Tuberculosis

Tuberculosis (TB) is an infectious disease caused by the bacterium *Mycobacterium tuberculosis* (MTB). Tuberculosis generally affects the lungs, but can also affect other parts of the body. Most infections do not have symptoms, in which case it is known as latent tuberculosis. About 10% of latent infections progress to active disease which, if left untreated, kills about half of those infected.

Symptoms: The general signs and symptoms include fever, chills, night sweats, loss of appetite, weight loss, and fatigue.

Pulmonary tuberculosis: If a tuberculosis infection is in the lungs (90% cases), it is pulmonary tuberculosis. Symptoms may include chest pain and a prolonged cough producing sputum. Occasionally, people may cough up blood in small amounts. Tuberculosis may become a chronic illness and cause extensive scarring in the upper lobes of the lungs. Upper lung lobes are more frequently affected by tuberculosis than the lower ones.
When the tuberculosis infection spreads outside the lungs it causes other kinds of TB, which are collectively denoted as “extrapulmonary tuberculosis”. Extrapulmonary TB occurs more commonly in young children and immunosuppressed persons. Common sites of extrapulmonary infection include the pleura, the CNS, the genitourinary system.

Causes: The main cause of TB is *Mycobacterium Tuberculosis,* which is a small, aerobic, nonmotile bacillus. The high lipid content of this bacterium accounts for many of its unique clinical characteristics. It divides every 16-20 hours which is very slow compared with other bacteria, which divide in less than an hour.
A number of factors make people more susceptible to TB infections. The most important risk factor globally is HIV.

Mechanism and mode of Transmission:
When people with active pulmonary TB cough, sneeze, speak, sing, or spit, they expel infectious aerosol droplets 0.5 to 5.0 μm in diameter. A single sneeze can release upto 40,000 droplets. Each droplet may transmit the disease, since the infectious dose of tuberculosis is very small. Inhalation of fewer than 10 bacteria can cause an infection.
People with prolonged, frequent, or close contact with TB infected people are at a high risk of becoming infected. A person with active but untreated tuberculosis may infect 10-15 other people per year. Transmission occur only from people with active TB, those with latent infection are not thought to be contagious. The probability of transmission from one person to another depends upon several factors – number of infectious droplets expelled by the carrier, the duration of exposure, the virulence of the *M. tuberculosis* strain, the level of immunity in the uninfected person. If a person becomes infected, it typically takes three to four weeks before he becomes infectious enough to transmit the disease to others.

TB infection begins when the mycobacteria reach the pulmonary alveoli, where they invade and replicate within endosomes of alveolar macrophages. Macrophages identify the bacterium as foreign and attempt to eliminate it by phagocytosis. The bacterium is enveloped by the macrophage and stored temporarily in membrane-bound vesicle called a phagososme. The phagosome then combines with a lysosome to create phagolysosome. The cell attempts to use reactive oxygen species and acid to kill the bacterium. However, the thick, waxy mycolic acid capsule of the *M. tuberculosis* protects it from these toxic substances. *M. tuberculosis* is able to reproduce inside the macrophage and will eventually kill the immune cell.

Prevention: Tuberculosis prevention and control efforts rely primarily on the vaccination of infants and detection and providing appropriate treatment of the active cases. The only available vaccine as of 2011 is Bacillus Calmette-Guerin (BCG).