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Jessica Rogers
Stacy Castro

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References available upon request.

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By: Jessica Rogers and Stacy Castro

Micro Organism

Chagas disease is a vector transmitted disease also known as American trypanosomiasis. Chagas disease is classified as a protozoan or protista, which is a simplified version of an animal-like single celled organism that is like a multicellular organism. This is due to the trypanosoma cruzi which is the protozoan itself. (U.S. National Library of Medicine, 2012). This disease’s life cycle is complicated. The trypanosoma cruzi changes from its life cycle as it travels from host to host. 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 cite. The disease grows, multiplying by using binary fission and the infected cell dies. During the third stage the disease bursts into the bloodstream 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. The first order of defence is to avoid infection. If a patient is diagnosed with Chagas disease immediate treatment is strongly advised. The longer the patient has the disease the less likely the patient will respond to treatment. If the patient reaches the chronic stages he or she will most likely pass away (Mayo Clinic, 2014). Chagas disease is a form of African sleeping sickness, and vice versa. (Archive, 2014).

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. T helper cells boost the fighting cells and send signals to give instructions. T memory 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 phases of Chagas disease the present 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). If a patient is diagnosed with Chagas disease immediate treatment is strongly advised. The longer the patient has the disease the less likely the patient will respond to treatment. If the patient reaches the chronic stages he or she will most likely pass away (Mayo Clinic, 2014). Luckily Chagas disease will not recur 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 will lay dormant for days, months, or even years. Then usually 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 alterations. 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).