

Chagas Disease (American Trypanosomiasis)

Chagas Disease is caused by the parasite *Trypanosoma cruzi*, which is transmitted to animals and people by primarily night-feeding Triatomine insects. These insect vectors are found only in the Americas; mainly in rural areas of Latin America where poverty is widespread. However the impact of Chagas disease is not limited to Latin America's rural areas: Large-scale population movements from rural to urban areas of Latin America and to other regions of the world have increased the geographic distribution and changed the epidemiology of Chagas disease.¹ Chagas disease (*T. cruzi* infection) is also referred to as *American Trypanosomiasis*.

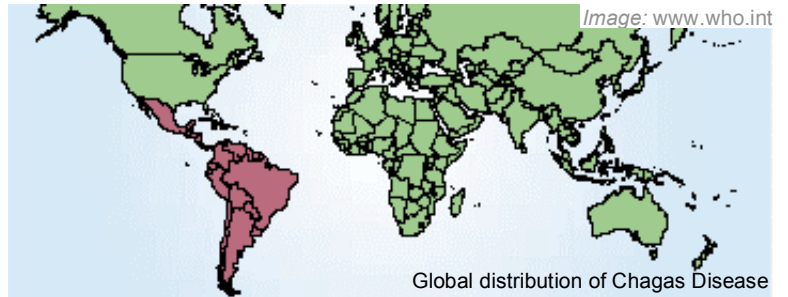
Incidence

At present, global estimates indicate an infection prevalence of 13 million, with 3.0–3.3 million symptomatic cases and an annual incidence of 200,000 cases in 15 countries.² It is estimated that as many as 11 million people in Mexico, Central America and South America alone have Chagas Disease, most of whom do not know they are infected.¹

Distribution

Chagas Disease is present on the American continent in two different ecological zones: the Southern Cone region, where the main vector lives inside or close to human homes; and Central America and Mexico where the main vector species lives both inside dwellings and in uninhabited areas.

In recent years however, there has been significant population migration of those from endemic countries into the United States and Europe. This had led to increased risks for populations in Europe and the USA as the disease spreads outside the traditional geographic boundaries.¹



Causative Agent and Transmission

Chagas Disease is caused by *Trypanosoma cruzi*, a parasitic protozoa, and is transmitted through contact with the faeces of an infected triatomine insect, such as *Triatoma infestans*, also known as *assassin*, *vinchuca*, *cone nose* or *kissing bugs*. The parasite also infects over 150 species of domestic and wild mammals, from where the insect may acquire infection that can be subsequently transmitted when it feeds on a human.



Triatomines are large bloodsucking insects of which a number of species have adapted to living in and around houses. Although different triatomines occur in various countries they are all similar in appearance and life cycle and all can carry *T. cruzi*.

The insects ingest the parasites when they feed at night, on an infected animal or person. Infected insects then deposit the parasites with their faeces on the skin of another person during or shortly after feeding. Scratching or rubbing helps the parasites to enter the body through the bite wound or broken skin. Carried by the fingers, they can also penetrate through the mucosae of the eyes, nose or mouth, eventually reaching the bloodstream. The parasites cannot penetrate undamaged skin. Transmission is also possible from mother to unborn child during pregnancy, by transfusion of infected blood and consumption of uncooked food contaminated with faeces from infected bugs.

Symptoms

There are two phases of Chagas disease: the acute phase and the chronic phase. Both phases can be symptom free or life threatening.

The **acute phase** lasts for the first few weeks or months of infection. It usually occurs unnoticed because it is symptom free or exhibits only mild symptoms and signs that are not unique to Chagas Disease. The symptoms noted by the patient can include fever, fatigue, body aches, headache, rash, loss of appetite, diarrhoea, and vomiting. The signs on physical examination can include mild enlargement of the liver or spleen, swollen glands, and local swelling (a chagoma) where the parasite entered the body. The most recognized marker of acute Chagas Disease is called Romaña's sign, which includes swelling of the eyelids on the side of the face near the bite wound or where the insect faeces were deposited or accidentally rubbed into the eye. Even if symptoms develop during the acute phase, they usually fade away on their own, within a few weeks or months. Although the symptoms resolve, the infection, if untreated, persists. Rarely, young children (<5%) die from severe inflammation/infection of the



¹ US Center for Disease Control http://www.cdc.gov/ncidod/dod/parasites/chagasdisease/factsheet_chagas_disease.htm

heart muscle (myocarditis) or brain (meningoencephalitis). The acute phase also can be severe in people with weakened immune systems.

During the **chronic phase**, the infection may remain silent for decades or even for life. However, some people develop:

- **cardiac complications**, which can include an enlarged heart (cardiomyopathy), heart failure, altered heart rate or rhythm, and cardiac arrest (sudden death); and/or
- **intestinal complications**, which can include an enlarged oesophagus (megaesophagus) or colon (megacolon) and can lead to difficulties with eating or with passing stool.

The average lifetime risk of developing one or more of these complications is about 30%.³

Treatment

There are two approaches to therapy, both of which can be life saving:

- **Antiparasitic** treatment, to kill the parasite
 - This most effective early in the course of infection but is not limited to cases in the acute phase. Most people do not need to be hospitalized during treatment.
- **Symptomatic** treatment, to manage the symptoms and signs of infection.
 - This may help people who have cardiac or intestinal problems from Chagas disease. For example, pacemakers and medications for irregular heartbeats may be life saving for some patients with chronic cardiac disease.

Pathogenesis

The diversity of the clinical manifestations of Chagas Disease and the complexity of its pathology have led to there being two much-contested hypotheses as to the pathogenesis of the disease⁴:

1. *Autoimmune Hypothesis*: This arises from the fact that parasites are found infrequently in the lesions associated with the chronic phase of the disease, therefore suggesting the cause of symptoms is an autoimmune response due to autoantibodies or autoreactive T cells, derived by molecular mimicry between parasite and host antigens.
2. *Parasite Persistence Hypothesis*: The fact that the parasite (*T. cruzi*) does persist in the chronic phase albeit in small numbers, and that antiparasite treatment reduces the severity of symptoms lends weight to those who argue that symptoms are due to the body's antiparasite response. However, this does not answer why it is so persistently the heart that develops the inflammatory lesions when parasites are present in several organs, and why there seems little correlation between parasite burden and degree of symptoms.

The parasite persistence hypothesis is currently dominant. However the two theories may not be mutually exclusive since anti-immunopathogenic responses in patients may be driven by the parasite burden. Some sort of combined pathogenic mechanism is likely. Renewed interest in neglected diseases is driving research into this question and to the development of new antiparasitic drugs.

Control and Prevention

Triatomines typically infest poor-quality buildings constructed of mud, adobe brick or palm thatch, particularly those with cracks or crevices in the walls and roof. Travellers who are unable to avoid residing in such accommodation or sleep outdoors in endemic areas should:

- Sleep under an insecticide-treated mosquito net
- Treat bedding with insecticide
- Spray exposed skin with DEET (30%) proof
- Wear protective clothing

In addition, travellers should be aware of other possible routes of transmission, including blood-borne and food-borne.

Links

- US Centers for Disease Control and Prevention. Travelers' Health: Yellow Book 2005-2006
<http://www2.ncid.cdc.gov/travel/yb/utills/ybGet.asp?section=dis&obj=chagas.htm>
- National Travel Health Network and Centre: Travel Health Information Sheet: Trypanosomiasis
<http://www.nathnac.org/travel/factsheets/trypanosomiasis.htm>
- US Center for Disease Control
http://www.cdc.gov/ncidod/dpd/parasites/chagasdisease/factsht_chagas_disease.htm
- World Health Organisation Disease Watch: Chagas Disease
<http://www.who.int/tdr/dw/chagas2003.htm>



³ US Center for Disease Control http://www.cdc.gov/ncidod/dpd/parasites/chagasdisease/factsht_chagas_disease.htm