Clinical Aspect of Chagas

Jesseka McGee


This article starts off by giving all of the background information about chagas such as where it comes from, how it is transmitted, which countries have the disease and what it is. It then goes on to discuss the clinical aspects of chagas which has two different phases. First there is the acute phase (initial phase) which then turns into the chronic phase. The chronic phase has three categories which are indeterminate, cardiac and digestive. During the indeterminate stage some patients will begin to have a chronic form or they will have a good prognosis with no risk. “Heart disease is the most important clinical aspect of ChD, due to its frequency and severity.” There are also 4 stages of chagas: Stage A (indeterminate), Stage B (disease progression), Stage C/D (symptoms of heart failure). The most consistent independent predictors of death identified in most of the studies were LV dysfunction, New York Heart Association functional class, and non-sustained VT during 24-h Holter monitoring.


The two types of treatment (benznidazole and nifurtimox) are limited to children under the age of twelve during the acute stage or in the early chronic phase. 62% of people are cured with these antiparasitic drugs. There is a 30-60 day treatment process but patients to not always comply with the instructions. At one point there was a 30 mg tablet of nifurtimox but no longer is available. There is a major need for new drugs because the existing ones are either not sufficient or the side effects are too harsh.


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is available. There is a major need for new drugs because the existing ones are either not sufficient or the side effects are too harsh.


This article, written by the World Health Organization, gives statistics about Chagas and talks about the types of treatment available to patients. It states that “up to 30% of chronically infected people develop cardiac alterations and up to 10% develop digestive, neurological or mixed alterations which may require specific treatment.” The two drugs used for treatment are benznidazole and nifurtimox. Benznidazole is used in the acute stage rather than the chronic phase because it is more effective. The longer a person takes to be treated, the less effective the drug will be. These drugs are also more effective in children as opposed to adults.


The two types of treatment for people that have Chagas are benznidazole and nifurtimox. They reduce the amount of parasites in the infected body. These drugs are also recommended for the acute stage of Chagas. The CDC suggests that people/children in the acute stage, with congenital infections and suppressed immune systems take these antiparasitic drugs. CDC also recommends that adults over 50 years of age get individualized plans of treatment. These drugs can only be administered through the CDC in the United States.


This article written by the CDC notes two ways to treat Chagas, which are antiparasitic and symptomatic treatments. Antiparasitic treatments kill parasites while symptomatic treatments manage symptoms and signs of the infection. Like the other articles have stated, antiparasitic treatment (benznidazole and nifurtimox) is more effective in the beginning but it can also be used in the chronic phase. This point is different from the other articles because they say that these drugs should mainly be used for the acute stage. The symptomatic treatments should be given to patients with cardiac and intestinal problems that result from Chagas. Using pacemakers and medications for irregular heartbeats are recommended during the chronic stage.

The Political Economy of Chagas and Other Neglected Diseases
Janeanne Levenstein


Chinnock reports that pharmaceutical companies are putting more resources into the research and production of treatments for neglected diseases such as Chagas; additionally, the article notes that the companies are becoming more likely to donate drugs than in the past. It notes some examples of pharmaceutical companies that have done so in the past. It also suggests that Chagas
is on its way to becoming substantial enough to catch the interest of pharmaceutical companies because it is affecting an increasing number of people in North America and Europe.


The author notes two problems in the health system; first, that for-profit pharmaceutical companies do not give enough attention to “poor people’s” diseases, and second, that R&D is focused too heavily on medicinal treatments (as opposed to say preventional lifestyle changes). The author offers some suggestions on how to fix these problems. She mentions push and pull funding as options, but her best case scenario is the promotion of non-profit NGO pharmaceutical companies that are oriented toward neglected diseases. She mentions a few of these non-profit NGOs that are already in existence and uses DNDI as a case study. Most useful for our project was her mention of existing organizations and how they function -- how they could be used for the chagas cause.


A very short article that notes the increase in pharmaceutical companies partnering with non-profit organizations in order to develop and provide medicine for “neglected diseases.” The Japanese company Eisai agreed to provide a drug, E1224, that may help in eradicating Chagas, will offer expertise, and has rights to sell the drug.


This article notes some of the difficulties being faced by the attack on Chagas, pointing out that there are significant gaps in research due to a lack of coordinated and comprehensive investigations. The article notes how Chagas can be prevented (through eliminating the vector insect) and offers a brief history of its discovery and impact over the years. The author suggests that there are only two ways to prevent the disease: burning houses and schools in rural areas (seems a bit excessive), and periodic fumigation. The article goes on to note the difficulty of eradicating the disease with medical intervention due to the pharmaceutical companies’ lack of interest in a disease that affects people who likely are unable to pay for medicine. Despite this, the article notes the development of alternative prevention attempts such as a paint that repels the bugs and a few other developing approaches in a number of Central and South American nations.


This article addresses the problems that intellectual property rights, patenting, and global trade regimes pose on access to medicine, especially for the global poor and developing nations. The author proposes that coalitions between multiple developing nations can work together to advocate collectively against the bullying that the WTO and developed nations tend to perpetrate. Additionally, the author notes that constituent pressure in developed nations can help force developed nations to carry out more lenient and favorable international health policies.

The article notes that the increase of world traveling is bringing diseases to new parts of the world - often from least industrialized nations to most. This transportation is raising awareness about these diseases and serving as an impetus for those in positions of power to take action toward the prevention and treatment of these “exotic” diseases.

Treatment and Drug Invention for Chagas Disease
Qingyao Li


This study provides the first look at the genetic diversity of T. cruzi at a genomic scale. The analysis covers an estimated ~60% of the genetic diversity present in the population, providing an essential resource for future studies on the development of new drugs and diagnostics, for Chagas Disease. These data is available through the TcSNP database (http://snps.tcruzi.org).


The article investigated the in vivo activity of fexinidazole against T. cruzi, using mice as hosts. The T. cruzi strains used in the study were previously characterized in murine models as susceptible (CL strain), partially resistant (Y strain), and resistant (Colombian and VL-10 strains) to the drugs currently in clinical use, benznidazole and nifurtimox. The results demonstrated that fexinidazole was effective in suppressing parasitemia and preventing death in infected animals for all strains tested. In addition, assessment of definitive parasite clearance (cure) through parasitological, PCR, and serological methods showed cure rates of 80.0% against CL and Y strains, 88.9% against VL-10 strain, and 77.8% against Colombian strain among animals treated during acute phase, and 70% (VL-10 strain) in those treated in chronic phase. Benznidazole had a similar effect against susceptible and partially resistant T. cruzi strains. Fexinidazole treatment was also shown to reduce myocarditis in all animals infected with VL-10 or Colombian resistant T. cruzi strains, although parasite eradication was not achieved in all treated animals at the tested doses. Conclusions: Fexinidazole is an effective oral treatment of acute and chronic experimental CD caused by benznidazole susceptible, partially resistant, and resistant T. cruzi. These findings illustrate the potential of fexinidazole as a drug candidate for the treatment of human CD.


A hundred years from its description, Chagas cardiomyopathy remains a challenging disease. Although successful vector-control strategies have decreased the incidence of Chagas disease in several Latin American countries, both migration to urban areas and immigration have spread the disease worldwide; and now, blood transfusion, organ transplantation, and vertical transmission are a concern. The pathogenesis of Chagas cardiomyopathy involves complex host-parasite interactions, where low-grade but incessant systemic infection and triggered autoimmune reaction are the main mechanisms for its development, with the contribution of autonomic
damage and microvascular disturbances. Chagas cardiomyopathy is the most important clinical presentation of Chagas disease and comprises a wide range of manifestations, including heart failure, arrhythmias, heart blocks, sudden death, thromboembolism, and stroke. Recently, simple clinical prognostic scores have been developed to identify high-risk patients and help with management. The treatment of Chagas cardiomyopathy focuses mostly on managing heart failure, arrhythmias, and thromboembolism. The role of specific antiparasitic therapy in the chronic form is not yet defined, and a randomized trial is now under way to address this crucial point. In this article, we review the main clinical aspects of Chagas cardiomyopathy and underscore some upcoming challenges for the appropriate control, diagnosis, and management of this complex disease.


In this "Critical Review" Coura and Castro made a historical introduction of drugs assayed against Chagas disease beginning in 1912 with the works of Mayer and Rocha Lima up to the experimental use of nitrofurazone. In the beginning of the 70s, nifurtimox and benznidazole were introduced for clinical treatment, but results showed a great variability and there is still a controversy about their use for chronic cases. After the introduction of these nitroheterocycles only a few compounds were assayed in chagasic patients. The great advances in vector control in the South Cone countries, and the demonstration of parasite in chronic patients indicated the urgency to discuss the etiologic treatment during this phase, reinforcing the need to find drugs with more efficacy and less toxicity. It also reviewed potential targets in the parasite and present a survey about new classes of synthetic and natural compounds studied after 1992/1993.


To examine the evidence base and provide practical recommendations for evaluation, counseling, and etiologic treatment of patients with chronic T cruzi infection. Chagas disease presents an increasing challenge for clinicians in the United States. Despite gaps in the evidence base, current knowledge is sufficient to make practical recommendations to guide appropriate evaluation, management, and etiologic treatment of Chagas disease.

Whole-genome sequencing of the protozoan pathogen *Trypanosoma cruzi* revealed that the diploid genome contains a predicted 22,570 proteins encoded by genes, of which 12,570 represent allelic pairs. Over 50% of the genome consists of repeated sequences, such as retrotransposons and genes for large families of surface molecules, which include trans-sialidases, mucins, gp63s, and a large novel family (>1300 copies) of mucin-associated surface protein (MASP) genes. Analyses of the *T. cruzi*, *T. brucei*, and *Leishmania major* (Tritryp) genomes imply differences from other eukaryotes in DNA repair and initiation of replication and reflect their unusual mitochondrial DNA. Although the Tritryp lack several classes of signaling molecules, their kinomes contain a large and diverse set of protein kinases and phosphatases; their size and diversity imply previously unknown interactions and regulatory processes, which may be targets for intervention.


*Trypanosoma cruzi* affects millions of people worldwide. Clinical variability of Chagas disease can be due to the genetic variability of this parasite, requiring further genome studies. Here the genome sequence of the *T. cruzi* Dm28c clone (TcI), a strain related to the sylvatic cycle of the parasite is reported.


Three candidate antigens were recognized by antibody response in chagasic patients from two distinct study sites and expressed in diverse strains of the circulating parasites. A multiplex ELISA detecting antibody response to three antigens was highly sensitive and specific in diagnosing *T. cruzi* infection in humans, suggesting that a diagnostic kit based on TcG1, TcG2 and TcG4 recombinant proteins will be useful in diverse situations.


Chagas disease (American trypanosomiasis) is endemic in 21 countries of the Americas, where control is largely focused on elimination of the domestic insect vectors (Triatominae) coupled with measures to extend and improve the screening of blood donors in order to avoid transfusional transmission. Through national programmes and multinational initiatives coordinated by WHO-PAHO, much has been accomplished in these domains in terms of reducing transmission. Attention now turns to consolidating the successes in interrupting transmission, and improved treatment for those already infected and those who may become affected in the future. This article, based on technical discussions at the " epidemiological and
It was previously reported that the cancer drug clinical candidate tipifarnib kills the causative agent of Chagas disease, *Trypanosoma cruzi*, by blocking ergosterol biosynthesis at the level of inhibition of lanosterol 14α-demethylase. Tipifarnib is an inhibitor of human protein farnesyltransferase. Tipifarnib analogues were synthesized that no longer bind to protein farnesyltransferase and display increased potency for killing parasites. This was achieved in a structure-guided fashion by changing the substituents attached to the phenyl group at the 4-position of the quinoline ring of tipifarnib and by replacing the amino group by OMe. Several compounds that kill *Trypanosoma cruzi* at subnanomolar concentrations and are devoid of protein farnesyltransferase inhibition were discovered. The compounds are shown to be advantageous over other lanosterol 14α-demethylase inhibitors in that they show only modest potency for inhibition of human cytochrome P450 (3A4). Since tipifarnib displays high oral bioavailability and acceptable pharmacokinetic properties, the newly discovered tipifarnib analogues are ideal leads for the development of drugs to treat Chagas disease.


The results demonstrate that the chagasic IgGs can directly interact with and desensitize m2 mAChRs and provide support for the hypothesis of autoimmune mechanisms having a role in the pathogenesis of Chagas’ cardiomeuromyopathy.


The paper provide a molecular background to CYP51 inhibition and azole resistance and enlighten the path for directed design of new, more potent and selective drugs to develop an efficient treatment for Chagas disease.

McKerrow, JH, Doyle, PS, Engel, JC, Podust, LM, Robertson, SA, Ferreira, R, Saxton, T, Arkin, M,


This review will focus on two general approaches carried out at the Sandler Center, University of
California, San Francisco, to address the challenge of developing new drugs for the treatment of Chagas disease. The first approach is target-based drug discovery, and two specific targets, cytochrome P450 CYP51 and cruzain (aka cruzipain), are discussed. A "proof of concept" molecule, the vinyl sulfone inhibitor K777, is now a clinical candidate. The preclinical assessment compliance for filing as an Investigational New Drug with the United States Food and Drug Administration (FDA) is presented, and an outline of potential clinical trials is given. The second approach to identifying new drug leads is parasite phenotypic screens in culture. The development of an assay allowing high throughput screening of *Trypanosoma cruzi* amastigotes in skeletal muscle cells is presented. This screen has the advantage of not requiring specific strains of parasites, so it could be used with field isolates, drug resistant strains or laboratory strains. It is optimized for robotic liquid handling and has been validated through a screen of a library of FDA-approved drugs identifying 65 hits.


Posaconazole is a triazole antifungal agent with a spectrum of activity that includes Candida and Cryptococcus species, many molds, and some endemic fungi. Posaconazole has received US Food and Drug Administration approval for the treatment of oropharyngeal candidiasis, including infections refractory to itraconazole and/or fluconazole. It is also approved as prophylaxis for invasive Aspergillus and Candida infections in patients aged 13 years who are at high risk of developing these infections, in adult and adolescent hematopoietic stem cell transplant recipients with graft-versus-host disease, and in persons with hematologic malignancies and prolonged neutropenia due to chemotherapy, who are at high risk of developing these infections. Approval for additional indications is being sought. Limited clinical experience suggests efficacy for the treatment of infections due to Zygomycetes and as salvage therapy for patients with invasive aspergillosis and coccidioidomycosis. Currently available only as an oral suspension, posaconazole, which has been well tolerated, requires administration with food or a nutritional supplement to assure adequate bioavailability. Posaconazole is predominantly eliminated in the feces, where it appears as unchanged drug. Metabolism, mostly glucuronidation, plays only a minor role in its elimination, as does renal clearance; as a consequence, dose adjustment is not required in the presence of renal or hepatic insufficiency. Although not a substrate of hepatic CYP450 3A4, posaconazole inhibits this enzyme and thus has the potential for significant pharmacokinetic interactions with drugs metabolized by this isoform. Its use in combination with CYP450 substrates that prolong the QTc interval is contraindicated, as is its use with ergot alkaloids; administration of posaconazole with other substrates and/or inducers of this enzyme system requires caution. Posaconazole is both a substrate and inhibitor of P-glycoprotein. Currently, the major roles for posaconazole in clinical practice are as prophylaxis for neutropenic patients with significant risk of infection with filamentous fungi and as therapy for zygomycoses. It may also have a role in the treatment of other filamentous fungal and some yeast infections, but assessment of its overall place in antifungal therapy awaits the availability of further clinical experience.


To compare long-term outcomes of patients with nonacute Chagas disease treated with
benznidazole versus outcomes of those who did not receive treatment. Compared with no treatment, benznidazole treatment was associated with reduced progression of Chagas disease and increased negative seroconversion for patients presenting with nonacute disease and no heart failure. These observations indicate that a randomized, controlled trial should now be conducted.


The finding in the parasite of a phosphagen and its biosynthetic pathway, which are totally different from those in mammalian host tissues, points out this arginine kinase as a possible chemotherapy target for Chagas' disease.


The structural study identified a unique parasite pocket that neighbors the active site and may thus be valuable for the design of parasite-specific inhibitors.

Testing for Chagas in Blood, Tissues, and Organs

Leigh Field


<http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm210429.tm>.

U.S. Food and Drug Administration approved another test to determine whether or not T. cruzi is present in blood, tissue, and organ donors. T. cruzi is a blood borne parasite and can be picked up with the new test Abbott Prism Chagas and its very receptive to detecting the antibodies that T. cruzi has. It can pick up these antibodies through serum/plasma from whole blood and blood compounds. Some statistics about infection in the United States are given (300,000 people in the U.S. are infected, detected 1,000 with Abbott test in last 3 years, T. cruzi can be spread through blood donation, organ donation, infected mother to child).

This article is very relevant to how blood is tested and T. cruzi is detected. Although this test is mainly used for blood and organ donations instead of routine screenings, it is still very applicable to the recent advances in detecting T. cruzi. This information is very reliable because its from the FDA website informing citizens on the advances and up to date tests performed on donors. Although it does not say if this test is required by all donors, but the test is intended to screen the donors blood and organs intended for transfusion/transplantation.

This article is very helpful to my research to know that there is T. cruzi in
the United States, although it isn’t necessarily publicized. Also that there are new advances in tests. This article was published in 2010 but has been updated as late as 04/23/2013. Thus, this test is still relevant and important to my research on Chagas disease in Costa Rica.


Blood tests are used to detect the T. cruzi parasite by picking up the proteins from your immune system to combat it (1). Then there are a few more tests that can be used to evaluate your stage (Acute or Chronic), these are Electrocardiogram (electrical activity of heart), a Abdominal X-ray (images of stomach, intestines, colon), and Upper endoscopy (images of esophagus).

These are important tests to understand in simpler terms of what is being detected by the blood tests to confirm Chagas, and what other measures are taken post diagnosis. This also aids in the steps taken to come to the conclusion of how to treat the patient who has Chagas, in determining whether or not it is acute or chronic.


11 million people throughout Latin America are affected by Trypanosoma cruzi parasite. Triatomine insects, blood donations/transfusions, congenital transmission, organ donations/ transplants, laboratory accidents, ingesting food or drink can transmit this disease with T. cruzi in it (Stramer et al, 1). This disease has two stages – Acute (can half mild symptoms) that can change to chronic phase, both are generally asymptomatic. In 2005 a new test came out called ELISA that can detect the antibodies in T. cruzi that are in a serum/plasma. The further test used to double check the first one is called RIPA. If the second test is positive then the patient is deemed positive.

I believe this will couple well with the article discussing the Abbott test that is newly out, since this one is from 2005. The Abbott test was not mentioned but the ELISA and RIPA were. It is interesting to me, and possibly could mean that the ELISA & RIPA were replaced by the Abbott test. It does say also that they have had a few cases of false negatives with the ELISA and RIPA testings, though they are few, they still are struggling to detect all cases of Chagas in blood with these two tests. The information is
put out on the CDC government, it is good to see the progression of the Chagas testing and helpful to know what is current and what was used previously.

This helps to give some current and past data to compare in my research. It also is interesting to note that there are advances being made in Chagas testing though it is slow.


A relatively new test created to detect T.cruzi in chronic patients. It is a particle gel immunoassay called PaGIA-Chagas, and is easy to use and shows test results quickly. Routine tests for Chagas include – Indirect immunoflorescence assay (IFA), indirect haemagglutination (IHA), and enzyme-linked immunosorbent assay (ELISA) (590). During the study patients were only deemed positive for chronic Chagas if both the PaGIA-Chagas and the IFA both came back positive. Overall, the accuracy is related to PaGIA-Chagas results that use serum and capillary blood-derived plasma. It is said to not be very good for field conditions, but it will save time for field work in general (592).

It is interesting and very relevant because this is the first I found a difference in tests done that test for Chagas in general and Chagas in chronic patients. This specific test is said to be convenient for testing blood donors and those in general who may want to be tested for Chagas (591). I think this will be very important to include with a list of testing’s that occur for Chagas currently.

Prevalence of T. Cruzi in Monteverde Area

Ken Jameson


Searched two areas around San Luis Abajo, used five capture methods, and observed triatoma behavior. Live traps were not successful, but active search turned up 32 specimens. Has suggestions for improving the capture rate of live traps.


Examined t. Cruzi in triatoma gathered from four sites in San Luis. She found 75% of the ones from non-fumigated sites were infected(25 of 33) and 62% of those from fumigated sites were infected (5 of 8).

Fong, Linda Susan. 2003. “The incidence of Trypanosoma cruzi (Trypanosomatidae) in Mice from San Luis, Monteverde, Puntarenas, Costa Rica.” EAP Tropical Biology and

She captured live mice in three areas of San Luis and used two blood tests to examine presence of t. cruzi. Of the 19 mice from three species, only one was found to be infected.


Examined triatoma from six sites, with most from La Bella. Overall she found a rate of infections of 28%


The most complete and extensive study of t. Cruzi infection rates. She found the none were infected in “La Chancheria area below Monteverde (of 166 triatoma); 39% from La Bella were infected (of 540 triatoma); and 22% from El INVU (of 296 triatoma) were infected. She did extensive analysis, finding elevation was the main factor in triatoma prevalence and that rodents were the most common blood source.


Searched seven sites for triatomas and found them in all but Canas and La Cruz. On average 30% were infected with t. cruzi, though none in Monteverde and La Lindora. Looked at many correlates; found that 29% of those where triatoma were found reported having been bitten.


She examined triatoma from 12 properties in San Luis. She found 2 of 14 infected or 14% and that proximity to dogs seemed to have an influence on infection.

Awareness and Screening in Monteverde
Emily Doherty


Currently there is no good way to manage Chagas, especially after the disease reaches the chronic stage. Insecticide is used currently to control the insect population. The chinches however, are particularly nasty bugs though because both females and males have to feed on blood all throughout their lives, which means that people’s chance of getting bitten by a chinche is greatly increased compared to other bugs because they have to feed so often. When the
chinche defecates, it leaves the parasite in its waste as well. There are people working to create a peptide that would make the chinche not defecate directly after eating, which in turn would not spread Chagas to people. In theory, this would be a spray for a room or a topical lotion that would have no negative effects on people.


The symptoms of Chagas are broken down into two parts—the acute and chronic phases. The acute phases could include swelling of bitten area, fever, fatigue, rash, body aches, headache, loss of appetite, nausea/diarrhea/vomiting, swollen glands, or enlargement of liver or spleen. These symptoms however, can all be very subtle and they range widely, making it difficult to properly diagnose Chagas. After the acute phase passes (which can easily go unnoticed) there are no further symptoms until one reaches the chronic stage. The chronic stage symptoms can include an irregular heartbeat, inflamed/enlarged heart, congestive heart failure, sudden heart attack, difficulty swallowing, or abdominal pain. The CDC also says that you may become infected by wild animals such as raccoons or opossums or an infected pet (I believe there is conflicting information on this way of transmission).


This website says that it is possible for pets to get Chagas by eating food that has the insects feces on it, thus contracting the disease. Recently also in Brazil, 25 people became ill and 3 died from drinking Guarapa, which is a Brazilian juice that apparently contained the kissing bugs feces. Also, in order to prevent bug bites, wear long sleeves, as the bugs do not bite through clothing, and shake out your sheets before going to bed. It is especially difficult to know when you have gotten Chagas because only 1% of the population will experience acute symptoms.


This is a good, easy, fact sheet for anyone looking for the basics. I think it gives very good, clear information on who is at risk and how to get tested for it if you think you are at risk. It explains how people can get Chagas from the bug biting you, mother to baby, blood transfusion, and organ transplant. It also has a picture of the bug so that people can know what it looks like.


This site provides basic information, including where and how to get a bug checked for Chagas. If there is not a cite near you, they provide a website that you may contact. It also includes good pictures and information to be able to correctly identify the bugs. It also shows a picture of what the bite looks like, and reasons for swelling (including allergic reactions). Most people who have severe swelling are allergic to the saliva of the bugs, as not all bites have strong reactions. Most reactions are mild.

Mother To Child Transmission of Chagas Disease
Mia Rizzi

This article shares the research done on chagas disease transmission from mother to child. It focuses on a specific case of two Bolivian parents who moved to Japan and had their son. Kazuo et al. suspect that the reason chagas disease is now found in Europe and Asia is because of the lack of tests done in conjunction with increased emigration. Now that people from Latin America are moving all around the world the disease is being spread without knowing it (through blood donation or pregnancy, etc.). The disease is not regularly tested for in blood donors or pregnant women. However many countries will not allow someone to donate blood if they have lived in or traveled to chagas disease endemic areas.


This article provides a scientific perspective of the spread of the T. cruzi protozoa and how it can be transferred specifically through breast milk from mother to child. Norman, López-Velez explains that women are the majority of migrants from Latin America, thus emphasizing the importance of studying how it is transmitted through breast-feeding. Although the research was rather inconclusive, it offered a new insight on how it is transmitted and what can be done to prevent it. The article also introduces the issue that breast feeding is the most nutritious option however studies have found the T. cruzi protozoa in breast milk.


This article provided information about the awareness of pregnant women in chagas endemic areas. It acknowledges that in order to take a preventative approach to the issue not only does the mother need to be active and aware of what needs to be done for an early diagnosis, but there needs to be a strong initiative of the political health system to provide all of these services and allow them to be accessible everywhere. The Southern Cone Initiative has implemented a national routine in Paraguay, Uruguay and Argentina for pregnant mothers to be serologically tested for T. cruzi to provide diagnostic information at childbirth. However this does not tackle the issue of rural areas with low coverage of pre-delivery services. Many health programs now perform serology six months after child birth from a chagas positive mother.

Official Documents from Costa Rica and International Organizations Related to the Effort to Eliminate Chagas Disease
Ken Jameson
Lays out in great detail a strategy for identifying threats of Chagas and infestations of triatoma dimidiata, treatment for acute and chronic Chagas, guidelines for fumigating infested sites, and extensive reporting requirements for all aspects related to Chagas. The basis of the strategy is the elimination of triatoma colonies through fumigation and monitoring. We found no evidence that the protocol is followed here in Montverde.

Contains extensive information on Chagas in the Western Hemisphere with many links to documents that have been developed in the course of highlighting Chagas and other neglected vector-borne diseases.

Provides an introduction to the Central American effort to address Chagas disease. Contains links to the meetings held on the issue since the activity started in 1996. The main focus was on the vector rhodnius prolixus, the main Central American vector, though not in Costa Rica. Triatoma dimidiata is the main Costa Rica vector.

Reports on a meeting held in Costa Rica in December 2010 to develop a strategy for dealing with Chagas. Has a series of recommendations for screening and treatment.

Summarizes efforts in Latin America to deal with Chagas. Describes elements of Chagas elimination and lays out a comprehensive program to address this “neglected disease.”

Provides detailed instructions on how to prepare and apply insecticide to infested homes. Never deals with the actual pesticide to be used. Other documents related to malaria suggest the continued use of DDT.
This study identified 6 essential components for a successful Chagas Treatment program. One of the essential components was the development of Information, Education, and Communication (IEC) modules which targeted families, community authorities, health staff members, and key community figures to teach about Chagas and create a dialogue between the various actors to develop the best treatment approach suitable for different cultural and socioeconomic contexts.


This article describes a video project made by a Loyola University Team that provides step by step preventative instructions for communities at risk of Chagas. The video follows an ‘ecohealth’ approach that focuses on prevention through home improvement projects and focuses on community empowerment and autonomy.


This article describes a project in Bolivia that established Vector Information Posts (PIVs) which act as reference points for everything related to Chagas, including information about places that provide free diagnoses and treatments. In six years this project achieved 28 PIVs, managed to consolidate Chagas related information, and assist grassroots associations, many of which are headed by women.


This article describes the role of culture and local beliefs/stigmas in helping to spread tropical disease and in hindering treatment. Ultimately, the article concludes that public health education is essential in order to change these cultural practices and promote the successful treatment of parasitic diseases. Through education, people can change practices that promote disease and deplete stigmas that get in the way of successful treatment plans.

In 1993, Chagas disease was the most important tropical disease in Latin America. Persisting and re-emerging in different rural ecological zones (notably in the Northern Cone of Latin America and Central America), the major approaches to control the disease have included improved case management and vector control programs. As alluded to this article, public health workers are particularly important for controlling this disease. Médecins Sans Frontières has proven the importance of establishing case management protocols that included public health workers training on prevention, screening, diagnosis, and treatment of Chagas.


Chagas may not be as well-known as diseases like malaria or HIV, but it affects millions of people. The article states that most of Chagas disease transmission is controlled by spraying residual insecticide on houses and screening blood donors. After two (7 yrs. long) community wide campaigns that involved public health workers, the Gran Chaco reduced an 88% domestic infestation. Although the parasite was not eliminated, a strong relationship between public health workers and communities’ members emerged that allowed motivation, health promotion and community mobilization, in close cooperation with the main locally health practitioners and leaders. The conclusion presented in this article points out that this type of partnership could be an important tool to scale up eradication activities of the disease within the country.


This article mentions how Chagas' disease is an important neglected public health problem in many Latin American countries. Named after Carlos Chagas, this disease has two successive phases: acute and chronic. The article states that thanks to a coordinated multi-country campaign
in the Southern Cone countries, the transmission was interrupted in Uruguay, Brazil and Chile. This article contains population-based epidemiological data on Chagas-associated mortality and successful prevention methods utilized by public health workers (1980-2006). Moncayo et al. also mentioned that the integrated activities sustained and expanded the significant progress that has been achieved so far in the interruption of transmission of Chagas disease in several countries of Latin America.

http://www.cdc.gov/mmwr/preview/mmwrhtml/su48a7.htm

This article states that any sort of elimination and eradication programs are laudable goals, but they carry with them an awesome responsibility. In 1997, WHO listed Chagas disease as being candidate for elimination as public health problems within 10 years. This article focuses on how a disease under consideration for eradication must be of recognized public health importance, and be perceived as a worthy goal by all levels of society. At present, there may not be enough trained health workers to provide even a basic level of the Chagas disease prevention. The article mentions what is the public health worker role within the eradication of Chagas disease: they travel within the community, speak to groups, and visit homes, distribute information and otherwise connect with local people. Developing world public health infrastructures are still forming. Overall, the article points out how public health workers are very important because they often are the main bridge for eradicating disease, and help link people to needed health care information and services.

http://www.ncbi.nlm.nih.gov/books/NBK11745/

At present, Chagas disease has two main research priorities. The first is the development of new vector control strategies. These strategies will allow the successful elimination campaign used in the Southern Cone countries in Latin America to be extended to the Central American and a few South American countries, where the vectors are often not fully established. The second strategy is the development of affordable treatment for the millions of people already infected with the parasite and the prevention of any chronic complications. This article focuses on Tropical disease and how neglected they are as tropical diseases seem to truly be diseases of the poor. However, the article also notes the elimination of Chagas disease (and many other) as public
health problems can be achieved. The article mentions how investments in research and control can make a significant contribution to eradicate tropical disease. Tropical diseases are now on target for elimination as public health problems are affecting large parts of the world, however, these diseases require new tools in order to efficiently and effectively be eliminated.

Prevention and Pest Control
Ben Crosby


This article discusses the infestation rates of Triatoma dimidiata in houses in a small neighborhood outside of San Jose. The researchers, Rodrigo and Rojas, concluded that it is difficult for the bug to thrive in cleaner households, but that the insects usually live in colonies in storage sheds, cellars, or nearby fields outside of the home anyway. Methods such as pesticides were found to be ineffective for various reasons, such as annual migration habits and the ability of the Triatoma to survive most chemical control techniques. The easiest and most sustainable way to keep a home Triatoma free is to keep a clean living space while simultaneously minimizing man-made artificial ecotypes, where the insects can thrive.


In 2007, the World Health Organization announced a renewed strategy to eliminate Chagas disease in the Americas by 2010. But it is impossible to eradicate the disease completely “because of the zoonotic characteristics of the Tcruzi transmission cycle.” Additionally, the current main method of killing triatomine- with insecticide- is fast becoming obsolete. The insects are becoming resistant to pesticides. A cocktail of insecticides should be used to kill triatomine as well as any resistance they may have built up in the past decades. Insecticide-treated pet collars and bed nets are also viable ways to repel triatomine.

It is equally important to carry out regular surveys and evaluations in endemic areas to monitor the presence of triatomine, throughout the process of their extermination and after the bugs are no longer detected. In the 1990s in Argentina, there was a resurgence of the Chagas disease after it had supposedly been eliminated, so it is important to have a sustainable long-term plan of action. Lastly, there needs to be “advocacy to integrate Chagas disease into a country's health monitoring information system or other disease surveillance programmes (malaria,
dengue, or tuberculosis,)” as well as an established standard method of detecting T cruzi in order to more effectively determine the impact of Chagas and develop new ways of treatment and prevention.

3.


This article discusses the results of a study done to determine re-infestation rates and the effectiveness of traps on catching triatomine. After spraying insecticides, re-infestation rates are 26% after three months and 20% after six months. They also tested semiochemical traps (traps treated with chemicals with the intent of attracting something) vs un-baited (control) traps. The un-baited traps catch triatomine at a rate of 12.5% of the time, while the baited traps catch triatomine 63.6% of the time (after adjusting for imperfect detection). Baited traps are also more effective at finding triatomine than manual searches of a home after spraying insecticides. Manual searches found a re-infestation rate of 1.4%, while the baited traps found a re-infestation rate between 8.5% and 14%.

4.


This article examines the use of insecticides to determine the best way to use them to keep triatomine at bay. Pyrethroid, the insecticide of choice, was found to be the most effective when 50 mg/ sq meter was applied to a domicile. This amount of insecticide was found to reduce the amount of triatomine by 80% in any given household. Any more did not show an improvement in the amount of bugs it killed.

However, triatomine have a “re-infestation cycle.” Not much is known about it because not much is known about the bugs themselves. The most common belief is that triatomine are migratory in a sense because they move from food source to food source depending on the season. The most effective way to spray and eliminate triatomine would depend of this migratory cycle, but more studies are required to determine exactly when during the cycle would be most the effective to spray. Additionally, any interruption in the spraying cycle would undo all of the progress that had been made- a very likely outcome when considering the cost of spraying a house multiple times per year. Ultimately, this article determines that insecticide-treted screens and bed nets are the most sustainable solutions to minimize the transmission of T-cruzi.