Drugs Used in Treatment of Tuberculosis

Tuberculosis (TB) is an infectious bacterial disease caused primarily by *Mycobacterium tuberculosis*. *Mycobacterium avium complex* (MAC) infections are significant in immunocompromised patients, especially those with HIV.

Risk Factors for TB

- Alcoholism and drug misuse
- Immunocompromised states (e.g., HIV/AIDS)
- Overcrowded living conditions
- Chronic debilitating diseases such as diabetes

Common Symptoms of TB

- Persistent swollen lymph nodes
- Weight loss and loss of appetite
- Chronic non-productive cough
- Hemoptysis (coughing blood)
- Night sweats

Classification of Anti-Tuberculosis Drugs

1. First-Line Drugs (Primary treatment)

- **Isoniazid (H)**
- **Rifampicin (R)**
- **Ethambutol (E)**
- **Pyrazinamide (Z)**
- **Streptomycin (S)**

2. Second-Line Drugs (Used when resistance or intolerance occurs)

- Ethionamide (ETM)
- Para-aminosalicylic acid (PAS)
- Kanamycin (Kmc)
- Amikacin
- Capreomycin (Cpr)
- Ofloxacin
- Protionamide

First-Line Anti-TB Drugs Details

Isoniazid (H)

- Bactericidal against fast-growing and bacteriostatic against slow-growing *M. tuberculosis*.
- Well absorbed orally, crosses blood-brain barrier.
- Metabolized in liver; fast and slow acetylators exist.
- **Adverse effects:** Peripheral neuropathy (prevent with pyridoxine), hepatotoxicity.
- **Drug interactions:** Inhibits metabolism of phenytoin, carbamazepine, diazepam, warfarin (risk of toxicity).

Rifampicin (R)

- Effective against slow/intermittently dividing organisms.
- Oral absorption, excreted in bile.
- **Adverse effects:** Hepatotoxicity, orange-red discoloration of urine/sputum.
- **Drug interactions:** Induces metabolism of many drugs, reducing their efficacy (e.g., nevirapine, oral contraceptives).

Ethambutol (E)

- Good patient tolerance.
- **Adverse effects:** Optic neuritis causing decreased visual acuity and color blindness (monitor vision regularly).
- Use cautiously in renal impairment.

Pyrazinamide (Z)

- Active especially in acidic environments within tuberculous lesions.
- Oral absorption, hepatic metabolism.
- **Adverse effects:** Dose-related hepatotoxicity, hyperuricemia (can cause gout), photosensitivity.

Streptomycin (S)

- Given by injection; resistance develops rapidly if used alone.
- **Adverse effects:** Ototoxicity (tinnitus, vertigo), nephrotoxicity, sensitization.

Second-Line Anti-TB Drugs

- Aminoglycosides (Kanamycin, Amikacin, Capreomycin) used mainly in drug-resistant TB; toxic (ototoxicity, nephrotoxicity), given by injection, poor CSF penetration.
- Para-aminosalicylic acid (PAS): Tuberculostatic, delays resistance but less effective; interferes with rifampicin absorption.
- Ethionamide: Tuberculostatic, active against extra- and intracellular bacteria; side effects include anorexia, rash.
- Cycloserine: CNS toxicity common (psychosis, headache, tremor).

Treatment Principles and Regimens

- At least **two drugs** are combined to prevent resistance.
- Duration and drug choice depend on sensitivity of *M. tuberculosis*, lesion site, and severity.
- Treatment often prolonged (6 months or more) to ensure eradication.

- **Multidrug-resistant TB (MDR-TB):** Resistant to at least isoniazid and rifampicin; requires prolonged second-line therapy (12–24 months).
- **Extensively drug-resistant TB (XDR-TB):** Resistant to multiple key drugs, very difficult to treat.