

## Lecture 10

### *Mycobacterium tuberculosis*

**Mycobacteria:** are aerobic and nonmotile bacteria (except for the species *Mycobacterium marinum*). Mycobacteria are widespread organisms, typically living in water and food sources.

First discovered in 1882 by Robert Koch, Mycobacteria have an outer membrane. They possess capsules, and most do not form endospores. Primarily a pathogen of the mammalian respiratory system, it infects the lungs. tuberculosis has an unusual, waxy coating on its cell surface primarily due to the presence of mycolic acid. This coating makes the cells impervious to Gram staining, and as a result, *M. tuberculosis* can appear either Gram-negative or Gram-positive.



Most *Mycobacterium* species, can be cultured in Löwenstein–Jensen media, more commonly known as LJ medium, When grown on LJ medium, *M. tuberculosis* appears as brown, granular colonies (sometimes called "buff, rough and tough"). The media must be incubated for a significant length of time, usually four weeks, due to the slow doubling time of *M. tuberculosis* (15–20 hours) compared with other bacteria. However, some species grow very slowly due to extremely long reproductive cycles — *M. leprae*, may take more than 20 days to proceed through one division cycle (for comparison, some *E. coli* strains take only 20 minutes), making laboratory culture a slow process. Optimum growth temperatures vary widely according to the species and range from 25 °C to over 50 °C.

**Staining characteristics**

Mycobacteria are acid-fastness organisms (resistance to common laboratory stain). Once stained, cannot be decolorized with acid solutions. The most common staining technique is Ziehl-Neelsen stain, in which the bacteria are stained bright red.

**Signs and symptoms of active TB include:**

Tuberculosis usually attacked the lung, but it can also affect other parts of the body. The disease is transmitted by air when saliva spray is transmitted to people with active TB infection by coughing or sneezing, coughing that lasts three or more-week, chest pain, fever and night sweats.

**Treatment:** Antibiotics used to treat tuberculosis such as streptomycin, isoniazid, rifampin , are quite different from those used to treat other bacterial infectious diseases. Clinically, several anti-tuberculosis drugs must be simultaneously applied to avoid drug resistance and to increase efficiency of therapy.

**Vaccine:**

The BCG vaccine is the only TB vaccine currently available, although there are other TB vaccines under development. Although far from perfect, the BCG vaccine is a relatively inexpensive, safe, and readily available vaccine that is still the only vaccine available for the prevention of human forms of TB.