TB Lecture Summary

- **Facts about TB:**
- If treated is curable, and if not it's fetal.
- It mainly affects the lungs.
- **Epidemiology:**
- Affects all age groups.
- It is a worldwide disease (more common in developing countries).
- **Number of new cases**: Africa has the **highest** number of new cases (due to coupling with HIV Infection) → KSA → USA.
- It gets transmitted through inhalation of airborne and rarely through GIT.
- **People at risk :**
- Lab. technicians, workers in mines, doctors ,nurses. HIV pts., diabetics end stage renal failure, contacts with index case.
- **Characteristics of the Genus Mycobacteria:**
- Rod shape - non-motile - does not form spores - strict aerobe - multiply intracellularly.
- Causes Delayed hypersensitivity reaction.
- **Staining:**
- Stain: **ziehl-Neelsen stain** (ZN stain)
- It doesn't get stained by gram stain because it contains a high lipid conc. (**Mycolic Acid**) in its cell wall which resists staining.
- it is called "**Acid-Alcohol Fast Bacilli**" because it resists decolorization with HCL and Ethanol or both.
- **mycobacterium tuberculosis complex:**
- M. tuberculosis. (Human Type)
- M. bovis. (Bovine Type)
- M. Africanum.
- BCG strains.

- **Pathogenesis:**

- Mycobacterium is inhaled through airborne droplet → reaches alveolar macrophages → causes granuloma. (M.TB will live in a dormant state).

- **Types of TB:**

Primary TB (initial exposure):	Secondary TB (reactivation):
- can spread to other organs (Lymph nodes, meningitis, bones and joints, miliary and genitourinary). - Asymptomatic. - Ghon focus.	- Infectious and symptomatics. - caseation. - **clinical features**: Fever, hemoptysis, weight loss and weakness. - **Sources: Exogenous and Endogenous.**

- **Tuberculin Test:**

- it injects purified protein derivative (PPD) intradermally.
- Activates synthesized lymphocytes to produce CMI which appears as skin induration "the diameter of the induration determines the diagnosis".
- the result of the test is read after 48-72 hours.
- May not distinguish between active and past infection.
- **Methods:** Mantoux test.
- Results:

(+) Tuberculin Test			(-) Tuberculin Test
>5mm	>10mm	>15 mm	- No induration: -No previous infection -pre-hypersensitivity. - Lost TB senetivity with loss of antigen.
- Recent contact with active TB. - HIV or high risk for HIV.	- IV drug user, HIV seronegative patient. - Medical condition (diabetes, malignancy)	- Any person including those with no risk factor for TB.	

- **Laboratory Diagnosis of TB:**

1-Specimen:	2-Microscopy:	3-Culture:
-CSF. -3 early morning urine. - 3 early morning sputum. - bone, Joint aspirate. - Lymph nodes, pus or tissues.	ZN or (auramine) stain.	- the gold standard test. - LJ, other media plus LJ might be used: ★ MGIT ★ PCR: molecular test directly from specimen. ★ Prob Test: directly from respiratory samples.

- **Identification :**
- Measurement of Interferon–Gamma (IFNγ).
- Morphology → growth at 37℃ + 5-10% CO2
- **Management of TB:**
- Isolation for 10-14 days.
- Triple regimen of therapy (Why?) → prevent resistance mutants + cover strains located at different sites + prevent relapse.
- treatment is guided by sensitivity testing.

First Line treatment	Second Line Treatment
• Isoniazid (INH.) • Rifampicin (RIF.) • Ethambutol (E.) • Pyrazinamide (P.) • Streptomycin (S.) • Directly Observed Therapy(DOT.) For the first 2 months → INH+RIF+P For the next 4-6 months → INH+RIF	• PASA (Para-Amino Salicylic acid.) • Ethionamide. • Cycloserine. • Kanamycin. • Fluoroquinolones. It is more toxic. Used if the bacteria was resistant to the first line drugs.

Prevention of TB:

◄ **Immunization with BCG to all newborns.**