

# Tuberculosis (TB)

- **Introduction:**
  - Caused by *Mycobacterium tuberculosis*, an acid-fast bacillus.
  - TB is acquired by inhalation of respiratory droplets spread by coughing.
  - Previous BCG vaccine has no impact or effect on recommendations for treatment.
  - Primary TB is seen with the initial exposure.
  - Secondary TB is the reactivation of a latent infection.
- **Epidemiology:**
  - TB affects approximately 1/3 of the world's population.
  - TB is the world's 2<sup>nd</sup> most common cause of death from infectious disease after HIV/AIDS.
  - Saudi Arabia is considered as a *moderate* burden country.
- **Risk Factors:**
  - Approximately all patients with TB have one or more of the following risk factors:
    - Recent immigrants (in the past 5 years from endemic area).
    - Prisoners
    - HIV positive
    - Healthcare workers
    - Close contact with TB patient
    - Steroids use
    - Alcoholics
    - Hematological malignancies
    - Diabetes mellitus

- **Clinical Presentation:**
  - **Primary TB:**
    - With the initial exposure.
    - The bacilli are inhaled and deposit in the lungs as Ghon's complex (dormant).
    - Focal caseating necrosis in the lower lung lobes and hilar lymph nodes on pathology.
    - Usually asymptomatic patient, sometimes pleural effusion.
    - Positive PPD screening test.
  - **Secondary TB:**
    - Reactivation of the TB due to immune suppression like in AIDS and sometimes aging.
    - Occurs in the lung apex due to high O<sub>2</sub>.
    - Symptomatic patient: fever, night sweats, cough with hemoptysis, and weight loss.
    - Biopsy will reveal caseating granulomas.
    - Can lead to military extrapulmonary TB (systemic dissemination through lymphatic or blood):
      - Seen in 20% of HIV seropositive patients.
        - Sterile pyuria.
        - Meningitis in the base of the brain.
        - Cold abscess in the cervical lymph nodes.
        - Pott disease in the lumbar vertebrae.

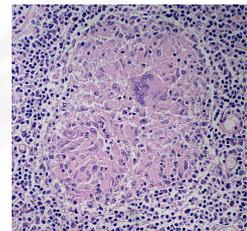


Figure 1: Caseating Granuloma.

Hemoptysis suggests advanced TB.

The most common organ to be involved in miliary TB is the *kidney*.



Figure 2: Cavitation in the Rt. upper lobe

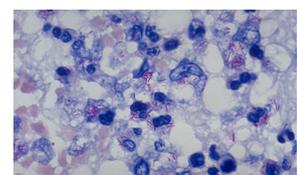


Figure 3: Acid-fast staining

- **Diagnosis:**
  - **Chest X-ray:**
    - Best initial test.
    - Cavitory lesion in the upper lobes.
  - **Sputum acid-fast testing:**
    - Definitive diagnosis.

- Obtain morning sputum.
- **Pleural biopsy:**
  - Most accurate diagnostic test.
  - Invasive, not used routinely.
- **Screening:**
  - *Mantoux tuberculin skin test (TST)*, a purified protein derivative (PPD) skin test is used.
    - **What induration size is considered positive:**  
 “The smaller the higher the risk”

Every person with positive PPD test should have CXR: to exclude active TB.

<b>&gt;5 mm</b>	<ul style="list-style-type: none"> <li>• HIV positive</li> <li>• Glucocorticoids users</li> <li>• Close contact with active TB patient</li> <li>• Organ transplant patients</li> <li>• Abnormal calcifications on CXR</li> </ul>
<b>&gt;10mm</b>	<ul style="list-style-type: none"> <li>• Recent immigration in the past 5 years</li> <li>• Healthcare workers</li> <li>• Prisoners</li> <li>• Injection drug users</li> <li>• Close contact with TB patient</li> <li>• Diabetes</li> <li>• Alcoholics</li> <li>• Hematologic malignancies</li> </ul>
<b>&gt;15 mm</b>	Healthy with no risk factors



- **False positive:**
  - Due to non-tuberculosis mycobacteria infections or vaccination.
- **False negative:**
  - Anergy.
- **Treatment:**
  - **Active TB:**
    - *RIPE Regimen: Rifampin, Isoniazide (INH), Pyrazinamide and Ethambutol.*
    - 4 drug empiric therapy for 6 month:
      - In the first 2-months → use all 4 drugs.
      - For the remaining 4-months → use only Rifampin + Isoniazide (INH).
    - Treatment might be extended for > 6months in some cases e.g.: osteomyelitis, pregnancy, or military TB.
    - All anti-tuberculosis drugs are *hepatotoxic*.
    - Steroids might be used to decrease the risk of constrictive pericarditis and meningitis.
  - **Latent TB (only positive PPD test):**
    - 9 months of INH.

**DO NOT** discontinue the anti TB drugs except if *LFTs are 3-5 times higher* than the baseline normal for the patient.

Drug	MOA	Side-effects & Toxicities	Management of the Toxicities
<b>Rifampin</b>	Blocking the RNA polymerase thus inhibiting the viral RNA synthesis.	Red to orange color body secretions or fluids.	Reassure the patient.
<b>Isoniazide (INH)</b>	Block the synthesis of mycolic acids thus inhibiting the formation of the mycobacterial wall.	Peripheral neuropathy.	Administer <i>pyridoxine</i> before INH to prevent it.
<b>Pyrazinamide</b>	Inhibiting the fatty acid synthesis thus interfering with the synthesis of the mycobacterial wall.  Active against the dormant bacilli found in macrophages.	<i>Hyperuricemia</i> that can result in gouty attacks.  <i>Teratogenic</i> in pregnancy.	Do not treat unless symptomatic (please refer to gout file).  Avoid it in pregnancy.
<b>Ethambutol</b>	Same as INH MOA.	Optic neuritis and color vision disturbance especially in renal failure.	Decrease the dose in renal failure.

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