Lymphatic filariasis

What is lymphatic filariasis?[1]

Filariasis is a group of diseases that affect humans and animals. Human filarial infections include lymphatic filariasis, onchocerciasis, loiasis and mansonellosis. These infections are believed to affect almost 200 million individuals worldwide with the major burden in developing countries.[2]

The agent is a nematode parasite of the order Filariidae, commonly called filariae. They are usually classified according to the final habitat of the adult worms in the human host.

- The cutaneous group includes *Loa loa, Onchocerca volvulus* and *Mansonella streptocerca*.
- The lymphatic group includes *Wuchereria bancrofti, Brugia malayi* and *Brugia timori*.
- The body cavity group includes *Mansonella perstans* and *Mansonella ozzardi.*

The cutaneous and lymphatic groups are the most important.

There are hundreds of filarial parasites but only eight species cause infections in humans. A few other species can cause incomplete infection but they are unable to complete the life cycle in the human.

This article will explore **lymphatic filariasis**; see also the separate Body Cavity Filariasis, Cutaneous Filariasis and Nematodes (Roundworms) articles.

Life cycle[3]

The life cycle, in common with all nematodes, has five developmental or larval stages in a vertebral host and an arthropod intermediate host and vector.

- Adult female worms produce thousands of first-stage larvae or microfilariae that are ingested by a feeding insect vector.
- The arthropod vectors are mosquitoes or flies. They may have a circadian rhythm in which they feed and this correlates with a circadian rhythm of the microfilariae in the circulation.
- The highest concentration of microfilariae usually occurs at the time of day when the local vector is most active in feeding.
- Microfilariae undergo two stages of development in the insect.
- Larvae at the third stage are then inoculated back into the vertebral host during feeding and the final two stages of development follow.

Lymphatic filariasis epidemiology[4]

The Global Programme to Eliminate Lymphatic Filariasis (GPELF) set a target of elimination as a public health problem (EPHP) in 1997, leading to over 7.1 billion treatments delivered as part of mass drug administrations (MDAs) since 2000. In 2011, the WHO published guidelines for halting treatment and verifying EPHP through the use of transmission assessment surveys (TAS) to measure a target threshold. By October 2018, 14 countries had reached this target, and 554 million people worldwide no longer require mass treatments.[5]

- 863 million people in 47 countries worldwide remain threatened by lymphatic filariasis and require preventative chemotherapy to stop the spread of lymphatic filariasis.
- Lymphatic filariasis can be eliminated by stopping the spread of infection through preventative chemotherapy with safe medicine combinations repeated annually. More than 8.6 billion cumulative treatments have been delivered to stop the spread of infection since 2000.

- 51 million people were infected as of 2018, a 74% decline since the start of the World Health Organization (WHO) Global Programme to Eliminate Lymphatic Filariasis in 2000.
- 692 million people no longer require preventative chemotherapy, due to successful implementation of WHO strategies.

Both sexes are affected equally. The rate of infection increases throughout childhood and adolescence, although it may be many years before the clinical features are seen.

Lymphatic filariasis is caused by *W. bancrofti, B. malayi*, and *B. timori*. It is spread by mosquitoes of the genera *Aedes, Anopheles, Culex,* and *Mansonia*. 90% of lymphatic filariasis is caused by *W. bancrofti* and the rest is mostly caused by *B. malayi. B. malayi* does not affect genitalia lymphatics.

Lymphatic filariasis symptoms[1]

The symptoms are predominantly the result of adult worms in the lymphatics. There are three broad types of clinical scenarios:

- Asymptomatic infection.
- Acute infection.
- Chronic infection.

Asymptomatic infection

- This is seen commonly in areas where the disease is endemic.
- Patients have no symptoms but microfilaria can be detected in peripheral blood smears.
- These patients will already have irreversible lymphatic changes highlighting the importance of their detection and treatment.

Acute infection

This includes acute adeno-lymphangitis (ADL) and acute filarial lymphangitis (AFL).

ADL

This is the most common acute presentation. It is characterised by:

- Fever and painful lymphadenopathy in the groin and axillae.
- Affected areas being painful, tender, red and swollen - usually the result of superimposed bacterial infection.
- Occurrence several times in a year and more so in rainy seasons, when the moisture between toes increases, leading to fungal infections which damage the skin, allowing worms to invade.
- Each episode of ADL enhances the development of lymphoedema.

AFL

- This is rare compared with ADL.
- It is caused by dying adult worms (either spontaneously or with treatment).
- It is characterised by small tender nodules at the site of worms dying. This may either be along the involved lymphatic or in the scrotum.
- Tender and enlarged lymphatics may be seen.
- There is no fever or secondary infection.

Chronic infection [6]

- This is manifested by lymphoedema, elephantiasis and lesions of the genitourinary system.
- Lymphoedema is the most common and may progress to elephantiasis.
- The lower limbs are most commonly involved - but the upper limbs, genitalia and breast in females may also be involved.
- Frequent episodes of ADL lead to the progression of lymphoedema.
- Hydrocele is commonly seen in chronic infection.
- Chylocele, chyluria and chylous ascites occur rarely.

Tropical pulmonary eosinophilia

This is a form of occult filariasis. Presenting symptoms include:

- Paroxysmal dry cough.
- Scattered wheezes and crackles are heard in both lungs.
- Dyspnoea.
- Anorexia.
- Malaise.
- Weight loss.
- Lymphadenopathy and hepatomegaly may be found.

Investigations

Blood

The usual means of detecting the parasite is by examination of peripheral blood. Most species, and all those that produce lymphatic involvement, may be detected by this method. It may be necessary to take the blood at a time when the circadian rhythm gives a high count. Another technique is to give a small dose of the drug diethylcarbamazine (DEC) to precipitate them into the circulation.

Immunological tests

Circulating filarial antigen may be detected using commercially available kits to test venous blood. This can be used in diagnosis and to monitor treatment. Antibody tests are also available. Eosinophilia is marked in all forms of filarial infection. Serum IgE and IgG4 are elevated with active disease. Polymerase chain reaction, which have a high specificity and sensitivity, are also available.

Urinalysis

If lymphatic filariasis is suspected, urine should be examined macroscopically for chyluria and then concentrated to examine microscopically for microfilariae. Chyluria results from obstruction of lymphatic drainage.

Imaging

Obstruction of the inguinal and scrotal lymphatics can be demonstrated and monitored by ultrasound. More recently ultrasonography has been used to detect adult worms in male scrotal lymphatics and lymphoscintigraphy has been used to detect lymphatic changes.[7]

It is important to appreciate that some of the newer and more sophisticated investigation methods may not be available in areas where the disease is endemic. Thus use of peripheral blood smears and immunological tests is the predominant detection method used.

Lymphatic filariasis treatment and management[1]

General measures

- Bed rest, limb elevation, and compression bandages are the traditional management of lymphoedema.
- Once infection has occurred a 'foot care programme' is paramount to break the cycle of infection and worsening lymphoedema. This involves washing of the affected area (including webs of the toes and deep folds), wiping the area dry, clipping and cleaning nails, avoiding injuries or infections and applying antifungal substances.[7]
- Prevention of repeated ADLs is also important and may require long-term antibiotic therapy - eg, oral penicillin or long-acting parenteral penicillin. Unfortunately, a lot of these simple measures are not achievable in areas where the disease is endemic due to economic and other political factors.

Drugs[3]

In accordance with current mass drug administration (MDA) programmes, the mainstay of treatment against lymphatic filariasis is combinations of ivermectin and diethylcarbamazine (DEC) with albendazole.[2]

- DEC is the most commonly used drug and kills both adult worms and microfilariae.[7] It is not licensed for use in the UK but can be used on a named patient basis.[8]

- Treatment of lymphatic filariasis with DEC involves either a 1-day or 12-day treatment course. Generally, 1-day treatment is as effective as the 12-day regimen. DEC is contra-indicated in patients who may also have onchocerciasis.
- DEC should be given for a longer duration in tropical pulmonary eosinophilia (treatment for 2-3 weeks is usual).
- Ivermectin kills the microfilariae, but not the adult worm, which is responsible for lymphoedema and hydrocele.

Community treatment [4]

The mass drug administration (MDA) regimen recommended by the WHO depends on the co-endemicity of lymphatic filariasis with other filarial diseases. WHO recommends the following MDA regimens:

- Albendazole (400 mg) alone twice per year for areas co-endemic with loiasis.
- Ivermectin (200 mcg/kg) with albendazole (400 mg) in countries with onchocerciasis.
- Diethylcarbamazine citrate (DEC) (6 mg/kg) and albendazole (400 mg) in countries without onchocerciasis:
    - Recent evidence indicates that the combination of three medicines can safely clear almost all microfilariae from the blood of infected people within a few weeks, as opposed to years using the routine two-medicine combination (DEC and albendazole).
    - Therefore WHO now recommends the following MDA regimen in countries without onchocerciasis in certain settings: ivermectin (200 mcg/kg) together with diethylcarbamazine citrate (DEC) (6 mg/kg) and albendazole (400 mg).

Complications and prognosis [5]

- Filarial diseases are rarely fatal but those affected tend to have poor health, have more time off work and are less productive. [9]
- If left untreated, lymphatic filariasis can lead to permanent and debilitating disability.

- The WHO has identified lymphatic filariasis as the second leading cause of permanent and long-term disability in the world after leprosy.
- The morbidity of human filariasis mainly results from the host reaction to microfilariae or developing adult worms in different areas of the body.

Prevention

- Avoidance of bites by vectors when in endemic areas. The separate Malaria article discusses avoidance of mosquito bites.
- Lymphatic filariasis can be eliminated by stopping the spread of infection through preventative chemotherapy for people living in areas where the infection is present (see 'Community treatment' above).[4]

Further reading

- Parasites A-Z; Centers for Disease Control and Prevention

Authored by:	Peer Reviewed by: Dr Rosalyn Adleman, MRCGP	
Originally Published: 20/11/2023	Next review date: 24/01/2023	Document ID: doc_3000

Patient Access

To find out more visit www.patientaccess.com
or download the app

Download on the App Store

GET IT ON Google Play

Follow us