Bancroftian Filariasis

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➢Definition:

Bancroftian filariasis is a **mosquito-borne disease** caused by the white slender filarial nematode ***Wuchereria bancrofti (W. bancrofti***) that lives in **lymphatics**, periodically shedding **microfilariae** (larvae) into peripheral blood, and often causes **elephantiasis** by **blocking lymphatic drainage.**

Geographical distribution:

- Tropical and subtropical countries.

- In Egypt it is endemic in some localities, in **Damietta** (Ezbet-El-Borg), **Dakahlia** (Meet-Ghamr) and **Sharkia** (Hehya) Governorates.

1- Adult:

- Thread - like in shape.

- Creamy white in colour.

- Anterior and posterior ends of male & female are provided with sensory papillae.

- Mouth: simple without lips and buccal cavity.

- Oesophagus: cylindrical.

Male:

- About 4 cm in length and 0.2 mm in diameter.

- Curved posterior end.

- 2 unequal and dissimilar spicules.

Female:

- About 8 cm in length and 0.4 mm in diameter

- 2 sets of genitalia.

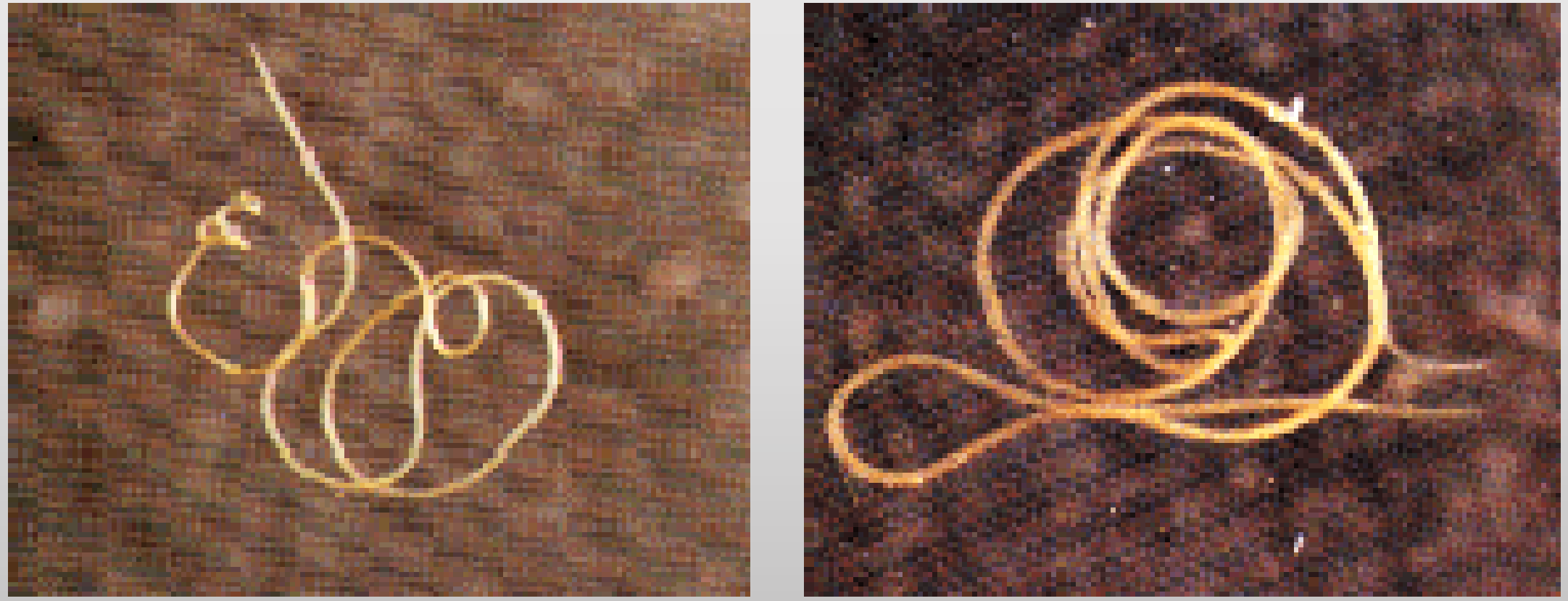
- Vulva anterior in the oesophageal region.

- Viviparous give birth to microfilaria

➢ Morphology:

1) Adult worm:

- The female worm is viviparous (laying microfilariae).



Adult male (left) and female (right) worms of Wuchereria bancrofti.

2) Microfilaria:

- 300 x10 µ.
- Sheathed, the sheath is loose and redundant (project beyond anterior and posterior ends).
- Bluntly rounded anterior end.
- Tapering posterior end and free of nuclei.
- Nocturnal periodicity (maximum at 12 a.m.).
- Microfilariae do not multiply or undergo any development in human. Their lifespan is about 2-3 months.

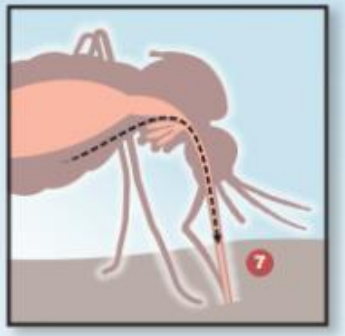
Microfilaria:

Adult worm:

The Life Cycle of Lymphatic Filariasis

MOSQUITO STAGES

7 Larvae migrate to a mosquito's head and proboscis.

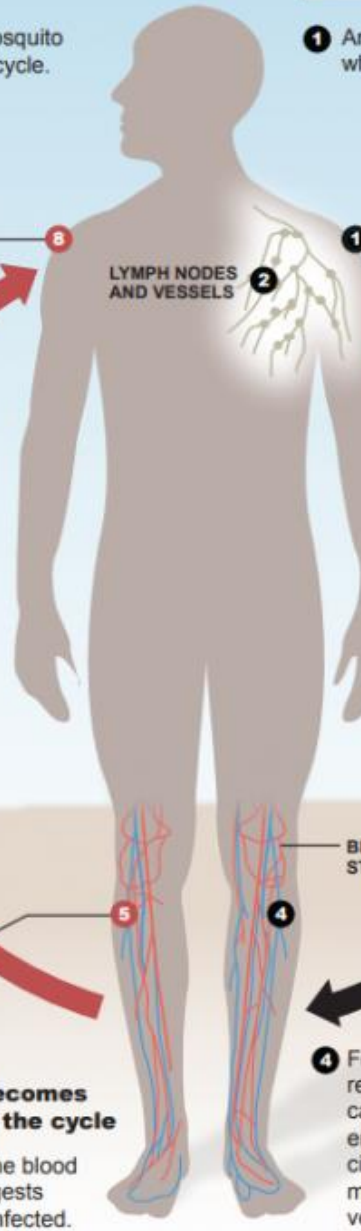


8 An infected mosquito continues the cycle.

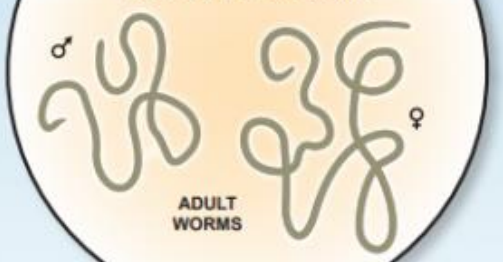
HUMAN STAGES

1 An infected mosquito deposits larvae on the skin while biting, and the larvae enter the wound.

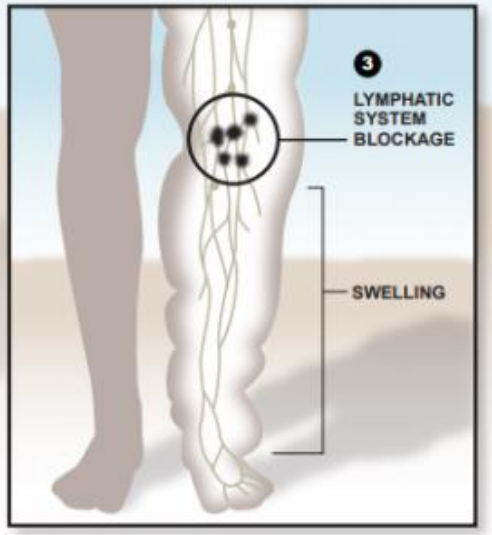
An infected mosquito starts the cycle



2 Larvae migrate to vessels and nodes of the lymphatic system, where they develop into thread-like adult worms.



3 Adult worms, which typically live five to seven years, damage the lymphatic system, causing infections that result in blockages, swelling, and fevers.

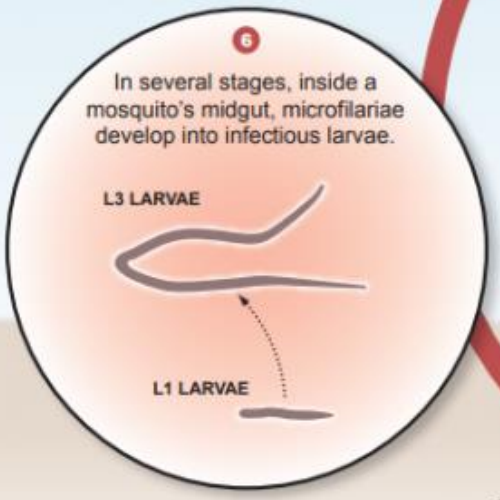


4 Fertilized female worms release embryonic offspring, called microfilariae, that enter the blood stream. They circulate at night, when mosquitoes bite, in blood vessels near the skin.

Another mosquito becomes infected, continuing the cycle

5 A mosquito, feeding on the blood of an infected person, ingests microfilariae, becoming infected.

6 In several stages, inside a mosquito's midgut, microfilariae develop into infectious larvae.



SOURCE: Centers for Disease Control and Prevention

The Carter Center / Graphic by Al Granberg

➢ Life cycle:

1. **Habitat:** adult in lymph vessels and lymph nodes especially that draining **lower part of the body**, while microfilariae are in the peripheral blood.
2. **Definitive host:** Man
3. **Intermediate host:**. The main vectors are *Culex mosquitoes*, *(Anopheles* and Aedes).

5. Infective stage: infective filariform larva is infective to man.

6. Mode of infection: Humans get infection by bite of mosquito carrying the infective filariform larvae (L3).

➢ Microfilarial periodicity:

- In India, China and many other Asian countries, microfilariae show a **nocturnal periodicity** in peripheral circulation (between **10 pm- 4 am**).

- Periodicity correlates with the night biting habit of the main mosquitoes vector (Culex and Anopheles). Periodicity may also be linked with the sleeping habits of human.

➢ Pathogenicity:

Disease: Bancroftian filariasis, wuchereriasis, elephantiasis.

- The various pathogenic complications of this disease are mainly due to the **adults**, the microfilariae seem to have no pathogenic manifestations although they have been associated with **granulomatous inflammation** of the lung, liver and spleen.

- It occurs due to **blockage** of lymph vessels and lymph nodes by the adult worms. The blockage may be due to **mechanical irritation** by the moving worms or **inflammatory reaction** to worm antigens and their secretions.

➢ Clinical picture:

I- Asymptomatic filariasis: this occurs in **endemic** areas, there is **microfilaria** in the blood **without** clinical manifestations.

II- Symptomatic (Classical filariasis): The main pathological lesions are:

1- Acute inflammatory manifestations: Due to toxic products of living or dead adult worms with superimposed secondary bacterial infection, it occurs in recurrent attacks and **is manifested by**:

-Lymphangitis of the genitalia (funiculitis, epididymitis, orchitis and scrotal oedema) with swelling and redness of affected parts.

-Lymphadenitis especially in the groin and axilla.

- Fever, chills, headache, vomiting and malaise.

-Leucocytosis and eosinophilia.

2- Chronic obstructive manifestations:

Due to **fibrosis** following the inflammatory process , the **coiled worms** inside lymphatics and **endothelial proliferation**, this may result in:

- **Dilatation of lymphatics** leading to varicosities especially in genital organs and abdominal wall as hydrocele, scrotal lymphoedema and lymphatic varices.

- **Rupture of distended lymphatics** (varicosities)

e.g. in urinary passages ⟶ chyluria, the peritoneal cavity ⟶ chylous ascitis, tunica vaginalis of testis ⟶ chylocele, intestine ⟶ chylous diarrhea.

- **Elephantiasis: oedema** of the affected part followed by **hypertrophy** of the skin and subcutaneous connective tissue, the **part** become hard, tender and the **skin** becomes thickened, rough, stretched and fissured lead to secondary bacterial infection.
- It is common in lower limbs and genitalia (scrotum, penis and vulva) rare in arms and breasts.

***Wuchereria bancrofti* elephantiasis of lower limb**

III. Occult filariasis: Pathogenesis:

- It occurs as a result of **hypersensitivity reaction to microfilarial antigens** not to lymphatic affection.
- Microfilariae are **not** present in blood, as they are destroyed by the allergic inflammatory reactions in the tissues.
- Occult filariasis is characterized by **absence** of classical manifestations of lymphatic filariasis. The **most common presentation** is tropical pulmonary eosinophilia (TPE), other manifestations as hepatosplenomegaly, glomerulonephritis, and arthritis have been reported

Tropical pulmonary eosinophilia (diffuse filarial lung disease):

-It is caused by immunologic **hyper-responsiveness** of the host to microfilarial antigens → local destruction of microfilariae in the pulmonary vascular system and diffuse interstitial lung disease.

-**Clinically** there is dyspnea, cough, asthmatic attacks and eosinophilia, which **respond well** to treatment with hetrazan.

- Blood examination: microfilariae are **not** detected in the peripheral blood.

- There is a high level of serum immunoglobulin E (**IgE**) and filarial antibodies. Serological tests with filarial antigen are usually **strongly positive.**

➢ Clinical picture:

I- Asymptomatic filariasis:

II- Symptomatic (Classical filariasis):

1- Acute inflammatory manifestations:

2- Chronic obstructive manifestations:

3- Elephantiasis

III. Occult filariasis:

Tropical pulmonary eosinophilia

➢Diagnosis:

I. Clinical: clinical picture as before.

II. Laboratory:

1- ***Detection of microfilariae in peripheral blood*** by the following methods:

- Direct fresh smear under dark ground illumination to see **motile microfilariae.**

- Giemsa-stained thick blood film to show the stained **fixed microfilaria**.

- **Provocative test:** Diethylcarbamazine is given orally (2- 8 mg /kg- body weight) to stimulate the microfilariae to circulate in the peripheral blood during day time.

2- Detection of microfilariae in chylous urine or from fluid aspirated from hydrocele and peritoneal cavities.

3- Urine examination: collect 10- 20 ml of morning urine, add 2ml ether to dissolve chyle, then centrifuge at low speed and examine the sediment.

4- ***Detection of adult worms:-*** Lymph node biopsy.

- X-ray to detect calcified dead worm

5- Detection of circulating filarial antibodies using the following tests; IFAT, CFT and ELISA. It is used during the incubation period and in late chronic infections when microfilariae are absent from peripheral blood.

➢ Treatment:

1. ***Diethylcarbamazine (Hetrazan)*** is the drug of choice, has a lethal action on microfilariae.

2. Surgical treatment: removal of elephantoid tissue.

➢ Prevention and control:

1. Treatment of patients.

2- Control of mosquitoes.

3- Use of insect repellants and screening.

4- Environmental sanitation.

MCQ 1: What is the drug of choice for treatment of bancroftian filariasis?

a. Chloroquine

b. Primaquine

c. Atebrine

d. Diethylcarbamazine (Hetrazan)

e. Artemisinin

MCQ 2: Which part is the commonest site of bancroftian elephantiasis?

a. Hands

b. breasts

c. lower limbs

d. Abdomen

e. upper limbs

MCQ 3: Patient was subjected to numerous mosquito bites. He suffered swelling, pain and redness of his leg with enlarged tender groin lymph nodes, then developed abdominal wall varices.

What is the most likely parasitic diagnosis?

a. Plasmodium falciparum

b. Wuchereria bancrofti

c. Plasmodium vivax

d. Trypanosoma bruci

e. Leishmania donovani

Discussion & Feedback

10 minutes