UNIT – 3

Anti-tubercular Agents

Synthetic Anti-tubercular Agents:

1. **Isoniazid:**
    - **Mechanism:** Inhibits mycolic acid synthesis, essential for the cell wall of Mycobacterium tuberculosis.
    - **Application:** Primary drug in TB treatment.
2. **Ethionamide:**
    - **Mechanism:** Inhibits mycolic acid synthesis, similar to isoniazid.
    - **Usage:** Used in multidrug regimens for TB.
3. **Ethambutol:**
    - **Mechanism:** Inhibits arabinosyl transferase, affecting cell wall synthesis.
    - **Role:** Used in combination for TB treatment to prevent resistance.
4. **Pyrazinamide:**
    - **Mechanism:** Exact mechanism not clear; thought to disrupt mycobacterial membrane.
    - **Application:** Effective against dormant bacilli.
5. **Para Amino Salicylic Acid (PAS):**
    - **Mechanism:** Interferes with folic acid synthesis.
    - **Usage:** Limited use due to toxicity; reserved for drug-resistant TB.

Anti-tubercular Antibiotics:

1. **Rifampicin:**
    - **Mechanism:** Inhibits RNA synthesis by binding to RNA polymerase.
    - **Application:** Key drug in TB treatment, used in multidrug regimens.
2. **Rifabutin:**
    - **Application:** Used in TB prophylaxis in HIV patients.
3. **Cycloserine:**
    - **Mechanism:** Inhibits cell wall synthesis.
    - **Usage:** Reserved for drug-resistant TB.
4. **Streptomycin:**
    - **Mechanism:** Binds to bacterial ribosomes, inhibiting protein synthesis.

- **Role:** Used in multidrug regimens for TB.

5. **Capreomycin Sulphate:**
    - **Mechanism:** Inhibits protein synthesis.
    - **Usage:** Reserved for multidrug-resistant TB.

Urinary Tract Anti-infective Agents

Quinolones:

1. **SAR of Quinolones:**
    - **Nalidixic Acid:** Prototype quinolone.
    - **Norfloxacin, Enoxacin, Ciprofloxacin, Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin, Moxifloxacin:** Developments with improved spectrum and pharmacokinetics.
2. **Nalidixic Acid:**
    - **Mechanism:** Inhibits bacterial DNA gyrase.
    - **Usage:** Limited due to resistance.
3. **Norfloxacin:**
    - **Features:** Improved bioavailability.
    - **Usage:** Effective against urinary tract infections.
4. **Ciprofloxacin:**
    - **Application:** Broad-spectrum, including UTIs and respiratory infections.
5. **Ofloxacin:**
    - **Role:** Effective against a range of bacteria, including UTIs.
6. **Nitrofurantoin:**
    - **Mechanism:** Unknown; may involve reactive intermediates damaging bacterial DNA.
    - **Usage:** Effective against UTIs.
7. **Furazolidine:**
    - **Application:** Used in the treatment of urinary tract infections.
8. **Methenamine:**
    - **Mechanism:** Converts to formaldehyde in an acidic environment, inhibiting bacterial growth.
    - **Usage:** Prophylaxis for recurrent UTIs.

Antiviral Agents

- **Amantadine Hydrochloride, Rimantadine Hydrochloride:**
    - **Mechanism:** Inhibits viral replication by blocking M2 protein.
    - **Application:** Used for influenza A.
- **Idoxuridine Trifluoride:**
    - **Application:** Antiviral agent used in the treatment of herpetic keratitis.
- **Acyclovir:**
    - **Mechanism:** Inhibits viral DNA synthesis.
    - **Usage:** Effective against herpes simplex and varicella-zoster viruses.
- **Ganciclovir:**
    - **Application:** Used for cytomegalovirus (CMV) infections.
- **Zidovudine (AZT):**
    - **Mechanism:** Nucleoside reverse transcriptase inhibitor.
    - **Usage:** Key drug in HIV/AIDS treatment.
- **Didanosine, Zalcitabine, Lamivudine, Loviride, Delavirdine:**
    - **Application:** Various antiretroviral agents used in HIV/AIDS treatment.
- **Ribavirin:**
    - **Usage:** Used for respiratory syncytial virus (RSV) and hepatitis C infections.
- **Saquinavir, Indinavir, Ritonavir:**
    - **Mechanism:** Protease inhibitors in HIV treatment.

This comprehensive overview provides detailed information on Anti-tubercular agents, Urinary tract anti-infective agents, and Antiviral agents, including their mechanisms of action, applications, and important representatives within each category.