



# **Filarial Worms, *Loa loa* and *Onchocerca volvulus***

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# Filarial Worms Causing Subcutaneous Filariasis

- *Loa loa* common name is African eye worm
- **Distribution:** It is limited to **West** and **Central Africa**.
- **Habitat:** In human, the **adults** are found in **subcutaneous tissues** and the **microfilariae** are found in the **blood**.

## Morphology:

- Adult worm live in **subcutaneous tissues**, through which they migrate. They may also occur in the **subconjunctival tissue**.
- The microfilariae are **sheathed** with column of nuclei extending **completely** to the tip of the tail.
- They **appear** in peripheral circulation only during the day from 12 noon to 2 pm (diurnal periodicity).

# Life cycle of *Loa loa*

(1) The *Chrysops* takes a **blood meal** and **infective L3 larvae** enter the bite wound.

(2) The larvae are carried in the **circulation** to the **subcutaneous tissue** where they moult and develop into mature **adult worms** over 6–12 months.

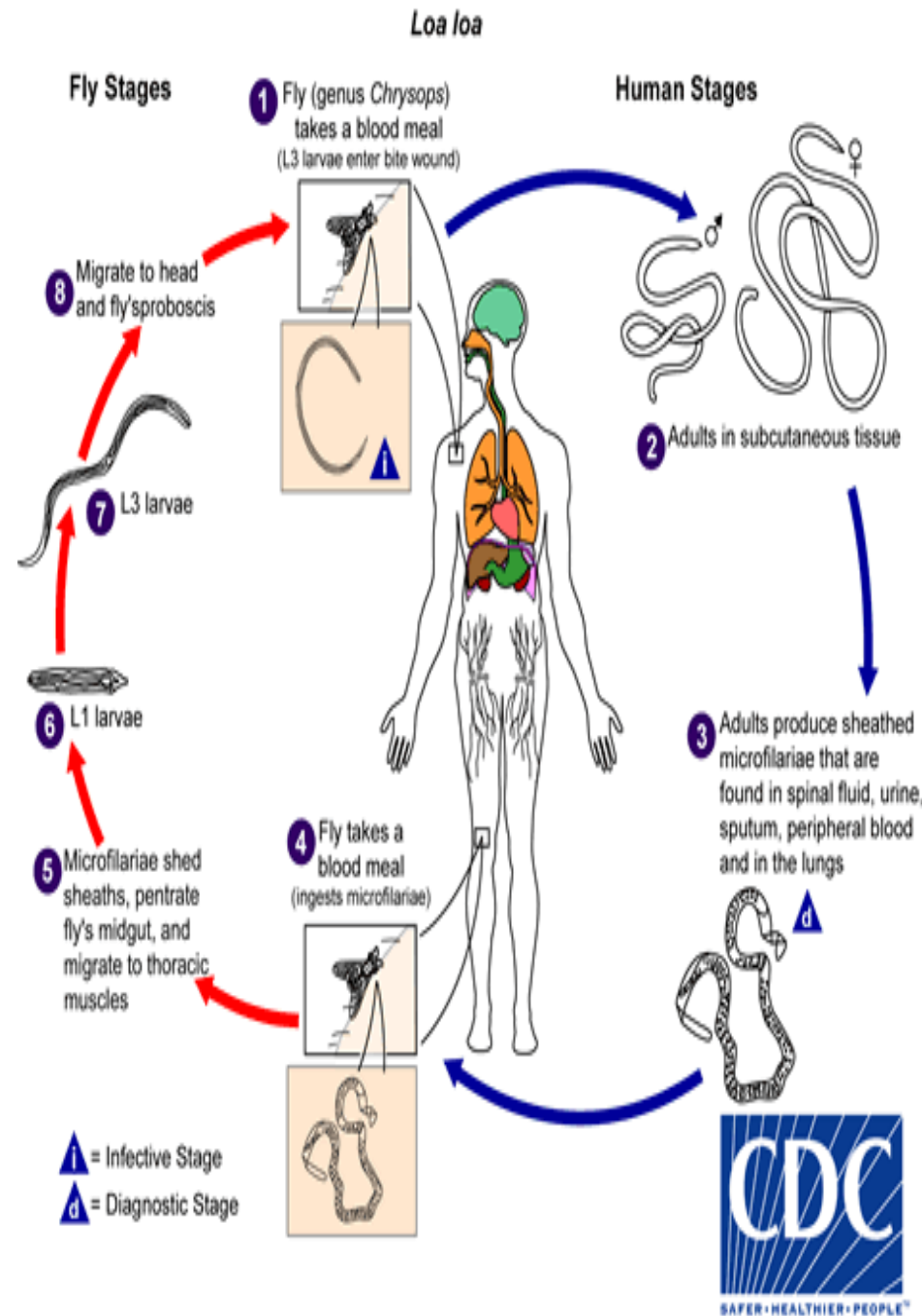
(3) Adult **females** produce **sheathed microfilariae**.

(4) The microfilariae are **ingested** by *Chrysops* during its blood meal.

(5–7) They **cast off their sheaths**, penetrate the stomach wall and reach **thoracic muscles** where they develop into infective larvae.

(8) The infective larvae migrate to the **head** and **proboscis** of the fly.

- Life cycle is completed in **2 hosts**. Human is the **definitive** host. The **intermediate** host or vector is the day biting flies (**mango flies**) of the genus *Chrysops* in which the microfilariae develop into the **infective third-stage larvae**.



- **Pathogenesis and Clinical Features of Loiasis**

The adult **migration** through **subcutaneous** tissues causes **temporary inflammation**, which appear as **swellings**, of up to 3 cm in size, usually seen on the extremities.

**Calabar swellings** or **fugitive swellings**. Swellings disappear in a few days, only to reappear elsewhere.

**Ocular manifestations** occur when the worm reaches the subconjunctival tissues during its migration.

- **Diagnosis**

1. Microscopic examination
2. Biopsy



**Fugitive swellings**



**Subconjunctival loiasis**

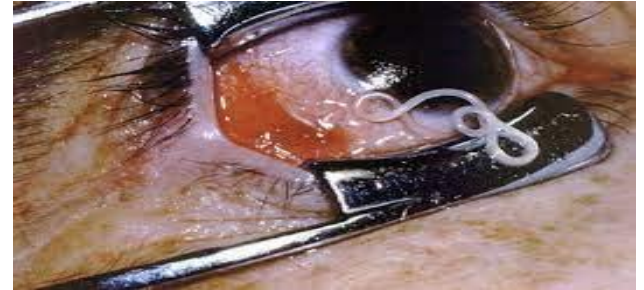
# Loiasis

- **Treatment**

**Diethylcarbamazine citrate** (DEC) is effective against both the **adult** and the **microfilarial** forms of *Loa loa*. Severe adverse reactions may develop following the sudden death of large numbers of microfilariae after giving DEC.

Administration of **corticosteroids** at the same time minimizes such reaction.

**Surgical removal** of the migrating **adult worms** that are found in the **conjunctiva** or under the skin.



- **Prevention and Control**

1. **Avoiding areas** where *Chrysops* are found.
2. Avoid vector bites by using **insect repellents** and **protective clothings**.
3. Treatment of positive cases.

# *Onchocerca volvulus*

- **Distribution**

Mainly in **tropical Africa, Central and South America**. A small focus of infection exists in **Yemen and south Arabia**.

- **Habitat**

The **adult** worms are in **nodules** in **subcutaneous connective tissue** of infected persons.

- **Morphology**

The microfilariae are **unsheathed** and non-periodic.

The microfilariae are found in the **skin** and **subcutaneous lymphatics** in the vicinity of parent worms.

They may also be found in the **eye**.

# Life cycle of *Onchocerca volvulus*

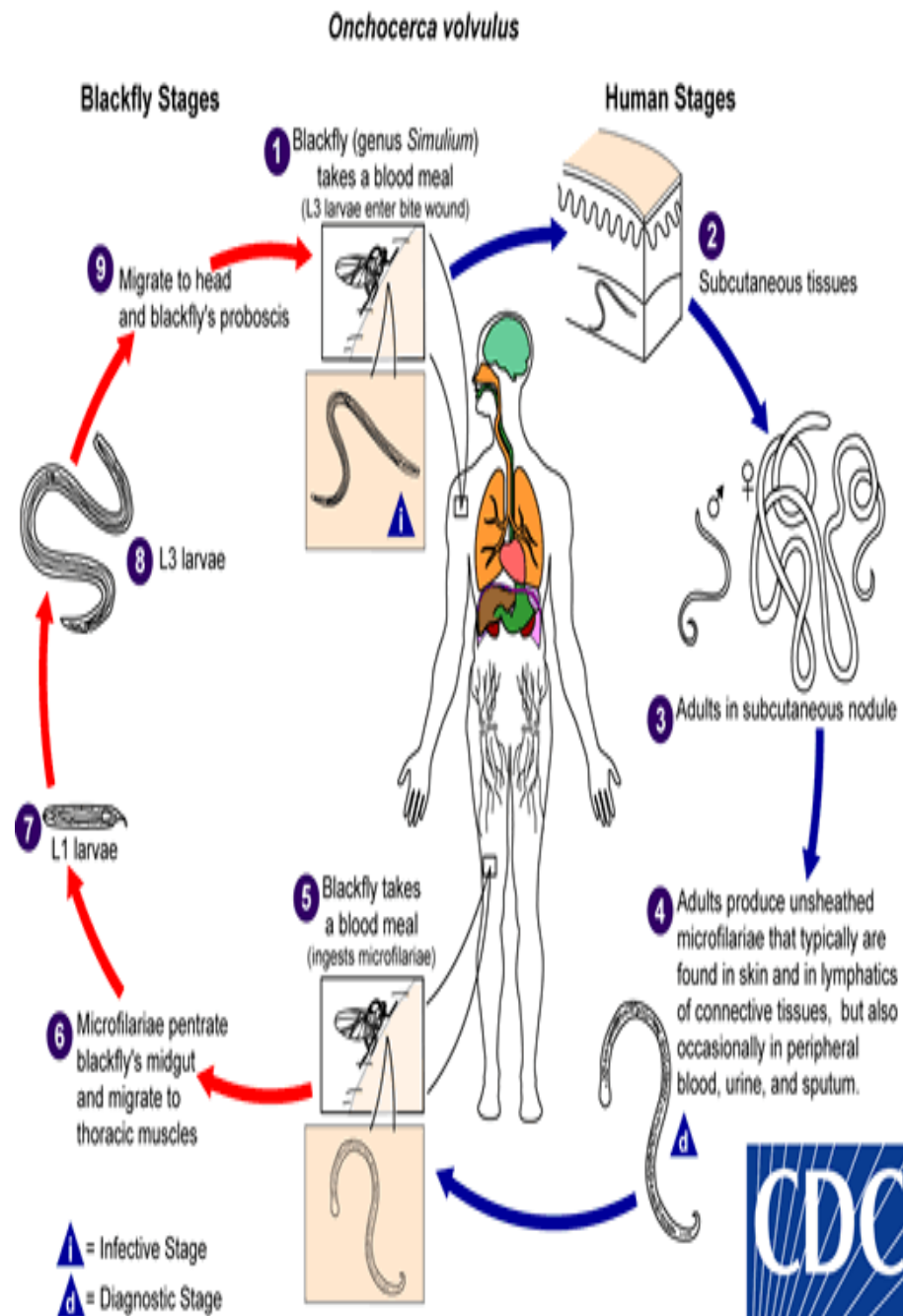
(1) The vector, *Simulium* (black fly), takes a blood meal and L3 larvae enter the bite wound.

(2–3) The larvae travel to the subcutaneous tissue and develop into adults which are found in the subcutaneous nodule.

(4) Adult females produce unsheathed microfilariae that are found in skin and in lymphatics of connective tissue.

(5–9) The female black flies are 'pool feeders' and suck blood and tissue fluids. Microfilariae from the skin and lymphatics are ingested and develop within the vector, becoming the infective third-stage larvae, which migrate to its mouth parts.

Life cycle is completed in 2 hosts. Humans are the only definitive host. Day-biting female black fly of the genus *Simulium* is the intermediate host.



# Pathogenesis and Clinical Features of Onchocerciasis (River blindness)

- Pathogenesis **depends on** the **host's allergic** and **inflammatory** reactions to the adult worms and microfilariae.
- The **subcutaneous nodule** or **onchocercoma** containing adult worms is a circumscribed, firm, non-tender and it is formed as a result of fibroblastic reaction around the worms.
- Nodules measure from a **few mm to about 10 cm**. They tend to occur over anatomical sites where the **bones are superficial**, such as the scalp, scapulae, ribs, elbows, iliac crest, sacrum and knees. The nodules are painless.
- Microfilariae cause **lesions in the skin and eyes**.
- The **skin lesion** is a dermatitis with pruritus, pigmentation, atrophy and fibrosis.
- **Ocular manifestations** range from photophobia to gradual blurring of vision, progressing to blindness.



**Onchocercoma**



**Onchocerciasis lesions in the eyes**



# Onchocerciasis

- **Diagnosis:** Microscopic examination, Biopsy, Molecular diagnosis.
- **Treatment**

**Ivermectin** is the main stay of treatment.

**Diethylcarbamazine citrate** (DEC) and suramin have also been used.

**Surgical excision** is recommended when nodules are located on the head due to the proximity of the worm to the eyes.

## Prevention and Control

1. Vector control (**larvicides**)
2. **Insect repellents** and **protective clothing**
3. Treatment of patients