

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 2nd 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 O₂.
 - 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.

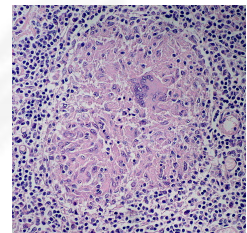


Figure 1: Caseating Granuloma.

Hemoptysis suggests advanced TB.

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

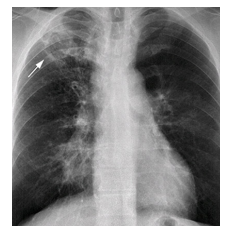


Figure 2: Cavitation in the Rt. upper lobe

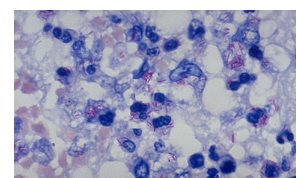


Figure 3: Acid-fast staining

- **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.

>5 mm	<ul style="list-style-type: none"> • HIV positive • Glucocorticoids users • Close contact with active TB patient • Organ transplant patients • Abnormal calcifications on CXR
>10mm	<ul style="list-style-type: none"> • Recent immigration in the past 5 years • Healthcare workers • Prisoners • Injection drug users • Close contact with TB patient • Diabetes • Alcoholics • Hematologic malignancies
>15 mm	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
Rifampin	Blocking the RNA polymerase thus inhibiting the viral RNA synthesis.	Red to orange color body secretions or fluids.	Reassure the patient.
Isoniazide (INH)	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.
Pyrazinamide	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.
Ethambutol	Same as INH MOA.	Optic neuritis and color vision disturbance especially in renal failure.	Decrease the dose in renal failure.

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