

Parasites that affect the Musculoskeletal system (continued)

Filarial Worms

- Nematodes.
- Tissue parasites.
- Require an intermediate host, which is usually an insect.
- Do not lay eggs like other worms, but produce larvae which are called microfilariae.

I. *Wuchereria bancrofti*

- They are worms that measure about 8cm in length. They reside in the lymphatics of the host, can survive for a few years (about 4 to 5), and produce microfilariae which can access the bloodstream.

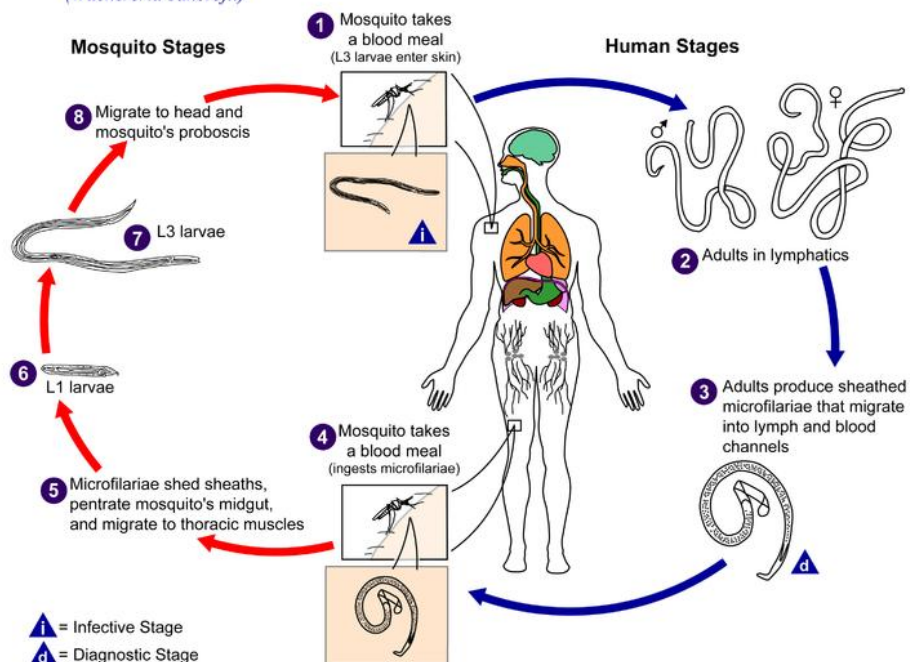
- o The microfilariae mostly appear at night (10pm-2am). Why is that?
 - The intermediate host is the mosquito, which usually flies at night. This is called the Diurnal rhythm.

- The filarisis cycle goes as follows:

1. Mature filariae reside in the lymphatics.
2. They produce microfilariae which enter the bloodstream.
3. The microfilariae are sucked up by a mosquito.
4. They develop morphologically in the mosquito to become infective microfilariae.
5. The infective microfilariae are transmitted to another host by laying them on the skin, around the wound (unlike leishmania, which inject the promastigotes directly into the wound). They then “swim” into the wound.
6. They gain access to the blood, reach the lymphatics, and mature into adult filariae (maturity usually takes about 3 months, sometimes up to 5).

Filariasis

(*Wuchereria bancrofti*)



- **Symptoms of filariasis**

- The pathology is more related to allergy to the worm, where an inflammatory reaction ensues once the worms' antigens are recognized.

- There are three kinds of manifestations:

1. Non-inflammatory:

More common in children. The worm is present, it produces microfilariae, the microfilariae are present in large numbers in the blood, but there is very little reaction to the worm.

It is described as a kind of "balance between the host and parasite". This is common in endemic areas, where children are adapted to such infections. It can last for a few years.

2. Inflammatory:

There is an allergic inflammatory reaction to the adult worms which is associated with the lymphatics. The patient experiences malaise, fever, and lymphangitis (inflammation of the walls of the lymphatic vessels).

It eventually settles, treated or untreated, and no complications occur.

Small numbers of microfilariae in the blood indicate an imbalance between parasite and host.

This leads to an inflammatory reaction. A small proportion (~5%) of people experiencing the inflammatory manifestation can actually progress into:

3. Obstructive disease:

The lymphatics are scarred and obstructed, which means the lymph flows back. This causes the swelling of organs involved; for example, feet become very swollen and "elephant-like", which is why this condition is sometimes referred to as Elephantiasis.

- **Diagnosis**

Can be achieved by observing clinical features, studying the degree of endemism, and more often, testing blood samples for the presence of microfilariae.

- **Treatment**

Can be achieved by cleansing the skin, surgery, and the use of therapeutic drugs (DEC[diethylcarbamazine], ivermectin, albendazole).

During treatment, a Mazzotti reaction might occur following the use of DEC in the form of an allergic reaction. It is a symptom complex seen in patients after undergoing treatment with the medication DEC. Mazzotti reactions can be life threatening, and are characterized by fever, abdominal pain, tachycardia, hypotension, and other dangerous symptoms. Doctors must be careful when using DEC on a patient.

II. *Loa loa*

- They live in subcutaneous tissue, do not cause serious disease, and go through the same cycle as *Wuchereria Bancrofti*.

- They lay microfilariae which can access the blood, and appear after 2pm.

- Their intermediate host is the mango fly which flies in the afternoon.

- Symptoms of *Loa Loa* filariasis

- Crawling sensations under the skin, which are not very common.

- Allergic reaction: Red itchy swellings at the site of infection, called “Calabar Swellings”, are usually seen at the wrist and periorbital area of the face. They are not very serious, and disappear a few days later.

- The worm might cross the subconjunctival tissue of the eye which can be felt as a foreign body in the eye. It will not produce any blindness, but is quite uncomfortable and can be removed surgically.

Reminder: Not very serious, unlike *Wuchereria bancrofti* which causes an allergic reaction.

- Diagnosis

Can be achieved by testing a blood smear taken during the afternoon.

- Treatment

Can be achieved by drugs, Mazzotti reaction is also possible.

III. *Onchocerca volvulus*

- They cause onchocerciasis or river blindness.

- They live in subcutaneous tissue, but do not wander. Instead, they settle in one area of the skin, with some fibrosis formed around the site of infection, and swelling in that area. They produce microfilariae, which do not reach the bloodstream, but wander in the subcutaneous tissue.

- Their intermediate host is the black fly. It bites the host, taking up the microfilariae, then bites another host transmitting the disease. This disease is only associated with fast flowing rivers, as they are the most suitable areas for the black fly to breed. Therefore, people living by the banks of fast flowing rivers are more likely to be infected than people living 3 or 4km away.

- **Symptoms**

- Are not very serious. Unsightly, but with no consequences.
- If widely distributed in the skin, they can cause atrophy and a “tissue paper” appearance, or a “lizard skin” appearance.
- The most serious complication is the blindness, as they can settle in the eye itself, destroying the retina.

The commonest cause of blindness is *Chlamydia trachomatis*, followed by *Onchocerca volvulus*.

- **Diagnosis**

- Cannot be achieved with a blood smear, as the parasite does not reach the bloodstream at all.
- Skin biopsies are obtained, placed in a normal saline solution, then observed after 24 hours. Microfilariae can be seen then.

- **Treatment**

- Drugs are used, however, Mazzotti reactions can occur, and can worsen the eyes condition.

IV. *Dracunculus medinensis* (guinea worm)

- A worm which lives in the subcutaneous tissue . It's very long between 50cm till 100cm in length , its anterior end migrate itself in parts where there's contact with water (e.g. the leg is infected and the anterior end is positioned in the soul of the foot) .

Life cycle :-

1. At the anterior end position swelling occurs and then ulceration .
2. When the ulcer goes in contact with water the worm will release the larvae into the water.
3. In water the cyclops (tiny creatures) will eat the larvae and the larvae will develop in them (intermediate host) .
4. So when someone drinks the water , the cyclops will enter the GIT and the larvae will penetrate the wall of small intestine and migrate to the subcutaneous tissue where it will develop into the adult worm .

diagnosis : local lesion with demonstration of worm or larvae .

treatment : drugs and surgical methods (pulling the anterior end by using of forceps slowly so you won't detach it (the anterior end) from the rest of the worm which will lead to inflammatory reaction .

Ectoparasites

- Live on the skin.

I. Lice (single: louse)

- The egg of a louse is called a nit. They can be found stuck to the hair, and shine under fluorescent light which helps detect them.

A. Head Lice

- They are confined to the head, and are attracted to moist or damp areas; such as behind the ears.

- Head lice are not a hygienic issue; they can easily be transmitted by close contact with an infected person. They do not transmit disease either.

- Symptoms

- Itchiness.

- Scratching may lead to excoriation of the skin (abrasions; skin is worn off) which can be secondarily infected by bacteria.

B. Body Lice

- Are morphologically identical to head lice. They live on human bodies, but lay their eggs in the seams of clothes.

- They are a hygienic issue, commonly seen in people living in poor conditions; such as homeless people, jail inmates, and people living in war conditions. Washing of the body and clothes can easily prevent infection.

- Body lice can be a vector for bacterial diseases; for example, *Borrelia*, and *Rickettsia typhus*.

C. Pubic Lice

- Commonly called “Crabs” because of their slightly similar appearances, they affect pubic hair, sometimes eyelashes and brows, and can be considered an STD in some cases.

- They are not vectors for other diseases. Their only consequences are itchiness and excoriation of the skin.

II. *Sarcoptes scabiei* (Scabies)

- Create S-shaped burrows (tunnels) inside the cornified layer of skin while traveling through it, insert themselves in them, and feed off the keratin of this layer.

- For the first few weeks, no symptoms appear. Their feces then start to provoke allergies and cause itchiness all over the body. The most vulnerable sites are the armpits, groin, wrists, and finger folds. The face is usually spared, except in babies.

- Can be considered an STD in certain cases.

III. *Cimex lectularius* (Bed Bugs)

- Nest in cracks in walls, wood, furniture, or anything similar.

- They are not a hygienic issue.

- They feed on blood. Their bites are similar to mosquito bites, only larger and nastier, and might cause skin rashes and allergic symptoms.

- Do not transmit diseases, but are a nuisance because of their bad smell.

- Acquisition is by close contact.

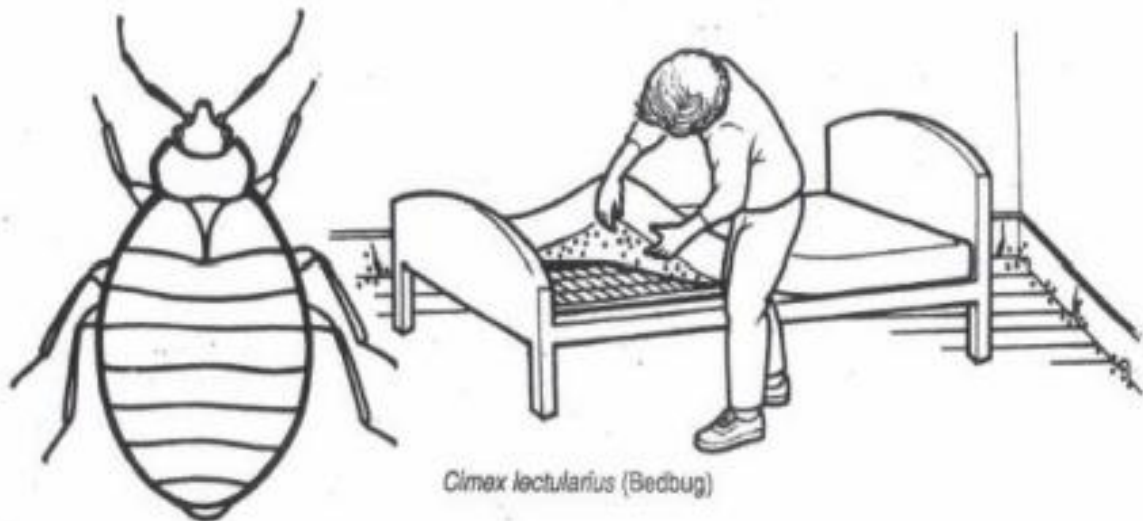


Figure 15-5. Habitat of *Cimex lectularius*, the human bedbug.