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RESEARCH ARTICLE

## CHAGAS DISEASE

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### ARTICLE INFO

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### ABSTRACT

Chagas disease, caused by the protozoan *Trypanosoma cruzi*, is responsible for a greater disease burden than any other parasitic disease in the New World. Infection occurs when the triatomine vector defecates during its blood meal and fecal material containing the parasite is inoculated through the bite wound or mucous membranes. Vector-borne transmission occurs only in the Americas, where an estimated 8 million people are currently infected with *T. cruzi*. Historically, transmission was concentrated in rural Latin America, but successful vector-control programs have greatly decreased transmission in areas where the disease was formerly endemic, whereas migration has brought infected individuals to cities in Latin America, as well as to the United States, Europe, and Japan. Chagas (CHAH-gus) disease is an inflammatory, infectious disease caused by a parasite found in the feces of the triatomine (reduviid) bug. Infected bugs defecate after feeding, leaving behind *T. cruzi* parasites on the skin. The parasites can then enter your body through your eyes, mouth, a cut or scratch, or the wound from the bug's bite. The parasites usually enter the mammalian (human) host through the bug bite, or breaks in the skin or conjunctiva, replicate in mammalian cells, and may eventually reach other organs through the blood. Chronic-phase symptoms and signs of Chagas disease may be irregular heartbeats, EKG changes, palpitations, fainting (syncope), cardiomyopathy, congestive heart failure, shortness of breath (dyspnea), emphysema, stroke, sudden death, chronic abdominal pain, chronic constipation, dilated colon, and difficulty swallowing. Upper endoscopy, a procedure in which you swallow a thin, lighted tube (endoscope) that transmits images of your esophagus onto a screen. Treatment with antiparasitic drugs benznidazole (Rochagan, Ragonil) and nifurtimox (Lampit) kill or inhibit *T. cruzi* parasites; drugs are available from the CDC.

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### INTRODUCTION

Chagas disease is caused by the parasite *Trypanosoma cruzi* and transmitted in the feces of infected triatomine bugs, which defecate during or after taking a blood meal. The disease is endemic in Latin America. Children with acute infection are more likely to be symptomatic than adults. The acute phase may be asymptomatic or include nonspecific symptoms and signs. The chronic phase occurs 10 to 30 years later and may include cardiac or gastrointestinal symptoms. Congenital infection occurs in an estimated 5% to 10% of newborns of infected mothers. Screening of blood donors and blood is done to prevent transmission via blood and blood products. Diagnosis in the acute phase is by detecting the parasite in a blood smear; diagnosis in the chronic phase is by serology. Treatment with benznidazole or nifurtimox is recommended for all cases of congenital, acute and chronic Chagas disease in children and youth younger than 18 years of age.

#### Definition

Chagas (CHAH-gus) disease is an inflammatory, infectious disease caused by a parasite found in the feces of the

triatomine (reduviid) bug. Chagas disease is common in South America, Central America and Mexico, the primary home of the triatomine bug. Rare cases of Chagas disease have been found in the southern United States, as well.

Also called American trypanosomiasis, Chagas disease can infect anyone, but is diagnosed most often in children. Left untreated, Chagas disease later can cause serious heart and digestive problems.

#### Causes

The cause of Chagas disease is the parasite *Trypanosoma cruzi*, which is transmitted to humans from a bite from an insect known as the triatomine bug. These insects can become infected by *T. cruzi* when they ingest blood from an animal already infected with the parasite.

Triatomine bugs live primarily in mud, thatch or adobe huts in Mexico, South America and Central America. They hide in crevices in the walls or roof during the day, then come out at night—often feeding on sleeping humans.

Infected bugs defecate after feeding, leaving behind *T. cruzi* parasites on the skin. The parasites can then enter your body

through your eyes, mouth, a cut or scratch, or the wound from the bug's bite.

Scratching or rubbing the bite site helps the parasites enter your body. Once in your body, the parasites multiply and spread.

You may also become infected by:

- Eating uncooked food contaminated with feces from *T. cruzi*-infected bugs
- Being born to a woman infected with *T. cruzi*
- Having a blood transfusion containing infected blood
- Getting an organ transplant containing viable *T. cruzi*
- Working in a laboratory where there's an accidental exposure to the parasite
- Spending time in a forest that contains infected wild animals, such as raccoons and opossums
- Being around an infected pet

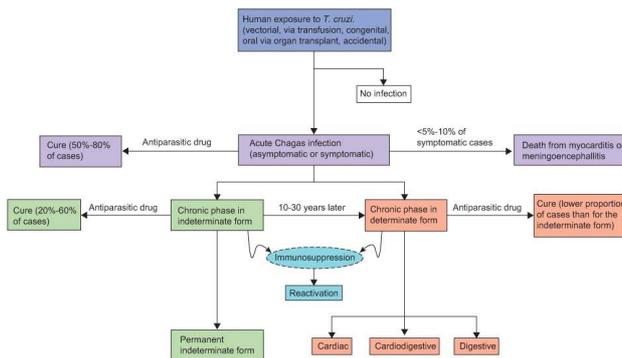
### Risk factors

The following factors may increase your risk of getting Chagas disease:

- Living in impoverished rural areas of Central America, South America and Mexico
- Living in a residence that contains triatomine bugs
- Receiving a blood transfusion or organ transplant from a person who carries the infection

### Pathophysiology

- Chagas disease is caused by a protozoan parasite named *Trypanosoma cruzi* that is transmitted to humans from the feces of triatomine bugs (kissing bugs).
- Chagas disease is not considered contagious from person to person.
- The parasites usually enter the mammalian (human) host through the bug bite, or breaks in the skin or conjunctiva, replicate in mammalian cells, and may eventually reach other organs through the blood.



### Symptoms

Chagas disease can cause a sudden, brief illness (acute), or it may be a long-lasting (chronic) condition. Symptoms range from mild to severe, although many people don't experience symptoms until the chronic stage.

### Acute phase

The acute phase of Chagas disease, which lasts for weeks or months, is often symptom-free. When signs and symptoms do occur, they are usually mild and may include:

- Swelling at the infection site
- Fever
- Fatigue
- Rash
- Body aches
- Eyelid swelling
- Headache
- Loss of appetite
- Nausea, diarrhea or vomiting
- Swollen glands
- Enlargement of your liver or spleen

Signs and symptoms that develop during the acute phase usually go away on their own. If left untreated, the infection persists and, in some cases, advances to the chronic phase.

### Chronic phase

Signs and symptoms of the chronic phase of Chagas disease may occur 10 to 20 years after initial infection, or they may never occur. In severe cases, however, Chagas disease signs and symptoms may include:

- Irregular heartbeat
- Congestive heart failure
- Sudden cardiac arrest
- Difficulty swallowing due to enlarged esophagus
- Abdominal pain or constipation due to enlarged colon
- Chagas disease is caused by a protozoan parasite named *Trypanosoma cruzi* that is transmitted to humans from the feces of triatomine bugs (kissing bugs).
- Chagas disease is not considered contagious from person to person.
- The parasites usually enter the mammalian (human) host through the bug bite, or breaks in the skin or conjunctiva, replicate in mammalian cells, and may eventually reach other organs through the blood.
- Chagas disease may proceed through three phases in an individual: acute, intermediate or indeterminate, and chronic.
- Chagas disease symptoms vary widely from no symptoms to severe in the chronic phase.
- Acute-phase symptoms of Chagas disease may be swelling and/or redness at the skin infection site (termed chagoma), rash, swollen lymph nodes, fever, head and body aches, fatigue, nausea, vomiting and/or diarrhea, liver and/or spleen enlargement, and the Romaña sign.
- Chronic-phase symptoms and signs of Chagas disease may be irregular heartbeats, EKG changes, palpitations, fainting (syncope), cardiomyopathy, congestive heart failure, shortness of breath (dyspnea), emphysema, stroke, sudden death, chronic abdominal pain, chronic constipation, dilated colon, and difficulty swallowing.

### Diagnostic evaluation

- Patient history, physical exam, direct microscopic visualization of the parasites, and detection of antibodies against the parasites are methods used to diagnose Chagas disease.
- Electrocardiogram, a procedure that records the electrical activity of your heart
- Chest X-ray, which lets your doctor see if your heart is enlarged

- Echocardiogram, a test that uses sound waves to capture moving images of your heart, allowing your doctor to see any changes to the heart or its function
- Abdominal X-ray, a procedure that uses radiation to capture images of your stomach, intestines and colon
- Upper endoscopy, a procedure in which you swallow a thin, lighted tube (endoscope) that transmits images of your esophagus onto a screen

### Treatment

As with diagnostic procedures, the medical treatment of cardiac and gastrointestinal signs and symptoms attributable to Chagas disease is similar to that instituted for similar problems caused by other etiologies. Such patients should be referred to appropriate subspecialists for evaluation and management. Treatment of Chagas disease focuses on killing the parasite in acute infection and managing signs and symptoms in later stages. chronic infection in persons who will undergo immunosuppression (eg, pretransplant) or in persons who are already immunosuppressed (eg, those with HIV infection).

- Treatment with antiparasitic drugs benznidazole (Rochagan, Ragonil) and nifurtimox (Lampit) kill or inhibit *T. cruzi* parasites; drugs are available from the CDC.
- Chronic-phase patients are usually treated using treatments directed at the specific symptoms or organ damage.
- Physicians such as cardiologists, gastroenterologists, transplant surgeons, and infectious-disease specialists may be members of a patient's treatment team.
- There is no vaccine against Chagas disease parasites for humans, but many experts suggest that elimination of primitive housing and increasing education about the disease may prevent most cases of Chagas disease; insecticides and insect repellents

### Complication

- Heart-related complications. Treatment may include medications, a pacemaker or other devices to regulate your heart rhythm, surgery, or even a heart transplant.
- Digestive-related complications. Treatment may include diet modification, medications, corticosteroids or, in severe cases, surgery.

### Prevention

There is no effective vaccine but the following may help aid prevention:

- Improved housing.
- Tourists avoiding mud/thatched huts.
- Mosquito nets should have a cloth roof to prevent the 'rain' of vector faeces.
- Insecticide spraying.
- Screening of blood donors and organ donors.

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