SECTION 12

ANTIMICROBIAL DRUGS

ANTIMICROBIAL DRUGS

A chemical structure

1. Sulfonamides and Related Drugs

- **Examples**: Sulfadiazine, Dapsone (DDS), Paraaminosalicylic acid (PAS).
- **Dose**: Varies; Sulfadiazine 500 mg-1 g every 6 hours.
- **Use**: UTIs, leprosy (Dapsone), TB (PAS).
- **MOA**: Inhibit folic acid synthesis.
- **Adverse Effects**: Hypersensitivity, GI upset, hemolytic anemia.

2. Diaminopyrimidines

- **Examples**: Trimethoprim, Pyrimethamine.
- **Dose**: Trimethoprim 100 mg every 12 hours.
- **Use**: UTIs, malaria (Pyrimethamine).
- **MOA**: Inhibit bacterial/protozoal DNA synthesis.
- **Adverse Effects**: Anemia, hyperkalemia.

3. Quinolones

- **Examples**: Nalidixic acid, Norfloxacin, Ciprofloxacin, Prulifloxacin.
- **Dose**: Ciprofloxacin 250-750 mg every 12 hours.
- **Use**: UTIs, respiratory infections, GI infections.
- **MOA**: Inhibit DNA gyrase/topoisomerase.
- **Adverse Effects**: Tendonitis, GI upset, QT prolongation.

4. β-Lactam Antibiotics

- **Examples**: Penicillins, Cephalosporins, Monobactams, Carbapenems.
- **Dose**: Penicillins vary; e.g., Penicillin G 2-4 million units every 4-6 hours.
- **Use**: Gram-positive infections, pneumonia, UTIs.
- **MOA**: Inhibit cell wall synthesis.
- **Adverse Effects**: Allergic reactions, GI upset, nephritis.

5. Tetracyclines

- **Examples**: Oxytetracycline, Doxycycline.
- **Dose**: Doxycycline 100 mg daily.
- **Use**: Respiratory infections, acne, malaria prophylaxis.
- **MOA**: Inhibit protein synthesis (30S ribosome).
- **Adverse Effects**: Photosensitivity, GI upset, dental discoloration.

6. Nitrobenzene Derivative

- **Example**: Chloramphenicol.
- **Dose**: 50-100 mg/kg/day divided every 6 hours.
- **Use**: Meningitis, typhoid fever.
- **MOA**: Inhibits protein synthesis (50S ribosome).
- **Adverse Effects**: Bone marrow suppression, aplastic anemia.

7. Aminoglycosides

- **Examples**: Streptomycin, Gentamicin, Amikacin, Neomycin.
- **Dose**: Gentamicin 5-7 mg/kg once daily.
- **Use**: Severe Gram-negative infections.
- **MOA**: Inhibit protein synthesis, increase membrane permeability.
- **Adverse Effects**: Nephrotoxicity, ototoxicity.

8. Macrolide Antibiotics

- **Examples**: Erythromycin, Clarithromycin, Azithromycin.
- **Dose**: Azithromycin 500 mg on day 1, then 250 mg daily.
- **Use**: Respiratory infections, STIs.
- **MOA**: Inhibit protein synthesis (50S ribosome).
- **Adverse Effects**: GI upset, QT prolongation.

9. Lincosamide Antibiotics

- **Examples**: Lincomycin, Clindamycin.
- **Dose**: Clindamycin 150-450 mg every 6 hours.
- **Use**: Anaerobic infections, skin infections.
- **MOA**: Inhibit protein synthesis (50S ribosome).
- **Adverse Effects**: Diarrhea, pseudomembranous colitis.

10. Glycopeptide Antibiotics

- **Examples**: Vancomycin, Teicoplanin.
- **Dose**: Vancomycin 15-20 mg/kg every 8-12 hours.
- **Use**: MRSA, C. difficile (oral Vancomycin).
- **MOA**: Inhibit cell wall synthesis.
- **Adverse Effects**: Nephrotoxicity, "red man syndrome."

11. Oxazolidinone

- **Example**: Linezolid.
- **Dose**: 600 mg every 12 hours.
- **Use**: MRSA, VRE.

- **MOA**: Inhibit protein synthesis (50S ribosome).
- **Adverse Effects**: Bone marrow suppression, neuropathy.

12. Polypeptide Antibiotics

- **Examples**: Polymyxin-B, Colistin, Bacitracin, Tyrothricin.
- **Dose**: Colistin 2.5-5 mg/kg/day divided every 12 hours.
- **Use**: Multi-drug resistant Gram-negative infections.
- **MOA**: Disrupt cell membrane integrity.
- **Adverse Effects**: Nephrotoxicity, neurotoxicity.

13. Nitrofuran Derivatives

- **Examples**: Nitrofurantoin, Furazolidone.
- **Dose**: Nitrofurantoin 50-100 mg every 6 hours.
- **Use**: UTIs.
- **MOA**: Inhibits bacterial enzyme systems.
- **Adverse Effects**: GI upset, pulmonary toxicity.

14. Nitroimidazoles

- **Examples**: Metronidazole, Tinidazole.
- **Dose**: Metronidazole 500 mg every 8-12 hours.
- **Use**: Anaerobic infections, protozoal infections.
- **MOA**: Produces free radicals that damage DNA.
- **Adverse Effects**: Metallic taste, peripheral neuropathy.

15. Nicotinic Acid Derivatives

- **Examples**: Isoniazid, Pyrazinamide, Ethionamide.
- **Dose**: Isoniazid 300 mg daily.
- **Use**: Tuberculosis.
- **MOA**: Inhibits mycolic acid synthesis.
- **Adverse Effects**: Hepatotoxicity, peripheral neuropathy.

16. Polyene Antibiotics

- **Examples**: Nystatin, Amphotericin-B, Hamycin.
- **Dose**: Amphotericin-B 0.5-1.5 mg/kg/day IV.
- **Use**: Fungal infections.
- **MOA**: Binds to ergosterol, disrupting fungal cell membrane.
- **Adverse Effects**: Nephrotoxicity, infusion reactions.

17. Azole Derivatives

- **Examples**: Miconazole, Clotrimazole, Ketoconazole, Fluconazole.
- **Dose**: Fluconazole 150 mg single dose (vaginal candidiasis).
- **Use**: Fungal infections.
- **MOA**: Inhibit ergosterol synthesis.
- **Adverse Effects**: Hepatotoxicity, QT prolongation.

18. Others

- **Examples**: Rifampin, Spectinomycin, Sodium fusidate, Cycloserine, Viomycin, Ethambutol, Thiacetazone, Clofazimine, Griseofulvin.
- **Dose**: Rifampin 600 mg daily.
- **Use**: Tuberculosis, leprosy, bacterial infections.
- **MOA**: Varies; e.g., Rifampin inhibits RNA synthesis.
- **Adverse Effects**: Hepatotoxicity, red/orange urine (Rifampin).

B .mechanism of action

1. Inhibit Cell Wall Synthesis

- **Penicillins**
  - **Dose**: Varies by type (e.g., Penicillin G: 1.2-2.4 million units IM).
  - **Uses**: Bacterial infections (e.g., strep throat, syphilis).
  - **MOA**: Inhibits transpeptidase, preventing cross-linking of peptidoglycan in bacterial cell walls.
  - **Adverse Effects**: Allergic reactions, gastrointestinal upset.
- **Cephalosporins**
  - **Dose**: Varies by generation (e.g., Ceftriaxone: 1-2 g IV/IM daily).
  - **Uses**: Broad-spectrum infections, surgical prophylaxis.
  - **MOA**: Inhibits cell wall synthesis by binding to PBPs.
  - **Adverse Effects**: Allergic reactions, nephrotoxicity.
- **Cycloserine**
  - **Dose**: 250 mg twice daily.
  - **Uses**: Second-line treatment for tuberculosis.
  - **MOA**: Inhibits incorporation of D-alanine into bacterial cell walls.
  - **Adverse Effects**: Neurotoxicity, seizures.
- **Vancomycin**
  - **Dose**: 15-20 mg/kg IV every 8-12 hours.
  - **Uses**: MRSA, C. difficile colitis.
  - **MOA**: Binds to D-Ala-D-Ala portion of cell wall precursors, inhibiting peptidoglycan synthesis.
  - **Adverse Effects**: Red man syndrome, nephrotoxicity, ototoxicity.
- **Bacitracin**
  - **Dose**: Topical application.
  - **Uses**: Skin infections.
  - **MOA**: Inhibits cell wall synthesis by interfering with bactoprenol pyrophosphate dephosphorylation.
  - **Adverse Effects**: Contact dermatitis.

2. Cause Leakage from Cell Membranes

- **Polymyxins (e.g., Polymyxin B, Colistin)**
  - **Dose**: Polymyxin B: 1.5-2.5 mg/kg/day IV; Colistin: 2.5-5 mg/kg/day IV.

    - **Uses**: Multidrug-resistant Gram-negative infections.
    - **MOA**: Disrupts bacterial cell membranes by binding to lipopolysaccharides.
    - **Adverse Effects**: Nephrotoxicity, neurotoxicity.
- **Polyenes (e.g., Amphotericin B, Nystatin, Hamycin)**
    - **Amphotericin B**
        - **Dose**: 0.7-1.5 mg/kg/day IV.
        - **Uses**: Systemic fungal infections.
        - **MOA**: Binds to ergosterol in fungal cell membranes, causing leakage.
        - **Adverse Effects**: Nephrotoxicity, infusion reactions.
    - **Nystatin**
        - **Dose**: Topical or oral (500,000 units 4 times daily).
        - **Uses**: Candidiasis.
        - **MOA**: Binds to ergosterol, disrupting the fungal cell membrane.
        - **Adverse Effects**: Local irritation, gastrointestinal upset.
    - **Hamycin**
        - **Dose**: Topical application.
        - **Uses**: Fungal infections.
        - **MOA**: Similar to Amphotericin B.
        - **Adverse Effects**: Local irritation.

3. Inhibit Protein Synthesis

- **Tetracyclines (e.g., Doxycycline)**
    - **Dose**: 100 mg orally twice daily.
    - **Uses**: Broad-spectrum infections, acne, malaria prophylaxis.
    - **MOA**: Binds to 30S ribosomal subunit, preventing tRNA attachment.
    - **Adverse Effects**: Photosensitivity, teeth discoloration in children.
- **Chloramphenicol**
    - **Dose**: 50-100 mg/kg/day IV.
    - **Uses**: Typhoid fever, bacterial meningitis.
    - **MOA**: Binds to 50S ribosomal subunit, inhibiting peptidyl transferase.
    - **Adverse Effects**: Bone marrow suppression, aplastic anemia.
- **Erythromycin**
    - **Dose**: 250-500 mg orally every 6-12 hours.
    - **Uses**: Respiratory tract infections, skin infections.
    - **MOA**: Binds to 50S ribosomal subunit, inhibiting protein synthesis.
    - **Adverse Effects**: Gastrointestinal upset, QT prolongation.
- **Clindamycin**
    - **Dose**: 150-450 mg orally every 6-8 hours.
    - **Uses**: Anaerobic infections, skin and soft tissue infections.
    - **MOA**: Binds to 50S ribosomal subunit, inhibiting protein synthesis.
    - **Adverse Effects**: Clostridium difficile colitis, diarrhea.
- **Linezolid**
    - **Dose**: 600 mg orally/IV every 12 hours.
    - **Uses**: MRSA, VRE infections.
    - **MOA**: Binds to 50S ribosomal subunit, preventing initiation complex formation.
    - **Adverse Effects**: Bone marrow suppression, serotonin syndrome.

4. Cause Misreading of mRNA Code and Affect Permeability

- **Aminoglycosides (e.g., Streptomycin, Gentamicin)**
    - **Dose**: Streptomycin: 15 mg/kg IM daily; Gentamicin: 3-5 mg/kg/day IV/IM.
    - **Uses**: Severe Gram-negative infections, tuberculosis (Streptomycin).
    - **MOA**: Bind to 30S ribosomal subunit, causing mRNA misreading and faulty protein synthesis.
    - **Adverse Effects**: Nephrotoxicity, ototoxicity.

5. Inhibit DNA Gyrase

- **Fluoroquinolones (e.g., Ciprofloxacin)**
    - **Dose**: 250-750 mg orally every 12 hours.
    - **Uses**: UTIs, respiratory infections, skin infections.
    - **MOA**: Inhibits DNA gyrase and topoisomerase IV, preventing DNA replication.
    - **Adverse Effects**: Tendon rupture, QT prolongation, CNS effects.

6. Interfere with DNA Function

- **Rifampin**
    - **Dose**: 600 mg orally once daily.
    - **Uses**: Tuberculosis, leprosy.
    - **MOA**: Inhibits DNA-dependent RNA polymerase, blocking RNA synthesis.
    - **Adverse Effects**: Hepatotoxicity, red-orange discoloration of bodily fluids.

7. Interfere with DNA Synthesis

- **Acyclovir**
    - **Dose**: 200-800 mg orally 5 times daily.
    - **Uses**: HSV, VZV infections.
    - **MOA**: Guanine analog; inhibits viral DNA synthesis.
    - **Adverse Effects**: Nephrotoxicity, gastrointestinal upset.
- **Zidovudine (AZT)**
    - **Dose**: 300 mg orally twice daily.
    - **Uses**: HIV infection, prevention of maternal-fetal transmission.
    - **MOA**: Nucleoside reverse transcriptase inhibitor (NRTI).
    - **Adverse Effects**: Bone marrow suppression, lactic acidosis.

8. Interfere with Intermediary Metabolism

- **Sulfonamides (e.g., Sulfamethoxazole)**
    - **Dose**: 800 mg sulfamethoxazole + 160 mg trimethoprim every 12 hours.
    - **Uses**: UTIs, Pneumocystis pneumonia.
    - **MOA**: Inhibits dihydropteroate synthase, blocking folate synthesis.
    - **Adverse Effects**: Hypersensitivity, crystalluria.
- **Sulfones (e.g., Dapsone)**
    - **Dose**: 50-100 mg orally once daily.

- **Uses**: Leprosy, dermatitis herpetiformis.
- **MOA**: Inhibits dihydropteroate synthase.
- **Adverse Effects**: Hemolysis in G6PD deficiency, methemoglobinemia.

- **Para-Aminosalicylic Acid (PAS)**
  - **Dose**: 4 g orally 2-3 times daily.
  - **Uses**: Tuberculosis (second-line).
  - **MOA**: Competes with PABA, inhibiting folate synthesis.
  - **Adverse Effects**: Gastrointestinal upset, hepatotoxicity.
- **Trimethoprim**
  - **Dose**: 100-200 mg orally every 12 hours.
  - **Uses**: UTIs, Pneumocystis pneumonia.
  - **MOA**: Inhibits dihydrofolate reductase.
  - **Adverse Effects**: Megal

C. Type of Organisms Against Which Primarily Active

1. Antibacterial

- **Penicillins**
  - **Dose**: Varies by type (e.g., Penicillin G: 1.2-2.4 million units IM).
  - **Uses**: Bacterial infections like strep throat, syphilis.
  - **MOA**: Inhibits cell wall synthesis.
  - **Adverse Effects**: Allergic reactions, gastrointestinal upset.
- **Aminoglycosides (e.g., Gentamicin)**
  - **Dose**: 3-5 mg/kg/day IV/IM.
  - **Uses**: Severe Gram-negative infections.
  - **MOA**: Causes mRNA misreading, increasing cell permeability.
  - **Adverse Effects**: Nephrotoxicity, ototoxicity.
- **Erythromycin**
  - **Dose**: 250-500 mg orally every 6-12 hours.
  - **Uses**: Respiratory and skin infections.
  - **MOA**: Inhibits protein synthesis.
  - **Adverse Effects**: GI upset, QT prolongation.
- **Fluoroquinolones (e.g., Ciprofloxacin)**
  - **Dose**: 250-750 mg orally every 12 hours.
  - **Uses**: UTIs, respiratory infections.
  - **MOA**: Inhibits DNA gyrase, preventing DNA replication.
  - **Adverse Effects**: Tendon rupture, QT prolongation.

2. Antifungal

- **Griseofulvin**
  - **Dose**: 500 mg orally daily.
  - **Uses**: Dermatophytosis (ringworm).
  - **MOA**: Disrupts mitotic spindle, inhibiting fungal cell division.
  - **Adverse Effects**: Headache, hepatotoxicity.
- **Amphotericin B**
  - **Dose**: 0.7-1.5 mg/kg/day IV.
  - **Uses**: Systemic fungal infections.
  - **MOA**: Binds to ergosterol, causing cell membrane leakage.
  - **Adverse Effects**: Nephrotoxicity, infusion reactions.
- **Ketoconazole**
  - **Dose**: 200-400 mg orally daily.
  - **Uses**: Superficial and systemic fungal infections.
  - **MOA**: Inhibits ergosterol synthesis.
  - **Adverse Effects**: Hepatotoxicity, endocrine effects.

3. Antiviral

- **Acyclovir**
  - **Dose**: 200-800 mg orally 5 times daily.
  - **Uses**: HSV, VZV infections.
  - **MOA**: Inhibits viral DNA synthesis.
  - **Adverse Effects**: Nephrotoxicity, gastrointestinal upset.
- **Amantadine**
  - **Dose**: 100 mg orally twice daily.
  - **Uses**: Influenza A, Parkinson's disease.
  - **MOA**: Inhibits viral uncoating, dopamine agonist.
  - **Adverse Effects**: CNS effects, orthostatic hypotension.
- **Zidovudine (AZT)**
  - **Dose**: 300 mg orally twice daily.
  - **Uses**: HIV infection, prevention of maternal-fetal transmission.
  - **MOA**: Inhibits reverse transcriptase.
  - **Adverse Effects**: Bone marrow suppression, lactic acidosis.

4. Antiprotozoal

- **Chloroquine**
  - **Dose**: 500 mg orally weekly (for prophylaxis).
  - **Uses**: Malaria, amebiasis.
  - **MOA**: Inhibits heme polymerase, causing toxic buildup in parasites.
  - **Adverse Effects**: Retinopathy, GI upset.
- **Pyrimethamine**
  - **Dose**: 25-75 mg orally daily.
  - **Uses**: Malaria, toxoplasmosis.
  - **MOA**: Inhibits dihydrofolate reductase, affecting DNA synthesis.
  - **Adverse Effects**: Bone marrow suppression.
- **Metronidazole**
  - **Dose**: 500 mg orally/IV every 8 hours.
  - **Uses**: Amebiasis, giardiasis, trichomoniasis.
  - **MOA**: Forms toxic metabolites that damage DNA.
  - **Adverse Effects**: Metallic taste, neurotoxicity.
- **Diloxanide**
  - **Dose**: 500 mg orally three times daily.
  - **Uses**: Asymptomatic amebiasis.

- **MOA**: Inhibits protein synthesis in protozoa.
- **Adverse Effects**: Gastrointestinal upset.

5. Anthelmintic

- **Mebendazole**
  - **Dose**: 100 mg orally twice daily.
  - **Uses**: Helminthic infections (e.g., roundworms, hookworms).
  - **MOA**: Inhibits glucose uptake and microtubule synthesis in parasites.
  - **Adverse Effects**: Abdominal pain, hepatotoxicity.
- **Pyrantel**
  - **Dose**: 11 mg/kg orally once.
  - **Uses**: Pinworms, roundworms.
  - **MOA**: Causes paralysis of worms by depolarizing neuromuscular blockers.
  - **Adverse Effects**: GI upset, dizziness.
- **Niclosamide**
  - **Dose**: 2 g orally once.
  - **Uses**: Tapeworm infections.
  - **MOA**: Inhibits oxidative phosphorylation in tapeworms.
  - **Adverse Effects**: Nausea, abdominal pain.
- **Diethylcarbamazine**
  - **Dose**: 2 mg/kg orally three times daily.
  - **Uses**: Filariasis, loiasis.
  - **MOA**: Immobilizes microfilariae, altering surface structure.
  - **Adverse Effects**: Fever, headache, allergic reactions.

D. Spectrum of Activity

Narrow-spectrum

- **Penicillin G**
  - **Dose**: 1.2-2.4 million units IM.
  - **Uses**: Streptococcal infections, syphilis.
  - **MOA**: Inhibits bacterial cell wall synthesis.
  - **Adverse Effects**: Allergic reactions, GI upset.
- **Streptomycin**
  - **Dose**: 15 mg/kg IM daily.
  - **Uses**: Tuberculosis, plague.
  - **MOA**: Causes misreading of mRNA, disrupting protein synthesis.
  - **Adverse Effects**: Ototoxicity, nephrotoxicity.
- **Erythromycin**
  - **Dose**: 250-500 mg orally every 6-12 hours.
  - **Uses**: Respiratory tract infections, skin infections.
  - **MOA**: Inhibits protein synthesis.
  - **Adverse Effects**: GI upset, QT prolongation.

Broad-spectrum

- **Tetracyclines (e.g., Doxycycline)**
  - **Dose**: 100 mg orally twice daily.
  - **Uses**: Broad-spectrum infections, acne.
  - **MOA**: Inhibits protein synthesis by binding to the 30S ribosomal subunit.
  - **Adverse Effects**: Photosensitivity, teeth discoloration in children.
- **Chloramphenicol**
  - **Dose**: 50-100 mg/kg/day IV.
  - **Uses**: Typhoid fever, bacterial meningitis.
  - **MOA**: Inhibits protein synthesis by binding to the 50S ribosomal subunit.
  - **Adverse Effects**: Bone marrow suppression, aplastic anemia.

E. Type of Action

Primarily Bacteriostatic

- **Sulfonamides (e.g., Sulfamethoxazole)**
  - **Dose**: 800 mg sulfamethoxazole + 160 mg trimethoprim every 12 hours.
  - **Uses**: UTIs, Pneumocystis pneumonia.
  - **MOA**: Inhibits folate synthesis.
  - **Adverse Effects**: Hypersensitivity, crystalluria.
- **Tetracyclines (e.g., Doxycycline)**
  - **Dose**: 100 mg orally twice daily.
  - **Uses**: Broad-spectrum infections, acne.
  - **MOA**: Inhibits protein synthesis.
  - **Adverse Effects**: Photosensitivity, teeth discoloration in children.
- **Chloramphenicol**
  - **Dose**: 50-100 mg/kg/day IV.
  - **Uses**: Typhoid fever, bacterial meningitis.
  - **MOA**: Inhibits protein synthesis.
  - **Adverse Effects**: Bone marrow suppression, aplastic anemia.
- **Erythromycin**
  - **Dose**: 250-500 mg orally every 6-12 hours.
  - **Uses**: Respiratory tract infections, skin infections.
  - **MOA**: Inhibits protein synthesis.
  - **Adverse Effects**: GI upset, QT prolongation.
- **Clindamycin**
  - **Dose**: 150-450 mg orally every 6-8 hours.
  - **Uses**: Anaerobic infections, skin and soft tissue infections.
  - **MOA**: Inhibits protein synthesis.
  - **Adverse Effects**: Clostridium difficile colitis, diarrhea.
- **Linezolid**
  - **Dose**: 600 mg orally/IV every 12 hours.
  - **Uses**: MRSA, VRE infections.
  - **MOA**: Inhibits protein synthesis.
  - **Adverse Effects**: Bone marrow suppression, serotonin syndrome.
- **Ethambutol**
  - **Dose**: 15-25 mg/kg orally once daily.

    - **Uses**: Tuberculosis.
    - **MOA**: Inhibits cell wall synthesis.
    - **Adverse Effects**: Optic neuritis.

Primarily Bactericidal

- **Penicillins**
    - **Dose**: Varies (e.g., Penicillin G: 1.2-2.4 million units IM).
    - **Uses**: Bacterial infections like strep throat, syphilis.
    - **MOA**: Inhibits cell wall synthesis.
    - **Adverse Effects**: Allergic reactions, GI upset.
- **Cephalosporins (e.g., Ceftriaxone)**
    - **Dose**: 1-2 g IV/IM daily.
    - **Uses**: Broad-spectrum infections, surgical prophylaxis.
    - **MOA**: Inhibits cell wall synthesis.
    - **Adverse Effects**: Allergic reactions, nephrotoxicity.
- **Aminoglycosides (e.g., Gentamicin)**
    - **Dose**: 3-5 mg/kg/day IV/IM.
    - **Uses**: Severe Gram-negative infections.
    - **MOA**: Causes mRNA misreading, increasing cell permeability.
    - **Adverse Effects**: Nephrotoxicity, ototoxicity.
- **Vancomycin**
    - **Dose**: 15-20 mg/kg IV every 8-12 hours.
    - **Uses**: MRSA, C. difficile colitis.
    - **MOA**: Inhibits cell wall synthesis.
    - **Adverse Effects**: Red man syndrome, nephrotoxicity, ototoxicity.
- **Polypeptides (e.g., Polymyxin B)**
    - **Dose**: 1.5-2.5 mg/kg/day IV.
    - **Uses**: Multidrug-resistant Gram-negative infections.
    - **MOA**: Disrupts bacterial cell membranes.
    - **Adverse Effects**: Nephrotoxicity, neurotoxicity.
- **Ciprofloxacin**
    - **Dose**: 250-750 mg orally every 12 hours.
    - **Uses**: UTIs, respiratory infections.
    - **MOA**: Inhibits DNA gyrase, preventing DNA replication.
    - **Adverse Effects**: Tendon rupture, QT prolongation.
- **Rifampin**
    - **Dose**: 600 mg orally once daily.
    - **Uses**: Tuberculosis, leprosy.
    - **MOA**: Inhibits DNA-dependent RNA polymerase, blocking RNA synthesis.
    - **Adverse Effects**: Hepatotoxicity, red-orange discoloration of bodily fluids.
- **Metronidazole**
    - **Dose**: 500 mg orally/IV every 8 hours.
    - **Uses**: Amebiasis, giardiasis, trichomoniasis.
    - **MOA**: Forms toxic metabolites that damage DNA.
    - **Adverse Effects**: Metallic taste, neurotoxicity.
- **Isoniazid**
    - **Dose**: 5 mg/kg orally daily.
    - **Uses**: Tuberculosis.
    - **MOA**: Inhibits mycolic acid synthesis in mycobacteria.
    - **Adverse Effects**: Hepatotoxicity, peripheral neuropathy.
- **Cotrimoxazole**
    - **Dose**: 800 mg sulfamethoxazole + 160 mg trimethoprim every 12 hours.
    - **Uses**: UTIs, Pneumocystis pneumonia.
    - **MOA**: Inhibits folate synthesis.
    - **Adverse Effects**: Hypersensitivity, crystalluria.
- **Pyrazinamide**
    - **Dose**: 15-30 mg/kg orally once daily.
    - **Uses**: Tuberculosis.
    - **MOA**: Inhibits fatty acid synthesis in mycobacteria.
    - **Adverse Effects**: Hepatotoxicity, hyperuricemia.

F. Antibiotics are Obtained From

Fungi

- **Penicillin**
    - **Dose**: Varies (e.g., Penicillin G: 1.2-2.4 million units IM).
    - **Uses**: Bacterial infections like strep throat, syphilis.
    - **MOA**: Inhibits cell wall synthesis.
    - **Adverse Effects**: Allergic reactions, GI upset.
- **Griseofulvin**
    - **Dose**: 500 mg orally daily.
    - **Uses**: Dermatophytosis (ringworm).
    - **MOA**: Disrupts mitotic spindle, inhibiting fungal cell division.
    - **Adverse Effects**: Headache, hepatotoxicity.
- **Cephalosporins (e.g., Ceftriaxone)**
    - **Dose**: 1-2 g IV/IM daily.
    - **Uses**: Broad-spectrum infections, surgical prophylaxis.
    - **MOA**: Inhibits cell wall synthesis.
    - **Adverse Effects**: Allergic reactions, nephrotoxicity.

Bacteria

- **Polymyxin B**
    - **Dose**: 1.5-2.5 mg/kg/day IV.
    - **Uses**: Multidrug-resistant Gram-negative infections.
    - **MOA**: Disrupts bacterial cell membranes.
    - **Adverse Effects**: Nephrotoxicity, neurotoxicity.
- **Tyrothricin**
    - **Dose**: Topical application.
    - **Uses**: Local infections.
    - **MOA**: Disrupts bacterial cell membranes.
    - **Adverse Effects**: Local irritation.
- **Colistin**

- **Dose**: 2.5-5 mg/kg/day IV.
- **Uses**: Multidrug-resistant Gram-negative infections.
- **MOA**: Disrupts bacterial cell membranes.
- **Adverse Effects**: Nephrotoxicity, neurotoxicity.

- **Aztreonam**
  - **Dose**: 1-2 g IV/IM every 6-12 hours.
  - **Uses**: Gram-negative bacterial infections.
  - **MOA**: Inhibits cell wall synthesis.
  - **Adverse Effects**: GI upset, skin rashes.
- **Bacitracin**
  - **Dose**: Topical application.
  - **Uses**: Skin infections.
  - **MOA**: Inhibits cell wall synthesis.
  - **Adverse Effects**: Contact dermatitis.

Actinomycetes

- **Aminoglycosides (e.g., Streptomycin)**
  - **Dose**: 15 mg/kg IM daily.
  - **Uses**: Tuberculosis, plague.
  - **MOA**: Causes misreading of mRNA, disrupting protein synthesis.
  - **Adverse Effects**: Ototoxicity, nephrotoxicity.
- **Macrolides (e.g., Erythromycin)**
  - **Dose**: 250-500 mg orally every 6-12 hours.
  - **Uses**: Respiratory and skin infections.
  - **MOA**: Inhibits protein synthesis.
  - **Adverse Effects**: GI upset, QT prolongation.
- **Tetracyclines (e.g., Doxycycline)**
  - **Dose**: 100 mg orally twice daily.
  - **Uses**: Broad-spectrum infections, acne.
  - **MOA**: Inhibits protein synthesis.
  - **Adverse Effects**: Photosensitivity, teeth discoloration in children.
- **Polyenes (e.g., Amphotericin B)**
  - **Dose**: 0.7-1.5 mg/kg/day IV.
  - **Uses**: Systemic fungal infections.
  - **MOA**: Binds to ergosterol, causing cell membrane leakage.
  - **Adverse Effects**: Nephrotoxicity, infusion reactions.
- **Chloramphenicol**
  - **Dose**: 50-100 mg/kg/day IV.
  - **Uses**: Typhoid fever, bacterial meningitis.
  - **MOA**: Inhibits protein synthesis.
  - **Adverse Effects**: Bone marrow suppression, aplastic anemia

SULFONAMIDES

1. Short-Acting (4–8 hours)

- **Sulfadiazine**
  - **Dose**: 500 mg orally every 6 hours.
  - **Uses**: Toxoplasmosis, urinary tract infections (UTIs).
  - **MOA**: Inhibits bacterial folic acid synthesis by competing with para-aminobenzoic acid (PABA).
  - **Adverse Effects**: Crystalluria, hypersensitivity reactions, hematological disorders (e.g., agranulocytosis).

2. Intermediate-Acting (8–12 hours)

- **Sulfamethoxazole**
  - **Dose**: 800 mg sulfamethoxazole + 160 mg trimethoprim orally every 12 hours (combined as cotrimoxazole).
  - **Uses**: UTIs, Pneumocystis jirovecii pneumonia, bronchitis.
  - **MOA**: Inhibits bacterial folic acid synthesis by blocking dihydropteroate synthase (when combined with trimethoprim, also inhibits dihydrofolate reductase).
  - **Adverse Effects**: Nausea, vomiting, skin rash, Stevens-Johnson syndrome, bone marrow suppression.

3. Long-Acting (~7 days)

- **Sulfadoxine**
  - **Dose**: 500 mg orally once weekly (usually combined with pyrimethamine).
  - **Uses**: Malaria (prophylaxis and treatment).
  - **MOA**: Inhibits bacterial folic acid synthesis, extended duration of action due to slow excretion.
  - **Adverse Effects**: Severe skin reactions (e.g., Stevens-Johnson syndrome), hypersensitivity, liver toxicity.
- **Sulfamethopyrazine**
  - **Dose**: 1-2 g orally as a single dose.
  - **Uses**: Malaria (combined with other antimalarials), specific bacterial infections.
  - **MOA**: Inhibits folic acid synthesis, prolonging antimicrobial action.
  - **Adverse Effects**: Hypersensitivity reactions, GI disturbances, hematological effects.

4. Special Purpose Sulfonamides

- **Sulfacetamide Sodium**
  - **Dose**: 10-30% ophthalmic solution/ointment applied every 2-3 hours.
  - **Uses**: Bacterial conjunctivitis, corneal ulcers.
  - **MOA**: Inhibits folic acid synthesis in bacteria.
  - **Adverse Effects**: Local irritation, allergic reactions.
- **Mafenide**
  - **Dose**: Topical application of 5-10% cream to burns, applied 1-2 times daily.
  - **Uses**: Burn wound infections.
  - **MOA**: Inhibits bacterial folic acid synthesis; effective against Gram-positive and Gram-negative bacteria.
  - **Adverse Effects**: Pain at application site, allergic reactions, metabolic acidosis.
- **Silver Sulfadiazine**
  - **Dose**: Topical application of 1% cream applied to burns once or twice daily.
  - **Uses**: Prevention and treatment of infections in burns.
  - **MOA**: Disrupts bacterial cell membranes and inhibits folic acid synthesis.
  - **Adverse Effects**: Local irritation, argyria (skin discoloration), allergic reactions.
- **Sulfasalazine**
  - **Dose**: 500 mg to 1 g orally 3-4 times daily.

- **Uses**: Ulcerative colitis, Crohn’s disease, rheumatoid arthritis.
- **MOA**: Metabolized to sulfapyridine and 5-aminosalicylic acid (5-ASA), reducing inflammation.
- **Adverse Effects**: GI upset, headache, reversible oligospermia, hypersensitivity reactions.

cotrimazole

Trimethoprim + Sulfamethoxazole (Cotrimoxazole)

Dose:

- **Adults (Standard):** 800 mg sulfamethoxazole / 160 mg trimethoprim (1 tablet) every 12 hours.
- **Children:** Based on weight (6–12 mg/kg/day trimethoprim).

Uses:

- UTIs, respiratory infections, pneumonia (PCP), traveler's diarrhea, shigellosis, otitis media, infection prophylaxis.

Mechanism of Action (MOA):

- **Sulfamethoxazole:** Inhibits folic acid synthesis (dihydropteroate synthase).
- **Trimethoprim:** Blocks DNA synthesis (dihydrofolate reductase).
- Combined effect disrupts bacterial growth.

Side Effects:

- **Common:** Nausea, diarrhea, rash, headache.
- **Serious:** Stevens-Johnson syndrome, blood disorders, liver/kidney damage.

Precautions:

- Avoid in kidney/liver issues, pregnancy, infants under 2 months, and sulfa allergy.

QUINOLONES

First Generation Fluoroquinolones:

1. **Norfloxacin**
    - **MOA:** Inhibits bacterial DNA gyrase and topoisomerase IV, preventing DNA replication.
    - **Uses:** UTIs, prostatitis, gastroenteritis.
    - **Dose:** 400 mg twice daily.
    - **Side Effects:** Nausea, dizziness, headache.
2. **Ofloxacin**
    - **MOA:** Inhibits DNA gyrase and topoisomerase IV, disrupting bacterial DNA synthesis.
    - **Uses:** UTIs, respiratory infections, skin infections.
    - **Dose:** 200–400 mg twice daily.
    - **Side Effects:** GI upset, insomnia, dizziness.
3. **Ciprofloxacin**
    - **MOA:** Inhibits bacterial DNA gyrase and topoisomerase IV, stopping DNA replication.
    - **Uses:** UTIs, respiratory infections, skin infections, anthrax.
    - **Dose:** 250–750 mg twice daily.
    - **Side Effects:** Nausea, diarrhea, tendonitis.
4. **Pefloxacin**
    - **MOA:** Inhibits DNA gyrase and topoisomerase IV, halting bacterial DNA replication.
    - **Uses:** UTIs, respiratory infections, gastroenteritis.
    - **Dose:** 400 mg twice daily.
    - **Side Effects:** GI upset, rash, dizziness.

Second Generation Fluoroquinolones:

1. **Levofloxacin**
    - **MOA:** Inhibits bacterial DNA gyrase and topoisomerase IV, preventing DNA replication.
    - **Uses:** UTIs, respiratory infections, skin infections.
    - **Dose:** 500–750 mg once daily.
    - **Side Effects:** Nausea, headache, insomnia.
2. **Moxifloxacin**
    - **MOA:** Inhibits bacterial DNA gyrase and topoisomerase IV, disrupting bacterial DNA replication.
    - **Uses:** Respiratory infections, skin infections, intra-abdominal infections.
    - **Dose:** 400 mg once daily.
    - **Side Effects:** GI upset, dizziness, QT prolongation.
3. **Lomefloxacin**
    - **MOA:** Inhibits bacterial DNA gyrase and topoisomerase IV, blocking DNA synthesis.

- **Uses:** UTIs, respiratory infections.
- **Dose:** 400 mg once daily.
- **Side Effects:** Photosensitivity, GI upset.

4. **Gemifloxacin**
   - **MOA:** Inhibits DNA gyrase and topoisomerase IV, halting bacterial DNA replication.
   - **Uses:** Respiratory infections, bronchitis, pneumonia.
   - **Dose:** 320 mg once daily.
   - **Side Effects:** Rash, GI upset, headache.
5. **Sparfloxacin**
   - **MOA:** Inhibits bacterial DNA gyrase and topoisomerase IV, preventing DNA replication.
   - **Uses:** Respiratory infections, skin infections.
   - **Dose:** 200 mg once daily.
   - **Side Effects:** Photosensitivity, GI upset, QT prolongation.
6. **Prulifloxacin**
   - **MOA:** Inhibits DNA gyrase and topoisomerase IV, blocking bacterial DNA synthesis.
   - **Uses:** UTIs, respiratory infections.
   - **Dose:** 600 mg once daily.
   - **Side Effects:** GI upset, dizziness, rash.

Beta-Lactam Antibiotics

1. Acid-Resistant Alternative to Penicillin G:

- **Phenoxymethyl Penicillin (Penicillin V)**
  - **Dose: 250–500 mg every 6–8 hours.**
  - **MOA: Inhibits bacterial cell wall synthesis by binding to penicillin-binding proteins (PBPs).**
  - **Adverse Effects: Nausea, vomiting, diarrhea, allergic reactions (rash, anaphylaxis).**

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2. Penicillinase-Resistant Penicillins:

- **Methicillin**
  - **Dose: Discontinued due to nephrotoxicity; formerly used at 1–2 g every 4–6 hours IV.**
  - **MOA: Binds to PBPs, inhibiting bacterial cell wall synthesis; resistant to penicillinase.**
  - **Adverse Effects: Nephrotoxicity, interstitial nephritis, allergic reactions.**
- **Cloxacillin**
  - **Dose: 250–500 mg every 6 hours orally or 500 mg every 4–6 hours IV.**
  - **MOA: Inhibits cell wall synthesis, penicillinase-resistant.**
  - **Adverse Effects: GI upset, liver enzyme elevation, allergic reactions.**
- **Dicloxacillin**
  - **Dose: 250–500 mg every 6 hours orally.**
  - **MOA: Similar to cloxacillin; resistant to penicillinase.**
  - **Adverse Effects: GI upset, hypersensitivity, liver toxicity.**

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3. Extended Spectrum Penicillins:

(a) Aminopenicillins

- **Ampicillin**
  - **Dose: 250–500 mg every 6 hours orally or 1–2 g every 4–6 hours IV/IM.**
  - **MOA: Inhibits bacterial cell wall synthesis by binding to PBPs, extended spectrum.**
  - **Adverse Effects: Rash, diarrhea, allergic reactions, pseudomembranous colitis.**
- **Bacampicillin**
  - **Dose: 400–800 mg every 12 hours orally.**
  - **MOA: Prodrug of ampicillin; inhibits cell wall synthesis.**
  - **Adverse Effects: Similar to ampicillin (rash, diarrhea, allergic reactions).**
- **Amoxicillin**
  - **Dose: 250–500 mg every 8 hours or 500–875 mg every 12 hours orally.**
  - **MOA: Inhibits cell wall synthesis, broader spectrum than penicillin V.**
  - **Adverse Effects: Diarrhea, rash, allergic reactions, nausea.**

(b) Carboxypenicillins

- **Carbenicillin**
  - **Dose: 1–2 g every 4–6 hours IV.**
  - **MOA: Inhibits bacterial cell wall synthesis, active against Pseudomonas.**
  - **Adverse Effects: Hypokalemia, bleeding disorders, GI upset.**

(c) Ureidopenicillins

- **Piperacillin**
  - **Dose: 3–4 g every 6–8 hours IV.**
  - **MOA: Inhibits bacterial cell wall synthesis, extended spectrum including Pseudomonas.**
  - **Adverse Effects: Thrombocytopenia, GI upset, allergic reactions.**
- **Mezlocillin**
  - **Dose: 3–4 g every 6–8 hours IV.**
  - **MOA: Inhibits bacterial cell wall synthesis, broader gram-negative coverage.**
  - **Adverse Effects: GI upset, bleeding, hypersensitivity reactions.**

β-Lactamase Inhibitors:

- **Clavulanic Acid**
  - **Dose: Combined with amoxicillin (e.g., 500 mg amoxicillin + 125 mg clavulanic acid every 8 hours).**
  - **MOA: Inhibits β-lactamase enzymes, protecting penicillins from degradation.**
  - **Adverse Effects: Diarrhea, nausea, allergic reactions.**
- **Sulbactam**
  - **Dose: Combined with ampicillin (1–2 g ampicillin + 0.5–1 g sulbactam every 6–8 hours).**
  - **MOA: Inhibits β-lactamase, extending antibiotic activity.**
  - **Adverse Effects: Rash, GI upset, allergic reactions.**
- **Tazobactam**
  - **Dose: Combined with piperacillin (4.5 g every 6–8 hours IV).**
  - **MOA: Inhibits β-lactamase enzymes, enhancing the effect of piperacillin.**
  - **Adverse Effects: Nausea, diarrhea, allergic reactions**

Tetracyclines

1. **Tetracycline**
   - **Dose: 250–500 mg every 6 hours orally.**
   - **MOA: Inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit, preventing tRNA attachment.**
   - **Adverse Effects: GI upset, photosensitivity, teeth discoloration in children, hepatotoxicity, and nephrotoxicity.**
2. **Doxycycline**
   - **Dose: 100 mg every 12–24 hours orally or IV.**
   - **MOA: Inhibits protein synthesis by binding to the 30S ribosomal subunit, bacteriostatic.**
   - **Adverse Effects: GI upset, photosensitivity, esophageal irritation, teeth discoloration in children.**
3. **Oxytetracycline**
   - **Dose: 250–500 mg every 6 hours orally or 100–200 mg every 12 hours IV.**
   - **MOA: Similar to other tetracyclines, inhibits protein synthesis by binding to the 30S ribosomal subunit.**
   - **Adverse Effects: Nausea, vomiting, diarrhea, photosensitivity, hepatotoxicity, and nephrotoxicity.**
4. **Minocycline**
   - **Dose: 100 mg every 12 hours orally or IV.**
   - **MOA: Inhibits protein synthesis by binding to the 30S ribosomal subunit, bacteriostatic.**
   - **Adverse Effects: Dizziness, vertigo, GI upset, photosensitivity, teeth discoloration, and skin pigmentation.**
5. **Demeclocycline**
   - **Dose: 150 mg every 6 hours orally.**
   - **MOA: Inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit, also used in SIADH for reducing water retention.**
   - **Adverse Effects: Photosensitivity, GI upset, nephrotoxicity, teeth discoloration, and hepatotoxicity.**

Glycylcycline

1. **Tigecycline**
   - **Dose: 100 mg IV initial dose, followed by 50 mg every 12 hours IV.**
   - **MOA: Binds to the 30S ribosomal subunit, preventing protein synthesis; effective against tetracycline-resistant bacteria.**
   - **Adverse Effects: Nausea, vomiting, diarrhea, increased liver enzymes, and increased risk of death in severe infections.**

Chloramphenicol

- **Dose:**
  - **Adults: 500 mg every 6 hours (oral/IV).**
  - **Children: 25–50 mg/kg/day (based on weight).**
- **MOA**
  Inhibits bacterial protein synthesis by binding to the 50S ribosomal subunit, preventing peptide bond formation, which makes it bacteriostatic.
- **Uses:**

- Typhoid fever
- Bacterial meningitis
- Rickettsial infections (e.g., typhus)
- Bacterial conjunctivitis (eye infections)
- Anaerobic infections (intra-abdominal)

- **Adverse Effects:**
  - Bone marrow suppression
  - Aplastic anemia (rare, serious)
  - Gray baby syndrome (in neonates)
  - GI upset
  - Hepatotoxicity

Aminoglycoside Antibiotics

Systemic Aminoglycosides

1. **Streptomycin**
   - Dose: 15 mg/kg/day IV/IM (divided doses).
   - Uses: Tuberculosis, plague, tularemia.
   - MOA: Inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit, causing misreading of mRNA.
   - Adverse Effects: Ototoxicity, nephrotoxicity, allergic reactions.
2. **Amikacin**
   - Dose: 15 mg/kg/day IV/IM (divided doses).
   - Uses: Severe infections, including those resistant to other aminoglycosides.
   - MOA: Inhibits protein synthesis by binding to the 30S ribosomal subunit.
   - Adverse Effects: Ototoxicity, nephrotoxicity, headache.
3. **Gentamicin**
   - Dose: 3–5 mg/kg/day IV/IM (divided doses).
   - Uses: Gram-negative infections, sepsis, nosocomial infections.
   - MOA: Inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit.
   - Adverse Effects: Ototoxicity, nephrotoxicity, dizziness.
4. **Sisomicin**
   - Dose: 6–8 mg/kg/day IV/IM (divided doses).
   - Uses: Infections resistant to gentamicin and tobramycin.
   - MOA: Similar to other aminoglycosides; inhibits protein synthesis by binding to the 30S ribosomal subunit.
   - Adverse Effects: Ototoxicity, nephrotoxicity, rash.
5. **Kanamycin**
   - Dose: 15 mg/kg/day IV/IM (divided doses).
   - Uses: Tuberculosis, gram-negative infections.
   - MOA: Inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit.
   - Adverse Effects: Ototoxicity, nephrotoxicity, vertigo.
6. **Netilmicin**
   - Dose: 6–7.5 mg/kg/day IV/IM (divided doses).
   - Uses: Severe infections, including those resistant to other aminoglycosides.
   - MOA: Inhibits protein synthesis by binding to the 30S ribosomal subunit.
   - Adverse Effects: Ototoxicity, nephrotoxicity, rash.
7. **Tobramycin**
   - Dose: 3–5 mg/kg/day IV/IM (divided doses).
   - Uses: Pseudomonas infections, cystic fibrosis.
   - MOA: Inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit.
   - Adverse Effects: Ototoxicity, nephrotoxicity, tinnitus.
8. **Paromomycin**
   - Dose: 25 mg/kg/day (oral or IM) for specific infections.
   - Uses: Intestinal infections, leishmaniasis.
   - MOA: Inhibits protein synthesis by binding to the 30S ribosomal subunit.
   - Adverse Effects: GI upset, hearing loss, nephrotoxicity.

Topical Aminoglycosides

1. **Neomycin**
   - Dose: Apply topically as a cream or ointment.

- **Uses: Topical infections, including minor skin infections.**
- **MOA: Inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit.**
- **Adverse Effects: Local skin irritation, allergic contact dermatitis.**

2. **Framycetin**
    - **Dose: Apply topically as an ointment or cream.**
    - **Uses: Topical infections, particularly in skin and eye infections.**
    - **MOA: Inhibits protein synthesis by binding to the 30S ribosomal subunit.**
    - **Adverse Effects: Local irritation, allergic reactions.**

MACROLIDE ANTIBIOTICS

Erythromycin

- **Use:** Bacterial infections (e.g., respiratory infections, skin infections, STIs)
- **Dose:**
    - Adults: 250-500 mg every 6 hours
    - Children: 30-50 mg/kg/day in divided doses
- **MOA:** Inhibits bacterial protein synthesis by binding to the 50S ribosomal subunit.
- **Adverse Effects:** Gastrointestinal upset (nausea, vomiting, diarrhea), allergic reactions, liver enzyme elevation, and potential QT interval prolongation.

Roxithromycin

- **Use:** Respiratory tract infections, skin infections, and soft tissue infections.
- **Dose:**
    - Adults: 150 mg twice daily or 300 mg once daily.
    - Children: 5-8 mg/kg/day in divided doses.
- **MOA:** Similar to erythromycin; inhibits protein synthesis by binding to the 50S ribosomal subunit.
- **Adverse Effects:** Gastrointestinal disturbances, headache, dizziness, and potential allergic reactions.

Clarithromycin

- **Use:** Upper and lower respiratory tract infections, skin infections, and H. pylori eradication.
- **Dose:**
    - Adults: 250-500 mg every 12 hours.
    - Children: 7.5 mg/kg twice daily (max 500 mg).
- **MOA:** Inhibits bacterial protein synthesis by binding to the 50S ribosomal subunit.
- **Adverse Effects:** Gastrointestinal issues, altered taste, headache, liver enzyme elevation, and risk of QT prolongation.

Azithromycin

- **Use:** Respiratory infections, STIs, and certain bacterial infections (e.g., MAC).
- **Dose:**
    - Adults: 500 mg on day 1, then 250 mg for 4 days (5-day course).
    - Children: 10 mg/kg on day 1, then 5 mg/kg for 4 days.
- **MOA:** Inhibits bacterial protein synthesis by binding to the 50S ribosomal subunit.
- **Adverse Effects:** Gastrointestinal upset, allergic reactions, potential for QT prolongation, and hepatotoxicity.

LINCOSAMIDE ANTIBIOTICS

Clindamycin

- **Use:** Serious bacterial infections (e.g., skin, respiratory, bone infections).
- **Dose:**
    - **Adults:** 150-450 mg every 6-8 hours.
    - **Children:** 8-25 mg/kg/day in divided doses.
- **MOA:** Inhibits protein synthesis by binding to the 50S ribosomal subunit.
- **Adverse Effects:** Nausea, diarrhea, risk of C. difficile infection, skin rash, liver enzyme elevation.

Lincomycin

- **Use:** Serious infections from anaerobic and gram-positive bacteria (e.g., skin, bone infections).
- **Dose:**
    - **Adults:** 500 mg every 6-8 hours.
    - **Children:** 10-20 mg/kg/day in divided doses.
- **MOA:** Inhibits protein synthesis by binding to the 50S ribosomal subunit.
- **Adverse Effects:** Nausea, diarrhea, risk of C. difficile infection, skin rash, liver enzyme elevation.

GLYCOPEPTIDE ANTIBIOTICS

Vancomycin

- **Use:** Serious gram-positive infections (e.g., MRSA, C. difficile).
- **Dose:**
    - **Adults:** 15-20 mg/kg IV every 8-12 hours.
    - **Children:** 10-15 mg/kg every 6-8 hours.

- **MOA:** Inhibits cell wall synthesis.
- **Adverse Effects:** Nephrotoxicity, ototoxicity (rare), red man syndrome, allergic reactions.

Teicoplanin

- **Use:** Gram-positive infections (e.g., MRSA, enterococci).
- **Dose:**
  - **Adults:** 6-12 mg/kg IV once daily.
  - **Children:** 6-10 mg/kg every 12 hours for 3 doses, then once daily.
- **MOA:** Inhibits cell wall synthesis.
- **Adverse Effects:** Nephrotoxicity (less common), rash, fever, allergic reactions.

OXAZOLIDINONE

Linezolid

- **Use:** Serious gram-positive infections (e.g., MRSA, VRE).
- **Dose:**
  - **Adults:** 600 mg IV/orally every 12 hours.
  - **Children:** 10 mg/kg IV/orally every 8-12 hours.
- **MOA:** Inhibits protein synthesis by binding to the 50S ribosomal subunit.
- **Adverse Effects:** Bone marrow suppression, peripheral neuropathy, serotonin syndrome, gastrointestinal issues.

MISCELLANEOUS ANTIBIOTICS

Spectinomycin

- **Use:** Treatment of gonorrhea (when penicillin allergy exists).
- **Dose:** Typically 2 g IM as a single dose.
- **MOA:** Inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit.
- **Adverse Effects:** Nausea, dizziness, local injection site reactions, and potential allergic reactions.

Quinupristin/Dalfopristin

- **Use:** Treatment of vancomycin-resistant Enterococcus (VRE) and skin infections.
- **Dose:** 7.5 mg/kg IV every 8 to 12 hours.
- **MOA:** Inhibits protein synthesis by binding to the 50S ribosomal subunit; synergistic effect of both components.
- **Adverse Effects:** Gastrointestinal disturbances, arthralgia, myalgia, and infusion site reactions.

Fusidic Acid

- **Use:** Treatment of skin infections, including impetigo and infections caused by Staphylococcus.
- **Dose:** Typically 250 mg to 500 mg orally, or topical formulations as needed.
- **MOA:** Inhibits bacterial protein synthesis by blocking elongation factor G.
- **Adverse Effects:** Gastrointestinal upset, liver dysfunction (with prolonged use), and local skin reactions (topical use).

Mupirocin

- **Use:** Treatment of localized skin infections (e.g., impetigo) and nasal MRSA colonization.
- **Dose:** Topical application; typically applied 2-3 times daily.
- **MOA:** Inhibits bacterial protein synthesis by binding to bacterial isoleucyl-tRNA synthetase.
- **Adverse Effects:** Local irritation, burning sensation, and allergic contact dermatitis

POLYPEPTIDE ANTIBIOTICS

Polymyxin B

- **Use:** Treatment of serious infections caused by Gram-negative bacteria (e.g., Pseudomonas aeruginosa).
- **Dose:** 300,000 to 600,000 units IV every 12 hours (dose may vary based on infection severity).
- **MOA:** Disrupts bacterial cell membrane integrity, leading to cell lysis.
- **Adverse Effects:** Nephrotoxicity, neurotoxicity, and allergic reactions.

Colistin (Polymyxin E)

- **Use:** Treatment of multi-drug resistant Gram-negative infections (e.g., carbapenem-resistant Enterobacteriaceae).
- **Dose:** 2.5 to 5 mg/kg IV daily in divided doses; adjusted for renal function.
- **MOA:** Similar to Polymyxin B; disrupts the bacterial cell membrane.
- **Adverse Effects:** Nephrotoxicity, neurotoxicity, respiratory issues (when inhaled), and potential allergic reactions.

Bacitracin

- **Use:** Topical treatment for skin infections, particularly those caused by Gram-positive bacteria.
- **Dose:** 500 units/g topical ointment applied 1-3 times daily; systemic use is rare due to toxicity.
- **MOA:** Inhibits bacterial cell wall synthesis by interfering with peptidoglycan formation.
- **Adverse Effects:** Local irritation, allergic reactions, and nephrotoxicity

URINARY ANTISEPTICS

Nitrofurantoin

- **Use:** Treatment and prophylaxis of urinary tract infections (UTIs).
- **Dose:**
    - For UTIs: 50-100 mg orally 4 times daily.
    - Prophylaxis: 50-100 mg orally at bedtime.
- **MOA:** Inhibits bacterial enzyme systems and impairs cell wall synthesis; primarily effective against Gram-positive and some Gram-negative bacteria.
- **Adverse Effects:** Nausea, vomiting, diarrhea, pulmonary toxicity (with long-term use), peripheral neuropathy, and hemolytic anemia (especially in G6PD deficiency).

. Methenamine

- **Use:** Prevention and treatment of chronic UTIs.
- **Dose:**
    - For adults: 1 g orally 2-4 times daily, depending on the formulation (e.g., methenamine mandelate or methenamine hippurate).
- **MOA:** Decomposes in acidic urine to formaldehyde, which exerts bactericidal effects.
- **Adverse Effects:** Gastrointestinal upset, rash, and potential for bladder irritation; contraindicated in renal insufficiency.

URINARY ANALGESIC

Phenazopyridine

- **Use:** Symptomatic relief of urinary tract discomfort (pain, burning, urgency).
- **Dose:** 100-200 mg orally three times daily after meals; typically used for no more than 2 days.
- **MOA:** Acts as a local analgesic on the urinary tract mucosa.
- **Adverse Effects:** Discoloration of urine (orange/red), gastrointestinal upset, headache, and potential allergic reactions.

Antitubercular Drugs

First-Line Drugs for Tuberculosis

Isoniazid (H)

- **Use:** First-line treatment for active and latent TB.
- **Dose:** 5 mg/kg (max 300 mg) orally daily.
- **MOA:** Inhibits mycolic acid synthesis in bacterial cell walls.
- **Adverse Effects:** Hepatotoxicity, peripheral neuropathy, and hypersensitivity reactions.

Rifampin (R)

- **Use:** Effective for both active and latent TB.
- **Dose:** 10 mg/kg (max 600 mg) orally daily.
- **MOA:** Inhibits bacterial RNA synthesis by binding to RNA polymerase.
- **Adverse Effects:** Hepatotoxicity, orange-red discoloration of bodily fluids, and flu-like symptoms.

Pyrazinamide (Z)

- **Use:** Part of combination therapy for TB.
- **Dose:** 25 mg/kg (max 2000 mg) orally daily.
- **MOA:** Disrupts mycobacterial cell membrane metabolism and transport.
- **Adverse Effects:** Hepatotoxicity, hyperuricemia, and gastrointestinal upset.

Ethambutol (E)

- **Use:** Used in combination with other agents for TB.
- **Dose:** 15 mg/kg (max 1,200 mg) orally daily.
- **MOA:** Inhibits arabinogalactan synthesis in mycobacterial cell walls.
- **Adverse Effects:** Optic neuritis (vision changes), rash, and hyperuricemia.

Streptomycin (S)

- **Use:** Injectable first-line agent for severe TB cases.
- **Dose:** 15 mg/kg (max 1,000 mg) IM daily.
- **MOA:** Inhibits protein synthesis by binding to the 30S ribosomal subunit.
- **Adverse Effects:** Ototoxicity, nephrotoxicity, and hypersensitivity reactions.

Second-Line Drugs for Tuberculosis

Ethionamide (Eto)

- **Use:** Treatment of drug-resistant TB.
- **Dose:** 15 mg/kg (max 1,000 mg) orally daily.
- **MOA:** Inhibits mycolic acid synthesis in the bacterial cell wall.
- **Adverse Effects:** Gastrointestinal disturbances, hepatotoxicity, and endocrine disorders.

Prothionamide (Pto)

- **Use:** Drug-resistant TB treatment.

- **Dose:** 15-20 mg/kg (max 1,000 mg) orally daily.
- **MOA:** Similar to Ethionamide; disrupts cell wall synthesis.
- **Adverse Effects:** GI upset, hepatotoxicity, and peripheral neuropathy.

Cycloserine (Cs)

- **Use:** Treatment of resistant TB.
- **Dose:** 10 mg/kg (max 1,000 mg) orally daily.
- **MOA:** Inhibits cell wall synthesis by blocking D-alanine incorporation.
- **Adverse Effects:** CNS effects (seizures, depression), and peripheral neuropathy.

Terizidone (Trd)

- **Use:** Drug-resistant TB treatment.
- **Dose:** 300 mg orally daily.
- **MOA:** Similar to Cycloserine; inhibits cell wall synthesis.
- **Adverse Effects:** CNS effects, peripheral neuropathy, and GI upset.

Para-aminosalicylic acid (PAS)

- **Use:** Adjunct therapy for resistant TB.
- **Dose:** 150 mg/kg (max 10 g) orally daily.
- **MOA:** Inhibits folate synthesis in bacteria.
- **Adverse Effects:** GI upset, hypersensitivity reactions, and liver toxicity.

Fluoroquinolones

Ofloxacin (Ofx)

- **Use:** Treatment of resistant TB.
- **Dose:** 400 mg orally daily.
- **MOA:** Inhibits bacterial DNA gyrase and topoisomerase IV.
- **Adverse Effects:** Tendonitis, CNS effects, and GI disturbances.

Levofloxacin (Lvx/Lfx)

- **Use:** Treatment of drug-resistant TB.
- **Dose:** 500-750 mg orally daily.
- **MOA:** Inhibits DNA replication by targeting topoisomerase IV.
- **Adverse Effects:** Tendon rupture, CNS effects, and QT prolongation.

Moxifloxacin (Mfx)

- **Use:** Multi-drug resistant TB treatment.
- **Dose:** 400 mg orally daily.
- **MOA:** Inhibits bacterial DNA replication.
- **Adverse Effects:** GI upset, CNS effects, and QT prolongation.

Ciprofloxacin (Cfx)

- **Use:** Treatment of resistant TB.
- **Dose:** 500-750 mg orally twice daily.
- **MOA:** Inhibits DNA gyrase.
- **Adverse Effects:** GI upset, CNS effects, and tendon damage.

Injectable Drugs

Rifabutin

- **Use:** TB treatment, particularly in HIV-infected patients.
- **Dose:** 5 mg/kg (max 300 mg) orally daily.
- **MOA:** Inhibits RNA synthesis.
- **Adverse Effects:** Uveitis, hepatotoxicity, and drug interactions.

Kanamycin (Km)

- **Use:** Treatment of resistant TB.
- **Dose:** 15 mg/kg IM daily.
- **MOA:** Inhibits protein synthesis by binding to the 30S ribosomal subunit.
- **Adverse Effects:** Ototoxicity, nephrotoxicity, and hypersensitivity reactions.

Amikacin (Am)

- **Use:** Multi-drug resistant TB treatment.
- **Dose:** 15 mg/kg IM daily.
- **MOA:** Inhibits protein synthesis by binding to the 30S ribosomal subunit.
- **Adverse Effects:** Ototoxicity, nephrotoxicity, and injection site reactions.

Thiacetazone (Thz)

- **Use:** Resistant TB treatment.
- **Dose:** 150 mg orally daily.
- **MOA:** Disrupts mycobacterial cell wall synthesis.
- **Adverse Effects:** Hepatotoxicity, skin reactions, and blood dyscrasias.

Capreomycin (Cm)

- **Use:** Used in multi-drug resistant TB.
- **Dose:** 1 g IM daily.
- **MOA:** Inhibits protein synthesis.
- **Adverse Effects:** Nephrotoxicity, ototoxicity, and injection site reactions.

Antileprotic Drugs

Sulfone:

Dapsone (DDS)

- **Use:** Treatment of leprosy, dermatitis herpetiformis, and as part of Pneumocystis pneumonia prophylaxis in HIV.
- **Dose:** 100 mg to 200 mg orally daily.
- **MOA:** Inhibits dihydropteroate synthase, interfering with folate synthesis in bacteria.
- **Adverse Effects:** Hemolysis (especially in G6PD deficiency), methemoglobinemia, and gastrointestinal upset.

Phenazine Derivative:

Clofazimine

- **Use:** Treatment of leprosy and multidrug-resistant tuberculosis.
- **Dose:** 100 mg orally daily (may vary based on protocol).
- **MOA:** Binds to DNA, inhibiting mycobacterial growth and has anti-inflammatory properties.
- **Adverse Effects:** Skin discoloration (pink to brown), gastrointestinal upset, and potential for hepatotoxicity.

Antitubercular Drugs

- **Rifampin**
  - **Use:** First-line treatment for active and latent tuberculosis.
  - **Dose:** 10 mg/kg (max 600 mg) orally daily.
  - **MOA:** Inhibits bacterial RNA synthesis by binding to RNA polymerase.
  - **Adverse Effects:** Hepatotoxicity, orange-red discoloration of bodily fluids, and flu-like symptoms.
- **Ethionamide**
  - **Use:** Treatment of drug-resistant tuberculosis.
  - **Dose:** 15 mg/kg (max 1,000 mg) orally daily.
  - **MOA:** Inhibits mycolic acid synthesis in bacterial cell walls.
  - **Adverse Effects:** GI disturbances, hepatotoxicity, and endocrine disorders.

Other Antibiotics

- **Ofloxacin**
  - **Use:** Treatment of resistant tuberculosis and other infections.
  - **Dose:** 400 mg orally daily.
  - **MOA:** Inhibits bacterial DNA gyrase and topoisomerase IV.
  - **Adverse Effects:** Tendonitis, CNS effects, and gastrointestinal disturbances.
- **Moxifloxacin**
  - **Use:** Treatment of multidrug-resistant tuberculosis and other infections.
  - **Dose:** 400 mg orally daily.
  - **MOA:** Inhibits bacterial DNA replication by targeting topoisomerase IV.
  - **Adverse Effects:** GI upset, CNS effects, and QT prolongation.
- **Minocycline**
  - **Use:** Treatment of various infections, including those caused by resistant bacteria.
  - **Dose:** 200 mg orally on day 1, then 100 mg daily.
  - **MOA:** Inhibits protein synthesis by binding to the 30S ribosomal subunit.
  - **Adverse Effects:** Photosensitivity, dizziness, and possible skin pigmentation changes.
- **Clarithromycin**
  - **Use:** Treatment of respiratory tract infections and as part of H. pylori eradication.
  - **Dose:** 250-500 mg orally twice daily.
  - **MOA:** Inhibits bacterial protein synthesis by binding to the 50S ribosomal subunit.
  - **Adverse Effects:** GI upset, liver enzyme elevations, and potential for QT prolongation.

Antifungal Drugs

1. Polyenes

- **Amphotericin B (AMB)**
  - **Use:** Treatment of severe systemic fungal infections (e.g., cryptococcal meningitis).
  - **Dose:** 0.5-1 mg/kg IV daily (varies by indication).
  - **MOA:** Binds to ergosterol in fungal cell membranes, forming pores that lead to cell death.
  - **Adverse Effects:** Nephrotoxicity, infusion reactions (fever, chills), and electrolyte imbalances.
- **Nystatin**
  - **Use:** Treatment of superficial candidiasis (oral thrush, skin infections).
  - **Dose:** 100,000 units/mL suspension; swish and swallow or apply topically.
  - **MOA:** Similar to Amphotericin B; binds to ergosterol.
  - **Adverse Effects:** Minimal systemic absorption; GI upset with oral use.
- **Hamycin** (Not commonly used; possibly a misreference to Hamycin or a similar drug)

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2. Echinocandins

- **Caspofungin**
  - **Use:** Treatment of invasive candidiasis and aspergillosis.
  - **Dose:** 70 mg IV on day 1, then 50 mg daily.
  - **MOA:** Inhibits 1,3-β-D-glucan synthesis in the fungal cell wall.
  - **Adverse Effects:** Hepatotoxicity, infusion-related reactions.
- **Micafungin**
  - **Use:** Treatment of esophageal candidiasis and prophylaxis in high-risk patients.
  - **Dose:** 100 mg IV daily.
  - **MOA:** Similar to Caspofungin; inhibits cell wall synthesis.
  - **Adverse Effects:** Hepatotoxicity and infusion-related reactions.

- **Anidulafungin**
  - **Use:** Treatment of candidemia and other invasive candidiasis.
  - **Dose:** 200 mg IV on day 1, then 100 mg daily.
  - **MOA:** Inhibits 1,3-β-D-glucan synthesis.
  - **Adverse Effects:** Minimal toxicity; potential for liver enzyme elevation.

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3. Heterocyclic Benzofuran

- **Griseofulvin**
  - **Use:** Treatment of dermatophyte infections (e.g., tinea capitis).
  - **Dose:** 500 mg to 1,000 mg orally daily.
  - **MOA:** Disrupts fungal cell mitosis by binding to tubulin.
  - **Adverse Effects:** GI upset, headache, and potential for liver toxicity.

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4. Antimetabolite

- **Flucytosine (5-FC)**
  - **Use:** Treatment of cryptococcal meningitis (often in combination with Amphotericin B).
  - **Dose:** 25 mg/kg orally every 6 hours.
  - **MOA:** Inhibits DNA and RNA synthesis by interfering with fungal pyrimidine metabolism.
  - **Adverse Effects:** Bone marrow suppression, hepatotoxicity, and GI upset.

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5. Azoles

A. Imidazoles

- **Clotrimazole**
  - **Use:** Topical treatment for skin and mucosal infections.
  - **Dose:** Apply 1% cream or solution 2-3 times daily.
  - **MOA:** Inhibits ergosterol synthesis.
  - **Adverse Effects:** Local irritation.
- **Econazole**
  - **Use:** Topical treatment for dermatophyte and Candida infections.
  - **Dose:** Apply once daily for 2-4 weeks.
  - **MOA:** Similar to Clotrimazole; inhibits ergosterol synthesis.
  - **Adverse Effects:** Local irritation.
- **Miconazole**
  - **Use:** Topical or intravaginal treatment for fungal infections.
  - **Dose:** Apply 2% cream or 100 mg intravaginally.
  - **MOA:** Inhibits ergosterol synthesis.
  - **Adverse Effects:** Local irritation and allergic reactions.
- **Oxiconazole**
  - **Use:** Topical treatment for skin fungal infections.
  - **Dose:** Apply twice daily.
  - **MOA:** Inhibits ergosterol synthesis.
  - **Adverse Effects:** Local irritation.
- **Ketoconazole**
  - **Use:** Systemic treatment of fungal infections (less common now).
  - **Dose:** 200-400 mg orally daily.
  - **MOA:** Inhibits ergosterol synthesis.
  - **Adverse Effects:** Hepatotoxicity, GI upset, and endocrine effects.

B. Triazoles

- **Fluconazole**
  - **Use:** Treatment of candidiasis and cryptococcal meningitis.
  - **Dose:** 200 mg on day 1, then 100-200 mg daily.
  - **MOA:** Inhibits ergosterol synthesis.
  - **Adverse Effects:** Hepatotoxicity and GI upset.
- **Itraconazole**
  - **Use:** Treatment of various fungal infections (e.g., aspergillosis).
  - **Dose:** 200 mg orally once daily or in divided doses.
  - **MOA:** Inhibits ergosterol synthesis.
  - **Adverse Effects:** Hepatotoxicity, GI upset, and potential for heart failure.
- **Voriconazole**
  - **Use:** Treatment of invasive aspergillosis and other serious fungal infections.
  - **Dose:** 6 mg/kg IV every 12 hours for 2 doses, then 4 mg/kg.
  - **MOA:** Inhibits ergosterol synthesis.
  - **Adverse Effects:** Visual disturbances, hepatotoxicity, and skin rash.
- **Posaconazole**
  - **Use:** Prophylaxis in high-risk patients and treatment of invasive fungal infections.
  - **Dose:** 300 mg orally twice daily for the first day, then 300 mg daily.
  - **MOA:** Inhibits ergosterol synthesis.
  - **Adverse Effects:** Hepatotoxicity and GI upset.

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6. Allylamine

- **Terbinafine**
  - **Use:** Treatment of dermatophyte infections (e.g., onychomycosis).
  - **Dose:** 250 mg orally daily.
  - **MOA:** Inhibits squalene epoxidase, disrupting ergosterol synthesis.
  - **Adverse Effects:** Hepatotoxicity, GI upset, and skin reactions.

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7. Other Topical Agents

- **Tolnaftate**
  - **Use:** Treatment of tinea infections.
  - **Dose:** Apply twice daily.
  - **MOA:** Inhibits fungal growth.
  - **Adverse Effects:** Local irritation.
- **Undecylenic acid**
  - **Use:** Treatment of dermatophyte infections.
  - **Dose:** Apply twice daily.
  - **MOA:** Inhibits fungal growth.
  - **Adverse Effects:** Local irritation.
- **Benzoic acid**
  - **Use:** Antifungal and keratolytic agent.
  - **Dose:** Apply as directed.
  - **MOA:** Disrupts fungal cell wall integrity.
  - **Adverse Effects:** Local irritation.
- **Quiniodochlor**
  - **Use:** Topical antifungal treatment.
  - **Dose:** Apply as directed.
  - **MOA:** Antifungal and antibacterial activity.
  - **Adverse Effects:** Local irritation.
- **Ciclopirox olamine**
  - **Use:** Treatment of fungal infections.
  - **Dose:** Apply twice daily.
  - **MOA:** Inhibits fungal cell growth.
  - **Adverse Effects:** Local irritation.
- **Butenafine**
  - **Use:** Treatment of superficial fungal infections.
  - **Dose:** Apply once daily.
  - **MOA:** Inhibits squalene epoxidase.
  - **Adverse Effects:** Local irritation.
- **Sodium thiosulfate**
  - **Use:** Treatment of fungal infections and other dermatological conditions.
  - **Dose:** As directed based on formulation.
  - **MOA:** Antifungal activity.
  - **Adverse Effects:** Minimal; localized irritation possible.

Antiviral Drugs

1. Anti-Herpes Virus

- **Idoxuridine**
  - **Use:** Topical treatment for herpes simplex keratitis.
  - **Dose:** Apply 1% solution 5 times daily.
  - **MOA:** Nucleoside analog that inhibits viral DNA synthesis.
  - **Adverse Effects:** Local irritation and potential toxicity to corneal epithelium.
- **Trifluridine**
  - **Use:** Treatment of herpes simplex keratitis.
  - **Dose:** Apply 1 drop in the affected eye every 2 hours while awake.
  - **MOA:** Inhibits viral DNA synthesis.
  - **Adverse Effects:** Ocular irritation and conjunctivitis.
- **Acyclovir**
  - **Use:** Treatment of herpes simplex infections, shingles, and varicella.
  - **Dose:** 400 mg orally 3 times daily (for HSV).
  - **MOA:** Inhibits viral DNA polymerase.
  - **Adverse Effects:** Renal toxicity (crystallization), nausea, and diarrhea.
- **Valacyclovir**
  - **Use:** Treatment of herpes zoster and genital herpes.
  - **Dose:** 1,000 mg orally 3 times daily (for shingles).
  - **MOA:** Prodrug of acyclovir; inhibits viral DNA polymerase.
  - **Adverse Effects:** Headache, nausea, and potential renal toxicity.
- **Famciclovir**
  - **Use:** Treatment of herpes zoster and genital herpes.
  - **Dose:** 500 mg orally 3 times daily (for shingles).
  - **MOA:** Prodrug of penciclovir; inhibits viral DNA synthesis.
  - **Adverse Effects:** Headache and nausea.
- **Ganciclovir**
  - **Use:** Treatment of CMV retinitis in immunocompromised patients.
  - **Dose:** 5 mg/kg IV every 12 hours for 14-21 days.
  - **MOA:** Inhibits viral DNA polymerase.
  - **Adverse Effects:** Bone marrow suppression, nephrotoxicity.
- **Valganciclovir**
  - **Use:** Treatment and prevention of CMV disease in transplant patients.
  - **Dose:** 900 mg orally twice daily for 21 days (induction).
  - **MOA:** Prodrug of ganciclovir; inhibits viral DNA synthesis.
  - **Adverse Effects:** Bone marrow suppression and GI symptoms.
- **Cidofovir**
  - **Use:** Treatment of CMV retinitis in AIDS patients.
  - **Dose:** 5 mg/kg IV weekly.
  - **MOA:** Inhibits viral DNA polymerase.
  - **Adverse Effects:** Nephrotoxicity, ocular toxicity.
- **Foscarnet**
  - **Use:** Treatment of CMV retinitis resistant to ganciclovir.
  - **Dose:** 90 mg/kg IV daily divided into two doses.
  - **MOA:** Inhibits viral DNA and RNA polymerase.
  - **Adverse Effects:** Nephrotoxicity and electrolyte imbalances.
- **Fomivirsen**
  - **Use:** Treatment of CMV retinitis.
  - **Dose:** 330 µg intravitreal injection every 2 weeks.
  - **MOA:** Antisense oligonucleotide that inhibits viral protein synthesis.
  - **Adverse Effects:** Ocular inflammation and retinal detachment.

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2. Anti-Influenza Virus

- **Amantadine**
  - **Use:** Prophylaxis and treatment of influenza A.
  - **Dose:** 100 mg orally daily.
  - **MOA:** Inhibits viral uncoating.
  - **Adverse Effects:** CNS effects (dizziness, insomnia) and GI upset.
- **Rimantadine**
  - **Use:** Prophylaxis and treatment of influenza A.
  - **Dose:** 100 mg orally twice daily.
  - **MOA:** Similar to amantadine; inhibits viral uncoating.
  - **Adverse Effects:** Less CNS effects than amantadine; GI upset.
- **Oseltamivir**
  - **Use:** Treatment and prophylaxis of influenza A and B.
  - **Dose:** 75 mg orally twice daily for 5 days (treatment).
  - **MOA:** Neuraminidase inhibitor; prevents viral release.
  - **Adverse Effects:** Nausea and vomiting.
- **Zanamivir**
  - **Use:** Treatment of influenza A and B.
  - **Dose:** 10 mg (two inhalations) twice daily for 5 days.
  - **MOA:** Neuraminidase inhibitor.
  - **Adverse Effects:** Bronchospasm, cough, and throat discomfort.

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3. Anti-Hepatitis Virus / Nonselective Antivirals

Primarily for Hepatitis B:

- **Lamivudine**
  - **Use:** Treatment of chronic hepatitis B.
  - **Dose:** 100 mg orally daily.
  - **MOA:** NRTI; inhibits reverse transcription of viral RNA.
  - **Adverse Effects:** Headache, fatigue, and risk of resistance.
- **Adefovir dipivoxil**
  - **Use:** Treatment of chronic hepatitis B.
  - **Dose:** 10 mg orally daily.
  - **MOA:** NRTI; inhibits viral DNA polymerase.
  - **Adverse Effects:** Nephrotoxicity and headache.
- **Tenofovir**
  - **Use:** Treatment of chronic hepatitis B and HIV.
  - **Dose:** 300 mg orally daily.
  - **MOA:** NRTI; inhibits viral DNA synthesis.
  - **Adverse Effects:** Renal toxicity and bone mineral density loss.

Primarily for Hepatitis C:

- **Ribavirin**
  - **Use:** Treatment of hepatitis C (often combined with other agents).
  - **Dose:** 800-1,200 mg orally daily (based on weight).
  - **MOA:** Inhibits viral RNA synthesis.
  - **Adverse Effects:** Hemolytic anemia, fatigue, and teratogenic effects.
- **Interferon α**
  - **Use:** Treatment of hepatitis C and B.
  - **Dose:** 3 million IU subcutaneously 3 times a week (varies).
  - **MOA:** Enhances immune response against viruses.
  - **Adverse Effects:** Flu-like symptoms, depression, and hematological effects.

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4. Anti-Retrovirus

(a) NRTIs

- **Zidovudine (AZT)**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 300 mg orally twice daily.
  - **MOA:** Inhibits reverse transcriptase.
  - **Adverse Effects:** Bone marrow suppression and GI upset.
- **Didanosine**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 400 mg orally daily.
  - **MOA:** Inhibits reverse transcriptase.
  - **Adverse Effects:** Pancreatitis and peripheral neuropathy.
- **Stavudine**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 40 mg orally twice daily.
  - **MOA:** Inhibits reverse transcriptase.
  - **Adverse Effects:** Peripheral neuropathy and lactic acidosis.
- **Lamivudine**
  - **Use:** Treatment of HIV infection and hepatitis B.
  - **Dose:** 150 mg orally twice daily.
  - **MOA:** Inhibits reverse transcriptase.
  - **Adverse Effects:** Headache and fatigue.
- **Abacavir**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 300 mg orally twice daily.
  - **MOA:** Inhibits reverse transcriptase.
  - **Adverse Effects:** Hypersensitivity reactions and GI upset.
- **Emtricitabine**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 200 mg orally daily.
  - **MOA:** Inhibits reverse transcriptase.
  - **Adverse Effects:** Hyperpigmentation of palms and soles.
- **Tenofovir (Nt RTI)**
  - **Use:** Treatment of HIV infection and hepatitis B.

- **Dose:** 300 mg orally daily.
- **MOA:** Inhibits viral DNA synthesis.
- **Adverse Effects:** Renal toxicity and bone mineral density loss.

(b) NNRTIs

- **Nevirapine**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 200 mg orally daily (initial), then 400 mg daily.
  - **MOA:** Inhibits reverse transcriptase.
  - **Adverse Effects:** Hepatotoxicity and rash.
- **Efavirenz**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 600 mg orally daily.
  - **MOA:** Inhibits reverse transcriptase.
  - **Adverse Effects:** CNS effects (dizziness, vivid dreams) and rash.
- **Delavirdine**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 400 mg orally three times daily.
  - **MOA:** Inhibits reverse transcriptase.
  - **Adverse Effects:** Rash and GI upset.

c) Protease Inhibitors

- **Ritonavir**
  - **Use:** Treatment of HIV infection, often used as a booster for other protease inhibitors.
  - **Dose:** 100-400 mg orally daily (as a booster).
  - **MOA:** Inhibits HIV protease, preventing viral maturation.
  - **Adverse Effects:** Gastrointestinal upset, altered taste, and potential hepatotoxicity.
- **Atazanavir**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 300 mg orally once daily (with ritonavir, 100 mg).
  - **MOA:** Inhibits HIV protease.
  - **Adverse Effects:** Hyperbilirubinemia, GI upset, and rash.
- **Indinavir**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 800 mg orally every 8 hours.
  - **MOA:** Inhibits HIV protease.
  - **Adverse Effects:** Nephrolithiasis (kidney stones) and gastrointestinal disturbances.
- **Nelfinavir**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 750 mg orally three times daily.
  - **MOA:** Inhibits HIV protease.
  - **Adverse Effects:** Diarrhea, abdominal pain, and flatulence.
- **Saquinavir**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 1000 mg orally twice daily (with ritonavir for enhanced effect).
  - **MOA:** Inhibits HIV protease.
  - **Adverse Effects:** GI upset, headache, and increased liver enzymes.
- **Amprenavir**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 1200 mg orally daily (can be divided).
  - **MOA:** Inhibits HIV protease.
  - **Adverse Effects:** Diarrhea, rash, and potential hypersensitivity reactions.
- **Lopinavir**
  - **Use:** Treatment of HIV infection (often combined with ritonavir).
  - **Dose:** 400 mg/100 mg (lopinavir/ritonavir) orally twice daily.
  - **MOA:** Inhibits HIV protease.
  - **Adverse Effects:** GI upset, hyperlipidemia, and cardiovascular effects.

(d) Entry (Fusion) Inhibitor

- **Enfuvirtide**
  - **Use:** Treatment of HIV infection in treatment-experienced patients.
  - **Dose:** 90 mg subcutaneously twice daily.
  - **MOA:** Inhibits the fusion of the virus with the host cell membrane.
  - **Adverse Effects:** Injection site reactions, allergic reactions, and increased risk of pneumonia.

(e) CCR5 Receptor Inhibitor

- **Maraviroc**
  - **Use:** Treatment of CCR5-tropic HIV-1 infection.
  - **Dose:** 300 mg orally twice daily.
  - **MOA:** Blocks CCR5 co-receptor on T-cells, preventing viral entry.
  - **Adverse Effects:** Hepatotoxicity, cardiovascular effects, and increased risk of infections.

(f) Integrase Inhibitor

- **Raltegravir**
  - **Use:** Treatment of HIV infection.
  - **Dose:** 400 mg orally twice daily.
  - **MOA:** Inhibits the integrase enzyme, preventing viral DNA integration into the host genome.
  - **Adverse Effects:** Insomnia, headache, and potential for increased liver enzymes

Antimalarial Drugs

1. 4-Aminoquinolines

- **Chloroquine (CQ)**
  - **Use:** Treatment and prevention of malaria.
  - **Dose:** 500 mg orally weekly for prevention; loading dose followed by 250 mg for treatment.
  - **MOA:** Interferes with heme polymerization in the parasite.
  - **Adverse Effects:** Nausea, headache, visual disturbances, and potential cardiotoxicity.
- **Amodiaquine (AQ)**
  - **Use:** Treatment of malaria (often combined with artesunate).
  - **Dose:** 10 mg/kg daily for 3 days.
  - **MOA:** Similar to chloroquine; inhibits heme polymerization.
  - **Adverse Effects:** Hepatotoxicity and agranulocytosis.
- **Piperaquine**
  - **Use:** Treatment of uncomplicated malaria (often combined with artemisinin).
  - **Dose:** 40 mg/kg total for 3 days.
  - **MOA:** Inhibits parasite growth and development.
  - **Adverse Effects:** Generally well-tolerated; may cause GI upset.

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2. Quinoline-Methanol

- **Mefloquine**
  - **Use:** Prevention and treatment of malaria.
  - **Dose:** 250 mg orally weekly for prevention; 750 mg loading dose, then 250 mg for treatment.
  - **MOA:** Disrupts parasite replication in red blood cells.
  - **Adverse Effects:** Neuropsychiatric effects (anxiety, depression), dizziness, and GI disturbances.

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3. Cinchona Alkaloids

- **Quinine**
  - **Use:** Treatment of severe malaria and as an alternative for chloroquine-resistant malaria.
  - **Dose:** 600 mg orally every 8 hours for 7 days.
  - **MOA:** Inhibits nucleic acid synthesis in the parasite.
  - **Adverse Effects:** Cinchonism (tinnitus, headache), hypoglycemia, and cardiac effects.
- **Quinidine**
  - **Use:** Treatment of severe malaria (IV formulation).
  - **Dose:** 10 mg/kg loading dose, followed by 5-7 mg/kg every 8 hours.
  - **MOA:** Similar to quinine; inhibits nucleic acid synthesis.
  - **Adverse Effects:** Cardiac arrhythmias, hypotension, and cinchonism.

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4. Biguanide

- **Proguanil (Chloroguanide)**
  - **Use:** Prevention and treatment of malaria.
  - **Dose:** 200 mg orally daily.
  - **MOA:** Inhibits dihydrofolate reductase, disrupting folate synthesis.
  - **Adverse Effects:** GI disturbances and rash.

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5. Diaminopyrimidine

- **Pyrimethamine**
  - **Use:** Treatment of malaria, often in combination with sulfadoxine.
  - **Dose:** 75 mg loading dose, then 25 mg daily for 2 days.
  - **MOA:** Inhibits dihydrofolate reductase.
  - **Adverse Effects:** Megaloblastic anemia and gastrointestinal effects.

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6. 8-Aminoquinoline

- **Primaquine**
  - **Use:** Radical cure of P. vivax and P. ovale malaria.
  - **Dose:** 15 mg orally daily for 14 days.
  - **MOA:** Disrupts mitochondrial function in the parasite.
  - **Adverse Effects:** Hemolytic anemia in G6PD-deficient individuals.
- **Tafenoquine**
  - **Use:** Radical cure of P. vivax malaria.
  - **Dose:** 300 mg orally as a single dose.
  - **MOA:** Similar to primaquine; acts on liver stages.
  - **Adverse Effects:** Hemolytic anemia and psychiatric effects.

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7. Sulfonamides

- **Sulfadoxine**
  - **Use:** Often combined with pyrimethamine for malaria treatment.
  - **Dose:** 500 mg orally as a single dose.
  - **MOA:** Inhibits dihydropteroate synthase in folate synthesis.
  - **Adverse Effects:** Skin reactions, fever, and gastrointestinal upset.
- **Sulfamethopyrazine**
  - **Use:** Similar use as sulfadoxine; less common.
  - **Dose:** Varies; often part of combination therapy.
  - **MOA:** Inhibits folate synthesis.
  - **Adverse Effects:** Allergic reactions, GI disturbances, and potential hematological effect

8. Antibiotics

Tetracycline

- **Dose**: 250-500 mg orally every 6-12 hours.
- **Use**: Treats bacterial infections, including acne, urinary tract infections, and respiratory infections.
- **MOA**: Inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit.
- **Adverse Effects**: Photosensitivity, gastrointestinal upset, and teeth discoloration in children.

Doxycycline

- **Dose**: 100 mg orally every 12 hours on the first day, followed by 100 mg once daily.
- **Use**: Effective against a variety of infections, including Lyme disease, acne, and malaria prophylaxis.
- **MOA**: Similar to tetracycline, inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit.
- **Adverse Effects**: Photosensitivity, esophagitis, gastrointestinal discomfort, and potential for drug-induced lupus.

Clindamycin

- **Dose**: 150-450 mg orally every 6-8 hours or 600-1200 mg intravenously per day in divided doses.
- **Use**: Treats anaerobic bacterial infections, acne, and as a prophylactic for endocarditis.
- **MOA**: Inhibits bacterial protein synthesis by binding to the 50S ribosomal subunit.
- **Adverse Effects**: Diarrhea, risk of Clostridioides difficile-associated diarrhea, rash, and liver dysfunction.

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9. Sesquiterpene Lactones

Artesunate

- **Dose**: 2.4 mg/kg intravenously at 0, 12, and 24 hours, followed by once daily for severe malaria.
- **Use**: Treatment of severe malaria.
- **MOA**: Generates reactive oxygen species (ROS) that damage malarial parasite proteins.
- **Adverse Effects**: Hemolytic anemia, bradycardia, gastrointestinal upset.

Artemether

- **Dose**: 80 mg artemether + 480 mg lumefantrine (co-formulated) orally twice daily for 3 days.
- **Use**: Treatment of uncomplicated Plasmodium falciparum malaria.
- **MOA**: Same as artesunate, it disrupts parasite metabolism via ROS production.
- **Adverse Effects**: Dizziness, anorexia, and QT prolongation.

Arteether

- **Dose**: 150 mg intramuscularly daily for 3 days.
- **Use**: Alternative for severe malaria when artesunate is unavailable.
- **MOA**: Similar to artemether and artesunate, causes oxidative damage to parasites.
- **Adverse Effects**: Neurotoxicity with prolonged use, transient bradycardia.

Arterolane

- **Dose**: 150 mg arterolane + 750 mg piperaquine once daily for 3 days.
- **Use**: Treatment of uncomplicated malaria.
- **MOA**: Rapidly kills parasites by causing oxidative stress.
- **Adverse Effects**: Headache, gastrointestinal upset, QT prolongation.

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10. Amino Alcohols

Halofantrine

- **Dose**: 500 mg orally every 6 hours for three doses (not widely used due to toxicity).
- **Use**: Treatment of uncomplicated malaria.
- **MOA**: Disrupts parasite mitochondrial function leading to cell death.
- **Adverse Effects**: QT prolongation, cardiotoxicity, and gastrointestinal upset.

Lumefantrine

- **Dose**: 480 mg (in combination with artemether) orally twice daily for 3 days.
- **Use**: Treatment of uncomplicated malaria in combination with artemether.
- **MOA**: Inhibits the polymerization of heme, which is toxic to the parasite.
- **Adverse Effects**: QT prolongation, headache, dizziness.

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11. Naphthyridine

Pyronaridine

- **Dose**: 180 mg pyronaridine + 60 mg artesunate once daily for 3 days.
- **Use**: Treatment of uncomplicated malaria.
- **MOA**: Interferes with heme detoxification in the parasite.
- **Adverse Effects**: Elevated liver enzymes, gastrointestinal discomfort, headache.

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12. Naphthoquinone

Atovaquone

- **Dose**: 250 mg atovaquone + 100 mg proguanil orally once daily for prophylaxis; 4 tablets once daily for 3 days for treatment.
- **Use**: Prophylaxis and treatment of malaria, treatment of Pneumocystis jirovecii pneumonia (PCP).
- **MOA**: Inhibits the mitochondrial electron transport chain in parasites, leading to cell death.
- **Adverse Effects**: Rash, fever, nausea, diarrhea, and potential liver toxicity.

Antiamoebic and Other Antiprotozoal Drugs

1. Tissue Amoebicides

(a) For Both Intestinal and Extraintestinal Amoebiasis

- **Nitroimidazoles:**
  - **Metronidazole**
    - **Dose**: 500-750 mg orally every 8 hours for 7-10 days.
    - **Uses**: Amoebiasis (intestinal and hepatic), giardiasis, trichomoniasis.
    - **MOA**: Forms reactive oxygen species that damage DNA in anaerobic organisms.
    - **Adverse Effects**: Metallic taste, GI upset, neurotoxicity (e.g., peripheral neuropathy).
  - **Tinidazole**
    - **Dose**: 2 g orally once daily for 3 days.
    - **Uses**: Amoebiasis, giardiasis, trichomoniasis.
    - **MOA**: Similar to metronidazole; disrupts DNA synthesis in anaerobes.
    - **Adverse Effects**: Nausea, headache, bitter taste.
  - **Secnidazole**
    - **Dose**: 2 g orally as a single dose.
    - **Uses**: Amoebiasis, giardiasis.
    - **MOA**: Similar to metronidazole; causes DNA strand breaks in anaerobes.
    - **Adverse Effects**: GI upset, metallic taste, dizziness.
  - **Ornidazole**
    - **Dose**: 1.5 g orally once daily for 3-5 days.
    - **Uses**: Amoebiasis, giardiasis, trichomoniasis.
    - **MOA**: Causes DNA damage in anaerobic protozoa and bacteria.
    - **Adverse Effects**: GI disturbances, dizziness, headache.
  - **Satranidazole**
    - **Dose**: 2 g orally as a single dose or 1 g twice daily for 2-3 days.
    - **Uses**: Amoebiasis, giardiasis.
    - **MOA**: Disrupts DNA synthesis in anaerobic organisms.
    - **Adverse Effects**: GI upset, headache, dizziness.
- **Alkaloids:**
  - **Emetine**
    - **Dose**: 60 mg IM or SC once daily for 5-10 days.
    - **Uses**: Severe extraintestinal amoebiasis (when metronidazole is contraindicated).
    - **MOA**: Inhibits protein synthesis in amoebae.
    - **Adverse Effects**: Cardiotoxicity, muscle weakness, nausea.
  - **Dehydroemetine**
    - **Dose**: 1 mg/kg IM or SC once daily for 5-10 days.
    - **Uses**: Severe extraintestinal amoebiasis.
    - **MOA**: Similar to emetine; inhibits protein synthesis in amoebae.
    - **Adverse Effects**: Cardiotoxicity, pain at injection site, GI disturbances.

(b) For Extraintestinal Amoebiasis Only

- **Chloroquine**
  - **Dose**: 600 mg base orally on day 1, then 300 mg base daily for 2-3 weeks.
  - **Uses**: Hepatic amoebiasis, malaria.
  - **MOA**: Concentrates in parasitized cells, interfering with DNA and protein synthesis.
  - **Adverse Effects**: Retinopathy, GI upset, pruritus.

2. Luminal Amoebicides

(a) Amide

- **Diloxanide Furoate**
  - **Dose**: 500 mg orally three times daily for 10 days.
  - **Uses**: Asymptomatic cyst carriers, mild intestinal amoebiasis.
  - **MOA**: Unknown; possibly disrupts protein synthesis in amoebae.
  - **Adverse Effects**: Flatulence, GI disturbances, allergic reactions.
- **Nitazoxanide**
  - **Dose**: 500 mg orally twice daily for 3 days.
  - **Uses**: Amoebiasis, giardiasis, cryptosporidiosis.
  - **MOA**: Interferes with the pyruvate-ferredoxin enzyme pathway in protozoa.
  - **Adverse Effects**: Nausea, abdominal pain, headache.

(b) 8-Hydroxyquinolines

- **Quiniodochlor (Iodochlorohydroxyquin, Clioquinol)**
  - **Dose**: 250-650 mg orally three times daily for 20 days.
  - **Uses**: Intestinal amoebiasis.
  - **MOA**: Chelates essential metals, disrupting amoebic metabolism.
  - **Adverse Effects**: Neurotoxicity (long-term use), GI disturbances, rash.
- **Diiodohydroxyquin (Iodoquinol)**
  - **Dose**: 650 mg orally three times daily for 20 days.
  - **Uses**: Intestinal amoebiasis, asymptomatic carriers.
  - **MOA**: Similar to quiniodochlor; disrupts amoebic metabolism.
  - **Adverse Effects**: GI upset, thyroid enlargement (due to iodine), rash.

(c) Antibiotics

- **Tetracyclines**
  - **Dose**: 250-500 mg orally every 6-12 hours.
  - **Uses**: Intestinal amoebiasis (combined with other drugs), bacterial infections.
  - **MOA**: Inhibits protein synthesis by binding to the 30S ribosomal subunit.
  - **Adverse Effects**: Photosensitivity, GI upset, teeth discoloration in children.
- **Paromomycin**
  - **Dose**: 25-35 mg/kg/day orally in 3 divided doses for 5-10 days.
  - **Uses**: Intestinal amoebiasis, giardiasis.
  - **MOA**: Inhibits protein synthesis by binding to the 30S ribosomal subunit.

- **Adverse Effects**: GI upset, ototoxicity (rare with oral use).

Anthelmintic Drugs

1. Roundworm (Ascaris lumbricoides)

- **Mebendazole**
  - **Dose**: 100 mg orally twice daily for 3 days.
  - **Uses**: Ascariasis, hookworm, whipworm.
  - **MOA**: Inhibits microtubule synthesis, causing paralysis and death of the worm.
  - **Adverse Effects**: GI upset, hypersensitivity reactions, hepatotoxicity (rare).
- **Albendazole**
  - **Dose**: 400 mg orally as a single dose.
  - **Uses**: Ascariasis, hookworm, pinworm, whipworm.
  - **MOA**: Inhibits glucose uptake, depleting glycogen stores in worms, leading to death.
  - **Adverse Effects**: GI upset, elevated liver enzymes, alopecia (long-term use).
- **Piperazine**
  - **Dose**: 75 mg/kg orally as a single dose.
  - **Uses**: Ascariasis, pinworm.
  - **MOA**: Paralyzes worms by acting as a GABA agonist, allowing them to be expelled.
  - **Adverse Effects**: Nausea, vomiting, neurotoxicity (high doses).
- **Levamisole**
  - **Dose**: 150 mg orally as a single dose.
  - **Uses**: Ascariasis, hookworm.
  - **MOA**: Causes paralysis of worms by depolarizing neuromuscular blockade.
  - **Adverse Effects**: Nausea, vomiting, agranulocytosis (rare).
- **Pyrantel**
  - **Dose**: 11 mg/kg (max 1 g) orally as a single dose.
  - **Uses**: Ascariasis, hookworm, pinworm.
  - **MOA**: Causes spastic paralysis of worms by stimulating nicotinic receptors.
  - **Adverse Effects**: GI upset, dizziness, headache.
- **Ivermectin**
  - **Dose**: 200 mcg/kg orally as a single dose.
  - **Uses**: Strongyloidiasis, onchocerciasis, ascariasis.
  - **MOA**: Binds to glutamate-gated chloride channels, causing paralysis and death of the worm.
  - **Adverse Effects**: Itching, dizziness, mild fever.

2. Hookworm (Ancylostoma duodenale, Necator americanus)

- **Mebendazole**
  - **Dose**: 100 mg orally twice daily for 3 days.
  - **Uses**: Hookworm, ascariasis, whipworm.
  - **MOA**: Inhibits microtubule synthesis in worms.
  - **Adverse Effects**: GI upset, hypersensitivity.
- **Albendazole**
  - **Dose**: 400 mg orally as a single dose.
  - **Uses**: Hookworm, ascariasis, pinworm.
  - **MOA**: Inhibits glucose uptake in worms.
  - **Adverse Effects**: GI upset, liver enzyme elevation.
- **Pyrantel**
  - **Dose**: 11 mg/kg orally as a single dose.
  - **Uses**: Hookworm, pinworm, ascariasis.
  - **MOA**: Causes spastic paralysis of worms.
  - **Adverse Effects**: GI upset, dizziness.
- **Levamisole**
  - **Dose**: 150 mg orally as a single dose.
  - **Uses**: Hookworm, ascariasis.
  - **MOA**: Causes neuromuscular paralysis in worms.
  - **Adverse Effects**: GI upset, agranulocytosis (rare).

3. Pinworm (Enterobius vermicularis)

- **Pyrantel**
  - **Dose**: 11 mg/kg orally as a single dose.
  - **Uses**: Pinworm, ascariasis, hookworm.
  - **MOA**: Causes spastic paralysis of worms.
  - **Adverse Effects**: GI upset, dizziness.
- **Mebendazole**
  - **Dose**: 100 mg orally as a single dose.
  - **Uses**: Pinworm, ascariasis, hookworm.
  - **MOA**: Inhibits microtubule synthesis in worms.
  - **Adverse Effects**: GI upset, hypersensitivity.
- **Piperazine**
  - **Dose**: 65 mg/kg orally as a single dose.
  - **Uses**: Pinworm, ascariasis.
  - **MOA**: Paralyzes worms by acting as a GABA agonist.
  - **Adverse Effects**: Nausea, neurotoxicity (high doses).
- **Albendazole**
  - **Dose**: 400 mg orally as a single dose.
  - **Uses**: Pinworm, ascariasis, hookworm.
  - **MOA**: Inhibits glucose uptake in worms.
  - **Adverse Effects**: GI upset, elevated liver enzymes.

4. Threadworm (Strongyloides stercoralis)

- **Ivermectin**
  - **Dose**: 200 mcg/kg orally as a single dose.
  - **Uses**: Strongyloidiasis, onchocerciasis.
  - **MOA**: Causes paralysis and death by binding to glutamate-gated chloride channels.
  - **Adverse Effects**: Itching, dizziness, mild fever.
- **Albendazole**
  - **Dose**: 400 mg orally twice daily for 7 days.
  - **Uses**: Strongyloidiasis, ascariasis, hookworm.

    - **MOA**: Inhibits glucose uptake in worms.
    - **Adverse Effects**: GI upset, liver enzyme elevation.

5. Whipworm (Trichuris trichiura)

- **Mebendazole**
    - **Dose**: 100 mg orally twice daily for 3 days.
    - **Uses**: Whipworm, hookworm, ascariasis.
    - **MOA**: Inhibits microtubule synthesis in worms.
    - **Adverse Effects**: GI upset, hypersensitivity.
- **Albendazole**
    - **Dose**: 400 mg orally as a single dose.
    - **Uses**: Whipworm, ascariasis, hookworm.
    - **MOA**: Inhibits glucose uptake in worms.
    - **Adverse Effects**: GI upset, liver enzyme elevation.

6. Trichinella spiralis

- **Albendazole**
    - **Dose**: 400 mg orally twice daily for 8-14 days.
    - **Uses**: Trichinosis, neurocysticercosis.
    - **MOA**: Inhibits glucose uptake in worms.
    - **Adverse Effects**: GI upset, liver enzyme elevation.
- **Mebendazole**
    - **Dose**: 200-400 mg orally three times daily for 3 days.
    - **Uses**: Trichinosis, ascariasis, whipworm.
    - **MOA**: Inhibits microtubule synthesis in worms.
    - **Adverse Effects**: GI upset, hypersensitivity.

7. Filaria (Wuchereria bancrofti, Brugia malayi)

- **Diethylcarbamazine (DEC)**
    - **Dose**: 6 mg/kg/day orally in 3 divided doses for 12 days.
    - **Uses**: Lymphatic filariasis.
    - **MOA**: Inhibits arachidonic acid metabolism in microfilariae, leading to their immobilization.
    - **Adverse Effects**: Fever, headache, nausea, Mazzotti reaction.
- **Albendazole**
    - **Dose**: 400 mg orally as a single dose (combined with DEC or ivermectin).
    - **Uses**: Lymphatic filariasis, ascariasis, hookworm.
    - **MOA**: Inhibits glucose uptake in worms.
    - **Adverse Effects**: GI upset, liver enzyme elevation.
- **Ivermectin**
    - **Dose**: 150-200 mcg/kg orally as a single dose (combined with albendazole or DEC).
    - **Uses**: Lymphatic filariasis, strongyloidiasis.
    - **MOA**: Causes paralysis and death of microfilariae by binding to glutamate-gated chloride channels.
    - **Adverse Effects**: Itching, dizziness, mild fever.

8. Guinea Worm (Dracunculus medinensis)

- **Metronidazole**
    - **Dose**: 250 mg orally three times daily for 7-10 days.
    - **Uses**: Guinea worm disease (adjunct to mechanical extraction).
    - **MOA**: Causes DNA damage in anaerobic parasites.
    - **Adverse Effects**: Metallic taste, nausea, headache.
- **Mebendazole**
    - **Dose**: 100 mg orally twice daily for 3 days.
    - **Uses**: Guinea worm disease (adjunct therapy).
    - **MOA**: Inhibits microtubule synthesis in worms.
    - **Adverse Effects**: GI upset, hypersensitivity.

9. Tapeworms (Taenia saginata, Taenia solium, Hymenolepis nana, Neurocysticercosis)

- **Praziquantel**
    - **Dose**: 5-10 mg/kg orally as a single dose for Taenia; 25 mg/kg orally as a single dose for H. nana.
    - **Uses**: Tapeworm infections, neurocysticercosis.
    - **MOA**: Increases cell membrane permeability to calcium, causing paralysis of the parasite.
    - **Adverse Effects**: Dizziness, headache, GI upset.
- **Niclosamide**
    - **Dose**: 2 g orally as a single dose (adult); 50 mg/kg (max 2 g) orally as a single dose (children).
    - **Uses**: Tapeworm infections (Taenia, H. nana).
    - **MOA**: Inhibits oxidative phosphorylation in tapeworm mitochondria.
    - **Adverse Effects**: Nausea, abdominal pain, lightheadedness.
- **Albendazole**
    - **Dose**: 400 mg orally twice daily for 8-30 days (for neurocysticercosis).
    - **Uses**: Neurocysticercosis, hydatid disease.
    - **MOA**: Inhibits glucose uptake in cysts, leading to degeneration.
    - **Adverse Effects**: GI upset, elevated liver enzymes, bone marrow suppression.
- **Nitazoxanide**
    - **Dose**: 500 mg orally twice daily for 3 days.
    - **Uses**: Hymenolepis nana, giardiasis.
    - **MOA**: Interferes with the pyruvate-ferredoxin enzyme pathway in protozoa and helminths.
    - **Adverse Effects**: Nausea, abdominal pain, headache.

10. Hydatid Disease (Echinococcus granulosus, E. multilocularis)

- **Albendazole**
    - **Dose**: 400 mg orally twice daily for 1-6 months.
    - **Uses**: Hydatid disease, neurocysticercosis.
    - **MOA**: Inhibits glucose uptake in cysts, leading to degeneration.
    - **Adverse Effects**: GI upset, liver enzyme elevation, bone marrow suppression.
- **Mebendazole**
    - **Dose**: 40-50 mg/kg/day orally in divided doses for 3-6 months.
    - **Uses**: Hydatid disease.
    - **MOA**: Inhibits microtubule synthesis in cysts, leading to degeneration.

- **Adverse Effects**: GI upset, liver enzyme elevation, hypersensitivity.

CHEMOTHERAPY OF NEOPLASTIC DISEASES

A. Cytotoxic Drugs

1. Alkylating Agents

- **Mechlorethamine (Mustine HCl)**
  - **Dose**: 0.4 mg/kg IV every 4 weeks.
  - **Uses**: Hodgkin's lymphoma.
  - **MOA**: Alkylates DNA, leading to cross-linking and inhibition of DNA replication.
  - **Adverse Effects**: Myelosuppression, nausea, vomiting, alopecia.
- **Cyclophosphamide**
  - **Dose**: 500-1000 mg/m² IV every 3 weeks.
  - **Uses**: Breast cancer, lymphomas, leukemias.
  - **MOA**: Alkylates DNA, leading to cross-linking and inhibition of DNA replication.
  - **Adverse Effects**: Myelosuppression, hemorrhagic cystitis, nausea.
- **Ifosfamide**
  - **Dose**: 1.2-2.4 g/m² IV on days 1-3 every 3 weeks.
  - **Uses**: Testicular cancer, sarcomas.
  - **MOA**: Alkylates DNA, leading to cross-linking and inhibition of DNA replication.
  - **Adverse Effects**: Myelosuppression, hemorrhagic cystitis, nephrotoxicity.
- **Chlorambucil**
  - **Dose**: 0.1-0.2 mg/kg orally daily for 3-6 weeks.
  - **Uses**: Chronic lymphocytic leukemia (CLL).
  - **MOA**: Alkylates DNA, leading to cross-linking and inhibition of DNA replication.
  - **Adverse Effects**: Myelosuppression, GI disturbances, hepatotoxicity.
- **Melphalan**
  - **Dose**: 2-10 mg/m² IV or orally every 4-6 weeks.
  - **Uses**: Multiple myeloma, ovarian cancer.
  - **MOA**: Alkylates DNA, leading to cross-linking and inhibition of DNA replication.
  - **Adverse Effects**: Myelosuppression, nausea, mucositis.
- **Thio-TEPA (Ethylenimine)**
  - **Dose**: 0.3-0.5 mg/kg IV every 1-4 weeks.
  - **Uses**: Bladder cancer, breast cancer.
  - **MOA**: Alkylates DNA, leading to cross-linking and inhibition of DNA replication.
  - **Adverse Effects**: Myelosuppression, mucositis, neurotoxicity.
- **Busulfan (Alkyl Sulfonate)**
  - **Dose**: 4-8 mg orally daily.
  - **Uses**: Chronic myeloid leukemia (CML).
  - **MOA**: Alkylates DNA, leading to cross-linking and inhibition of DNA replication.
  - **Adverse Effects**: Myelosuppression, pulmonary fibrosis, hyperpigmentation.
- **Carmustine (BCNU)**
  - **Dose**: 150-200 mg/m² IV every 6 weeks.
  - **Uses**: Brain tumors, lymphomas.
  - **MOA**: Alkylates DNA, leading to cross-linking and inhibition of DNA replication.
  - **Adverse Effects**: Myelosuppression, pulmonary toxicity, liver damage.
- **Lomustine (CCNU)**
  - **Dose**: 130 mg/m² orally as a single dose every 6 weeks.
  - **Uses**: Brain tumors, Hodgkin’s disease.
  - **MOA**: Alkylates DNA, leading to cross-linking and inhibition of DNA replication.
  - **Adverse Effects**: Myelosuppression, GI upset, hepatotoxicity.
- **Dacarbazine (DTIC)**
  - **Dose**: 2-4.5 mg/kg IV daily for 5 days, repeated every 3 weeks.
  - **Uses**: Melanoma, Hodgkin’s lymphoma.
  - **MOA**: Methylates DNA, leading to inhibition of DNA replication.
  - **Adverse Effects**: Myelosuppression, nausea, flu-like symptoms.
- **Temozolomide**
  - **Dose**: 150-200 mg/m² orally for 5 days every 28 days.
  - **Uses**: Glioblastoma, astrocytoma.
  - **MOA**: Methylates DNA, leading to inhibition of DNA replication.
  - **Adverse Effects**: Myelosuppression, nausea, fatigue.
- **Procarbazine (Methylhydrazine)**
  - **Dose**: 100 mg/m² orally daily for 14 days.
  - **Uses**: Hodgkin’s lymphoma.
  - **MOA**: Inhibits DNA, RNA, and protein synthesis by generating free radicals.
  - **Adverse Effects**: Myelosuppression, GI upset, neurotoxicity.

2. Platinum Coordination Complexes

- **Cisplatin**
  - **Dose**: 50-100 mg/m² IV every 3-4 weeks.
  - **Uses**: Testicular, ovarian, bladder, lung cancers.
  - **MOA**: Forms DNA cross-links, leading to apoptosis.
  - **Adverse Effects**: Nephrotoxicity, ototoxicity, nausea, myelosuppression.
- **Carboplatin**
  - **Dose**: 300-360 mg/m² IV every 3-4 weeks.
  - **Uses**: Ovarian, lung, and head and neck cancers.
  - **MOA**: Forms DNA cross-links, leading to apoptosis.
  - **Adverse Effects**: Myelosuppression, nausea, nephrotoxicity (less than cisplatin).
- **Oxaliplatin**
  - **Dose**: 85 mg/m² IV every 2 weeks.
  - **Uses**: Colorectal cancer.
  - **MOA**: Forms DNA cross-links, leading to apoptosis.
  - **Adverse Effects**: Peripheral neuropathy, nausea, myelosuppression.

3. Antimetabolites

- **Methotrexate (MTX)**
  - **Dose**: 25-500 mg/m² IV weekly, depending on cancer type.
  - **Uses**: Leukemia, breast cancer, rheumatoid arthritis.
  - **MOA**: Inhibits dihydrofolate reductase, reducing DNA and RNA synthesis.
  - **Adverse Effects**: Myelosuppression, hepatotoxicity, mucositis.

- **Pemetrexed**
  - **Dose**: 500 mg/m² IV every 21 days.
  - **Uses**: Non-small cell lung cancer, mesothelioma.
  - **MOA**: Inhibits thymidylate synthase and other folate-dependent enzymes.
  - **Adverse Effects**: Myelosuppression, rash, mucositis.
- **6-Mercaptopurine (6-MP)**
  - **Dose**: 2.5 mg/kg orally daily.
  - **Uses**: Acute lymphoblastic leukemia (ALL).
  - **MOA**: Inhibits purine nucleotide synthesis, impairing DNA synthesis.
  - **Adverse Effects**: Myelosuppression, hepatotoxicity, GI upset.
- **6-Thioguanine (6-TG)**
  - **Dose**: 2 mg/kg orally daily.
  - **Uses**: Acute myeloid leukemia (AML).
  - **MOA**: Inhibits purine synthesis and DNA replication.
  - **Adverse Effects**: Myelosuppression, hepatotoxicity, GI upset.
- **Azathioprine**
  - **Dose**: 1-2 mg/kg orally daily.
  - **Uses**: Organ transplant rejection, autoimmune diseases.
  - **MOA**: Converted to 6-MP, inhibiting purine synthesis.
  - **Adverse Effects**: Myelosuppression, hepatotoxicity, nausea.
- **Fludarabine**
  - **Dose**: 25 mg/m² IV daily for 5 days every 4 weeks.
  - **Uses**: Chronic lymphocytic leukemia (CLL).
  - **MOA**: Inhibits DNA polymerase and ribonucleotide reductase.
  - **Adverse Effects**: Myelosuppression, neurotoxicity, infections.
- **5-Fluorouracil (5-FU)**
  - **Dose**: 400-600 mg/m² IV daily for 5 days every 28 days.
  - **Uses**: Colorectal, breast, gastric cancers.
  - **MOA**: Inhibits thymidylate synthase, reducing DNA synthesis.
  - **Adverse Effects**: Myelosuppression, mucositis, hand-foot syndrome.
- **Capecitabine**
  - **Dose**: 1,250 mg/m² orally twice daily for 14 days every 21 days.
  - **Uses**: Colorectal, breast cancers.
  - **MOA**: Converted to 5-FU in the body, inhibiting DNA synthesis.
  - **Adverse Effects**: Diarrhea, hand-foot syndrome, myelosuppression.
- **Cytarabine (Cytosine Arabinoside)**
  - **Dose**: 100-200 mg/m² IV daily for 7 days.
  - **Uses**: Acute myeloid leukemia (AML).
  - **MOA**: Inhibits DNA polymerase, preventing DNA synthesis.
  - **Adverse Effects**: Myelosuppression, nausea, neurotoxicity.

4. Microtubule Damaging Agents

- **Vincristine (Oncovin)**
  - **Dose**: 1.4 mg/m² IV weekly.
  - **Uses**: Leukemias, lymphomas.
  - **MOA**: Inhibits microtubule formation, preventing mitosis.
  - **Adverse Effects**: Peripheral neuropathy, constipation, myelosuppression.
- **Vinblastine**
  - **Dose**: 6-12 mg/m² IV every 2-3 weeks.
  - **Uses**: Lymphomas, testicular cancer.
  - **MOA**: Inhibits microtubule formation, preventing mitosis.
  - **Adverse Effects**: Myelosuppression, GI upset, neuropathy.
- **Vinorelbine**
  - **Dose**: 25-30 mg/m² IV weekly.
  - **Uses**: Non-small cell lung cancer, breast cancer.
  - **MOA**: Inhibits microtubule formation, preventing mitosis.
  - **Adverse Effects**: Myelosuppression, fatigue, neuropathy.
- **Paclitaxel**
  - **Dose**: 135-175 mg/m² IV every 3 weeks.
  - **Uses**: Breast, ovarian, lung cancers.
  - **MOA**: Stabilizes microtubules, preventing cell division.
  - **Adverse Effects**: Myelosuppression, peripheral neuropathy, hypersensitivity.
- **Docetaxel**
  - **Dose**: 75-100 mg/m² IV every 3 weeks.
  - **Uses**: Breast, lung, prostate cancers.
  - **MOA**: Stabilizes microtubules, preventing cell division.
  - **Adverse Effects**: Myelosuppression, fluid retention, neuropathy.
- **Estramustine**
  - **Dose**: 10-14 mg/kg orally daily.
  - **Uses**: Prostate cancer.
  - **MOA**: Combines estrogen with alkylating agent, disrupting microtubule function.
  - **Adverse Effects**: GI upset, thromboembolism, gynecomastia.

5. Topoisomerase-2 Inhibitors

- **Etoposide**
  - **Dose**: 100-200 mg/m² IV daily for 3-5 days.
  - **Uses**: Lung cancer, testicular cancer.
  - **MOA**: Inhibits topoisomerase II, causing DNA strand breaks.
  - **Adverse Effects**: Myelosuppression, nausea, alopecia.

6. Topoisomerase-1 Inhibitors

- **Topotecan**
  - **Dose**: 1.5 mg/m² IV daily for 5 days.
  - **Uses**: Ovarian cancer, small cell lung cancer.
  - **MOA**: Inhibits topoisomerase I, causing DNA strand breaks.
  - **Adverse Effects**: Myelosuppression, nausea, alopecia.
- **Irinotecan**
  - **Dose**: 125 mg/m² IV weekly.
  - **Uses**: Colorectal cancer.
  - **MOA**: Inhibits topoisomerase I, causing DNA strand breaks.
  - **Adverse Effects**: Diarrhea, myelosuppression, nausea.

7. Antibiotics

- **Dactinomycin (Actinomycin D)**
  - **Dose**: 0.5-2 mg/m² IV every 2-3 weeks.
  - **Uses**: Wilms' tumor, rhabdomyosarcoma.
  - **MOA**: Intercalates into DNA, inhibiting RNA synthesis.
  - **Adverse Effects**: Myelosuppression, nausea, hepatotoxicity.
- **Doxorubicin (Adriamycin)**
  - **Dose**: 60-75 mg/m² IV every 3 weeks.
  - **Uses**: Breast, ovarian, lymphomas.
  - **MOA**: Intercalates into DNA, inhibiting topoisomerase II.
  - **Adverse Effects**: Cardiotoxicity, myelosuppression, alopecia.
- **Daunorubicin**
  - **Dose**: 45-60 mg/m² IV every 3 weeks.
  - **Uses**: Leukemias.
  - **MOA**: Intercalates into DNA, inhibiting topoisomerase II.
  - **Adverse Effects**: Cardiotoxicity, myelosuppression, alopecia.
- **Epirubicin**
  - **Dose**: 100-120 mg/m² IV every 3 weeks.
  - **Uses**: Breast cancer.
  - **MOA**: Intercalates into DNA, inhibiting topoisomerase II.
  - **Adverse Effects**: Cardiotoxicity, myelosuppression, nausea.
- **Mitoxantrone**
  - **Dose**: 12 mg/m² IV every 3 weeks.
  - **Uses**: Breast cancer, prostate cancer, leukemias.
  - **MOA**: Intercalates into DNA, inhibiting topoisomerase II.
  - **Adverse Effects**: Myelosuppression, nausea, cardiotoxicity.
- **Bleomycins**
  - **Dose**: 10-20 units/m² IV weekly.
  - **Uses**: Testicular cancer, Hodgkin’s lymphoma.
  - **MOA**: Generates free radicals, causing DNA strand breaks.
  - **Adverse Effects**: Pulmonary fibrosis, skin changes, fever.
- **Mitomycin C**
  - **Dose**: 20 mg/m² IV every 6-8 weeks.
  - **Uses**: Gastric, pancreatic, breast cancers.
  - **MOA**: Cross-links DNA, inhibiting DNA replication.
  - **Adverse Effects**: Myelosuppression, nephrotoxicity, GI upset.

8. Miscellaneous

- **Hydroxyurea**
  - **Dose**: 15-30 mg/kg orally daily.
  - **Uses**: Chronic myeloid leukemia (CML), sickle cell anemia.
  - **MOA**: Inhibits ribonucleotide reductase, reducing DNA synthesis.
  - **Adverse Effects**: Myelosuppression, GI upset, skin rash.
- **L-Asparaginase**
  - **Dose**: 6,000-10,000 units/m² IV every 2 weeks.
  - **Uses**: Acute lymphoblastic leukemia (ALL).
  - **MOA**: Hydrolyzes asparagine, leading to protein synthesis inhibition.
  - **Adverse Effects**: Hypersensitivity, pancreatitis, hepatotoxicity.
- **Tretinoin (All-trans retinoic acid)**
  - **Dose**: 45 mg/m² orally daily.
  - **Uses**: Acute promyelocytic leukemia (APL).
  - **MOA**: Induces differentiation of promyelocytes.
  - **Adverse Effects**: Retinoic acid syndrome, leukocytosis, hypertriglyceridemia.
- **Arsenic Trioxide**
  - **Dose**: 0.15 mg/kg IV daily.
  - **Uses**: Acute promyelocytic leukemia (APL).
  - **MOA**: Induces apoptosis and differentiation.
  - **Adverse Effects**: QT prolongation, leukocytosis, peripheral neuropathy.

B. Targeted Drugs

1. Tyrosine Protein-Kinase Inhibitors

- **Imatinib**
  - **Dose**: 400 mg orally daily.
  - **Uses**: Chronic myeloid leukemia (CML), gastrointestinal stromal tumors (GIST).
  - **MOA**: Inhibits BCR-ABL tyrosine kinase.
  - **Adverse Effects**: Edema, nausea, muscle cramps.
- **Nilotinib**
  - **Dose**: 300 mg orally twice daily.
  - **Uses**: Chronic myeloid leukemia (CML).
  - **MOA**: Inhibits BCR-ABL tyrosine kinase.
  - **Adverse Effects**: QT prolongation, rash, myelosuppression.

2. EGF Receptor Inhibitors

- **Gefitinib**
  - **Dose**: 250 mg orally daily.
  - **Uses**: Non-small cell lung cancer (NSCLC).
  - **MOA**: Inhibits EGFR tyrosine kinase.
  - **Adverse Effects**: Diarrhea, rash, interstitial lung disease.
- **Erlotinib**
  - **Dose**: 150 mg orally daily.
  - **Uses**: Non-small cell lung cancer (NSCLC), pancreatic cancer.
  - **MOA**: Inhibits EGFR tyrosine kinase.
  - **Adverse Effects**: Rash, diarrhea, fatigue.
- **Cetuximab**
  - **Dose**: 400 mg/m² IV initially, then 250 mg/m² weekly.
  - **Uses**: Colorectal cancer, head and neck cancer.
  - **MOA**: Monoclonal antibody against EGFR.
  - **Adverse Effects**: Infusion reactions, rash, hypomagnesemia.

3. Angiogenesis Inhibitors

- **Bevacizumab**
  - **Dose**: 5-15 mg/kg IV every 2-3 weeks.
  - **Uses**: Colorectal, lung, and renal cancers.
  - **MOA**: Inhibits VEGF, preventing angiogenesis.
  - **Adverse Effects**: Hypertension, bleeding, proteinuria.
- **Sunitinib**
  - **Dose**: 50 mg orally daily for 4 weeks on, 2 weeks off.
  - **Uses**: Renal cell carcinoma, GIST.
  - **MOA**: Inhibits multiple tyrosine kinases including VEGF.
  - **Adverse Effects**: Hypertension, fatigue, hand-foot syndrome.

4. Proteasome Inhibitor

- **Bortezomib**
  - **Dose**: 1.3 mg/m² IV or subcutaneously twice weekly.
  - **Uses**: Multiple myeloma, mantle cell lymphoma.
  - **MOA**: Inhibits 26S proteasome, disrupting protein degradation.
  - **Adverse Effects**: Peripheral neuropathy, thrombocytopenia, GI upset.

5. Unarmed Monoclonal Antibodies

- **Rituximab**
  - **Dose**: 375 mg/m² IV weekly for 4-8 weeks.
  - **Uses**: Non-Hodgkin's lymphoma, chronic lymphocytic leukemia (CLL).
  - **MOA**: Targets CD20 on B-cells, leading to cell lysis.
  - **Adverse Effects**: Infusion reactions, infections, myelosuppression.
- **Trastuzumab**
  - **Dose**: 8 mg/kg IV initially, then 6 mg/kg every 3 weeks.
  - **Uses**: HER2-positive breast cancer.
  - **MOA**: Targets HER2 receptor, inhibiting cell growth.
  - **Adverse Effects**: Cardiotoxicity, infusion reactions, myelosuppression.

C. Hormonal Drugs

1. Glucocorticoids

- **Prednisolone**
  - **Dose**: 20-60 mg orally daily.
  - **Uses**: Lymphomas, leukemias, inflammatory conditions.
  - **MOA**: Anti-inflammatory and immunosuppressive effects.
  - **Adverse Effects**: Hyperglycemia, osteoporosis, hypertension.

2. Estrogens

- **Fosfestrol**
  - **Dose**: 1-3 g IV daily.
  - **Uses**: Prostate cancer.
  - **MOA**: Suppresses androgen production.
  - **Adverse Effects**: Gynecomastia, thromboembolism, cardiovascular risk.
- **Ethinylestradiol**
  - **Dose**: 20-50 mcg orally daily.
  - **Uses**: Hormonal replacement therapy, contraception.
  - **MOA**: Estrogen receptor agonist.
  - **Adverse Effects**: Thromboembolism, nausea, breast tenderness.

3. Selective Estrogen Receptor Modulators (SERMs)

- **Tamoxifen**
  - **Dose**: 20 mg orally daily.
  - **Uses**: ER-positive breast cancer.
  - **MOA**: Estrogen receptor antagonist in breast tissue.
  - **Adverse Effects**: Hot flashes, thromboembolism, endometrial cancer risk.
- **Toremifene**
  - **Dose**: 60 mg orally daily.
  - **Uses**: ER-positive breast cancer.
  - **MOA**: Estrogen receptor antagonist in breast tissue.
  - **Adverse Effects**: Hot flashes, thromboembolism, QT prolongation.

4. Selective Estrogen Receptor Downregulators (SERDs)

- **Fulvestrant**
  - **Dose**: 500 mg IM every month.
  - **Uses**: ER-positive metastatic breast cancer.
  - **MOA**: Binds to estrogen receptor, promoting its degradation.
  - **Adverse Effects**: Injection site reactions, hot flashes, nausea.

5. Aromatase Inhibitors

- **Letrozole**
  - **Dose**: 2.5 mg orally daily.
  - **Uses**: ER-positive breast cancer.
  - **MOA**: Inhibits aromatase, reducing estrogen production.
  - **Adverse Effects**: Osteoporosis, arthralgia, hot flashes.
- **Anastrozole**
  - **Dose**: 1 mg orally daily.
  - **Uses**: ER-positive breast cancer.
  - **MOA**: Inhibits aromatase, reducing estrogen production.
  - **Adverse Effects**: Osteoporosis, arthralgia, hot flashes.
- **Exemestane**
  - **Dose**: 25 mg orally daily.
  - **Uses**: ER-positive breast cancer.
  - **MOA**: Irreversible aromatase inhibitor.

- **Adverse Effects**: Osteoporosis, arthralgia, hot flashes.

6. Antiandrogens

- **Flutamide**
  - **Dose**: 250 mg orally three times daily.
  - **Uses**: Prostate cancer.
  - **MOA**: Androgen receptor antagonist.
  - **Adverse Effects**: Hepatotoxicity, gynecomastia, hot flashes.
- **Bicalutamide**
  - **Dose**: 50 mg orally daily.
  - **Uses**: Prostate cancer.
  - **MOA**: Androgen receptor antagonist.
  - **Adverse Effects**: Hepatotoxicity, gynecomastia, hot flashes.

7. 5-α Reductase Inhibitors

- **Finasteride**
  - **Dose**: 5 mg orally daily.
  - **Uses**: Benign prostatic hyperplasia (BPH), male pattern baldness.
  - **MOA**: Inhibits conversion of testosterone to dihydrotestosterone (DHT).
  - **Adverse Effects**: Sexual dysfunction, gynecomastia.
- **Dutasteride**
  - **Dose**: 0.5 mg orally daily.
  - **Uses**: Benign prostatic hyperplasia (BPH).
  - **MOA**: Inhibits both type I and II 5-α reductase.
  - **Adverse Effects**: Sexual dysfunction, gynecomastia.

8. GnRH Analogues

- **Nafarelin**
  - **Dose**: 400-800 mcg intranasally daily.
  - **Uses**: Endometriosis, precocious puberty.
  - **MOA**: Suppresses gonadotropin release, reducing sex hormone levels.
  - **Adverse Effects**: Hot flashes, decreased libido, osteoporosis.
- **Leuprorelin**
  - **Dose**: 3.75 mg IM every month.
  - **Uses**: Prostate cancer, endometriosis.
  - **MOA**: Suppresses gonadotropin release, reducing sex hormone levels.
  - **Adverse Effects**: Hot flashes, decreased libido, osteoporosis.
- **Triptorelin**
  - **Dose**: 3.75 mg IM every month.
  - **Uses**: Prostate cancer, endometriosis.
  - **MOA**: Suppresses gonadotropin release, reducing sex hormone levels.
  - **Adverse Effects**: Hot flashes, decreased libido, osteoporosis.

9. Progestins

- **Hydroxyprogesterone Acetate**
  - **Dose**: 250 mg IM weekly.
  - **Uses**: Endometriosis, secondary amenorrhea.
  - **MOA**: Binds to progesterone receptors, regulating gene expression.
  - **Adverse Effects**: Weight gain, edema, mood changes.

MISCELLANEOUS DRUGS

Immunosuppressant Drugs

1. Calcineurin Inhibitors (Specific T-cell Inhibitors)

- **Cyclosporine (Ciclosporin)**
  - **Dose**: 5-10 mg/kg/day orally or IV.
  - **Uses**: Organ transplantation, autoimmune diseases (e.g., rheumatoid arthritis, psoriasis).
  - **MOA**: Inhibits calcineurin, blocking T-cell activation and IL-2 production.
  - **Adverse Effects**: Nephrotoxicity, hypertension, hirsutism, gingival hyperplasia.
- **Tacrolimus**
  - **Dose**: 0.1-0.2 mg/kg/day orally.
  - **Uses**: Organ transplantation, atopic dermatitis.
  - **MOA**: Inhibits calcineurin, blocking T-cell activation and IL-2 production.
  - **Adverse Effects**: Nephrotoxicity, neurotoxicity, hyperglycemia, hypertension.

2. m-TOR Inhibitors

- **Sirolimus**
  - **Dose**: 2 mg/day orally.
  - **Uses**: Organ transplantation (especially kidney), certain cancers.
  - **MOA**: Inhibits mTOR, preventing T-cell proliferation and antibody production.
  - **Adverse Effects**: Hyperlipidemia, thrombocytopenia, delayed wound healing, interstitial lung disease.
- **Everolimus**
  - **Dose**: 0.75 mg twice daily orally.
  - **Uses**: Organ transplantation, certain cancers (e.g., renal cell carcinoma, breast cancer).
  - **MOA**: Inhibits mTOR, preventing T-cell proliferation and antibody production.
  - **Adverse Effects**: Hyperlipidemia, stomatitis, delayed wound healing, interstitial lung disease.

3. Antiproliferative Drugs (Cytotoxic Drugs)

- **Azathioprine**
  - **Dose**: 1-3 mg/kg/day orally.
  - **Uses**: Organ transplantation, autoimmune diseases (e.g., rheumatoid arthritis, Crohn's disease).
  - **MOA**: Converts to 6-mercaptopurine, inhibiting purine synthesis, leading to decreased lymphocyte proliferation.
  - **Adverse Effects**: Myelosuppression, hepatotoxicity, increased risk of infections.
- **Methotrexate**

    - **Dose**: 7.5-25 mg weekly orally or IM.
    - **Uses**: Autoimmune diseases (e.g., rheumatoid arthritis, psoriasis), certain cancers.
    - **MOA**: Inhibits dihydrofolate reductase, reducing DNA synthesis and cell proliferation.
    - **Adverse Effects**: Myelosuppression, hepatotoxicity, mucositis, pneumonitis.
- **Cyclophosphamide**
    - **Dose**: 1-5 mg/kg/day orally or IV.
    - **Uses**: Autoimmune diseases (e.g., systemic lupus erythematosus, vasculitis), certain cancers.
    - **MOA**: Alkylating agent that cross-links DNA, leading to cell death.
    - **Adverse Effects**: Myelosuppression, hemorrhagic cystitis, alopecia, infertility.
- **Chlorambucil**
    - **Dose**: 0.1-0.2 mg/kg/day orally.
    - **Uses**: Chronic lymphocytic leukemia (CLL), autoimmune diseases (e.g., nephrotic syndrome).
    - **MOA**: Alkylating agent that cross-links DNA, leading to cell death.
    - **Adverse Effects**: Myelosuppression, GI upset, hepatotoxicity.
- **Mycophenolate Mofetil (MMF)**
    - **Dose**: 1-1.5 g twice daily orally.
    - **Uses**: Organ transplantation, autoimmune diseases (e.g., lupus nephritis).
    - **MOA**: Inhibits inosine monophosphate dehydrogenase (IMPDH), reducing purine synthesis and lymphocyte proliferation.
    - **Adverse Effects**: GI upset, myelosuppression, increased risk of infections.

4. Glucocorticoids

- **Prednisolone**
    - **Dose**: 5-60 mg/day orally or IV (dose varies based on condition).
    - **Uses**: Autoimmune diseases, allergic reactions, inflammation, organ transplantation.
    - **MOA**: Anti-inflammatory and immunosuppressive effects by inhibiting multiple inflammatory pathways.
    - **Adverse Effects**: Hyperglycemia, osteoporosis, hypertension, increased risk of infections, Cushingoid features.

5. Biological Agents

(a) TNFα Inhibitors

- **Etanercept**
    - **Dose**: 25-50 mg subcutaneously weekly.
    - **Uses**: Rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis.
    - **MOA**: Binds to TNFα, preventing it from activating its receptor.
    - **Adverse Effects**: Increased risk of infections, injection site reactions, malignancies.
- **Infliximab**
    - **Dose**: 3-5 mg/kg IV every 6-8 weeks.
    - **Uses**: Rheumatoid arthritis, Crohn's disease, ulcerative colitis.
    - **MOA**: Monoclonal antibody against TNFα, preventing it from activating its receptor.
    - **Adverse Effects**: Infusion reactions, increased risk of infections, malignancies.
- **Adalimumab**
    - **Dose**: 40 mg subcutaneously every 2 weeks.
    - **Uses**: Rheumatoid arthritis, psoriatic arthritis, Crohn's disease.
    - **MOA**: Monoclonal antibody against TNFα, preventing it from activating its receptor.
    - **Adverse Effects**: Increased risk of infections, injection site reactions, malignancies.

(b) IL-1 Receptor Antagonist

- **Anakinra**
    - **Dose**: 100 mg subcutaneously daily.
    - **Uses**: Rheumatoid arthritis, neonatal-onset multisystem inflammatory disease.
    - **MOA**: Blocks IL-1 receptor, reducing inflammation.
    - **Adverse Effects**: Injection site reactions, increased risk of infections, neutropenia.

(c) IL-2 Receptor Antagonists (Anti-CD25 Antibodies)

- **Daclizumab**
    - **Dose**: 1 mg/kg IV every 2 weeks for 5 doses.
    - **Uses**: Organ transplantation (prophylaxis of acute rejection).
    - **MOA**: Monoclonal antibody against the IL-2 receptor (CD25) on activated T-cells, inhibiting their proliferation.
    - **Adverse Effects**: Increased risk of infections, hypersensitivity reactions.
- **Basiliximab**
    - **Dose**: 20 mg IV on day 0 and day 4 post-transplant.
    - **Uses**: Organ transplantation (prophylaxis of acute rejection).
    - **MOA**: Monoclonal antibody against the IL-2 receptor (CD25) on activated T-cells, inhibiting their proliferation.
    - **Adverse Effects**: Increased risk of infections, hypersensitivity reactions.

(d) Anti-CD3 Antibody

- **Muromonab CD3**
    - **Dose**: 5 mg IV daily for 10-14 days.
    - **Uses**: Organ transplantation (treatment of acute rejection).
    - **MOA**: Monoclonal antibody against CD3 on T-cells, leading to their depletion.
    - **Adverse Effects**: Cytokine release syndrome, increased risk of infections, hypersensitivity reactions.

(e) Polyclonal Antibodies

- **Antithymocyte Globulin (ATG)**
    - **Dose**: 10-15 mg/kg/day IV for 7-14 days.
    - **Uses**: Organ transplantation (prophylaxis and treatment of rejection), aplastic anemia.
    - **MOA**: Polyclonal antibodies against human T-cells, leading to their depletion.
    - **Adverse Effects**: Cytokine release syndrome, increased risk of infections, serum sickness.
- **Rho(D) Immune Globulin**
    - **Dose**: 300 mcg IM.
    - **Uses**: Prevention of Rh sensitization in Rh-negative mothers.
    - **MOA**: Binds to Rh-positive fetal red blood cells, preventing maternal immune response.
    - **Adverse Effects**: Injection site reactions, mild fever, hypersensitivity reactions.

Drugs Acting on Skin and Mucous Membranes

Topical Corticosteroids Overview

1. **Beclomethasone Dipropionate (0.025%) - BECLATE cream**
    - **Dose**: Apply thinly 1-2 times daily.
    - **Uses**: Anti-inflammatory for skin conditions like eczema, psoriasis.
    - **MOA**: Reduces inflammation by inhibiting phospholipase A2, decreasing prostaglandin and leukotriene production.
    - **Adverse Effects**: Skin thinning, striae, hypopigmentation.
2. **Betamethasone Benzoate (0.025%) - TOPICASONE cream/ointment**
    - **Dose**: Apply thinly 1-2 times daily.
    - **Uses**: Treats inflammatory skin conditions.
    - **MOA**: Potent anti-inflammatory agent that decreases cytokine production.
    - **Adverse Effects**: Skin atrophy, telangiectasia, contact dermatitis.
3. **Betamethasone Valerate (0.12%) - BETNOVATE cream/ointment, BETASONE cream**
    - **Dose**: Apply thinly 1-2 times daily.
    - **Uses**: Treats eczema, psoriasis, lichen planus.
    - **MOA**: Inhibits pro-inflammatory mediators, reducing swelling and redness.
    - **Adverse Effects**: Skin thinning, increased risk of infection.
4. **Halcinonide (0.1%) - CORTILATE, HALOG cream**
    - **Dose**: Apply thinly 1-2 times daily.
    - **Uses**: Manages inflammatory and pruritic skin conditions.
    - **MOA**: Potent anti-inflammatory that suppresses inflammatory cells.
    - **Adverse Effects**: Burning, itching, dryness, skin atrophy.
5. **Clobetasol Propionate (0.05%) - LOBATE, TENOVATE, DERMOTYL cream**
    - **Dose**: Apply thinly 1-2 times daily; do not use for more than 2 weeks.
    - **Uses**: Severe inflammatory skin conditions, plaque psoriasis.
    - **MOA**: Highly potent corticosteroid that inhibits multiple inflammatory pathways.
    - **Adverse Effects**: Skin thinning, adrenal suppression, stretch marks.
6. **Dexamethasone Sodium Phosphate (0.1%) - DECADRON cream with Neomycin 0.35%**
    - **Dose**: Apply 2-3 times daily.
    - **Uses**: Anti-inflammatory, combined with an antibiotic for infected skin conditions.
    - **MOA**: Suppresses immune response and inflammation.
    - **Adverse Effects**: Skin thinning, increased infection risk due to immunosuppression.
7. **Dexamethasone Trimethyl-Acetate (0.1%) - MILLICORTENOL cream**
    - **Dose**: Apply thinly 1-2 times daily.
    - **Uses**: Reduces inflammation in chronic skin conditions.
    - **MOA**: Inhibits inflammatory mediators and immune cells.
    - **Adverse Effects**: Skin thinning, local irritation.
8. **Fluocinolone Acetonide (0.025%) - FLUCORT oint., LUCI oint.**
    - **Dose**: Apply thinly 2-4 times daily.
    - **Uses**: Inflammatory and pruritic skin conditions.
    - **MOA**: Reduces inflammation by inhibiting phospholipase A2.
    - **Adverse Effects**: Skin thinning, striae, telangiectasia.
9. **Fluocortolone (0.5%) - ULTRALAN oint.**
    - **Dose**: Apply thinly 1-2 times daily.
    - **Uses**: Severe inflammatory skin conditions.
    - **MOA**: Potent anti-inflammatory action.
    - **Adverse Effects**: Local skin atrophy, striae, increased risk of infection.
10. **Triamcinolone Acetonide (0.1%) - LEDERCORT oint.**
    - **Dose**: Apply thinly 2-4 times daily.
    - **Uses**: Inflammatory skin conditions.
    - **MOA**: Inhibits cytokines and inflammatory mediators.
    - **Adverse Effects**: Skin atrophy, allergic contact dermatitis.

Moderately Potent Topical Corticosteroids

1. **Fluocinolone Acetonide (0.01%) - FLUCORT-H oint. and skin lotion**
    - **Dose**: Apply thinly 2-4 times daily.
    - **Uses**: Mild to moderate inflammatory skin conditions.
    - **MOA**: Anti-inflammatory and immunosuppressive effects.
    - **Adverse Effects**: Skin irritation, dryness, striae.
2. **Clobetasol Butyrate (0.05%) - EUMOSONE cream**
    - **Dose**: Apply thinly 1-2 times daily.
    - **Uses**: Inflammatory skin conditions.
    - **MOA**: Potent anti-inflammatory corticosteroid.
    - **Adverse Effects**: Skin thinning, telangiectasia.
3. **Fluocortolone (0.25%) - COLSIPAN oint.**
    - **Dose**: Apply thinly 1-2 times daily.
    - **Uses**: Moderate inflammatory skin conditions.
    - **MOA**: Anti-inflammatory action.
    - **Adverse Effects**: Skin atrophy, irritation.
4. **Mometasone (0.1%) - MOMATE, CUTIZONE oint., cream**
    - **Dose**: Apply thinly 1-2 times daily.
    - **Uses**: Eczema, psoriasis, allergic dermatitis.
    - **MOA**: Anti-inflammatory, antipruritic, vasoconstrictive properties.
    - **Adverse Effects**: Burning, itching, skin thinning.
5. **Fluticasone Propionate (0.05%) - FLUTIVATE, MOLIDERM cream**
    - **Dose**: Apply thinly 1-2 times daily.
    - **Uses**: Dermatitis, eczema.
    - **MOA**: Reduces inflammation and immune response.
    - **Adverse Effects**: Skin thinning, burning, itching.
6. **Prednicarbate (0.1-0.25%) - DERMATOP, STEROTOP cream**
    - **Dose**: Apply thinly 1-2 times daily.
    - **Uses**: Inflammatory skin conditions.
    - **MOA**: Anti-inflammatory corticosteroid.
    - **Adverse Effects**: Skin atrophy, irritation.
7. **Triamcinolone Acetonide (0.05%) - DESOWEN, DESONIDE cream/lotion**
    - **Dose**: Apply thinly 2-4 times daily.
    - **Uses**: Dermatitis, eczema.
    - **MOA**: Inhibits inflammatory processes.
    - **Adverse Effects**: Skin atrophy, irritation.
8. **Hydrocortisone (1%) + Urea (12%) - COTARYL-H cream**
    - **Dose**: Apply thinly 2-4 times daily.
    - **Uses**: Dry, scaly skin conditions.
    - **MOA**: Hydrocortisone reduces inflammation; urea hydrates and softens skin.
    - **Adverse Effects**: Skin thinning, irritation.
9. **Hydrocortisone Acetate (2.5%) - WYCORT oint.**
    - **Dose**: Apply thinly 2-4 times daily.

- **Uses**: Mild inflammatory skin conditions.
- **MOA**: Anti-inflammatory, antipruritic effects.
- **Adverse Effects**: Local irritation, skin thinning.

Mild Topical Corticosteroids

1. **Hydrocortisone Acetate (0.1–1.0%) - LYCORTIN 1% oint., CORTOQUINOL 1% with quiniodochlor 4% cream, GENTACYN-HC TOPICAL 1% with gentamicin 0.1%, CORTISONKEMICETINE 0.5% with chloramphenicol 0.5%**
   - **Dose**: Apply thinly 2-4 times daily.
   - **Uses**: Mild inflammatory and pruritic skin conditions.
   - **MOA**: Reduces inflammation; combination products offer antibacterial properties.
   - **Adverse Effects**: Skin thinning, local irritation, potential for infection due to immune suppression.
2. **Hydrocortisone Butyrate (0.001%) - LOCOID cream**
   - **Dose**: Apply thinly 2-4 times daily.
   - **Uses**: Mild inflammatory skin conditions.
   - **MOA**: Low potency corticosteroid with anti-inflammatory effects.
   - **Adverse Effects**: Skin irritation, dryness

Topical Pain Relief and Anti-inflammatory Preparations

1. **ALGIPAN Cream**
   - **Components**:
     - Capsicum Oleoresin 0.1%
     - Histamine 0.1%
     - Methyl Nicotinate 1%
     - Glycol Salicylate 5%
   - **Dose**: Apply to affected area 2-3 times daily.
   - **Uses**: Muscular pain, arthritis, minor aches, and pains.
   - **MOA**:
     - Capsicum Oleoresin: Causes a sensation of warmth, increases blood flow.
     - Histamine: Induces vasodilation.
     - Methyl Nicotinate: Vasodilator, improves blood circulation.
     - Glycol Salicylate: Anti-inflammatory and analgesic, reduces swelling and pain.
   - **Adverse Effects**: Skin irritation, redness, allergic reactions.
2. **ARJET SPRAY**
   - **Components (per 50 ml)**:
     - Methyl Salicylate 875 mg
     - Menthol 1.6 g
     - Camphor 1.5 g
     - Benzyl Nicotinate 20 mg
     - Squalane 250 mg
     - Glycol Salicylate 875 mg
   - **Dose**: Spray onto the affected area 2-3 times daily.
   - **Uses**: Relief from muscle and joint pain, sprains.
   - **MOA**:
     - Methyl Salicylate: Anti-inflammatory and analgesic effects.
     - Menthol & Camphor: Provide cooling sensation, mild local anesthetic.
     - Benzyl Nicotinate: Vasodilator, increases blood flow.
     - Squalane: Moisturizer, aids skin absorption.
   - **Adverse Effects**: Skin irritation, burning sensation, allergic reactions.
3. **RELISPRAY**
   - **Components**:
     - Winter Green Oil 20%
     - Clove Oil 1%
     - Menthol 4%
     - Nilgiri Oil 6%
     - Camphor 10%
     - Cinnamon Oil 0.5%
     - Turpentine Oil 10%
   - **Dose**: Spray onto the affected area 2-3 times daily.
   - **Uses**: Muscle and joint pain relief, minor aches.
   - **MOA**:
     - Winter Green Oil & Menthol: Anti-inflammatory, provides cooling effect.
     - Camphor: Local anesthetic, anti-inflammatory.
     - Clove, Cinnamon, Nilgiri, Turpentine Oils: Enhance blood circulation, warming effect.
   - **Adverse Effects**: Skin irritation, burning sensation, allergic reactions.
4. **EUTHERIA Balm**
   - **Components**:
     - Eucalyptol 7.2%
     - Menthol 4.7%
     - Methyl Salicylate 11.25%
   - **Dose**: Apply to affected area as needed.
   - **Uses**: Relieves pain and inflammation in muscles and joints.
   - **MOA**:
     - Eucalyptol: Analgesic, provides a cooling sensation.
     - Menthol: Cooling effect, local anesthetic.
     - Methyl Salicylate: Anti-inflammatory, reduces pain and swelling.
   - **Adverse Effects**: Skin irritation, burning sensation, potential allergic reactions.
5. **MEDICREME**
   - **Components**:
     - Methyl Salicylate 8%
     - Menthol 2%
     - Adrenaline 0.03%
     - Mephenesin 2.5%
     - Chlorpheniramine 0.2%
   - **Dose**: Apply 2-3 times daily to affected area.
   - **Uses**: Relief of muscle and joint pain.
   - **MOA**:
     - Methyl Salicylate: Anti-inflammatory, reduces pain.
     - Menthol: Cooling sensation, local anesthetic.
     - Adrenaline: Reduces swelling by vasoconstriction.
     - Mephenesin: Muscle relaxant.
     - Chlorpheniramine: Antihistamine, reduces allergic reactions.
   - **Adverse Effects**: Skin irritation, redness, dryness, allergic reactions.
6. **RELAXYL Ointment**

- **Components**:
  - Capsicum Oleoresin 0.05%
  - Mephenesin 10%
  - Methyl Nicotinate 1%
- **Dose**: Apply to the affected area 2-3 times daily.
- **Uses**: Muscle pain, joint pain relief.
- **MOA**:
  - Capsicum Oleoresin: Produces warmth, increases blood flow.
  - Mephenesin: Muscle relaxant, reduces spasms.
  - Methyl Nicotinate: Vasodilator, improves circulation.
- **Adverse Effects**: Skin irritation, redness, burning sensation.

7. **VICKS VAPORUB**
   - **Components**:
     - Menthol 2.8%
     - Camphor 5.25%
     - Thymol 0.1%
     - Turpentine Oil 5.5%
   - **Dose**: Apply on chest and throat or affected area 2-3 times daily.
   - **Uses**: Relief of cough, nasal congestion, muscle aches.
   - **MOA**:
     - Menthol & Camphor: Provide cooling sensation, mild analgesic.
     - Thymol: Antiseptic, provides relief from cough and congestion.
     - Turpentine Oil: Warming effect, aids in relieving muscle pain.
   - **Adverse Effects**: Skin irritation, burning sensation, allergic reactions.
8. **IODEX Ointment**
   - **Components**:
     - Methyl Salicylate 5%
     - Iodine 4%
   - **Dose**: Apply to the affected area 2-3 times daily.
   - **Uses**: Relief of muscle and joint pain, sprains.
   - **MOA**:
     - Methyl Salicylate: Anti-inflammatory, analgesic.
     - Iodine: Antiseptic, aids in reducing inflammation.
   - **Adverse Effects**: Skin irritation, possible iodine sensitivity.
9. **AMRUTANJAN Ointment**
   - **Components**:
     - Eucalyptus Oil 17%
     - Camphor 10%
     - Thymol 1%
     - Menthol 4.5%
     - Methyl Salicylate 7%
   - **Dose**: Apply to affected area 2-3 times daily.
   - **Uses**: Headache, muscle and joint pain relief.
   - **MOA**:
     - Eucalyptus Oil: Anti-inflammatory, provides cooling sensation.
     - Camphor & Menthol: Local anesthetics, cooling effect.
     - Methyl Salicylate: Reduces inflammation and pain.
     - Thymol: Antiseptic properties.
   - **Adverse Effects**: Skin irritation, redness, burning sensation.
10. **CAPSIGYL-D Gel**
    - **Components**:
      - Capsaicin 0.075%
      - Methyl Salicylate 20%
      - Menthol 10%
      - Camphor 5%
      - Eucalyptus Oil 5%
      - Diclofenac 1%
    - **Dose**: Apply to the affected area 2-3 times daily.
    - **Uses**: Relief of muscle and joint pain, arthritis.
    - **MOA**:
      - Capsaicin: Depletes substance P, reducing pain sensation.
      - Methyl Salicylate: Anti-inflammatory, reduces pain.
      - Menthol & Camphor: Cooling and warming sensations, mild anesthetic effects.
      - Diclofenac: NSAID, inhibits COX enzymes, reducing inflammation and pain.
    - **Adverse Effects**: Skin irritation, burning sensation, allergic reactions.

Psoralens and Related Products

1. **Psoralen**
   - **Source**: Obtained from the fruit of *Ammi majus*.
   - **Uses**: Treatment of psoriasis and vitiligo, often in combination with UVA therapy.
   - **MOA**:
     - Binds to DNA upon UV exposure, enhancing pigmentation and reducing skin cell turnover.
     - Induces apoptosis in rapidly dividing cells.
   - **Adverse Effects**: Nausea, vomiting, skin burning, increased risk of skin cancer with prolonged use.
2. **MANADERM**
   - **Formulations**:
     - **Tablets**: 10 mg
     - **Ointment**: 1%
   - **Dose**: Typically 10 mg orally 1-2 times weekly; ointment as needed.
   - **Uses**: Psoriasis, vitiligo, and other skin conditions.
   - **MOA**: As above for psoralen.
   - **Adverse Effects**: Similar to psoralen, including potential photosensitivity.
3. **PSORLINE**
   - **Formulations**:
     - **Tablets**: 5 mg
     - **Solution/Ointment**: 0.25%
   - **Dose**: 5 mg orally, dosage can vary based on condition; ointment applied to affected areas.
   - **Uses**: Psoriasis, vitiligo.
   - **MOA**: Similar action as psoralen.
   - **Adverse Effects**: Photosensitivity, skin irritation, nausea.
4. **Methoxsalen (MACSORALEN)**
   - **Formulations**:
     - **Tablets**: 10 mg
     - **Solution**: 1%
   - **Dose**: 10 mg orally 1-2 times weekly; solution applied to skin.

- **Uses**: Psoriasis, vitiligo.
- **MOA**: Interacts with UV light to enhance therapeutic effects, similar to psoralen.
- **Adverse Effects**: Nausea, headache, skin burning, increased skin cancer risk.

5. **Trioxsalen (NEOSORALEN)**
   - **Formulations**:
     - **Tablets**: 5 mg, 25 mg
     - **Lotion**: 0.2%
   - **Dose**: 5 mg or 25 mg orally 1-2 times weekly; lotion applied to affected skin areas.
   - **Uses**: Treatment of psoriasis and vitiligo.
   - **MOA**: Similar to methoxsalen, enhancing the effects of UV therapy.
   - **Adverse Effects**: Photosensitivity, skin irritation, potential systemic effects similar to other psoralens.

Drugs for Psoriasis

1. **Topical Corticosteroids**
   - **Common Drugs**:
     - **Clobetasol propionate** 0.05% cream/ointment
     - **Betamethasone dipropionate** 0.05% cream/ointment
   - **Dose**: Apply to affected area 1-2 times daily.
   - **Uses**: First-line treatment for mild to moderate psoriasis.
   - **MOA**: Reduces inflammation, itching, and suppresses the immune response.
   - **Adverse Effects**: Skin thinning, stretch marks, rebound flares, potential systemic absorption leading to HPA axis suppression.
2. **Vitamin D Analogues**
   - **Common Drugs**:
     - **Calcipotriol (Calcipotriene)** 0.005% cream/ointment
     - **Calcitriol** 0.0003% ointment
   - **Dose**: Apply to affected area 1-2 times daily.
   - **Uses**: Mild to moderate psoriasis, often in combination with corticosteroids.
   - **MOA**: Modulates skin cell production and reduces proliferation of keratinocytes.
   - **Adverse Effects**: Skin irritation, hypercalcemia (rare with topical use).
3. **Retinoids**
   - **Common Drugs**:
     - **Tazarotene** 0.05% or 0.1% gel/cream
   - **Dose**: Apply to affected area once daily.
   - **Uses**: Plaque psoriasis, especially in combination with corticosteroids.
   - **MOA**: Normalizes keratinocyte differentiation and proliferation.
   - **Adverse Effects**: Skin irritation, dryness, photosensitivity, teratogenicity (contraindicated in pregnancy).
4. **Coal Tar**
   - **Formulations**: 0.5%–5% in various creams, shampoos, and ointments.
   - **Dose**: Apply once or twice daily, depending on formulation.
   - **Uses**: Chronic plaque psoriasis, scalp psoriasis.
   - **MOA**: Reduces scaling, itching, and inflammation by slowing down the growth of skin cells.
   - **Adverse Effects**: Skin irritation, staining of skin/clothing, strong odor.
5. **Phototherapy**
   - **Types**:
     - **UVB Therapy**: Narrowband UVB (311–313 nm)
     - **PUVA**: Psoralen + UVA
   - **Dose**: Varies depending on the severity and type of psoriasis; typically 2-3 times per week.
   - **Uses**: Moderate to severe psoriasis.
   - **MOA**: Slows down the excessive skin cell production by altering DNA synthesis and reducing immune response.
   - **Adverse Effects**: Skin aging, increased risk of skin cancer, burns, hyperpigmentation.
6. **Systemic Retinoids**
   - **Common Drugs**:
     - **Acitretin** 25-50 mg daily
   - **Uses**: Severe psoriasis, especially pustular or erythrodermic types.
   - **MOA**: Normalizes skin cell growth and differentiation.
   - **Adverse Effects**: Dry skin, lips, eyes, liver toxicity, teratogenicity (strict contraception required for women).
7. **Methotrexate**
   - **Dose**: 7.5-25 mg once weekly, orally or via injection.
   - **Uses**: Moderate to severe psoriasis, especially psoriatic arthritis.
   - **MOA**: Inhibits dihydrofolate reductase, leading to reduced DNA synthesis and suppression of the immune system.
   - **Adverse Effects**: Liver toxicity, bone marrow suppression, gastrointestinal upset, teratogenicity.
8. **Cyclosporine**
   - **Dose**: 2.5-5 mg/kg/day, orally.
   - **Uses**: Severe, treatment-resistant psoriasis.
   - **MOA**: Inhibits calcineurin, leading to reduced T-cell activation and cytokine production.
   - **Adverse Effects**: Nephrotoxicity, hypertension, increased risk of infections, malignancies.
9. **Biologic Agents**
   - **Common Drugs**:
     - **TNF-α inhibitors**: Etanercept, Infliximab, Adalimumab
     - **IL-17 inhibitors**: Secukinumab, Ixekizumab
     - **IL-23 inhibitors**: Ustekinumab, Guselkumab
   - **Dose**: Varies depending on the specific agent (e.g., Etanercept 50 mg SC weekly).
   - **Uses**: Moderate to severe psoriasis, especially with psoriatic arthritis.
   - **MOA**: Target specific immune pathways involved in psoriasis (e.g., TNF-α, IL-17, IL-23).
   - **Adverse Effects**: Increased risk of infections, reactivation of latent tuberculosis, potential increased risk of malignancies, injection site reactions.
10. **Apremilast**
    - **Dose**: Start with 10 mg daily, titrated up to 30 mg twice daily.
    - **Uses**: Moderate to severe plaque psoriasis and psoriatic arthritis.
    - **MOA**: Phosphodiesterase 4 (PDE4) inhibitor, leading to increased intracellular cAMP and downregulation of the inflammatory response.
    - **Adverse Effects**: Diarrhea, nausea, headache, depression, weight loss.

Antiseptics, Disinfectants

1. Phenol Derivatives

- **Common Drugs**:
  - **Phenol**: Used in 1-5% solutions.
  - **Cresol**: Used in 1-3% solutions.
  - **Hexylresorcinol**: Used in 0.1-2% solutions.
  - **Chloroxylenol**: Used in 0.5-5% solutions.
  - **Hexachlorophene**: Used in 3% solutions.
- **Uses**: Antiseptic, disinfectant, and preservative in various formulations.
- **MOA**: Disrupts cell membranes, leading to leakage of cellular contents and cell death.

- **Adverse Effects**: Skin irritation, dermatitis, systemic toxicity with prolonged use or high concentrations.

2. Oxidizing Agents

- **Common Drugs**:
  - **Potassium permanganate**: Used in 0.01-0.1% solutions.
  - **Hydrogen peroxide**: Used in 3-6% solutions.
  - **Benzoyl peroxide**: Used in 2.5-10% creams/gels.
- **Uses**: Antiseptic for wounds, acne treatment, and disinfection.
- **MOA**: Releases free oxygen radicals that oxidize and damage microbial cells.
- **Adverse Effects**: Skin irritation, dryness, allergic reactions, staining (Potassium permanganate).

3. Halogens

- **Common Drugs**:
  - **Iodine**: 2% tincture, 10% povidone-iodine.
  - **Chlorine**: 0.5-1% solutions.
- **Uses**: Antiseptic, disinfectant, and water purification.
- **MOA**: Iodine and chlorine react with proteins and nucleic acids, leading to microbial cell death.
- **Adverse Effects**: Skin irritation, allergic reactions, staining of skin and clothing.

4. Biguanide

- **Common Drug**:
  - **Chlorhexidine**: 0.5-4% solutions.
- **Uses**: Skin antiseptic, mouthwash, surgical scrub.
- **MOA**: Disrupts bacterial cell membranes and precipitates cytoplasmic contents.
- **Adverse Effects**: Skin irritation, taste disturbances (oral use), rare allergic reactions.

5. Quaternary Ammonium Compounds (Cationic)

- **Common Drugs**:
  - **Cetrimide**: 0.5-1% solutions.
  - **Benzalkonium chloride**: 0.01-0.1% solutions.
- **Uses**: Antiseptic, disinfectant in surgical and medical settings.
- **MOA**: Disrupts cell membranes, leading to leakage of cell contents and microbial death.
- **Adverse Effects**: Skin irritation, hypersensitivity reactions.

6. Soaps (Sodium and Potassium)

- **Common Use**:
  - **Sodium/Potassium soaps**: 1-5% in various formulations.
- **Uses**: Skin cleansing, antiseptic in minor wounds.
- **MOA**: Soaps act as surfactants, disrupting cell membranes and emulsifying dirt and oils.
- **Adverse Effects**: Dryness, irritation, especially with frequent use.

7. Alcohols

- **Common Drugs**:
  - **Ethanol**: 70% solution.
  - **Isopropanol**: 70-90% solution.
- **Uses**: Skin antiseptic, hand sanitizers, surface disinfectants.
- **MOA**: Denatures proteins and dissolves lipids, leading to microbial cell death.
- **Adverse Effects**: Skin dryness, irritation, flammability.

8. Aldehydes

- **Common Drugs**:
  - **Formaldehyde**: 1-5% solutions.
  - **Glutaraldehyde**: 2% solution.
- **Uses**: High-level disinfectant, sterilization of medical instruments.
- **MOA**: Cross-links proteins and nucleic acids, leading to cell death.
- **Adverse Effects**: Respiratory irritation, skin sensitization, potential carcinogenicity with prolonged exposure.

9. Acids

- **Common Drugs**:
  - **Boric acid**: 2-5% solution.
  - **Acetic acid**: 1-5% solution.
- **Uses**: Antiseptic for minor wounds, ear infections (acetic acid), eye wash (boric acid).
- **MOA**: Acidic environment disrupts microbial cell function and growth.
- **Adverse Effects**: Skin irritation, potential toxicity with prolonged use (boric acid).

10. Metallic Salts

- **Common Drugs**:
  - **Silver nitrate**: 0.5-1% solution.
  - **Silver sulfadiazine**: 1% cream.
- **Uses**: Antiseptic for burns, wound dressing.
- **MOA**: Silver ions disrupt microbial cell walls and nucleic acids, leading to cell death.
- **Adverse Effects**: Argyria (skin discoloration), delayed wound healing, allergic reactions.

11. Dyes

- **Common Drugs**:
  - **Gentian violet**: 0.5-1% solution.
  - **Acriflavine**: 0.1-0.5% solution.
- **Uses**: Antiseptic for minor cuts, fungal infections.
- **MOA**: Disrupts microbial cell walls and inhibits nucleic acid synthesis.
- **Adverse Effects**: Skin staining, irritation, potential carcinogenicity with prolonged use.

12. Furan Derivative

- **Common Drug**:
  - **Nitrofurazone**: 0.2% ointment.
- **Uses**: Topical antiseptic for wounds, burns.
- **MOA**: Inhibits bacterial enzymes involved in carbohydrate metabolism, leading to cell death.
- **Adverse Effects**: Skin irritation, allergic reactions, potential carcinogenicity with prolonged use.

ECTOPARASITICIDES

1. Permethrin

- **Dose**: 5% cream or lotion applied to the skin.
- **Use**: Treatment of scabies and lice infestations.
- **MOA**: Disrupts sodium channels in the nerve cell membranes of parasites, leading to paralysis and death of the parasite.
- **Adverse Effects**: Skin irritation, itching, redness, burning sensation, rarely allergic reactions.

2. Sulfur

- **Dose**: 5-10% ointment or cream applied topically.
- **Use**: Treatment of scabies, acne, and seborrheic dermatitis.
- **MOA**: Exerts keratolytic, antibacterial, and antiparasitic effects; disrupts the cellular structure of parasites and bacteria.
- **Adverse Effects**: Skin irritation, dryness, peeling, and an unpleasant odor.

3. Lindane (BHC)

- **Dose**: 1% lotion or shampoo applied to the affected area.
- **Use**: Treatment of scabies and lice infestations.
- **MOA**: Interferes with neurotransmitter function in the nervous system of parasites, leading to hyperstimulation and death.
- **Adverse Effects**: Skin irritation, neurotoxicity (seizures, dizziness), contraindicated in infants and those with a history of seizures.

4. Dicophane (DDT)

- **Dose**: Not recommended for clinical use due to its toxic effects and environmental persistence.
- **Use**: Historically used as an insecticide; no longer recommended for medical or agricultural use.
- **MOA**: Disrupts sodium ion channels in nerve cells of insects, leading to paralysis and death.
- **Adverse Effects**: Highly toxic to humans and wildlife; carcinogenic, neurological symptoms, and environmental damage.

5. Benzyl Benzoate

- **Dose**: 25% lotion applied topically.
- **Use**: Treatment of scabies and lice infestations.
- **MOA**: Acts as a neurotoxin to mites and lice, causing paralysis and death.
- **Adverse Effects**: Skin irritation, burning sensation, and contact dermatitis, especially on sensitive skin areas.

6. Ivermectin

- **Dose**: 200 mcg/kg orally as a single dose; topical 1% cream or lotion.
- **Use**: Treatment of scabies, lice, and other parasitic infections.
- **MOA**: Binds to glutamate-gated chloride channels in parasites, causing an increase in permeability to chloride ions, leading to paralysis and death of the parasite.
- **Adverse Effects**: Skin irritation (topical use), dizziness, gastrointestinal discomfort, pruritus, and rarely, neurological effects.

7. Crotamiton

- **Dose**: 10% cream or lotion applied to the skin.
- **Use**: Treatment of scabies and pruritus.
- **MOA**: Antiparasitic effect through direct action on the scabies mite; also possesses antipruritic properties.
- **Adverse Effects**: Skin irritation, allergic reactions, contact dermatitis, and a burning sensation on application.

Chelating Agents

1. Dimercaprol (BAL)

- **Dose**: 2.5–5 mg/kg intramuscularly every 4 hours for 2 days, then every 6-12 hours for 7-10 days.
- **Use**: Treatment of heavy metal poisoning, including arsenic, gold, and mercury.
- **MOA**: Chelates heavy metals by forming stable, non-toxic complexes that can be excreted by the kidneys.
- **Adverse Effects**: Hypertension, tachycardia, nausea, vomiting, pain at the injection site, and nephrotoxicity.

2. Calcium Disodium DTPA

- **Dose**: 1 gram intravenously or intramuscularly once daily.
- **Use**: Treatment of lead poisoning and other heavy metal toxicities.
- **MOA**: Chelates divalent and trivalent metal ions, forming water-soluble complexes that are excreted via the urine.
- **Adverse Effects**: Hypocalcemia, kidney damage, gastrointestinal upset, and potential for metal redistribution.

3. Dimercaptosuccinic Acid (Succimer)

- **Dose**: 10 mg/kg orally every 8 hours for 5 days, followed by 10 mg/kg every 12 hours for 14 days.
- **Use**: Treatment of lead poisoning and mercury poisoning.
- **MOA**: Chelates heavy metals, particularly lead, forming water-soluble complexes excreted in the urine.
- **Adverse Effects**: Gastrointestinal disturbances, rash, elevated liver enzymes, and neutropenia.

4. Penicillamine

- **Dose**: 250 mg orally 2-4 times daily.
- **Use**: Treatment of Wilson’s disease (copper toxicity), rheumatoid arthritis, and cystinuria.
- **MOA**: Chelates metals like copper, forming soluble complexes that are excreted in the urine; also has immunomodulatory effects.
- **Adverse Effects**: Rash, gastrointestinal upset, bone marrow suppression, proteinuria, and nephrotoxicity.

5. Desferrioxamine

- **Dose**: 500 mg intramuscularly or subcutaneously daily, or 2 grams intravenously daily.

- **Use**: Treatment of iron overload (e.g., due to thalassemia or hemochromatosis) and aluminum toxicity.
- **MOA**: Chelates iron and aluminum, forming complexes that are excreted in the urine.
- **Adverse Effects**: Hypotension, flushing, visual disturbances, tinnitus, and allergic reactions.

6. Disodium Edetate

- **Dose**: 1-2 grams intravenously daily.
- **Use**: Treatment of hypercalcemia, digitalis toxicity, and lead poisoning.
- **MOA**: Chelates calcium and heavy metals, forming complexes excreted via the urine.
- **Adverse Effects**: Hypocalcemia, renal toxicity, thrombophlebitis, and hypotension.

7. Deferiprone

- **Dose**: 25-33 mg/kg orally three times daily.
- **Use**: Treatment of iron overload in patients with thalassemia major who are not adequately managed with desferrioxamine.
- **MOA**: Chelates iron, forming soluble complexes that are excreted in the urine.
- **Adverse Effects**: Agranulocytosis, neutropenia, gastrointestinal upset, arthralgia, and increased liver enzymes.

8. Calcium Disodium Edetate

- **Dose**: 1 gram/m² body surface area intravenously or intramuscularly every 8-12 hours.
- **Use**: Treatment of lead poisoning.
- **MOA**: Chelates lead, forming water-soluble complexes excreted in the urine.
- **Adverse Effects**: Renal toxicity, hypocalcemia, thrombophlebitis, and gastrointestinal disturbances.

Vitamins

Fat-Soluble Vitamins

1. **Retinol (Vitamin A1)**
   - **Dose**: 50,000-100,000 IU.
   - **Use**: Vision, skin health.
   - **MOA**: Regulates gene expression.
   - **Adverse Effects**: Hypervitaminosis A, liver toxicity.
2. **β-Carotene (Provitamin A)**
   - **Dose**: 50,000-100,000 IU.
   - **Use**: Antioxidant, vitamin A source.
   - **MOA**: Converts to retinol.
   - **Adverse Effects**: Carotenemia.
3. **Calciferol (Vitamin D2) & Cholecalciferol (Vitamin D3)**
   - **Dose**: 5-60,000 IU.
   - **Use**: Bone health, calcium absorption.
   - **MOA**: Increases calcium/phosphate absorption.
   - **Adverse Effects**: Hypercalcemia, kidney stones.
4. **Calcitriol**
   - **Dose**: 0.25-1 µg.
   - **Use**: Hypocalcemia, CKD.
   - **MOA**: Active vitamin D, regulates calcium.
   - **Adverse Effects**: Hypercalcemia.
5. **α-Tocopherol (Vitamin E)**
   - **Dose**: 100-600 mg.
   - **Use**: Antioxidant, deficiency.
   - **MOA**: Neutralizes free radicals.
   - **Adverse Effects**: Increased bleeding risk.
6. **Phytonadione (Vitamin K1)**
   - **Dose**: 50-100 µg.
   - **Use**: Blood clotting.
   - **MOA**: Synthesizes clotting factors.
   - **Adverse Effects**: Allergic reactions.

Water-Soluble Vitamins

7. **Thiamine (Vitamin B1)**
   - **Dose**: 1.5-100 mg.
   - **Use**: Beriberi, Wernicke-Korsakoff.
   - **MOA**: Coenzyme in metabolism.
   - **Adverse Effects**: Allergic reactions.
8. **Riboflavin (Vitamin B2)**
   - **Dose**: 1.7-20 mg.
   - **Use**: Riboflavin deficiency.
   - **MOA**: Coenzyme in redox reactions.
   - **Adverse Effects**: Yellow urine.
9. **Niacin (Vitamin B3)**
   - **Dose**: 20-500 mg.
   - **Use**: Pellagra, dyslipidemia.
   - **MOA**: Precursor to NAD/NADP.
   - **Adverse Effects**: Flushing, liver toxicity.
10. **Pyridoxine (Vitamin B6)**

- **Dose**: 2-100 mg.
- **Use**: Deficiency, pregnancy nausea.
- **MOA**: Coenzyme in metabolism.
- **Adverse Effects**: Neuropathy at high doses.

11. **Pantothenic Acid (Vitamin B5)**

- **Dose**: 4-50 mg.
- **Use**: Deficiency.
- **MOA**: Part of coenzyme A.
- **Adverse Effects**: Generally safe.

12. **Biotin (Vitamin B7)**

- **Dose**: 0.1-0.2 mg.
- **Use**: Deficiency, hair/skin health.
- **MOA**: Coenzyme in carboxylation.
- **Adverse Effects**: Safe.

13. **Folic Acid (Vitamin B9)**

- **Dose**: 0.2-5 mg.
- **Use**: Anemia, pregnancy.
- **MOA**: DNA synthesis.
- **Adverse Effects**: Masks B12 deficiency.

14. **Cyanocobalamin (Vitamin B12)**

- **Dose**: 2-1000 µg.
- **Use**: Anemia, neuropathy.
- **MOA**: DNA synthesis, RBC production.
- **Adverse Effects**: Safe; rare hypersensitivity.

15. **Ascorbic Acid (Vitamin C)**

- **Dose**: 60-500 mg.
- **Use**: Scurvy, antioxidant.
- **MOA**: Collagen synthesis, antioxidant.
- **Adverse Effects**: GI upset, kidney stones

Combination preparation of vitamins

ABDEC Drops

- **Dose**: Per 0.6 ml: Vitamin A 5,000 IU, Vitamin D 400 IU, others.
- **Use**: Multivitamin for infants and children.
- **MOA**: Supports growth, bone health, and immune function.
- **Adverse Effects**: Hypervitaminosis with prolonged use.

ADEXOLIN Capsules

- **Dose**: Per cap: Vitamin A 5,000 IU, Vitamin D 400 IU.
- **Use**: Multivitamin supplement.
- **MOA**: Maintains vision, immune function, and bone health.
- **Adverse Effects**: Hypervitaminosis A/D.

AQUASOL-A-D Drops

- **Dose**: Per ml: Vitamin A 24,000 IU, Vitamin D 1,000 IU.
- **Use**: Vitamin A and D deficiency.
- **MOA**: Supports vision, bone health, and immune function.
- **Adverse Effects**: Risk of toxicity with overdose.

AQUASOL-A-E Capsules

- **Dose**: Per cap: Vitamin A 30,000 IU, Vitamin E 50 IU.
- **Use**: Antioxidant and vitamin supplement.
- **MOA**: Protects cells from oxidative damage, supports vision and skin health.
- **Adverse Effects**: Hypervitaminosis A.

BECOSULES Capsules/Syrup

- **Dose**: Per cap: B-complex vitamins, Vitamin C 150 mg.
- **Use**: B-vitamin deficiency, general supplementation.
- **MOA**: Supports metabolism, nerve function, and immunity.
- **Adverse Effects**: Rare; may cause mild GI upset.

BECOZYME C FORTE Tablets

- **Dose**: Per tab: B-complex vitamins, Vitamin C 150 mg.
- **Use**: B-complex and Vitamin C supplementation.
- **MOA**: Supports metabolic processes and immune function.
- **Adverse Effects**: GI upset, rare allergic reactions.

BEJECTAL Injection

- **Dose**: Per ml: B-complex vitamins.
- **Use**: B-complex vitamin deficiency.
- **MOA**: Facilitates metabolic processes.
- **Adverse Effects**: Injection site pain, allergic reactions.

EDINOL Capsules

- **Dose**: Per cap: Vitamin A 10,000 IU, Vitamin D 1,000 IU, B-complex vitamins, Vitamin C 150 mg.
- **Use**: Multivitamin supplementation.
- **MOA**: Supports overall health and metabolic processes.
- **Adverse Effects**: Hypervitaminosis, GI upset.

MULTIVITAPLEX Elixir/FORTE Capsules

- **Dose**: Per 5 ml (elixir): Vitamin A 2,500 IU, Vitamin D 200 IU, others. Per cap (FORTE): Vitamin A 10,000 IU, Vitamin D 400 IU.
- **Use**: Multivitamin supplementation.
- **MOA**: Supports overall health, immune function, and bone health.
- **Adverse Effects**: Hypervitaminosis with high doses.

COBADEX FORTE Capsules

- **Dose**: Per cap: B-complex vitamins, Vitamin C 150 mg.
- **Use**: Multivitamin supplementation.
- **MOA**: Supports metabolic processes and immune function.
- **Adverse Effects**: GI upset, rare allergic reactions.

COBADEX Syrup

- **Dose**: Per 5 ml: B-complex vitamins, Vitamin C.
- **Use**: Multivitamin supplementation for children.
- **MOA**: Supports metabolism and immune function.
- **Adverse Effects**: Rare; possible GI upset.

KINETONE Liquid

- **Dose**: Per 15 ml: Vitamin A 2,000 IU, Vitamin D 200 IU, others.
- **Use**: Multivitamin for children.
- **MOA**: Supports growth and immune function.
- **Adverse Effects**: Rare; possible GI upset.

OPTINEURON Injection

- **Dose**: Per 3 ml: B-complex vitamins, Vitamin B12 1000 mcg.
- **Use**: B-complex vitamin deficiency, neuropathy.
- **MOA**: Supports nerve health and metabolism.
- **Adverse Effects**: Injection site pain, rare allergic reactions.

STRESS CAPS Capsules

- **Dose**: Per cap: B-complex vitamins, Vitamin C 150 mg.
- **Use**: Stress and fatigue management.
- **MOA**: Supports metabolic and immune function.
- **Adverse Effects**: GI upset, rare allergic reactions.

NEUROXIN-12 Injection

- **Dose**: Per 10 ml: B-complex vitamins, Vitamin B12 500 mcg.
- **Use**: B-complex deficiency, anemia, neuropathy.
- **MOA**: Supports nerve and blood health.
- **Adverse Effects**: Injection site reactions.

NEUROBION Tablets

- **Dose**: Per tab: B-complex vitamins.
- **Use**: B-complex deficiency.
- **MOA**: Supports metabolism and nerve function.
- **Adverse Effects**: Rare; possible GI upset.

POLYBION Capsules/Injection

- **Dose**: Per cap: B-complex vitamins. Per 2 ml injection: B-complex vitamins.
- **Use**: B-complex vitamin deficiency.
- **MOA**: Supports metabolic processes.
- **Adverse Effects**: GI upset, rare injection site reactions.

ROVIGON Tablets

- **Dose**: Per tab: Vitamin A 10,000 IU.
- **Use**: Vitamin A deficiency.
- **MOA**: Supports vision, skin health.
- **Adverse Effects**: Hypervitaminosis A.

SCLEROBION Tablets

- **Dose**: Per tab: Vitamin A 10,000 IU, Vitamin E 25 IU.
- **Use**: Skin health, vitamin A and E deficiency.
- **MOA**: Antioxidant, supports skin and vision.
- **Adverse Effects**: Hypervitaminosis A, GI upset.

VIMAGNA Drops

- **Dose**: Per ml: Vitamin A 2,000 IU, Vitamin D 200 IU, others.
- **Use**: Multivitamin supplementation for infants and children.
- **MOA**: Supports growth, bone health, and immune function.
- **Adverse Effects**: Rare; possible GI upset.

Vaccines and Sera

Killed (Inactivated) Vaccines

1. **Typhoid-paratyphoid (TAB)**
   - **Dose**: 0.5 ml subcutaneously, 2 doses 4 weeks apart.
   - **Use**: Prevention of typhoid and paratyphoid fevers.
   - **MOA**: Induces immunity by exposing the immune system to inactivated bacteria.
   - **Adverse Effects**: Local reaction, fever, malaise.
2. **Vi Typhoid Polysaccharide**
   - **Dose**: 0.5 ml intramuscularly, single dose.
   - **Use**: Prevention of typhoid fever.
   - **MOA**: Stimulates immune response against the Vi polysaccharide of *Salmonella typhi*.
   - **Adverse Effects**: Injection site reactions, fever.
3. **Cholera**
   - **Dose**: 1-2 doses orally, depending on vaccine type.
   - **Use**: Prevention of cholera.

- **MOA**: Induces immunity against *Vibrio cholerae* by inactivated bacteria or recombinant components.
- **Adverse Effects**: Gastrointestinal upset, mild fever.

4. **Whooping Cough (Pertussis)**
   - **Dose**: Given as part of DPT; 0.5 ml intramuscularly.
   - **Use**: Prevention of pertussis (whooping cough).
   - **MOA**: Induces immunity via inactivated *Bordetella pertussis*.
   - **Adverse Effects**: Fever, irritability, swelling at injection site.
5. **Meningococcal**
   - **Dose**: 0.5 ml intramuscularly, single or multiple doses depending on the schedule.
   - **Use**: Prevention of meningococcal disease.
   - **MOA**: Stimulates immune response against *Neisseria meningitidis*.
   - **Adverse Effects**: Fever, headache, injection site pain.
6. **Haemophilus influenzae type b**
   - **Dose**: 0.5 ml intramuscularly, given in 3-4 doses.
   - **Use**: Prevention of Haemophilus influenzae type b infections.
   - **MOA**: Induces immunity against Hib by polysaccharide conjugate.
   - **Adverse Effects**: Fever, injection site reactions.
7. **Plague**
   - **Dose**: 1-2 ml intramuscularly or subcutaneously.
   - **Use**: Prevention of plague.
   - **MOA**: Stimulates immune response against *Yersinia pestis*.
   - **Adverse Effects**: Fever, malaise, local pain.
8. **Poliomyelitis Inactivated (IPV, Salk)**
   - **Dose**: 0.5 ml intramuscularly, 3-4 doses.
   - **Use**: Prevention of poliomyelitis.
   - **MOA**: Induces immunity by exposing the immune system to inactivated poliovirus.
   - **Adverse Effects**: Local pain, mild fever.
9. **Rabies (Neural tissue, Chick embryo cell, Human diploid cell, Vero cell)**
   - **Dose**: Varies by type, typically 1 ml intramuscularly, multiple doses post-exposure.
   - **Use**: Post-exposure prophylaxis and pre-exposure vaccination against rabies.
   - **MOA**: Stimulates an immune response to the rabies virus.
   - **Adverse Effects**: Local pain, fever, allergic reactions.
10. **Influenza**
    - **Dose**: 0.5 ml intramuscularly, annually.
    - **Use**: Prevention of seasonal influenza.
    - **MOA**: Induces immunity by exposing the immune system to inactivated influenza viruses.
    - **Adverse Effects**: Soreness at injection site, mild fever, muscle aches.
11. **Hepatitis B**
    - **Dose**: 0.5-1 ml intramuscularly, given in 3 doses.
    - **Use**: Prevention of hepatitis B infection.
    - **MOA**: Induces immunity against hepatitis B by recombinant surface antigen.
    - **Adverse Effects**: Injection site reactions, mild fever.
12. **Hepatitis A**
    - **Dose**: 0.5-1 ml intramuscularly, 2 doses 6-12 months apart.
    - **Use**: Prevention of hepatitis A infection.
    - **MOA**: Stimulates immune response against inactivated hepatitis A virus.
    - **Adverse Effects**: Soreness at injection site, headache.

Live Attenuated Vaccines

1. **Bacillus Calmette-Guérin (BCG)**
   - **Dose**: 0.05-0.1 ml intradermally at birth.
   - **Use**: Prevention of tuberculosis.
   - **MOA**: Induces immune response against *Mycobacterium bovis*.
   - **Adverse Effects**: Local ulceration, lymphadenitis.
2. **Typhoid-Ty 21a**
   - **Dose**: 1 capsule orally, 3 doses on alternate days.
   - **Use**: Prevention of typhoid fever.
   - **MOA**: Induces immunity by exposing the immune system to live attenuated *Salmonella typhi*.
   - **Adverse Effects**: Gastrointestinal discomfort, mild fever.
3. **Poliomyelitis Oral (OPV, Sabin)**
   - **Dose**: 2 drops orally, multiple doses.
   - **Use**: Prevention of poliomyelitis.
   - **MOA**: Induces immunity via live attenuated poliovirus.
   - **Adverse Effects**: Rare risk of vaccine-associated paralytic poliomyelitis (VAPP).
4. **Mumps (Live Attenuated)**
   - **Dose**: 0.5 ml subcutaneously, usually given with MMR.
   - **Use**: Prevention of mumps.
   - **MOA**: Induces immune response against live attenuated mumps virus.
   - **Adverse Effects**: Mild fever, rash, parotid gland swelling.
5. **Measles (Live Attenuated)**
   - **Dose**: 0.5 ml subcutaneously, usually given with MMR.
   - **Use**: Prevention of measles.
   - **MOA**: Induces immunity against live attenuated measles virus.
   - **Adverse Effects**: Fever, rash, rarely encephalitis.
6. **Rubella (Live Attenuated)**
   - **Dose**: 0.5 ml subcutaneously, usually given with MMR.
   - **Use**: Prevention of rubella (German measles).
   - **MOA**: Stimulates immune response to live attenuated rubella virus.
   - **Adverse Effects**: Mild fever, rash, arthralgia in adults.
7. **Varicella (Live Attenuated)**
   - **Dose**: 0.5 ml subcutaneously, 2 doses.
   - **Use**: Prevention of varicella (chickenpox).
   - **MOA**: Induces immunity against live attenuated varicella-zoster virus.
   - **Adverse Effects**: Mild rash, fever, rarely breakthrough varicella.

Toxoids

1. **Tetanus (Fluid/Adsorbed)**
   - **Dose**: 0.5 ml intramuscularly, multiple doses.
   - **Use**: Prevention of tetanus.
   - **MOA**: Induces immunity via inactivated tetanus toxin.
   - **Adverse Effects**: Local reaction, mild fever.
2. **Diphtheria (Adsorbed)**
   - **Dose**: 0.5 ml intramuscularly, multiple doses.

- **Use**: Prevention of diphtheria.
- **MOA**: Stimulates immune response against inactivated diphtheria toxin.
- **Adverse Effects**: Local pain, mild fever.

Combined Vaccines

1. **Double Antigen (DT-DA)**
   - **Dose**: 0.5 ml intramuscularly, part of immunization schedule.
   - **Use**: Prevention of diphtheria and tetanus.
   - **MOA**: Combined immunization against diphtheria and tetanus toxins.
   - **Adverse Effects**: Local pain, fever.
2. **Triple Antigen (DPT)**
   - **Dose**: 0.5 ml intramuscularly, multiple doses.
   - **Use**: Prevention of diphtheria, pertussis, and tetanus.
   - **MOA**: Combined immunization against diphtheria, pertussis, and tetanus.
   - **Adverse Effects**: Fever, irritability, injection site pain.
3. **Measles, Mumps, Rubella (MMR)**
   - **Dose**: 0.5 ml subcutaneously, 2 doses.
   - **Use**: Prevention of measles, mumps, and rubella.
   - **MOA**: Induces immunity against live attenuated measles, mumps, and rubella viruses.
   - **Adverse Effects**: Mild fever, rash, joint pain.
4. **Pentavalent Vaccine (DPT + Hepatitis B + Hib)**
   - **Dose**: 0.5 ml intramuscularly, multiple doses.
   - **Use**: Prevention of diphtheria, pertussis, tetanus, hepatitis B, and Haemophilus influenzae type b.
   - **MOA**: Combined immunization against multiple diseases.
   - **Adverse Effects**: Fever, injection site pain, irritability.