**Helminth Infections**

- Helminths = worms
- Multicellular organisms
- Infect very large numbers of humans and cause a broad range of diseases

**Classification**

1. **Cestodes** (Tapeworms) Beef tapeworm / fish tapeworm
2. **Nematodes** (Round worms) Ascaris, pinworm, whipworm,
3. **Trematodes** (Flukes) Schistosoma haematobium (bilharziasis)

**Anthelmintic drugs**

They are used to treat infections with parasitic worms. May act by causing:

1. Paralysis of the worm.
2. Damaging the worm leading to partial digestion or rejection by immune mechanisms.
3. Interfere with the metabolism of the worm.

**Benzimidazole**

- Albendazole
- Mebendazole
- Thiabendazole

**Mechanism of action**

- Binding to β-tubulin
- Inhibits microtubule (important for glucose uptake) synthesis
- Reduced glucose uptake
- Slow immobilization and death of the intestinal parasites

**Albendazole**

- Broad spectrum oral Anthelminthic.
- Drug of choice in: Hydatid disease and Cysticercosis
- On empty stomach for intraluminal parasites, but with a fatty meal for tissue parasites.

**Adverse Effects**

- **Short term** (1-3 days): Mild epigastric pain, N/D/V, headache
- **Long term use**: fever, alopecia, increased liver enzymes, pancytopenia.
**Mebendazole**

- Wide spectrum and low incidence of adverse effects
- It kills hookworm, pin worm, ascaris and trichuris eggs.
- Orally, chewable tablets, before or after meal.

**Adverse Effects**

- **Short term therapy**: Mild GI disturbance.
- **High dose**: Hypersensitivity reactions, Agranulocytosis, Alopecia, Elevation of liver enzymes.
- Contraindicated in pregnancy

**Thiabendazole**

- Rapidly absorbed.
- Should be given after meals, should be chewed.

**Adverse Effects**

- More toxic than other benzimidazoles
- GI disturbances, Headache, Drowsiness
- Pruritus, Psychoneurotic Symptoms.
- Irreversible liver failure.
- Fatal Stevens –Johnson syndrome

**Praziquantel**

- For Schistosome, Trematode, Cestode infections, swallowed without chewing because their bitter taste can induce vomiting.
- Undergoes extensive first-pass metabolization

**Adverse effects**

- Headache, Dizziness, N/V/D
- Pruritus, Arthralgia, myalgia,
- Mild and transient elevations of liver enzymes

**Mechanism of action**

Increase the permeability of the membranes of parasite cells to Ca\(^{2+}\)

induces contraction of the parasites

Paralysis, Dislodgement, and Death.
**Ivermectin**

- Drug of choice for strongyloidiasis
- It is also used for Scabies, Lice, filariasis
- Acts on the parasite's glutamate-gated Cl⁻¹ channel receptors

![Diagram: Cl⁻¹ influx increased hyperpolarization paralysis]

**Adverse Effects**

- Fatigue, dizziness, GI disturbance
- Mazotti reaction due to Killing microfilaria (fever, headache, dizziness, somnolence, hypotension, tachycardia, peripheral edema)
- Should not be used during pregnancy

**Diethyl carbamazine**

- Drug of choice for the treatment of filariasis and tropical eosinophilia.

**Adverse Effects**

- Fever, rash, headache, GI disturbance,
- Retinal hemorrhage
- Encephalopathy
- Lymphangitis and lymphadenopathy.

**Mechanism of action**

1. Immobilizes microfilariae
2. Alters their surface structure
3. Displaces them from the tissues
4. Makes them susceptible to destruction by host defense mechanism
Metrifonate

- Organophosphate compound
- Safe, low-cost
- For Schistosoma haematobium infections.
- Rapidly absorbed after oral administration.

Adverse Effects

- Mild and transient cholinergic symptoms: N, V, D,
- Bronchospasm, Headache, Sweating, Fatigue, Dizziness,

Mechanism of action

- Inhibits cholinesterase, causing temporarily paralyzes the adult worms, resulting in their shift from the bladder venous plexus to small arterioles of the lungs, where they are trapped, encased by the immune system, and die.
- The drug is not effective against S haematobium eggs; live eggs continue to pass in the urine for several months after all adult worms have been killed.

Pyrantel Pamoate

- Broad spectrum
- Poorly absorbed from GIT
- Very effective against luminal organisms (mature or immature forms).
- Result in paralysis of worms
- Activity: Pin worm, Ascariasis, Hookworm

Adverse effects:

- Infrequent mild transient GI disturbance
- Drowsiness, headache, insomnia
- Rash, fever

Piperazine

- Treatment of ascariasis cure rate 90% for 2 days treatment.
- Causes paralysis of ascaris by: blocking acetylcholine at myoneural junction, the live worms expelled by normal peristalsis.

Adverse Effects

- GI disturbance
- Neurotoxicity
- Allergic reactions
Niclosamide

- **Treatment** of most tapeworm infections.
- **Action**: Inhibition of oxidative phosphorylation
- **Adverse effects**: Mild, Infrequent transitory GI disturbance

Oxamniquine

- Alternative to praziquantel for the treatment of S mansoni infections.
- Is readily absorbed orally; it should be taken with food.
- The **mechanism** of action is unknown.
- **A/E**: dizziness, headache, drowsiness; nausea and vomiting, diarrhea, colic, pruritus, and urticaria

Doxycycline

- Tetracycline antibiotic
- Has activity against W bancrofti, onchocerciasis.
- Acts indirectly, by killing wolbachia.

Bithionol

- Drug of choice for the treatment of Fasciola Hepaticum (sheep liver fluke)