

# Leprosy



## What is leprosy?

Leprosy is a chronic infectious disease that has been known since ancient times. For thousands of years, leprosy has struck fear into human beings and was well recognised in the oldest civilizations of China, Egypt and India. All over the world, leprosy has since been regarded by the community as a contagious, mutilating and incurable scourge. It once affected every continent and has left behind a terrifying image in history and human memory – one of mutilation, rejection and exclusion from society.

The causing pathogen is the organism *Mycobacterium leprae*, a rod-shaped bacillus. Leprosy is transmitted when an infected person, through sneezing or coughing, sends microscopic droplets loaded with the bacteria into the air, which are inhaled by people close by. Its mode of transmission is not well understood, and though people may contract leprosy, they rarely exhibit major symptoms: patches of dry skin that lose feeling due to nerve damage, grainy ulcerating lesions on hands, feet, and back, and a slimy discharge from the nose. The disease has a very long incubation period, which makes it difficult to determine where or when it was contracted.

The disease is characterised by disfiguring skin lesions, peripheral nerve damage, and progressive debilitation. It may also affect the inner lining (mucosa) of the upper respiratory tract and the eyes. There are two common forms of leprosy: tuberculoid and lepromatous. Both forms produce lesions on the skin that are less pigmented and have decreased sensation to touch, heat, or pain. The lepromatous form is the most severe, leading to large disfiguring nodules.

Eventually, leprosy causes nerve damage in the extremities manifested by loss of feeling in the skin and muscle weakness. People with long-term leprosy lose the use of their hands or feet due to mutilation of fingers or toes and repeated injury resulting from lack of sensation.

The emergence of drug-resistant *Mycobacterium leprae*, as well as high numbers of cases worldwide, have led to global concern about this disease.

### Who does leprosy affect?

Leprosy is found in temperate, tropical, and subtropical climates and is still common in many countries in the world. The annual number of newly infected people is around 600,000 cases, of which 75 per cent occur in South-East Asia.

Today, the highest leprosy burden is concentrated mainly in six countries: India, Brazil, Myanmar, Madagascar, Nepal, and Mozambique (in diminishing order). It is estimated that there are between one and two million people visibly and irreversibly disabled due to past and present leprosy who require care. Leprosy is one of the World Health Organisation's (WHO) targeted diseases for total elimination, along with smallpox (achieved) and poliomyelitis.

There is speculation that infection and consecutive disease tend to manifest in people with a genetically caused deficit of cellular-mediated immune defence. Children are more susceptible than adults to contracting the disease.

### Present treatments:

When *Mycobacterium leprae* was discovered by the Norwegian physician Gerhard Henrik Armauer Hansen – an alternative name for leprosy is Hansen's disease – in 1873, it was the first bacterium to be identified as causing disease in man. However, the first treatment for leprosy appeared in the late 1940s with the introduction of dapsone, and its derivatives.

Today, effective medications exist, and the isolation of infected individuals in leper colonies nowadays is unnecessary. Early recognition is important, as early treatment limits damage by the disease. People on long-term medication become noninfectious. This then allows for a normal lifestyle. Prevention consists of avoiding close physical contact with untreated people.

Medications used to eliminate the microorganism and to reduce symptoms include: a diphenylsulfone compound, a macrolide antibiotic, a riminophenazine dye derivate, a carbothiamide molecule and related compounds. In 1981, multi-drug therapy (MDT) was introduced by the WHO as the standard treatment for leprosy. The medicines used in WHO-MDT depend on the severity of the disease and are given either 12 months as triple combination of macrolide antibiotic, the riminophenazinederivate and the diphenylsulfone compound to patients who have high levels of the leprosy bacillus in their body or during six months as a dual regimen consisting of the macrolide antibiotic and the diphenylsulfone compound for patients with less bacterial load.

Children receive appropriately reduced doses of the above medicines. Still today, the macrolide antibiotic, which is also used to treat tuberculosis, is the most important anti-leprosy medication and is therefore included in the treatment of both types of leprosy.

Other antibacterial agents that are effective in the treatment of leprosy include compounds of the chemical group of macrolides, of tetracyclines and of gyrase inhibitors.

N-acetyl-salicylic acid, corticosteroids, the riminophenazinederivate or a glutarimide compound are used for the control of the inflammatory response (erythema nodosum leprosum, ENL) that may occur with therapy. The effectiveness of these medicines in minimising symptoms of chronic recurrent ENL is mainly due to their action against fever and their effect on associated neuritis, i.e. the inflammatory reaction around the patients' peripheral nerves.

---

**Leprosy is a bacterial infection. In ancient times it was a feared disease. Nowadays, effective treatments exist. However, resistance to the treatments has been reported and high numbers of cases worldwide have led to global concern. Hence, new therapies are always needed.**



Since the introduction of MDT, ENL reaction has become a rare complication, limited to a small proportion of patients with high bacterial load. Most of the ENL reactions are mild in nature and do not require specific treatment except with pain relievers and compounds to lower fever.

### **What's in the development pipeline?**

There are reports that immunotherapy using *Mycobacterium leprae* or other mycobacterium-derived vaccines may accelerate the clearance of dead bacilli from the tissues. Bacille Calmette-Guerin (BCG) vaccination was originally aimed at tuberculosis, but appears also to be effective against leprosy, affording around 40 to 50 per cent protection. However, more research is needed before this approach can be recommended for use in routine leprosy control programmes.



### **The longer-term future:**

The disease-causing pathogen *Mycobacterium leprae* has unique characteristics: its growth rate is extremely slow, the average period of duplication taking about two weeks and researchers have yet not been succeeding in growing the organism in culture. The bacterium lives best at temperatures slightly lower than most mammals, hence its affinity to the cooler regions of the human body. It can only be cultivated in a certain species of armadillo and in the mouse-footpad.

Meanwhile, the sequencing of the genome of *Mycobacterium leprae* has been achieved. The molecular information on the nature of the genome with the full catalogue of genes will give a direction to new options for the treatment of leprosy. The following lines of research deserve priority: (i) modes of transmission and methods of early detection, (ii) development of further animal models, (iii) methods of chemoprophylaxis, and (iv) immunological studies to develop a vaccine for disease prevention.

---

### **DISCLAIMER**

EFPIA has made all reasonable efforts to include accurate and up-to-date information in this PDF, but cannot guarantee completeness or accuracy of the information.

You must consult your doctor, or other qualified healthcare professional on any specific problem or matter covered by the information in this PDF.

The "Medicines for Mankind" publications are made available on condition that no part of the publications (including photographs) may be reproduced or abstracted without prior agreement with the European Federation of Pharmaceutical Industries and Associations (EFPIA). Under no circumstance can any of the material included in this PDF be used in promotional material and/or campaigns.

Editing Board: Dr. Robert Geursen (Chief Editor), Peter Heer, Bill Kirkness, Philippe Loewenstein, Steve Mees, Dr. Jean-Marie Muschart, Marie-Claire Pickaert (Coordinator).

Photocredits: ABPI, Allergan, AstraZeneca, EFPIA/Lander Loeckx, Damian Foundation, Galderma, Hilaire Pletinckx, Roche, sanofi-aventis; Design & Production: Megaluna+Triumviraat