

**Drugs used against helminths:**

There are three major groups of helminths namely: nematodes (roundworms), trematodes (flukes) and cestodes (tapeworms). Anthelmintics either kill worms or cause their expulsion from the body, without causing any significant damage to the host.

**Classification of Anthelmintic Drugs**

Classification of anthelmintics based on chemical structure

- Piperazines: Diethylcarbamazine citrate (DEC), Piperazine citrate.
- Benzimidazoles: Albendazole, Mebendazole, Thiabendazole.
- Heterocyclics: Oxamniquine, Praziquantel.
- Natural products: Ivermectin, Avermectin.
- Vinyl pyrimidines: Pyrantel, Oxantel.
- Amide: Niclosamide.
- Nitro derivative: Niridazole.
- Imidazo thiazole: Levamisole.

**Mebendazole**

Mebendazole is wide spectrum of anthelmintic activity and a low incidence of adverse effects. It is a drug of choice in the treatment of infections by whipworm eggs, pinworm, hookworms, and roundworm.

Mechanism of action:

Mebendazole probably acts by inhibiting microtubule synthesis. Its bind with parasite 'β-tubulin' and inhibit its polymerization. In addition mebendazole probably blocks glucose uptake in parasite and depletes its glycogen stores.

Note: Mebendazole is teratogenic in animals and therefore

- contraindicated in pregnancy.
- It should be used with caution in children younger than 2 years.

**Albendazole**

Albendazole, a broad-spectrum oral anthelmintic agent.

Mechanism of action: Inhibits microtubule synthesis and glucose uptake by the parasite.

Uses: – Used for the treatment of ascariasis, trichuriasis, hookworm and pinworm infections – Used for the treatment of Hydatid disease,

**Diethyl carbamazine citrate (DEC)**

its is the first drug for filariasis.

**Thiabendazole**

It is benzimidazole, it is rapidly absorbed orally . It can also get absorbed through the skin. Thus, could be applied in creams.

**Ivermectin**, is the drug of choice for the treatment of onchocerciasis (river blindness) caused by *Onchocerca volvulus* and for cutaneous larva migrans and strongyloidiasis.

**Niclosamide**

It is useful for the treatment of adult tape worm (cestodes) infestation. Mechanism of action: Adult worm is rapidly killed by inhibition of the oxidative phosphorylation or stimulation of ATPase activity. It has no effect on ova • Pharmacokinetics: It is not absorbed from the gut, thus Neither drug nor its metabolites are found in the blood or urine.

It is used in treatment of *T. Saginata* (Beef tape worm), *T. solium* (pork tapeworm), *Diphyllobothrium latum* (fish tapeworm) . In case of *T. solium* after 2 hrs of treatment, purge of magnesium sulphate should be given to eliminate all mature segments.

Adverse effects: Mild, infrequent and transitory GI disturbances • Alcohol consumption should be avoided • Not indicated in children under 2 years of age or pregnancy

**Piperazine**

Piperazine inhibits neurotransmitter function, causing helminth paralysis, they are then passed in the stool.. It is an oral agent, used in ascariasis and threadworm (*Enterobius vermicularis*) infection.

**Antimalarial drugs**

Malaria is a mosquito-borne infectious disease that affects humans. Malaria causes symptoms that typically include fever, tiredness, vomiting, and headaches

**Parasite lifecycle**

Malaria parasites spread by successively infecting two types of hosts: female *Anopheles* mosquitoes and humans as follow:

- 1.the mosquito, that ingests gametocytes the sexual form of the parasite when feeding on an infected human.
- 2.Gametocytes, which are both male and female, mate within the gut of the mosquito and undergo meiosis and then migrate through the midgut wall of the mosquito and form an oocyst, within which thousands of sporozoites develop.

3. These oocysts are then injected into a human during the next blood meal(s), where they rapidly make their way to the liver and infect hepatocytes and begin asexually (mitotically) replicating.

4. The liver schizonts rupture, releasing thousands of merozoites into the blood where they invade red blood cells.

5. The parasite begins replicating mitotically, progressing new daughter merozoites per schizont. The red blood cells then burst producing the characteristic fever cycle that embodies the clinical manifestations of the disease.

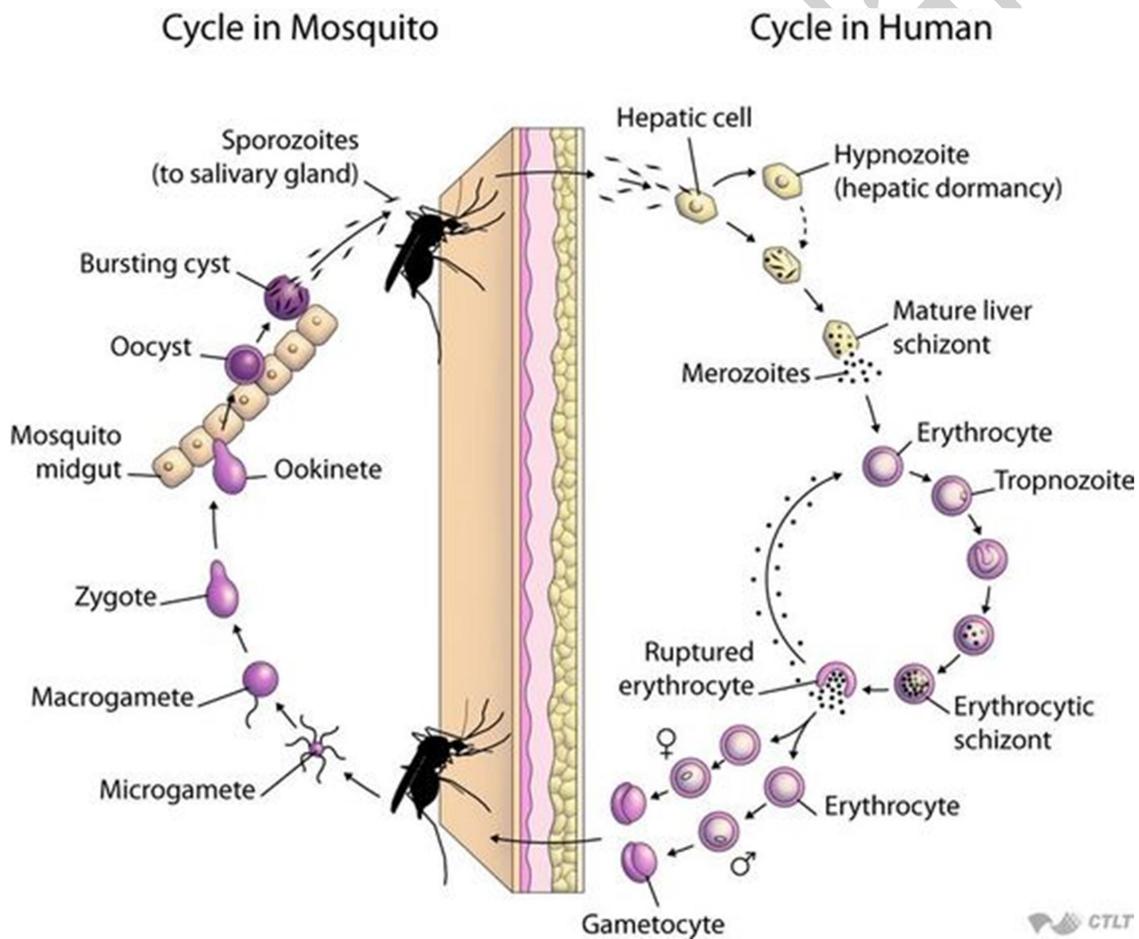


Figure: life cycle of malaria.

**treatment and prophylaxis of malaria**

Classification of anti malarial agents:

The anti malarial agents classified according to their chemical structure into

- 4-Aminoquinolines : Chloroquine, Amodiaquine
- 8-Aminoquinoline: Primaquine, Bulaquine
- Cinchona alkaloid : Quinine
- Sesquiterpine lactones: Artesunate, Arteether, Artemether
- Biguanides: Proguanil
- Diaminopyrimidine : Pyremethamine
- Quinoline methanol : Mefloquine
- Sulfonamides : Sulfadoxine Sulfamethopyrazine
- Phenanthrene methanol : Halofantrine
- Tetracycline: Doxycycline,
- Acridine : Mepacrine
- Naphthoquinone
- Atovaquone

No single drug that can eradicate all forms of the parasite's life cycle has been discovered or manufactured yet. Therefore, 1 or more classes of drugs often are given at the same time to combat malarial infection synergistically.

**Common antimalarial drugs**

**Chloroquine** — Chloroquine was the first drug produced on a large scale for treatment and prevention of malaria infection.

Mechanism of action: Chloroquine is an anti-**malaria** medicine that works by interfering with the growth of parasites in the red blood cells of the human body.

**To treat malaria:** Chloroquine is usually given for 3 days. the usual dose to treat the infection is approximately 25 mg/kg administered in a 3-day course

**To prevent malaria:** Start taking the medicine 2 weeks before entering an area where malaria is common. Chloroquine is usually taken once per week on the same day each week. Continue taking the medicine regularly during your stay and for at least 8 weeks after you leave the area

**Primaquine** is used for radical cure of malaria due to Plasmodium vivax and P. ovale (destruction of liver hypnozoites). Primaquine phosphate should be administered concurrently in order to eradicate the exoerythrocytic parasites in a dosage of 1 tablet (equivalent to 15 mg base) daily for 14 days

**ATOVAQUONE-PROGUANIL (Malarone®)**

Contain 250 mg atovaquone plus 100 mg proguanil hydrochloride

**Prevention:** 1 tablet daily; start one day before entering malaria-endemic area and continue during exposure and for 7 days after leaving

**Treatment:**

1,000 mg atovaquone AND 400 mg proguanil (4 tablets) once daily × 3 days

**DOXYCYCLINE**

Prevention: 1 tablet (100 mg) once daily; start 1 day before entering malaria-endemic area and continue during exposure and for 4 weeks after leaving

Treatment: 1 tablet (100 mg) or 100 mg IV twice daily for 7 days.

**MEFLOQUINE (Lariam®, Apo-Mefloquine)****Prevention:**

Start at least 1 week (preferably 2–3 weeks) before departure and continue during exposure and for 4 weeks after leaving

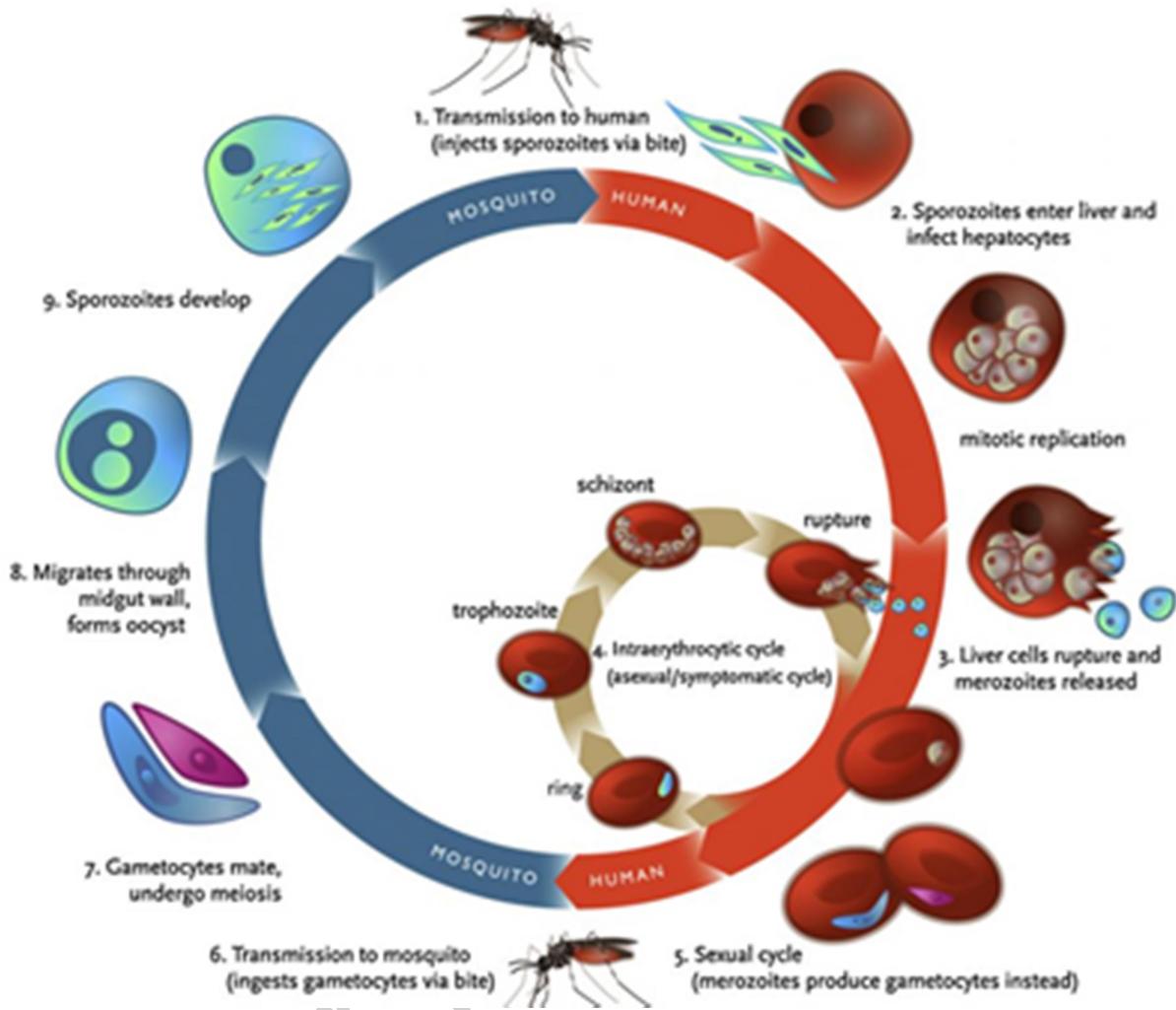


Figure: life cycle of malaria.

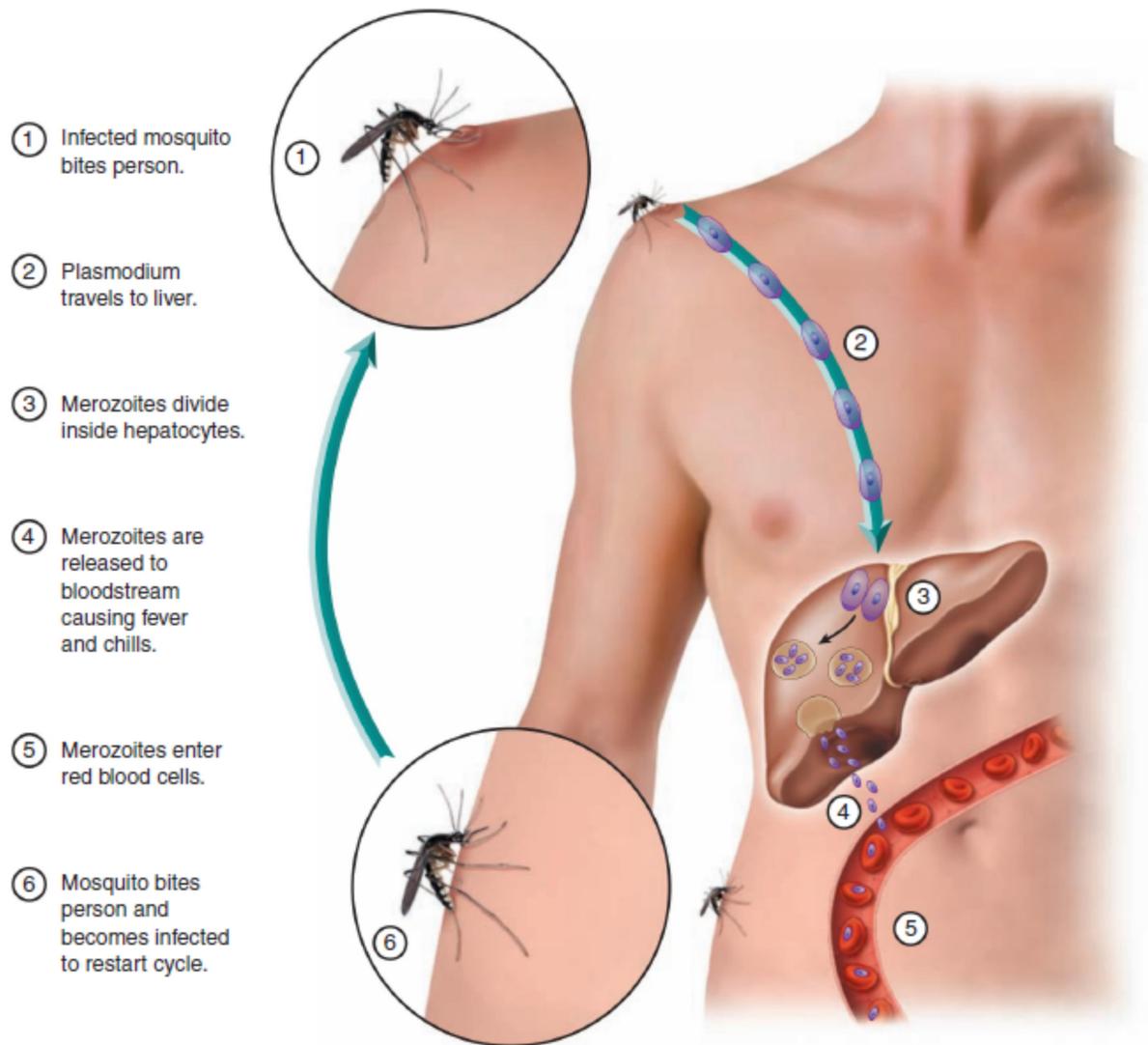


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