Welcome to June's Chagas ECHO Session:
Looking Behind the Curtain on Chagas Disease: Perspectives from the State and Federal Level

Chagas ECHO Webinar Series

South Coastal AHEC Program

Disclosure of Relevant Financial Relationships

Chagas Disease in the United States
ECHO: Extension for Community Health Outcomes

June 23, 2021 Virtual Learning Event

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Dr. Susan Montgomery and Ms. Bonny Mayes Planning Committee Members

Agenda

- Welcome
- Introductions and Announcements
- Presentation – Dr. Susan Montgomery and Ms. Bonny Mayes
- Q&A
- Closing Remarks

BONNY MAYES, MA

Epidemiologist, Texas Department of State Health Services, Zoonosis Control Branch

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Announcements

- This session will be recorded and be made available online at the UT Health San Antonio ECHO website
- We will be hosting monthly sessions, stay tuned for **July** topic coming soon!
- Evaluations will be sent out via email after this session
- CME certificates will be issued within 3 weeks following this session
- If you have any questions, please reach out to **chagasus@gmail.com**

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Looking Behind the Curtain on Chagas Disease: Perspectives from the State and Federal Level

Bonny Mayes, MA
Zoonosis Control Branch
Department of State Health Services

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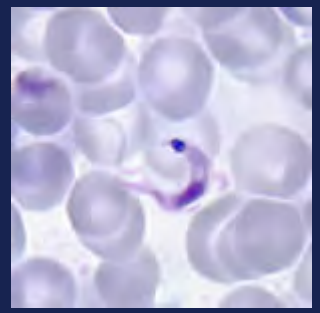
Chagas Disease

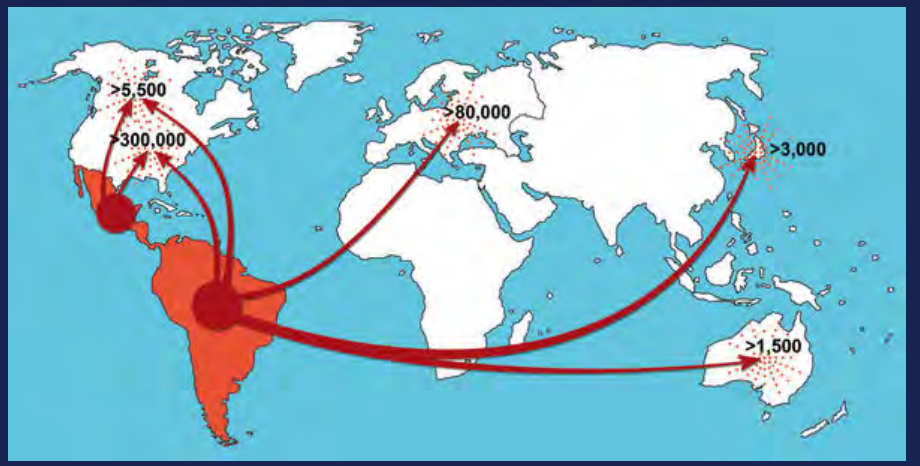
Named after the Brazilian physician Carlos Chagas, who discovered the disease in 1909

- **Causative Agent:**
  - *Trypanosoma cruzi*, a hemoflagellate protozoan parasite
- **Vector:**
  - kissing (triatomine) bugs
- **Distribution**:
  - endemic in the Americas
- **Prevalence**:
  - an estimated 8 million people are infected in Mexico, Central and S. America
  - CDC estimates that >300,000 persons with Chagas disease live in the U.S.



www.cdc.gov/parasites/chagas/diagnosis.html

Triatoma sanguisuga – Ed Wozniak



Chagas disease: a new worldwide challenge - Nature 465, S6-S7 (24 June 2010)

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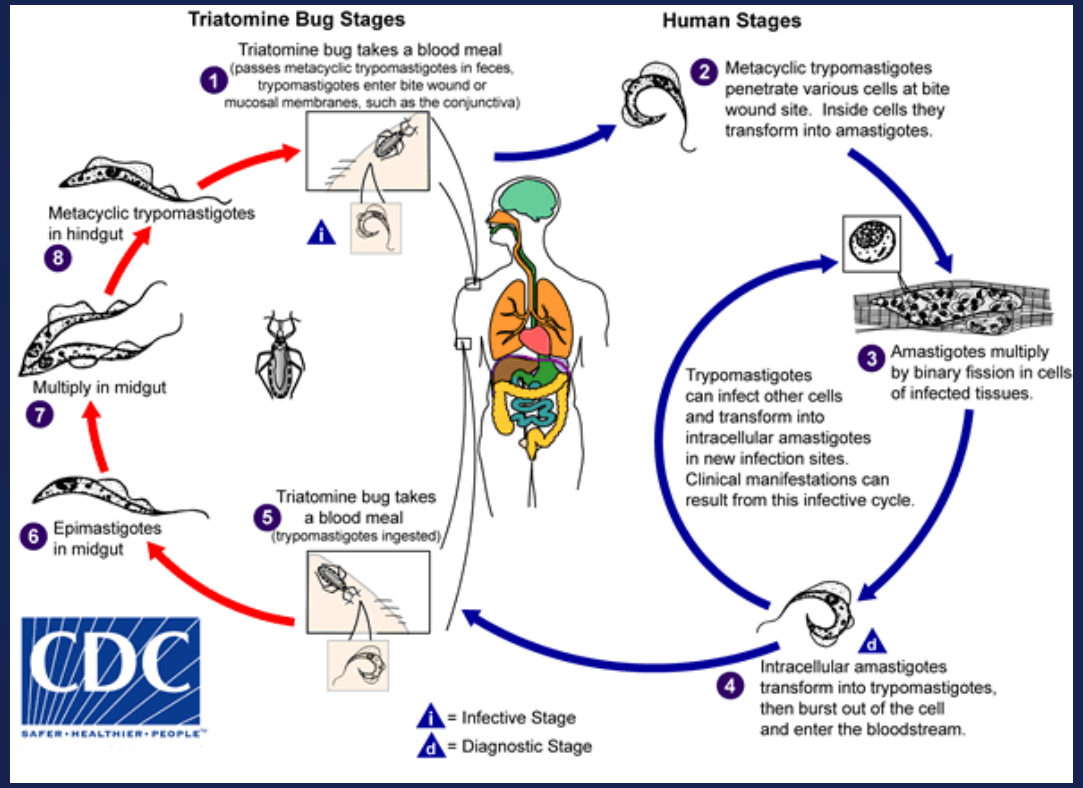
Trypanosoma cruzi Life Cycle

A sylvatic lifecycle is maintained between multiple mammalian wildlife hosts (*rodents, opossums, raccoons, and armadillos in particular in the southwestern U.S.*) and multiple species of triatomines



- infection typically occurs when **feces** from an infected triatomine enters through a bite wound or mucosal membrane

- infection can also occur from:
  - mother-to-baby (congenital)
  - contaminated blood products (transfusions)
  - an organ transplanted from an infected donor
  - laboratory accident
  - contaminated food or drink

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Acute Chagas Disease

- **Acute Phase:**

  - **often asymptomatic** or mild with non-specific symptoms, *such as*:
    - fever, fatigue, myalgia, headache, rash, loss of appetite, diarrhea, vomiting
    - other signs may be present: hepatosplenomegaly, swollen glands, **chagoma**, **Romaña's sign**
    - severe acute disease is rare but does occur in some children & immunocompromised individuals

  - if present, symptoms usually resolve spontaneously in 3-8 weeks

  - if untreated, *T. cruzi* remains in the body

https://www.cdc.gov/parasites/chagas/gen_info/detailed.html#intro

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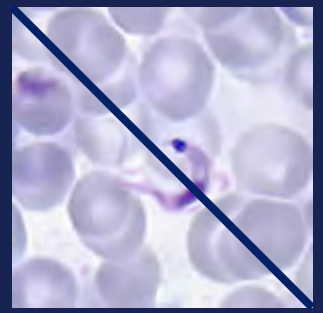
Chronic Chagas Disease

- **Chronic Indeterminate Phase**:
  - 70-80% of these patients will remain **asymptomatic** for life
  - latent infection
  - parasitemia below detectable levels



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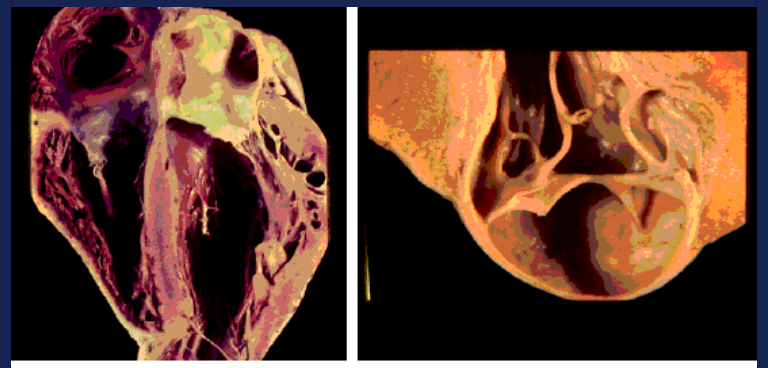
Chronic Chagas Disease

- **Chronic Symptomatic Phase:**
  - 20-30% of latent infections will progress to symptomatic chronic infection
  - typically manifests as heart conduction abnormalities/**heart failure** and/or less often intestinal motility and megasyndromes
  - parasitemia below detectable levels



Heart in chronic Chagas disease Longitudinal coronal section of the heart at autopsy (left panel) reveals a typical apical aneurysm; moderate dilation of both ventricles without significant thinning of the left ventricular wall is also found. In the right panel, a closeup of the apical aneurysm shows virtual apposition of endocardium to epicardium. Courtesy of João Samuel Meira Oliveira, MD.

www.emedmd.com/content/chagas-disease

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Chagas Disease Reporting

- **Chagas Disease is a notifiable condition in Texas!**
  - HSC 81.042 + TAC 97.2.

- **Reporting Methods:**
  - electronic Lab Reports (ELRs)
  - secure email to **WNV@dshs.texas.gov**
  - fax to **512-776-7454**

- **Blood Collection Agencies:**
  - collection agency name, BUI #, specimen collection date, donor name, phone number, DOB, age, sex, race, and hispanic ethnicity (Y/N)

- **Share the info with your city or county health department:**
  - www.dshs.texas.gov/idcu/investigation/conditions/contacts/

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DSHS Online Resources
www.texaszoonosis.org

Chagas Disease

Data Guidance Information Medical Providers Submission and Testing Resources

Chagas disease, also called American trypanosomiasis, is caused by infection with *Trypanosoma cruzi*, a single-celled parasite naturally transmitted by several species of triatomine bugs ("kissing bugs," "cone-nose bug," "vinchuca"). Humans, dogs, and many other species of domestic and wild animals are susceptible to infection. The insect vectors of Chagas disease and the *T. cruzi* parasite are found in all regions of Texas.

- General Information about Chagas Disease
  - Chagas Disease Data and Map of Geographic Distribution for Texas
- Chagas Disease Information for Medical Providers
  - Laboratory Diagnosis of Chagas Disease in Humans
- Triatomine Bug/Kissing Bug/Cone-Nose Bug/Vinchuca Submission and Testing
  Instructions and form for submitting bugs for identification and testing for *T. cruzi*
- Downloadable Information Guide – "Kissing Bugs and Chagas Disease: What You Need to Know"
  - English (PDF, 2.3 MB)
  - Spanish (PDF, 1.7 MB)
- Additional Resources

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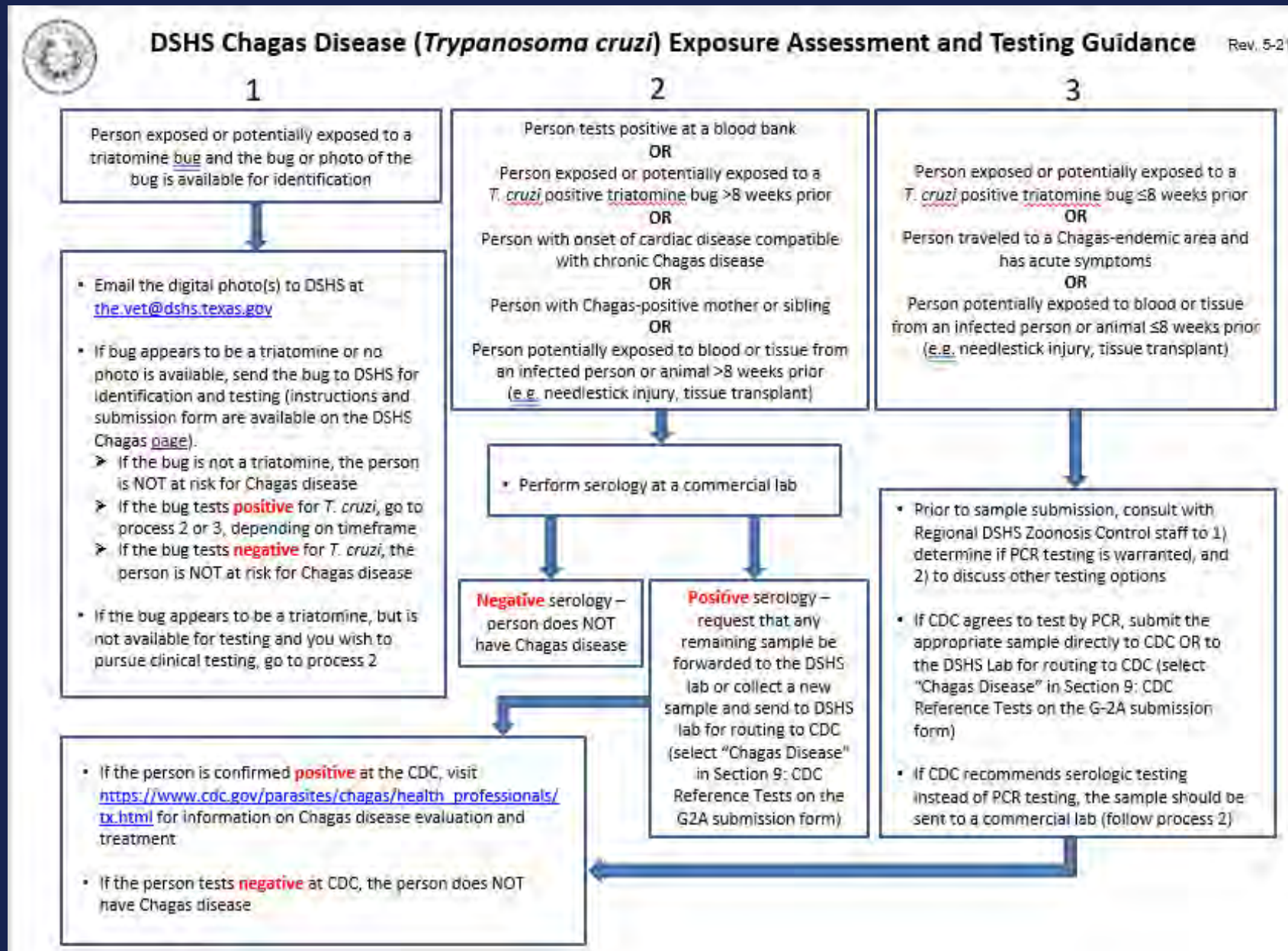
DSHS Chagas Disease (*Trypanosoma cruzi*) Exposure Assessment and Testing Guidance

Rev. 5-21



Located: zooregions\Zoo Conditions\Chagas & www.dshs.texas.gov/IDCU/disease/chagas/Chagas-Disease-Testing-Guidance-for-Healthcare-Providers.aspx

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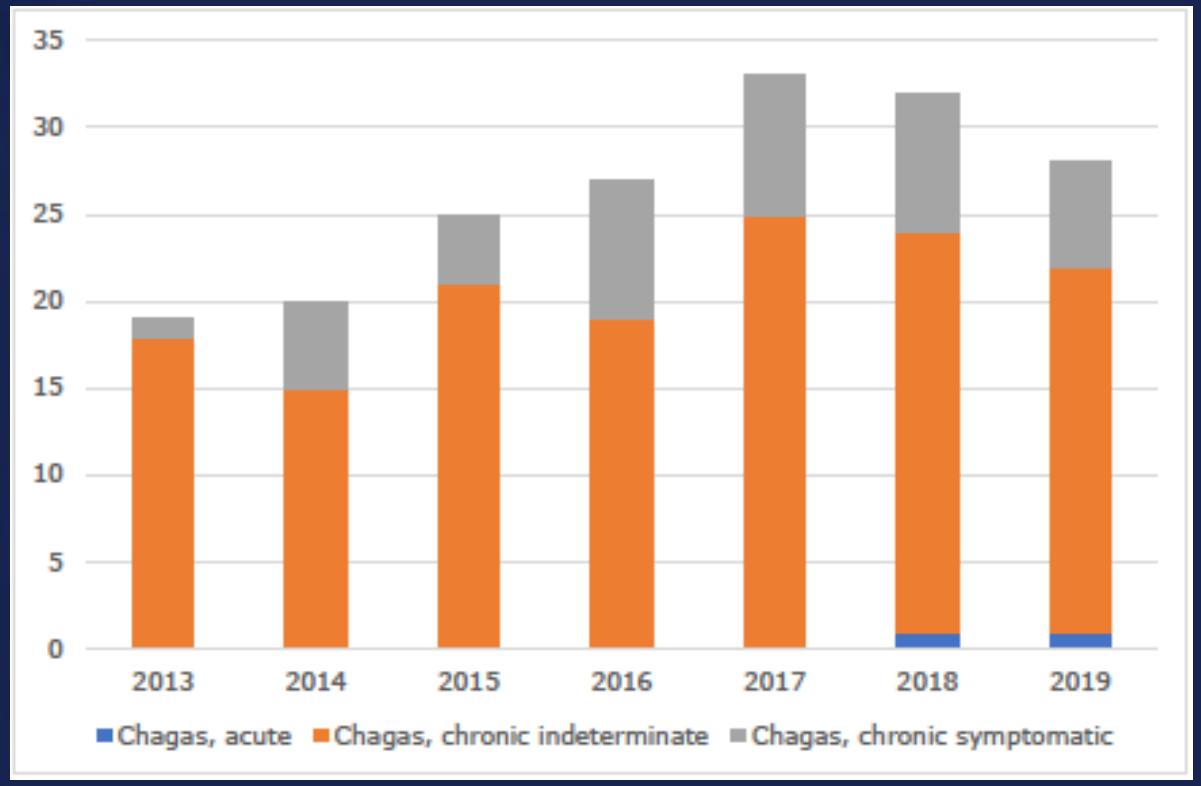
Human Chagas Disease Cases Reported in Texas, 2013-2019



- 184 Chagas Disease Cases
  - 34 locally acquired (18%)
  - 98 imported (53%)
  - 52 unknown (28%)
- Case Classification
  - 2 Acute (1%)
  - 142 Chronic Indeterminate (77%)
  - 40 Chronic Symptomatic (22%)
- Case Status
  - 88 confirmed (48%)
  - 96 probable (52%)

Locally Acquired Human Chagas Disease Cases Reported in Texas, 2013-2019

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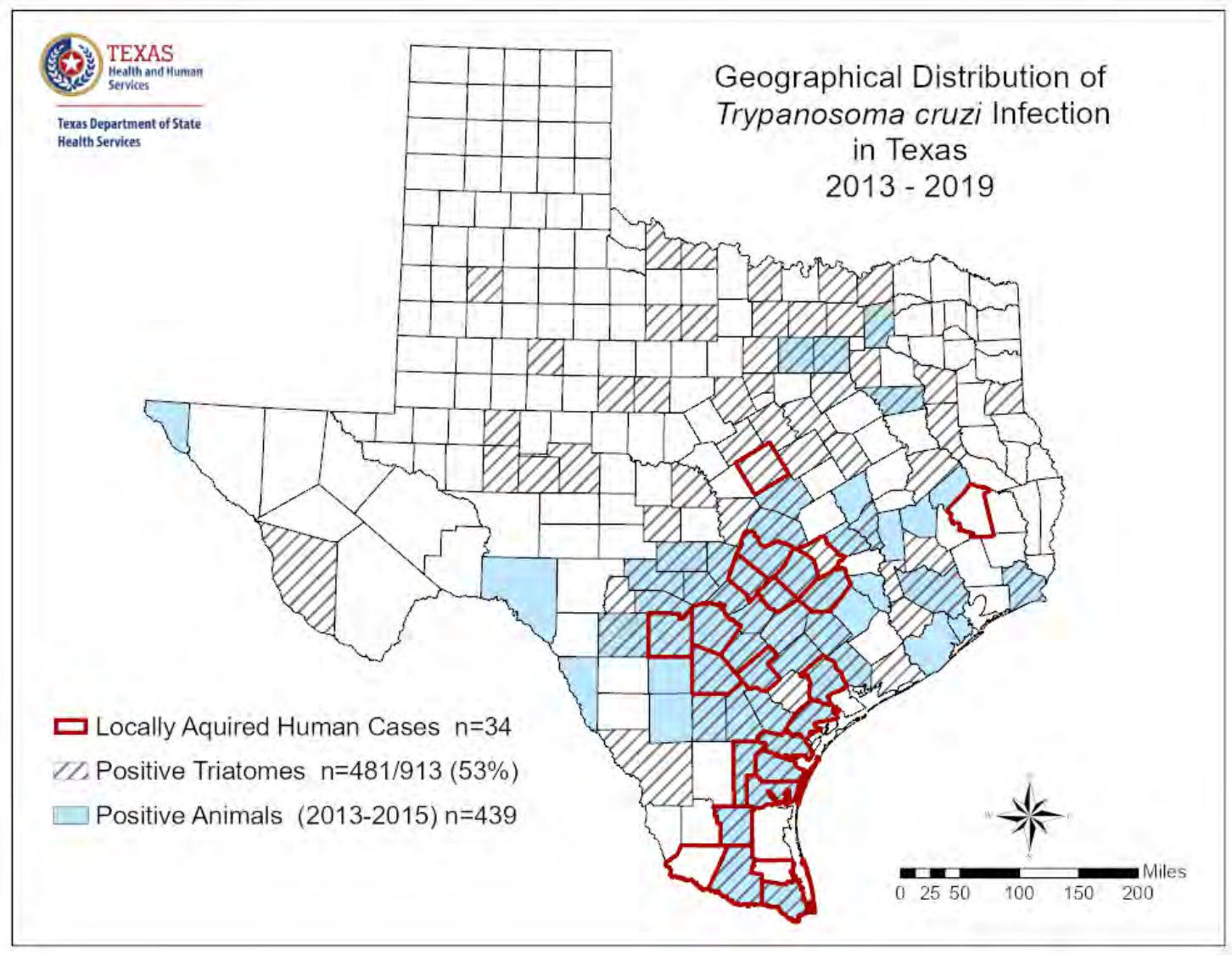

- 34 cases
- 22 counties
  - 26% in 1 county
- 2 acute
  - south Texas
  - central Texas
- Chronic
  - 30 indeterminate
  - 2 symptomatic
- 65% confirmed

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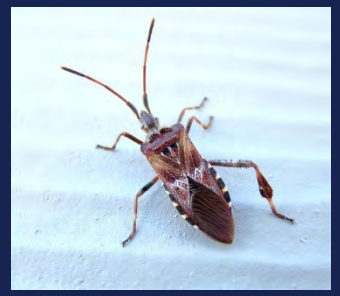
Person Exposed to a Triatomine (Kissing) Bug

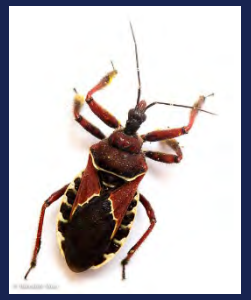
- **Person has bug**
  - confirm identity – many bugs are commonly confused with kissing bugs!
    - https://kissingbug.tamu.edu/found-a-bug/#identification OR
    - email The.Vet@dshs.texas.gov

Kissing Bugs



NOT Kissing Bugs






BugGuide.Net

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Person Exposed to a Triatomine (Kissing) Bug

- **Bug can be sent to DSHS**
  - www.dshs.state.tx.us/IDCU/health/zoonosis/Triatomine-Testing.aspx
  - CDC will test for presence of *T. cruzi* parasite, if positive for the presence of a human blood meal
  - service is free for Texas residents

- **Result interpretation cautions**
  - exposure to a triatomine infected with *T. cruzi* does not indicate transmission of the parasite occurred
  - exposure to a triatomine that tests **negative** may not rule out infection IF there are other triatomines present in the environment (e.g. living inside the home)

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Situations Where Testing for Acute Disease May be Appropriate

- **Person exposed or potentially exposed to a *T. cruzi* positive triatomine bug ≤8 weeks prior**
  - ➢ if asymptomatic, could wait until week 8 for serology
- **Person has significant exposure to a triatomine and has clinically compatible acute signs/symptoms** (e.g. Chagoma, hepatosplenomegaly)
- **Person traveled to a Chagas-endemic area and has acute symptoms**
- **Person potentially exposed to blood or tissue from an infected person or animal ≤8 weeks prior** (e.g. needlestick injury, tissue transplant)

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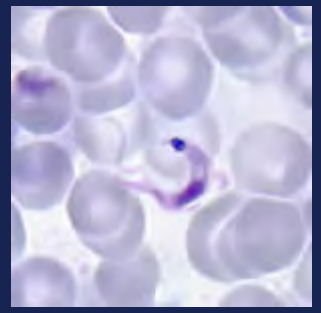
Tests Available for Diagnosis of Acute Chagas Disease

Incubation period for Chagas disease is typically 7-14 days



www.cdc.gov/parasites/chagas/diagnosis.html

- **Blood Parasite Exam**
  - examination of thick & thin blood smears for trypomastigotes
  - very low sensitivity, high specificity
  - available at DSHS, most commercial labs

- ***Trypanosoma cruzi* Molecular (PCR) Testing**
  - high sensitivity (100% for acute infections compared to microscopic examination)
  - requires pre-approval
  - available at CDC

- ***Trypanosoma cruzi* IgM Ab IFA (Indirect Fluorescent Antibody) Test**
  - to be used along with microscopic examination of a blood smear!!
  - **highly** prone to false positives ☹

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Situations Where Testing for Chronic Disease is Appropriate

- **Person exposed or potentially exposed to a *T. cruzi* positive triatomine bug** (*or bug that was not available for testing*) **>8 weeks prior**
- **Person tests positive at a blood bank**
- **Person with onset of cardiac disease compatible with chronic Chagas disease**
- **Person with Chagas-positive mother or sibling**
- **Person potentially exposed to blood or tissue from an infected person or animal >8 weeks prior** (e.g. needlestick injury, tissue transplant)

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Tests Available for Diagnosis of Chronic Chagas Disease

- ***Trypanosoma cruzi* IgG Serology**
  - ELISA
  - available at some commercial labs
  - good screening test - high sensitivity
  - specificity issues
    - false positives common
  - patients testing positive need follow up testing to confirm or rule out infection

- **Serology at CDC**
  - 3 tests available
  - for confirmatory testing, not initial screening

Triatoma sanguisuga on arm - Picture courtesy of Dr. Ed Wozniak & Christina Wozniak

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Public Health Consultation for Chagas Disease Testing

- **Zoonosis Control Regional Staff**
  - provide Chagas testing guidance
  - facilitate PCR testing at CDC
  - Contact list at www.dshs.state.tx.us/idcu/health/zoonosis/contact/

- **Molecular (PCR) Testing at CDC**
  - requires CDC approval
  - routed through DSHS with G-2A form
  - send directly to CDC with CDC Form 50.34

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Chagas Disease - Follow Up Testing

- **Patients with positive blood donor screening should have *T. cruzi* IgG serology testing at a commercial lab**
  - public health follows up with all Chagas reactive blood donors
  - if negative, there is not lab evidence of chronic infection

- **Patients with a positive *T. cruzi* IgG serology test should have confirmatory testing performed at the CDC**
  - provider can collect another sample and should route through DSHS
    OR
  - public health can request commercial lab positive samples be forwarded to DSHS
    - need **DSHS G2A form** completed by public health
    - copy of *T. cruzi* IgG lab report if not in NEDSS
    - our lab will not send to CDC without ZCB approval (*T. cruzi* IgG positive)

- **Positive results on two *T. cruzi* serology tests (generally EIA & IB) at CDC**
  - consistent with chronic Chagas infection

- **Patient tests negative at CDC**
  - no evidence of chronic Chagas infection

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Commercial Laboratory Testing

- **Mayo Medical Lab** - *not currently available*
  - *Trypanosoma cruzi* IgG Antibody ELISA
    - reflex to *Trypanosoma cruzi* IgG Antibody, Lateral Flow Assay for extra $

- **ARUP**
  - *Trypanosoma cruzi* Antibody, IgG – Hemagen IgG ELISA
  - *Trypanosoma cruzi* Antibody, IgM – Indirect Fluorescent Antibody (IFA)
    - for **acute** disease screening
    - to be used along with microscopic examination of a blood smear: Parasites Smear (Giemsa Stain), Blood
    - highly prone to false positives

- **Quest**
  - *Trypanosoma cruzi* Antibody, Total – Wiener IgG ELISA
  - Donor, Chagas Screen – ELISA
    - for screening blood & tissue donors
    - recommend *T. cruzi* IgG ELISA for positive donors

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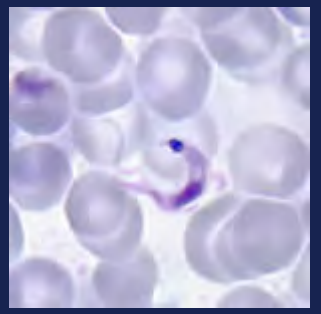
Public Health Laboratory Testing

- **Texas Department of State Health Services:**
  - Blood Parasite Exam
    - examination of thick & thin blood smears for trypomastigotes
  - Coming Soon! *Trypanosoma cruzi* IgG Serology
    - Hemagen & Wiener ELISA
    - likely available Fall 2021!

- **Centers for Disease Control & Prevention:**
  - *Trypanosoma cruzi* Real-Time PCR
    - blood
    - requires pre-approval
  - Serology: T. cruzi AB EIA, T. cruzi AB IB (TESA) and T. cruzi AB IFA
    - serum or plasma
    - for confirmatory testing, not initial screening!
    - diagnosis of chronic Chagas disease is generally established after concordant positive results are obtained with at least **two** different types of *T. cruzi* serologic assays



www.cdc.gov/parasites/chagas/diagnosis.html

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Chagas Disease Treatment

- **Patients should have confirmatory testing before treatment**
  - acute cases with positive **PCR** and/or blood parasite exam
  - chronic cases with positive **CDC serology**

- **FDA approved drugs**
  - Benznidazole – children 2-12 years of age
  - Nifurtimox – children from birth to 17 years of age
  - may be used “off label” for other age groups
  - both may cause significant side effects

- **CDC consultation**
  - available to assist with management of patients with Chagas disease
  - parasites@cdc.gov, (404) 718-4745

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Technical Resources

- **DSHS Subject Matter Experts:**
  - Bonny Mayes (ZCB Epidemiologist) bonny.mayes@dshs.texas.gov
  - Kelly Broussard (ZCB Epidemiologist) kelly.broussard@dshs.texas.gov
  - La Chae' (Susan) Butler, Laboratory Medical Parasitology Team, 512-776-7560
- **CDC:**
  - Parasitic Diseases Inquiries- parasites@cdc.gov, 404-718-4745

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Technical Resources (continued)

- **Web:**
  - DSHS Chagas Disease website - www.dshs.texas.gov/idcu/disease/chagas/
  - CDC Chagas Disease website - www.cdc.gov/chagas/
- **Publications:**
  - Infectious Diseases of the Dog and Cat, Craig E. Greene, 3rd Edition, Saunders, 2006, Chapter 72. "Trypanosomiasis." Pp. 676-681.
  - "Evaluation and Treatment of Chagas Disease in the United States: A Systematic Review," Bern, Caryn et al, JAMA, November 14, 2007, Vol. 298, No. 18.

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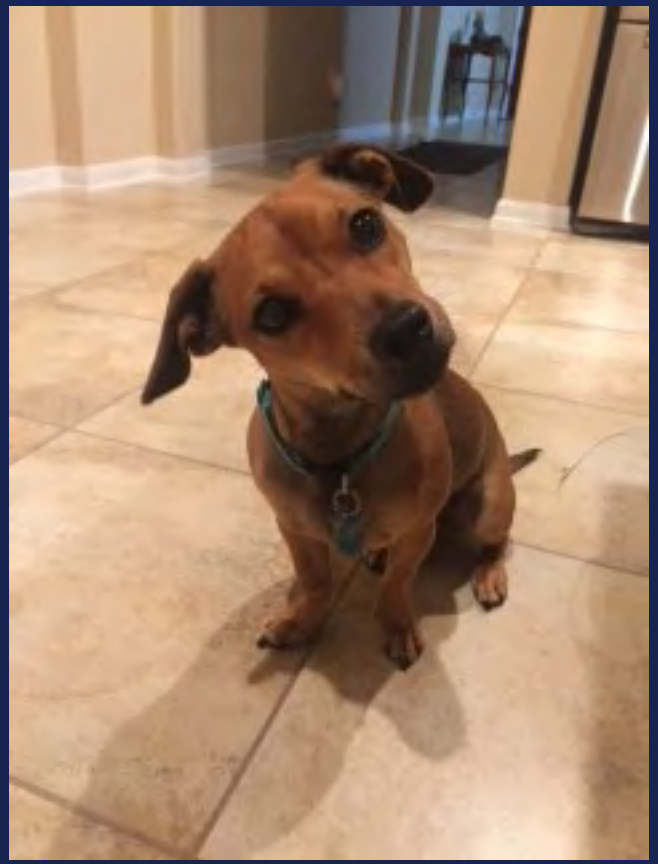
Contact Information



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512-776-2888

www.texaszoonosis.org

Behind the curtain: CDC Chagas disease activities

Susan P. Montgomery, DVM, MPH

Parasitic Diseases Branch

Centers for Disease Control and Prevention

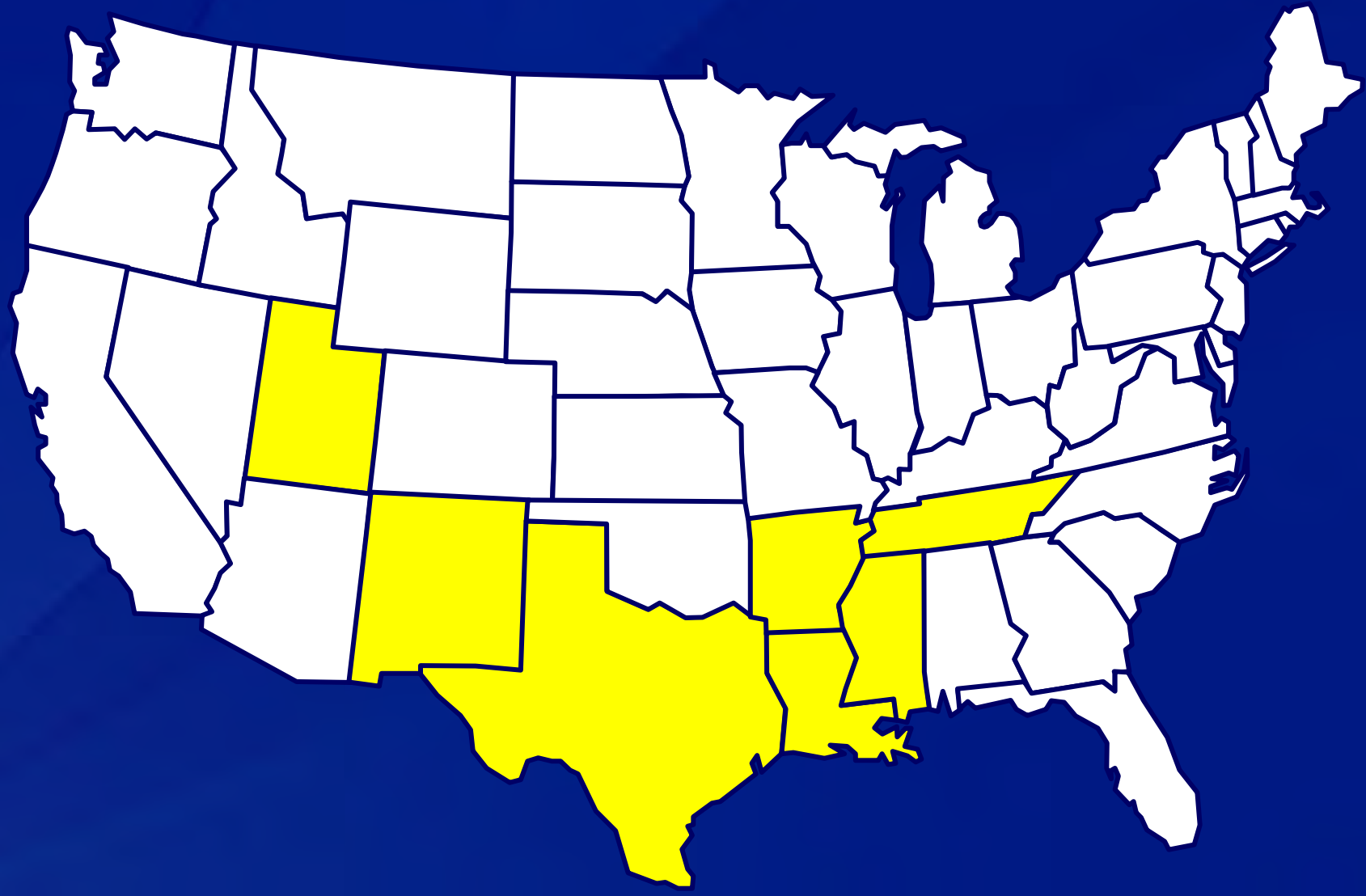
June 23, 2021

The findings and conclusions in this presentation have not been formally disseminated by the Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.

CDC supports state health departments

- **Chagas disease is not a nationally notifiable disease, CDC does not receive surveillance case reports from the states where it is reportable (AZ, AR, LA, MS, TN, TX, and UT)**
- **Reference laboratory testing in support of state public health labs**
  - Diagnostic testing
  - Triatomines with human contact testing
- **Subject matter expertise and Chagas disease health education materials (fact sheets, etc.)**

States where Chagas disease is reportable



AZ, AR, LA, MS, TN, TX, and UT

CDC Chagas disease diagnostic testing

- **Coordinated through state public health laboratory**
  - Specimens shipped from state lab to CDC
  - Reports go to state lab via dedicated secure email
- **Test Directory | Submitting Specimens to CDC | Infectious Diseases Laboratories | CDC**
  - Preapproval requirements
  - Specimen collection, handling and shipping instructions
  - Turn around times
  - CDC contacts
- **Required specimen submission form CDC 50.34**

CDC triatomine testing

- **Triatomines submitted by state health department using same specimen submission form CDC 50.34**
  - Identification by morphology and DNA (immature stages, damaged bugs)
  - Test the triatomine for *Trypanosoma cruzi* by PCR
  - If the triatomine was infected, test to identify species composition of bloodmeal
- **Results reported to state health department**
- **State health department forwards report to submitter and advises on next steps**

Bloodmeal sources detected (other than human)

- Eastern cottontail
- Striped skunk
- White-toothed woodrat
- White-tailed deer
- Dusky-footed woodrat
- Virginia opossum
- Western fox squirrel
- Raccoon
- Dog
- Cattle
- Grey fox
- Coyote
- Eastern wolf
- Nine-banded armadillo
- Eastern gray squirrel
- Golden-mantled ground squirrel
- Southern leopard frog
- Narrow-mouthed toad
- Coastal plains toad
- Sheep
- Wild boar
- European wildcat

CDC activities for U.S. Chagas disease patient care

- **Diagnostic testing gaps filled**
  - Chronic Chagas disease diagnosis confirmatory serology
  - Acute (congenital) Chagas disease molecular detection (PCR)
- **Treatment drugs prior to FDA approvals**
- **Consultation on diagnosis and management of Chagas disease**
- **Health care provider knowledge and awareness**
  - Collaborations with partners
  - CDC Chagas disease website content and continuing medical education online courses

CDC activities to promote Chagas disease control and prevention

- **Evidence needed for policy development**
- **With available evidence, best practices for control and prevention**
  - Transplant safety screening and monitoring
  - Maternal child health/congenital Chagas disease screening and monitoring
- **When possible, in kind support for studies of Chagas disease in U.S. populations (e.g., infection or clinical manifestations, general population or patient groups)**

CDC Chagas disease resources

- https://www.cdc.gov/parasites/chagas/
- https://www.cdc.gov/parasites/chagas/health_professionals/index.html
  - Diagnosis
  - Congenital Chagas Disease
  - Newly Diagnosed Patients
  - Antiparasitic Treatment
  - Continuing Education
- parasites@cdc.gov (404) 718-4745

Thanks to Gena Lawrence, Hilda Rivera, Theresa Benedict

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333
Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov Web: http://www.cdc.gov