Lymphatic filariasis, commonly known as elephantiasis, is one of the oldest and most debilitating diseases known to humanity.

Infection is usually acquired in childhood, but the painful and profoundly disfiguring visible manifestations of the disease occur later in life.

Whereas acute episodes of the disease cause temporary disability, elephantiasis leads to permanent disability. Besides the physical problems, lymphatic filariasis also generates psychological, social and economic costs. The impact of the disease is more devastating among affected young men and women, who will have to live with this debilitating and disfiguring condition throughout their life.

Like many other neglected tropical diseases and despite its devastating effects, very few people outside the affected countries have ever heard of lymphatic filariasis.

The disease is caused by infection with nematodes of the family Filarioidea: 90% of infections are caused by Wuchereria bancrofti and most of the remainder by Brugia malayi. These are long, thread-like worms, also known as filariae.

The male worms measure about 40 mm in length the female worms between 8 and 80–100 mm. Both male and female worms form “nests” in the human lymphatic system – the most essential component of the body’s immune system.
Filariae are responsible directly or indirectly for many of the manifestations associated with elephantiasis. These include fluid retention and tissue swelling (also called lymphoedema) in the lower limbs, genital diseases (hydrocele, chyloucele and swelling of the scrotum and penis) and frequent acute disease episodes. While early stages of lymphoedema are reversible, elephantiasis is life-long and causes permanent disability.

Although the majority of infected people do not show outward symptoms of the disease, most of them will have early stages or mild forms of lymphatic damage.

WHO IS AT RISK?

Filarial parasites are found in over 80 countries around the world. This means more than one billion people – or one-fifth of the world’s population – most of whom are the world’s poorest, are at risk.

Current WHO estimates put more than 120 million infections worldwide, with over 40 million patients severely incapacitated and disfigured by the disease.

An estimated 27 million men have genital problems (hydrocele) and almost 16 million, the majority of whom are women, have lymphoedema or elephantiasis of the leg.

The parasites thrive in tropical and subtropical regions where they affect the world’s poorest populations. WHO promotes mass drug administration (MDA) in all endemic countries as a core strategy and hopes to achieve further expansion of the programme.

Through MDA, WHO aims to provide drug treatment to all people within an endemic area or region at risk of the disease. Countries or regions implementing five rounds of MDA with high coverage are expected to reduce the rate of microfilaria to below 1% level. Once this is achieved, conditions for interruption of transmission will have been created.

Many countries that have successfully implemented WHO recommended MDA have already produced significant reduction rates in microfilaria, as well as morbidity associated with lymphatic filariasis.

AFRICAN REGION

Lymphatic Filariasis is endemic in 39 of the 46 Member States in the WHO African region. Of the at-risk population of 396 million in 2008, 79 million people were covered by mass drug administration.
REGION OF THE AMERICAS
In the WHO Region of the Americas, 7 countries are endemic for lymphatic filariasis and 12 million people at risk of the disease. Of the 3.4 million population, 2.7 million were reported to have ingested drugs in 2008 as part of the MDA campaign.

EASTERN MEDITERRANEAN REGION
Three countries in the Region are endemic for the disease, putting more than 12 million people at risk. These are: Egypt, Sudan and Yemen where out of a targeted population of more than 550,000, almost 510,000 people were treated in 2008.

SOUTH-EAST ASIA REGION
About 66% of the global population at risk for lymphatic filariasis live in the South-East Asia Region, which comprises 9 endemic countries. In 2008, 426 million people out of the 587 million targeted received treatment. In 2007, 482 million treatments were dispensed.

WESTERN PACIFIC REGION
In the Mekong-Plus subregion (Cambodia, Malaysia, the Philippines and Viet Nam), of the 25 million people targeted in 2008, 16 million were treated. In August 2007, China became the first country declared to have successfully eliminated lymphatic filariasis as a public health problem, followed by the Republic of Korea in March 2008.

Overall, almost 700 million of the total 1.33 billion population at risk of lymphatic filariasis were targeted for treatment in 2008.

LYMPHATIC FILARIASIS IN HISTORY
Lymphatic filariasis is as old as recorded history. Ancient writings in India and China describe swellings that closely describe filarial lesions, as do later descriptions by Greek and Arab physicians in the 10th century.

The Dutch explorer, Jan Huygen Linschoten on a visit to Goa between 1588 and 1592 described cases of people who had their legs “as thick as an elephant’s leg”.

However, western knowledge about LF started with the spread of colonies during the 18th and 19th centuries. One of the earliest Western descriptions was in 1863 by a French physician working in Cuba, Jean-Nicolas Demarquay and by Otto Henry Wucherer in Brazil in 1866.

But the dominant figure in the early history of LF is Sir Patrick Manson, a Scottish physician, who in 1877 discovered the life-cycle of the disease. This is regarded as one of the most significant discoveries in tropical medicine. His works, along with those of the English physician Joseph Bancroft contributed to fully describe the disease.

In 1947 Reginald Hewitt discovered the filaricidal effect of diethylcarbamazine (DEC) in animal experiments. In the same year D. Santiago-Stevenson treated the first LF case with DEC.

In 1957 John Flenniken Kessel mass administered DEC for the first time in Tahiti, a south Pacific island.

Drawing from the late 12th century, showing a woman with elephantiasis: “Byosushi-enakiminono”. Reproduced with the kind permission of Tokyo National Museum, Tokyo, Japan.
TRANSMISSION CYCLE

Filariae are transmitted through mosquitoes.

When a mosquito with infective stage larvae takes a blood meal, the parasites are deposited on the person’s skin from where they enter the body.

The larvae migrate to the lymphatic vessels where they develop into adult worms. This process may take 6–12 months, affecting the dilation and functioning of the lymphatic vessels.

The adult filariae live for several years in the human host, producing millions of microfilariae that circulate in the peripheral blood and are ingested by mosquitoes during blood-feeding.

The larval forms further develop inside the mosquito before becoming infectious to humans.

Thus, a cycle of transmission is established.

WHO GLOBAL PROGRAMME TO ELIMINATE LYMPHATIC FILARIASIS (GPELF)

In 1993, following advances in diagnosis and treatment, the International Task Force on Disease Eradication classified LF as an “eradicable” or “potentially eradicable” disease.

In 1997, WHO’s governing body – the World Health Assembly - adopted Resolution 50.29, calling on Member States to initiate steps to eliminate LF as a public health problem.

In response to this call, WHO started its Global Programme to Eliminate Lymphatic Filariasis (GPELF) in 2000. The strategy is based on:

• stopping the spread of infection; and
• alleviating the suffering of affected populations

In order to stop the spread, areas/regions where LF is endemic must be mapped and large-scale treatment programmes implemented to cover the entire at-risk population.

Alleviating the suffering caused by LF is done through community education programmes that raise awareness among patients. These programmes promote the benefits of intensive local hygiene practices and the possible improvement of damage that has already occurred, as well as the prevention of debilitating and painful episodes of inflammation.

CLINICAL MANIFESTATIONS AND DIAGNOSIS

The development of lymphatic filariasis in humans remains a puzzle.

Although the infection is generally acquired early in childhood, the disease may take years to manifest itself. Many people do not show outwardly clinical manifestations of their infection.

Studies have shown that such seemingly “healthy” patients may harbour hidden lymphatic pathology.

Infection not showing any indication of the disease is frequently characterized by the presence in the blood of thousands or hundreds of thousands of larval parasites (microfilariae) and adult worms located in the lymphatic system.

However, the most severe symptoms of chronic disease generally appear in adulthood. In endemic communities, 10–50% of men may suffer genital damage, notably fluid-filled enlargement of the sacs around the testes, and elephantiasis of the penis and scrotum.
Elephantiasis of the entire leg or arm, the vulva and the breast may affect up to 10% of men and women in these communities.

Acute episodes of local inflammation involving the skin, lymph nodes and lymphatic vessels often accompany chronic lymphoedema or elephantiasis.

Some of these episodes are caused by the body’s immune response to the parasite, but most are the result of bacterial skin infections and super infections of tissues where normal defences have been partially compromised due to underlying lymphatic damage.

Rigorous hygiene of affected limbs combined with added measures to minimize infection and promote lymph flow help in reducing the frequency of acute episodes of inflammation.

**LIVING WITH LYMPHATIC FILARIASIS – BALA’S STORY**

Bala lives in a village near Tindivanam, a small town in Tamil Nadu, south India.

He is 38 years old and suffers from a fairly advanced stage of lymphoedema.

As a child, Bala experienced no symptoms and studied up to grade eight in a nearby village.

Visible manifestations of the disease started when he was 23. Undeterred, Bala got married at the age of 26. He now has three children, with his eldest in grade five.

Bala works as a bus conductor (a person who collects fares from passengers). For the past 10 years, he has been employed by a private bus operator. He starts early in the morning and is mostly on his feet only to finish at 10 p.m.

“It is difficult to work with this affected leg” says Bala. “When I go to work, the swelling increases and when I rest the swelling decreases in volume.”

Bala earns about 5000 Indian rupees a month (approx. US$ 110). As head of the family, he knows that he has to work to be able to support his family.

“My doctor has told me that taking care of my leg and keeping a good hygiene is important to my health condition,” says Bala.

Although Bala admits that the disease is “disturbing” and has greatly affected his life, he is steadfast in his daily routine.

**LYMPHATIC FILARIASIS ELIMINATION: THE MEDICINES**

The most important goal of GPELF is to eliminate microfilariae from the blood of infected individuals resulting in the eventual interruption of transmission.

The recommended medicines are as follows:

- Single dose of albendazole, combined with diethylcarbamazine citrate DEC (once yearly) at least for 5 years;

or

- Single dose of albendazole, combined with ivermectin once yearly, at least for 5 years.

Another way to eliminate microfilariae in the blood is the regular intake of DEC-fortified salt over a period of at least one year.
SOCIAL MOBILIZATION AND MASS DRUG ADMINISTRATION (MDA)

Elimination of lymphatic filariasis means the incidence of the disease close to zero achieved through continued and coordinated intervention activities.

Social mobilization is a key component that links up the entire elimination effort. A high level of involvement and support is required over a 5-year period to break the LF transmission cycle. The active participation of the public is crucial.

Advocacy and effective communication are essential factors in securing the support and commitment of the public, political leaders, health-care workers, religious leaders and teachers.

RESEARCH PRIORITIES

Partial understanding of the “epidemiology of elimination” of lymphatic filariasis means there is a need for further research. These include:

- Understanding the behaviour of residual microfilaraemia and antigenaemia in communities where the level of microfilaraemia has been achieved through MDA.

To achieve interruption of transmission, the entire population at risk in a defined area, region or country must be treated, preferably through MDA. This involves complex logistics, extensive advocacy efforts and community participation as people who are not ill have to be persuaded to take the medicines. However, for those who already have the disease, steps to manage the disease condition and alleviate the suffering is more important. (See box “Some basic precautions for people living with LF”).

The main aim of MDA is to cover at least a five-year period to ensure that the level of larval parasites in the blood (microfilariae) remains below the threshold that cannot sustain transmission.

Other benefits of MDA include control of soil-transmitted helminthic infections contributing to the overall improvement of reproductive health and the enhancement of child and maternal health.

At the end of five years of continued once-a-year effective treatment, the worms that have not been killed will die naturally or are beyond their reproductive life-span. This should reduce or eliminate transmission in the host population and, with the transmission cycle broken, prevent recurrence of the disease.

The antifilarial medicines kill the vast majority of microfilariae in the human system. Many of the adult worms are also killed by DEC.

The media is instrumental in implementing behavioural change and encouraging people to accept and support MDA campaigns.

In many countries, such as Egypt, India and Sri Lanka, primary health-care workers at village and district levels have been the backbone of social mobilization campaigns. In many instances, doctors and nurses are usually involved in making house-to-house drug administration and, in so doing, convincing others of the need to take the medicines.

WHO’s Global Programme to Eliminate Lymphatic Filariasis (GPELF) launched in 2000 aims to eliminate LF as a public health problem by 2020 by protecting the entire 1.3 billion at-risk population across the globe.

The strategy rests on two important components:

- reducing transmission below a threshold that cannot sustain transmission
- Caring for those who already suffer from clinical manifestations of lymphatic filariasis, such as lymphoedema, elephantiasis and hydrocele which are irreversible.

Young women health workers and task force members in Dhalapathar, Orissa, India, 2009

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Opportunities provided by large-scale preventive chemotherapy are promising as they involve cost-effective delivery of medicines to endemic populations at regular intervals.

With the help of a strong international community of partners and the support of endemic countries, dramatic results have been achieved as more than 560 million people in 48 countries have been treated between 2000 – 2008 and over 2 billion treatments administered worldwide.

WHO has also encouraged mapping of endemic countries. To date 66 of the 81 countries endemic for LF have completed the mapping exercise. This enables for effective planning and allows the whole population in a defined district or region to be treated, depending on the level of microfilaria detected.

Once target populations have been identified through mapping, intervention programmes are implemented and these are continued regularly over a defined period of at least five years.

WHO aims to maximize the use of currently available tools to achieve the elimination of lymphatic filariasis as a public health problem in all endemic countries.
The task to eliminate lymphatic filariasis transmission is enormous.

No campaign of this magnitude is possible without the positive involvement of endemic countries and the unfaltering support of partners, non governmental organizations, the private sector and affected communities.

Added momentum can be further achieved through integrated programmes and large-scale social mobilization campaigns to ensure a healthy childhood, free of lymphatic filariasis.

Through effective global partnership, WHO hopes to eliminate lymphatic filariasis as a public health problem in all endemic countries by 2020.