

## Onchocerciasis (River Blindness)

### Description

Onchocerciasis or *River Blindness* is caused by a parasitic worm that is transmitted by the *Simulium* fly (blackfly). It is one of the world's leading causes of blindness. Blackflies are voracious daytime biters that are found near fast flowing rivers and streams. Although rarely fatal, the disease causes severe disability and suffering, leading to fertile land being abandoned and socioeconomic underdevelopment.

Adult worms live in nodules in the human body where the female worms produce high numbers of first-stage larvae (microfilariae). The death of microfilariae is very toxic to the skin and the eye, producing terrible itching and various eye manifestations. After repeated years of exposure, these lesions may lead to irreversible blindness and disfiguring skin diseases sometimes named "leopard skin" and "lizard skin".<sup>2</sup>



Image: WHO TDR<sup>1</sup>

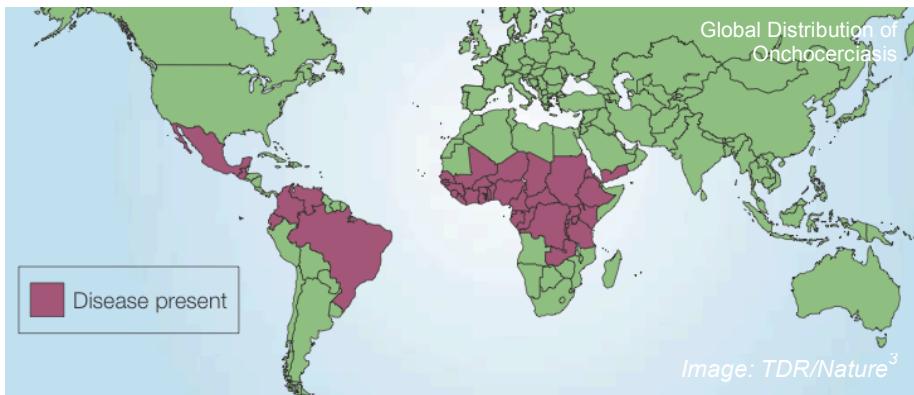


Image: TDR/Nature<sup>3</sup>

### Incidence and Distribution

Onchocerciasis is found in 28 countries in Africa (in the savannah as well as in the forest zone) from Senegal to Malawi, 6 countries in Latin America and in the Yemen. In 2003 the World Health Organization estimated that there were more than 17.7 million people infected with onchocerciasis, approximately 500,000 of whom have visual impairments and 270,000 are blind. 99% of cases are found in Africa.<sup>3</sup>

### Causative Agent and Transmission

The disease is caused by a small threadlike parasitic worm, *Onchocerca volvulus*, which is transmitted by the blackfly when it feeds. The parasite lives under the skin and is often aggregated into visible nodules and may persist for 7 to 14 years. The female worms produce offspring (microfilariae) which migrate from the nodules into the bloodstream. These microfilariae can infect a new blackfly with its next meal. Each female worm can produce millions of microfilariae during her lifetime. Worms can live for 10-15 years.<sup>4</sup>

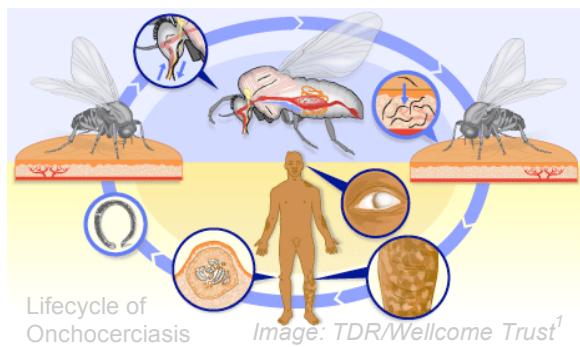


Image: TDR/Wellcome Trust<sup>1</sup>

Unlike other vector borne diseases such as malaria or dengue where a single inoculative bite can cause infection, hundreds of blackfly bites are required for a human to become infected with Onchocerciasis. Blackflies are small but ferocious biters who feed during the day and are known to bite through thin clothing and some insect repellents.

### Symptoms

Infected persons may be without symptoms. Those with symptoms will usually have one or more of the three manifestations; skin rash, eye lesions, and/or subcutaneous nodules (bumps under the skin). The

<sup>1</sup> WHO Special Programme for Research and Training in Tropical Diseases <http://www.who.int/tdr/diseases/oncho/default.htm>

<sup>2</sup> World Health Organisation Factsheet <http://www.who.int/tdr/diseases/oncho/>

<sup>3</sup> TDR/Nature Reviews Microbiology Disease Watch (December 2003) [http://www.who.int/tdr/dw/pdf/dw12\\_2003.pdf](http://www.who.int/tdr/dw/pdf/dw12_2003.pdf)

<sup>4</sup> US Center for Disease Control Division of Parasitic Diseases

[http://www.cdc.gov/ncidod/dpd/parasites/onchocerciasis/factsht\\_onchocerciasis.htm](http://www.cdc.gov/ncidod/dpd/parasites/onchocerciasis/factsht_onchocerciasis.htm)

most serious manifestation is eye lesions that can progress to blindness. The normal incubation period of Onchocerciasis ranges from 9 to 24 months after the bite of an infected blackfly.

Image: WHO TDR<sup>1</sup>

### **Eye Manifestations**

Microfilariae that migrate to the eye and subsequently die there cause severe inflammation and scarring that can lead to impaired vision and blindness.<sup>1</sup> The life expectancy of a person who becomes blind in endemic areas may be shortened by about 10 years.

Image: WHO TDR<sup>1</sup>

### **Skin Manifestations**

Onchocerciasis can cause an extremely distressing, intensely itchy chronic dermatitis. The dying microfilariae provoke a subcutaneous inflammatory response that eventually causes the skin to itch, and to become swollen and chronically thickened, a condition often called "lizard skin". The skin may also become lax due to the destruction of its elastic fibres. Over time the skin may lose some of its pigment, which on dark skin gives rise to an appearance commonly referred to as "leopard skin".

Nodules in the subcutaneous tissue vary in size from one to five centimetres in diameter and an infected individual may have as many as several hundred. Nodules may be detected over the skull, ribs, elbows, hips, thighs, and knees. Non-palpable nodules may be located within muscles, causing deep-seated pain. The region of the body most affected by nodules varies from one geographic area to another and depends on the biting habits of the area's blackflies and the clothing worn.<sup>5</sup>

### **Treatment**

Ivermectin (150-200 µg/kg orally once or twice per year) is the drug of choice for Onchocerciasis. Repeated annual or six monthly doses may be required because the drug kills the microfilariae but not the adult worms which can live for many years.<sup>6</sup> Travellers who have a diagnosis of Onchocerciasis should be advised to consult with a specialist in infectious diseases or tropical medicine.<sup>7</sup> Nodules can be surgically removed to destroy adult worms. At community level this is prohibitively expensive.

### **Control and Prevention**

Eliminating blackflies using larvicide was highly successful on a mass scale during the Onchocerciasis Control Programme (OCP) in West Africa. Transmission of the disease was halted in West Africa by the OCP, but the programme was discontinued in favour of mass ivermectin treatment which remains the principle method of onchocerciasis control in the region.

To prevent onchocerciasis:

- Cover up in areas of known blackfly populations
- Apply DEET (30% proof) to all exposed areas, sleeves and trouser bottoms
- Wear a head net if necessary
- Avoid camping near fast flowing rivers in affected areas



<sup>5</sup> Merck Mectizan Donation Program [http://www.mectizan.org/oncho\\_intro.asp](http://www.mectizan.org/oncho_intro.asp)

<sup>6</sup> Hopkins A. Ivermectin and onchocerciasis: is it all solved? *Eye* (2005) 19, 1057–1066.

[http://www.nature.com/eye/journal/v19/n10/fig\\_tab/6701962f7.html#figure-title](http://www.nature.com/eye/journal/v19/n10/fig_tab/6701962f7.html#figure-title)

<sup>7</sup> US Center for Disease Control Yellow Book <http://www2.ncid.cdc.gov/travel/yb/utils/ybGet.asp?section=dis&obj=oncho.htm>