Chagas Disease

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Etiological Agent: *Trypanosoma cruzi*

Transmission

Chagas Disease is mostly transmitted through contact with the parasite *Trypanosoma cruzi* which are located most prevalently in the feces of Triatomine bugs. This primarily vector transmitted disease can also be spread congenitally, through blood transfusion, through organ transplant, and rarely through food or lab accidents. ¹,²,⁵,⁶

Vector borne transmission has been reported in the southern United States of America, but is predominantly in the Southern Americas including Mexico, Central America, and South America.¹,²,⁵

Reservoirs

Wild mammalians are the currently the most common reservoir for *T. cruzi*. Domestic animals, such as dogs and cats, are quickly surpassing the wild animal reservoir population. Humans are also reservoirs.³,⁵

General Characteristics of *Trypanosoma cruzi*

Chagas’ disease, also known as American trypanosomiasis, is caused by the parasitic protozoan *Trypanosoma cruzi* which is classified in the order Kinetoplastida and in the family Trypanosomatidae. *T. cruzi* are metacyclic trypomastigotes in their infective form and amastigote in their intracellular form. One important quality of all forms of the parasite is its kinetoplast or dense intracellular body. It is infective in the trypomastigotic form and loses its flagellum and membrane when it turns in to its amastigote form to reproduce. The amastigote form is drawn to smooth muscle, making the heart the primary target. *T. cruzi* is described as a diploid, polymorphic parasite.⁵,⁶,⁷

Key Tests for Identification

Tests used for diagnosis of Chagas disease include thick and thin blood smears, serological tests, IHA, IFA, EIA, PCR, ELISA tests, western blot, chemiluminescence, and radio immunoprecipitation assay (RIPA) tests. In the acute phase of the disease physically looking for the microorganism in a blood smear is typically sufficient. To diagnose in the chronic phase, an IgG test to detect antibodies is going to be more accurate than a smear.²,⁶

Signs and Symptoms of Chagas Disease
Chagas’ disease has two phases: Acute and Chronic. Although the acute phase typically lacks symptoms, when a patient does have them, they can last for months and include: swelling at the infection site, fever, rash, fatigue, body aches, eyelid swelling, headache, loss of appetite, nausea, diarrhea, vomiting, swollen glands, and enlargement of the liver and or spleen.\textsuperscript{1, 2}

The chronic phase of Chagas disease which include congestive heart failure, enlarged colon, enlarged esophagus, sudden cardiac arrest, abdominal pain, and irregular heartbeat, can take up to 20 years to show symptoms.\textsuperscript{1, 2}

Virulence Factors

\textit{T. cruzi} increases its virulence potential through the use of antioxidant enzymes which assist the microbe in dealing with reactive nitrogen and oxygen which are generated while the microbe is infecting host cells. This enzyme is cysteine proteinase, or cruzipain, and cruzipain inhibitors have been successful in the killing of the parasite. The trypomastigote has a flagellum which also contributes to its virulence.\textsuperscript{8, 9}

Historical Information

Carlos Ribeiro Justiniano Chagas discovered the disease in 1909 which was later named after him. Chagas’ disease was discovered in Latin America where it was exclusive to until recently. Vector transmission has now been reported as far away as the southern states in the US, with infected people living all around the world.\textsuperscript{3}

Control/Treatment

After an infected patient is in the chronic phase of the disease it is incurable and can only be slowed through the use of medications. During the acute phase, the two drugs which have been used to treat Chagas disease are benznidazole and nifurtimox. These drugs are currently only attainable in the United States through the Centers for Disease Control and Prevention.\textsuperscript{1}

Vaccine and Prevention

Preventing Chagas disease consists primarily of vector management through the use of insecticides. Other precautions taken to prevent the transmission of Chagas include: bed nets, good hygiene, screening blood and organ donations, screening mothers and newborns, and home improvements.\textsuperscript{2, 3}

Local Cases

From 2013, the time the disease became legally reportable in the Unties States, to 2016 there have been 91 reported cases of Chagas’ disease in Texas.\textsuperscript{4}
Global Cases

There is an estimated 8-10 million people infected with Chagas disease. The vector borne infections are isolated to the Americas.²,³

References