7- *Trichuris trichiura*

Trichuris trichiura = Trichocephalus trichiuris

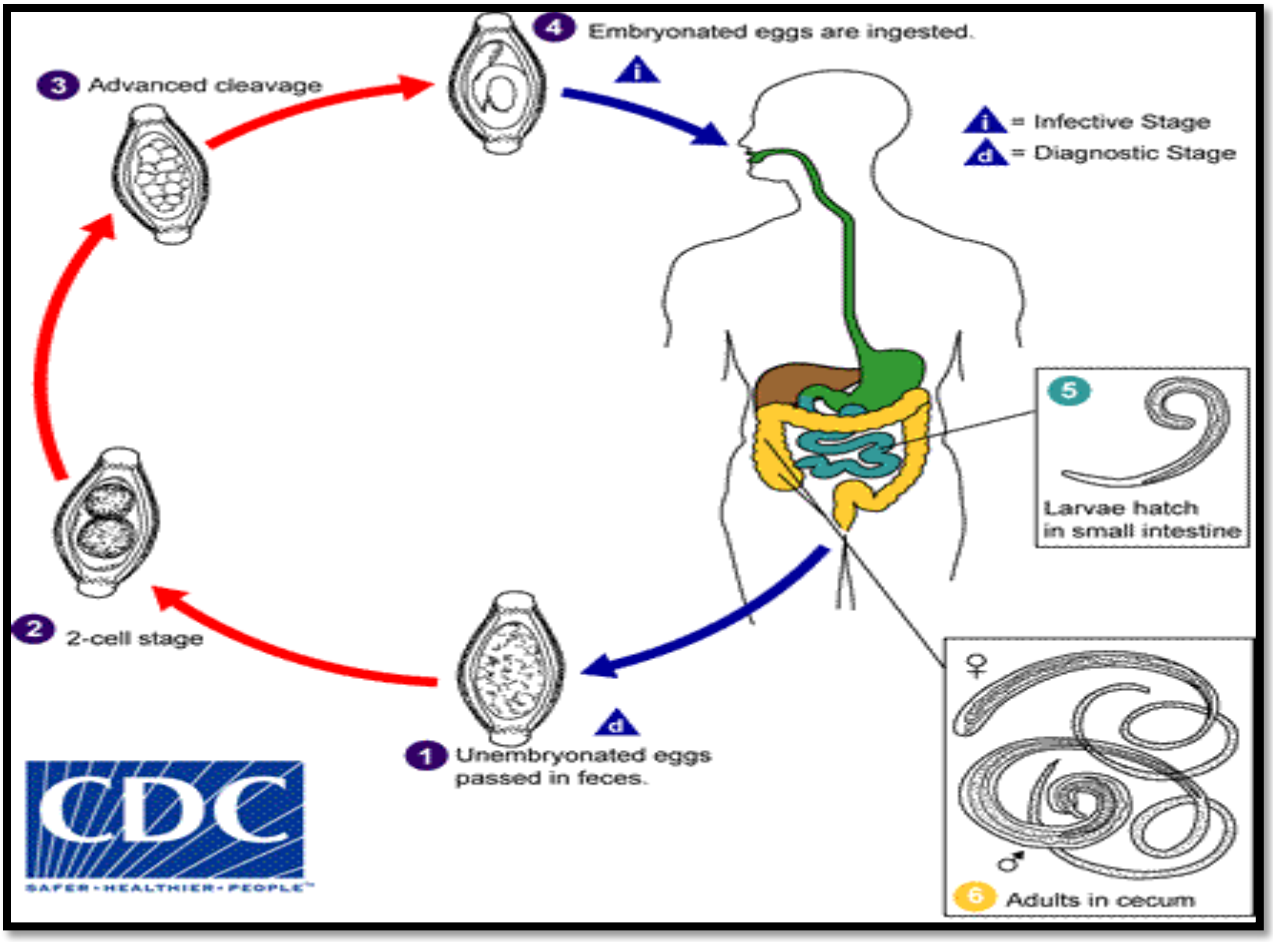
Disease: trichuriasis

- Target organ: large intestine.

- Commonly name: *whipworm* , the shape of the worm like a whip with wider "handles" at the posterior end.

Life cycle

Adult parasite in the large intestine of human, eggs are deposited from human feces to soil, they become embryonated and enter the "infective" stage and ingested and hatch in the human small intestine exploiting the intestinal microflora as hatching stimulus. The infective larvae penetrate the villi and continue to develop in the small intestine. The young worms move to the caecum and penetrate the mucosa, and there they complete development to adult worms in the large intestine.



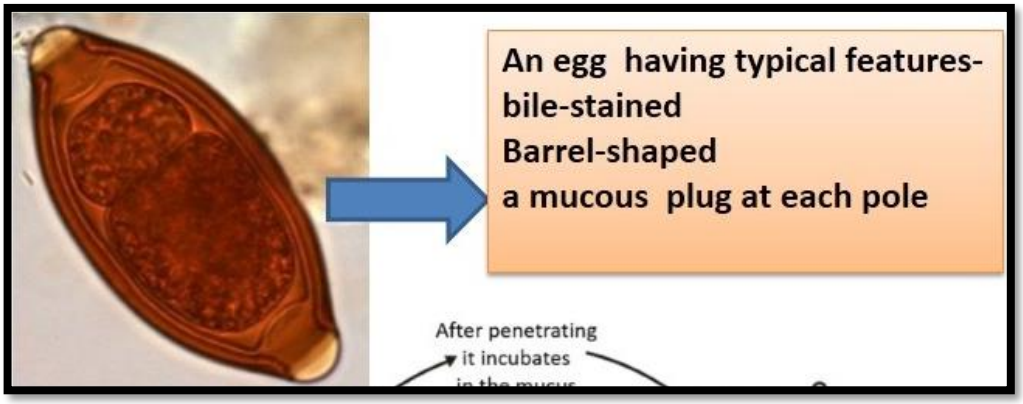
Life cycle of Trichuris trichiura inside and outside the human body

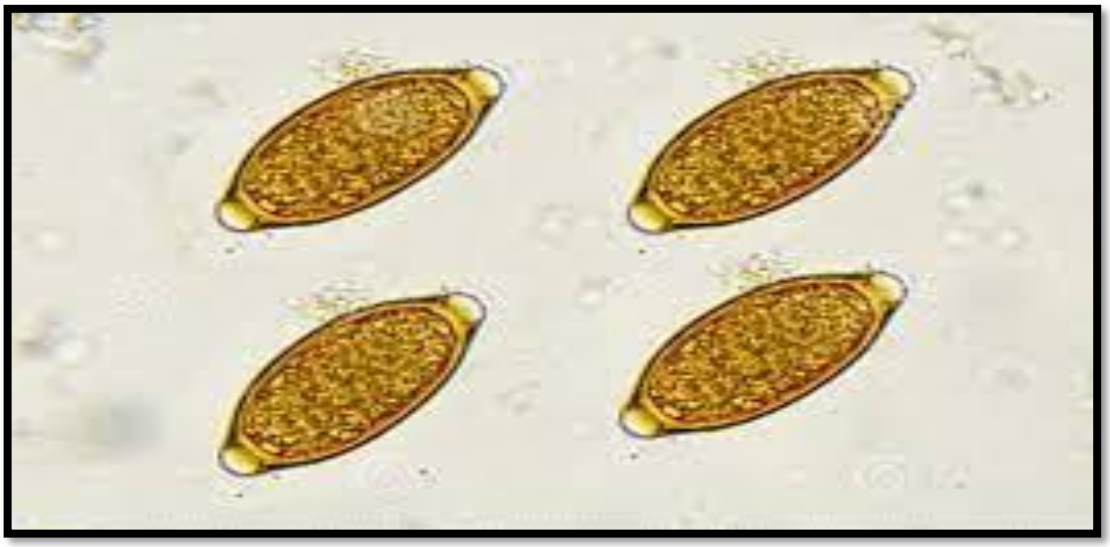
Diagnosis

A- The Kato-Katz thick-smear technique is used for identification of the *Trichuris trichiura* eggs in the stool sample. Eggs will appear 1- barrel-shaped and 2- unembryonated, having 3- bipolar plugs and a 4- smooth shell.

B- Concentration technique: to collect eggs when eggs concentration is low in light infections.

C- Colonoscopy: diagnose trichuriasis { threadlike, whip-like end }. { used when a few male worms and no eggs in the stool sample}.


An egg having typical features-
bile-stained
Barrel-shaped
a mucous plug at each pole
After penetrating
it incubates



Treatment

1- Albendazole.

2- Mebendazole.

If eggs can not be found in the stool, diarrhea may be caused by parasitic protozoa like

Signs and symptoms

Heavy infestations may have bloody diarrhea, Normocytic hypochromic anemia (iron-deficiency anemia), Vitamin A deficiency.

Coinfection (cross infection , misdiagnosis) of *T. trichiura* with:

1- *Schistosoma mansoni*, , 2-malaria, 3- Sub-Saharan Africa, 4- *Entamoeba histolytica*, 5- *Giardia lamblia*.

8- *Thelazia*

Disease: **Thelaziasis**

Common name : "eyeworms".

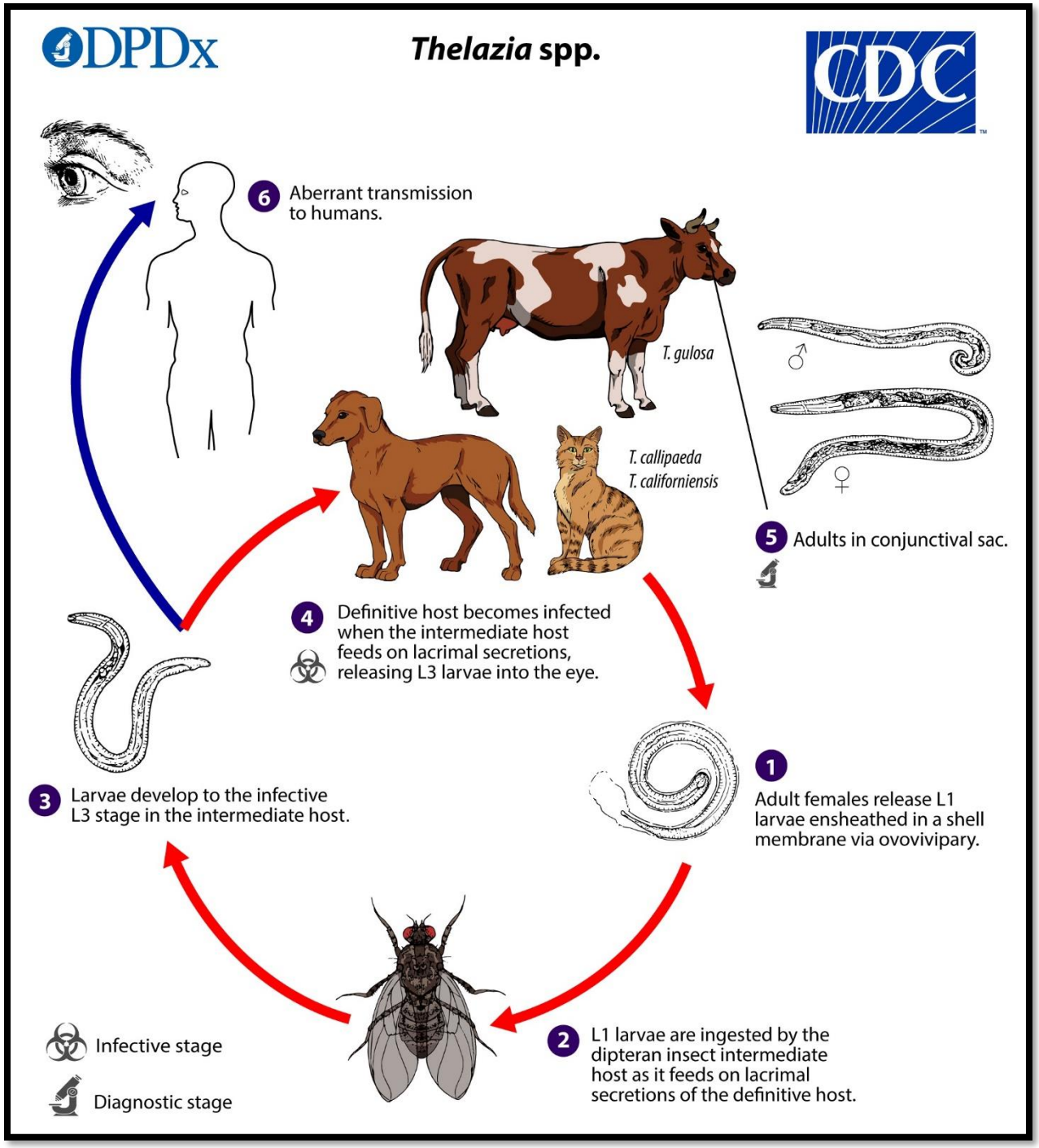
Target organs: adults parasite in (eyes, eyelids, tear ducts, etc.) of humans.

Infective stage: L3 larvae inside the intermediate host (flies).

Diagnostic stage: adult parasite in eye.

Life cycle

Adults reside in the conjunctival sac of the definitive host where the ovoviviparous females release first-stage (L1) larvae ensheathed in a shell membrane[1]. L1 larvae are ingested by the face fly intermediate host during feeding on tears and lacrimal secretions[2] The encapsulated larvae molt twice to become infective L3 larvae[3] . The fully developed L3 larvae break out of the capsules and migrate to the fly's mouthparts, where they remain until the fly feeds on the tears of the definitive host. The larvae invade the conjunctival sac of the definitive host upon the fly intermediate host's feeding[4] Humans may also serve as aberrant definitive hosts following exposure to an infected fly intermediate host in the same manner[5]


DPDx
Thelazia spp.
CDC
6 Aberrant transmission to humans.
T. gulosa
T. callipaeda
T. californiensis
5 Adults in conjunctival sac.
4 Definitive host becomes infected when the intermediate host feeds on lacrimal secretions, releasing L3 larvae into the eye.
3 Larvae develop to the infective L3 stage in the intermediate host.
1 Adult females release L1 larvae ensheathed in a shell membrane via ovovivipary.
2 L1 larvae are ingested by the dipteran insect intermediate host as it feeds on lacrimal secretions of the definitive host.
Infective stage
Diagnostic stage

Signs and symptoms

Thelazia causes watery eyes (epiphora), conjunctivitis, corneal opacity, or corneal ulcers (ulcerative keratitis).

Diagnosis

Examining the eyes and nearby tissues for the worms. Adult *Thelazia* are very active.

Treatment

1- Removal of the worm is suggested.

2- Topical treatment with cocaine or thiabendazole have also been reported to kill the worms in human cases.

9- *Loa loa*

Common name: "eye worm",

Target organ : conjunctiva of the eye.

The disease: loiasis

L. loa is one of three parasitic filarial nematodes that cause subcutaneous filariasis in humans.

The *L. loa* adult worm which travels under the skin can survive up to 10–15 years, causing inflammations known as Calabar swellings, under the skin, the female deposits the microfilariae which can develop in the host's blood, the microfilariae travel in the peripheral blood during the day and migrate into the lungs at night.

Lifecycle

The human is the definitive host, in which the parasitic worms attain sexual maturity, mate, and produce microfilariae. The flies serve as intermediate hosts in which the microfilariae undergo part of their morphological development, and then are borne to the next definitive host.

Signs and symptoms

1- Allergic inflammations called Calabar or Cameroon swellings, these swellings can be painful, as they are mostly found near the joints.

2- Chronic abscesses when the worms are dying.

3- Blindness.

4- Other tissues in which this worm can be found includes: the penis, testes, nipples, bridge of the nose, kidneys, and heart. The worms in these locations are not always externally visible.

Diagnosis

1- the presence of microfilariae in the blood, 2- the presence of a worm in the eye 3- presence of skin swellings.

4- Giemsa stain is the most commonly used diagnostic test that uses a thick blood smear to count the microfilariae, microfilariae can also be observed in urine and saliva samples.

- Patients have a higher number of eosinophils, and high IgE levels

- Blood samples are taken between 10 am and 2 pm because of the microfilariae are migration during the day

10- *Wuchereria bancrofti*

- Common name: Lymphatic filariasis (elephantiasis)

- cause swelling in the arms, legs, breasts, or genitals.

Target organ: lymphatic system.

- The disease is diagnosed by microscopic examination of blood collected during the night. The blood is typically examined as a smear after being stained with Giemsa stain.

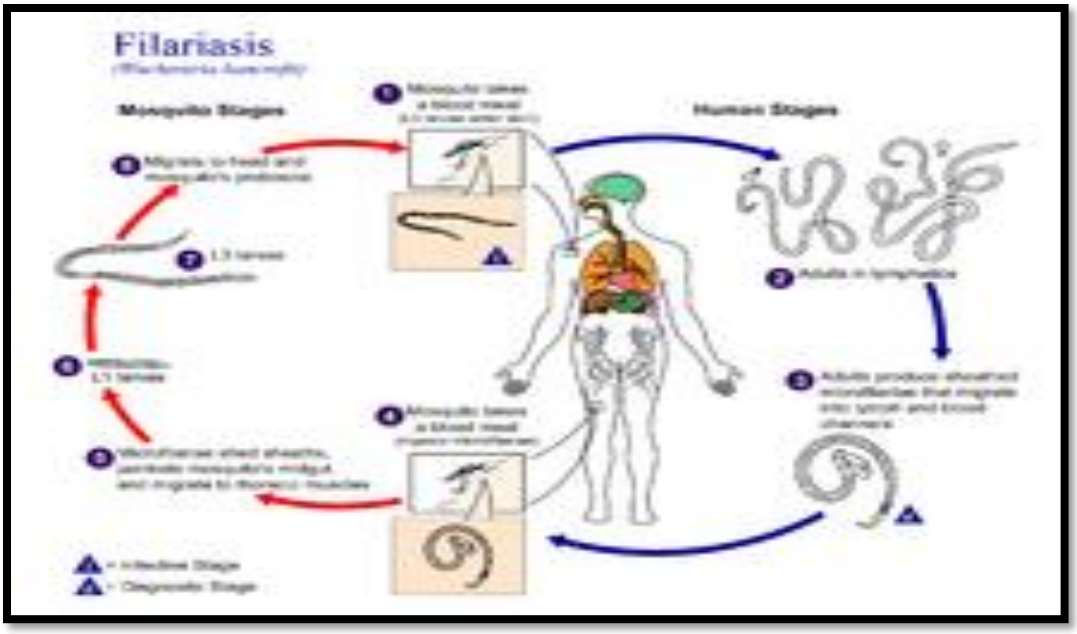
- Testing the blood for antibodies against the disease may also permit diagnosis.

Life cycle

Wuchereria bancrofti, a parasite that causes lymphatic filariasis

transmitted by bites from infected mosquitoes.

The disease itself is a result of a complex interplay between several factors: the worm, the bacteria within the worm, the host's immune response, and the numerous opportunistic infections and disorders that arise. The adult worms only live in the human lymphatic system. The parasite infects the lymph nodes and blocks the flow of lymph throughout the body; this results in chronic lymphedema.



Signs and symptoms

The most symptom of lymphatic filariasis is elephantiasis, *Wuchereria bancrofti* can affect the arms, breasts, legs, scrotum, and vulva (causing hydrocele formation),

Elephantiasis of the legs due to filariasis.

Diagnosis

By finding the microfilariae via microscopic examination. This may be difficult, as in most parts of the world, microfilariae only circulate in the blood at night. For this reason, the blood has to be collected nocturnally ليلي. The blood sample is typically in the form of a thick smear and stained with Giemsa stain. Testing the blood serum for antibodies against the disease may also be used.

Treatment

Anthelmintic

1- Albendazole is being used with ivermectin to treat the disease.

2- Albendazole is used with diethylcarbamazine.