Tuberculosis

Causative agent: ***Mycobacterium tuberculosis***: Weakly Gram + (acid-fast stain is used); highly aerobic; very slow-growing; transmitted in cough aerosols.

History: An ancient disease, sometimes called "consumption" (patient wasted away, lost weight); up to 1/3 of the world is infected. 10% of those infected may someday have active tuberculosis.

M. tuberculosis Mechanism of Disease:

1. *Mycobacterium* is able to enter the alveolar macrophages, and avoid phagocytosis. Its mycolic (waxy) cell wall gives it this ability.
2. Fibroblasts and Lymphocytes gather around the infected macrophages and form a granuloma (collagen fibers that wall off the infected parts of the lung). These areas are visible on an X-Ray.
3. Within the alveolar macrophages, TB may go dormant and stop multiplying (latent TB).
5. Helper T cells are activated, antibodies are produced, memory B and T cells are produced.
    - Immunosuppression OR Excessive inflammation may result in active TB
        - Immunosuppression may fail to result in control of *Mycobacterium* division within macrophages
        - Excessive inflammation may result in too much macrophage necrosis and spreading of *Mycobacterium*

Symptoms of Active Infection Include:

- Cough, frequently blood-tinged
- Weight loss
- Fever
- Can spread to other organs in some cases

Latent Tuberculosis Infection (LTB or LTBI) Symptoms:

- No symptoms
- X-Ray may show granulomas or may be clear; skin test should be positive

Diagnosing TB

- Mantoux Skin Test: a small amount of proteins purified from Mycobacterium are injected into the skin.
    - People that have been exposed and made antibodies to Mycobacterium test positive. It cannot distinguish between latent and active TB.
    - Those that have been vaccinated may test positive (in this case, the blood test is preferable)
    - If someone has recently had a TB skin test, they may test positive.
- Chest X-Ray
    - People with latent and active TB may show evidence of granulomas in their lungs.
- Sputum sample: Acid-fast stain shows *Mycobacterium* tuberculosis in sputum.

Treatment: Isoniazid (I suh NI uh ZID) for 9 months, even in LTBI; it works by preventing the mycolic acid (waxy coat) formation of *Mycobacterium*.