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Jessica Rogers

Stacy Castro

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# Chagas Disease: “The Kiss of Death”



By: Jessica Rogers and Stacy Castro

## Background



## Infection/Disease



## Treatment



### Micro Organism

Chagas disease is a vector transmitted disease also known as American trypanosomiasis. Chagas disease is classified as a protist or protozoa, which is a simplified version of ‘animal-like single celled organism that is like a multicellular organism’. This is because of the *trypanosoma cruzi* which is the protist itself (U.S. National Library of Medicine, 2012). This disease’s life cycle is complicated. The *trypanosoma cruzi* changes forms in its life cycle as it travels from hosts. The disease is first transmitted by the vector as it takes a blood meal. This is where the disease then takes over the cells near the wound site. The disease grows, multiplying by using binary fission and the infected cell tissue. During the third stage the disease bursts into the blood stream where a new vector takes a blood meal, digesting the disease. The microorganism multiplies within the vector’s body and the cycle repeats (CDC, 2013). The vector, commonly referred to as the ‘Kissing Bug’ is a black and orange striped insect the size of a penny -20 mm.

### Importance

Chagas disease is found primarily in Latin America, but has slowly traveled throughout Southern North America. Due to this disease’s growth, it can be considered common to south Texas and is easily becoming just as popular throughout the whole state. Because we ourselves live in Texas, caution towards the disease is strongly advised (Texas Department of State Health Services, 2012). However just because the disease cuts close to home is not the sole reason to worry; the fact that ‘if you discover you have the disease in the chronic stages you will perish’ is another reason to be wary. It is also important to understand Chagas disease because it is one of the major health problems in South America.

### Historical

Chagas disease was discovered by Carlos Chagas in 1909. He was the first to discover the aspects of the disease and so was named after him. The Chagas disease is a form of African sleeping sickness, and vice versa. (Archive, 2014). Disease vectors have been transferring this disease among mammals for over five million years, however the oldest record of the disease is 9,000 years old. Currently this is viewed as a crucial disease considering the fact you are deemed hopeless if you are not treated during the beginning stages. Using that information, one can infer that considering today’s technologies and sciences available, long ago this disease was not survivable.

### Immune Response

In the human immune system there are three lines of defense against attack. The first line of defense is a nonspecific defense consisting of multiple layers of skin, mucus, and cilia. The second line of defense is also nonspecific, but less so than the first. In the second line of defense the macrophages attack the pathogens, ‘eating’ them, while the white blood cells destroy invading pathogens. Also the body increases its temperature into a fever causing an inflammation to occur. Unlike the other two, the third line of defense is specific. B cells send out antibodies to attach to the disease causing organisms so that the macrophage find and consume them easier. Helper T cells boost the fighting cells and send signals to give instructions. Then memory T cells “remember” the attacking pathogen so the body can respond quicker the next time it is invaded with the same organism (Nogueira, L. G., & Cunha-Neto, 2009).

### Progression

Progression of Chagas disease with treatment in the acute phases of the disease will most commonly yield 100% curability. However after the acute stages of Chagas disease the percent rate of survivability and curability decreases and the treatment process becomes prolonged. Chagas disease also often yields no symptoms or signs that someone has the disease in the first stages. However the chronic stages show the heart failure and other symptoms (Mayo Clinic, 2014).

### Prognosis

If a patient is diagnosed with Chagas disease immediate treatment is strongly advised. The longer the patient has the disease the less likely the treatment will work. If a patient reaches the chronic stages he or she will most likely perish (Mayo Clinic, 2014). Luckily Chagas disease will not reoccur if you already have it. This is because most who catch the disease either cannot afford the treatment and die for that reason or because they have already reached the chronic stages and have died, or because they reached treatment and were cured. However, Chagas disease does seem to ‘reoccur’ due to the fact that after the acute phases pass, the disease it will lay dormant for days, months, or even years. Then suddenly the chronic stages will re-emerge (Mayo Clinic, 2014).

### Options

There are only two options for the treatment of Chagas disease, nifurtimox and benznidazole, which are prescribed during the acute phases. Both nifurtimox and benznidazole target the protozoa, and can cause some serious side effects. If a treatment is missed, health professionals warn patients not to take a double dose-that amount of strong medication could lead to some serious altercations. However this is not where troubles begin; troubles start at how to acquire the drugs since it is not commercially available in the United States or Canada (Drugs.com, 2015).

### Mechanism

The two drugs, nifurtimox and benznidazole, both attack the pathogen. The mechanism by which this is done by each varies greatly. Nifurtimox targets the deoxyribonucleic acid or DNA, of the pathogen. Benznidazole targets the ribonucleic acid or RNA, of the pathogen (Drugs.com, 2015). However not much more is known about benznidazole, and it is expected to be studied relatively soon, while nifurtimox is known so well that scientist even know how this drug is specifically removed.

### Emerging

The World Health Organization (WHO) has been alerted about Chagas disease and has decided to find a more efficient treatment. Also, Drugs for Neglected Diseases (DND) has started an initiative to build a strong case for Chagas disease in order to raise awareness of the severity of the disease. Drugs for Neglected Disease also hopes to create a non-expensive treatment for the disease in order for all classes to afford it. This emerging treatment will not just be for the acute stages like the two drugs already in use. It will be for all stages of Chagas disease. Therefore there is much hope for the new DND treatment to be released to the public as an official treatment drug, as well as the WHO effort to create one as well. There are many smaller projects for treatment emerging for CD, but the main one will be focused on. This main treatment is the DND’s; it is the most promising of all the projects and will most likely yield a product of the high-standards it boasts (World Health Organization, 2014; Pan American Health Organization, 2013).