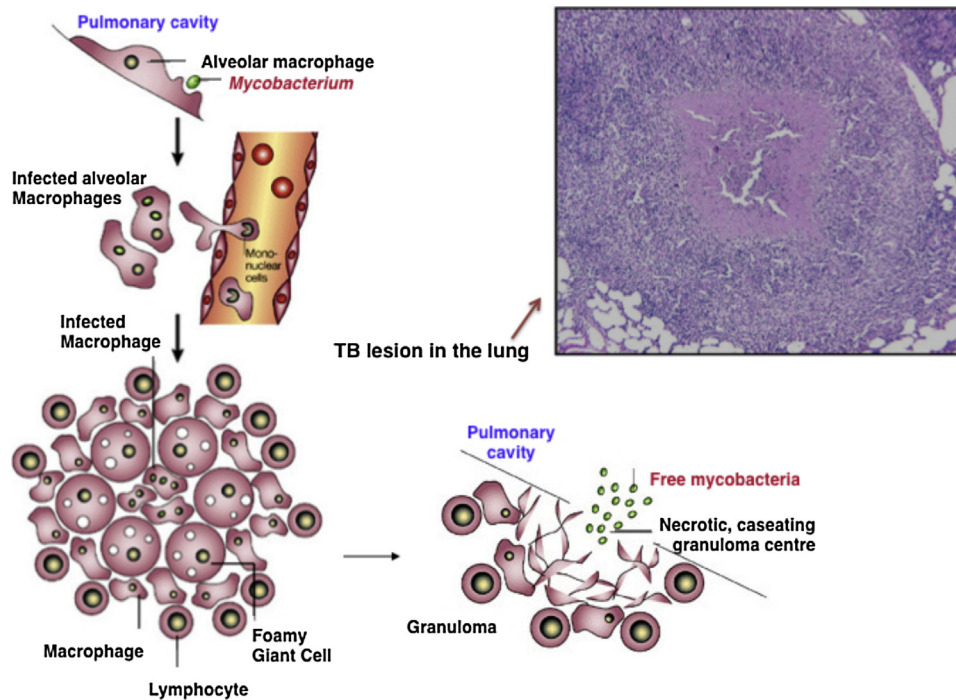


Fig. 1. *Tuberculosis Pathogenesis*. *M.tb* resides in the lung, and is the site of origin of transmission via aerosols. Bacilli are expelled through cough from an active pulmonary TB patient and enter lung alveoli of others [3].

Tuberculosis

Tuberculosis is one of the major infectious diseases in the world. It is estimated that about one third of the world's population (a majority in the developing countries) is infected with *Mycobacterium tuberculosis*, the etiological agent of the disease. Only about 5 to 10% develop clinical tuberculosis (TB) during 2 years after initial infection, remaining 90% of those infected show no clinical symptoms. The increasing prevalence of TB has been attributed to the increased number of patients infected with human immunodeficiency virus (HIV), bacterial resistance to medications, increased international travel and immigration from countries with high prevalence burden, and the growing numbers of the homeless and drug abusers [4,5].

Pathogenesis of tuberculosis

Infection with *M. tuberculosis*, follows a relatively well-defined sequence of events. The infectious bacilli are inhaled as droplets from the atmosphere. In the lung, the bacteria are phagocytosed by alveolar macrophages and induce a localized proinflammatory response that leads to recruitment of mononuclear cells from neighbouring blood vessels (Fig. 1). These cells are the building blocks for the granuloma, or tubercle, that defines the disease. The granuloma consists of a kernel of infected macrophages, surrounded by foamy giant cells and macrophages with a mantle of lymphocytes delineating the periphery of the structure. This tissue response typifies the 'containment' phase of the infection,

during which there are no overt signs of disease and the host does not transmit the infection to others. Containment fails after a change in the immune status of the host, which is usually a consequence of old age, malnutrition, or HIV co-infection. Under such circumstances, the centre of the granuloma undergoes caseation and spills viable, infectious bacilli into the airways. This leads to development of a productive cough that facilitates aerosol spread of infectious bacilli [6,7].

Global TB

The 2014 WHO report states that, "globally, an estimated 9.0 million people developed TB and 1.5 million died from the disease, 360,000 of whom were HIV-positive. TB is slowly declining each year and it is estimated that 37 million lives were saved between 2000 and 2013 through effective diagnosis and treatment [1]. This year's report shows higher global totals for new TB cases and deaths in 2013, reflecting use of availability of improved national data. An estimated 1.1 million (13%) of the 9 million people who developed TB in 2013 were HIV-positive. The number of people dying from HIV-associated TB has been falling for almost a decade. *The African Region accounts for about four out of every five HIV-positive TB cases and TB deaths among people who were HIV-positive.* In 2013, an estimated 510,000 women died as a result of TB, more than one third of whom were HIV-positive. There were 80,000 deaths from TB among HIV-negative children in the same year.

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