Zoonotic Disease
One-Health Health Investigations
Epidemiology and Laboratory Capacity Workshop – Oct. 2018
DSHS Zoonosis Control Branch
Session Topics

- One Health Concept in Zoonosis Investigation
- Anthrax
- Tularemia
- Brucellosis
- Chagas Disease
- Cysticercosis/Taeniasis
- NEDSS Reporting Tips
One Health Concept

- **One Health** recognizes that the health of people is connected to the health of animals and the environment.
- It is a collaborative, multisectoral, and transdisciplinary approach—working at the local, regional, national, and global levels—with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment.
- A One Health approach is important because 6 out of every 10 infectious diseases in humans are spread from animals.

https://www.cdc.gov/onehealth/
Fig. 2. A more descriptive representation of the epidemiologic triad which incorporates the insect vector. This depiction demonstrates that controlling the vector is as important as controlling the pathogen or treating the hosts. Adding a second organism as the disease vector complicates the interactions between the host, pathogen, and environment and this diagram attempts to explain how these complex interactions may result in endemic/epidemic transmission of the pathogen. There is pathogen transmission only when a competent mosquito species is infectious and feeds on a competent host, which is the very middle of the diagram. Some mosquito species are exposed to pathogens but are refractory or they do not feed on competent hosts. Similarly, some hosts are exposed through communicable routes or fomites, but not mosquitoes. A full description of the interactions, such as competent mosquito species, hosts, and environment are described in the similarly named review sections.

Public Health Response

Interventions at personal and community levels are key.

Communication and coordination are essential:

- With the public and medical community
- Between Epidemiology, Environmental Health, Animal Control, and Public Information/Education programs within each agency/jurisdiction
- Among neighboring Health Departments and Vector Control agencies
# Reportable Zoonoses

<table>
<thead>
<tr>
<th>Condition</th>
<th>Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaplasmosis</td>
<td>Lyme disease</td>
</tr>
<tr>
<td>Anthrax</td>
<td>Malaria</td>
</tr>
<tr>
<td>Arbovirus infections</td>
<td>Plague</td>
</tr>
<tr>
<td>Babesiosis</td>
<td>Q fever</td>
</tr>
<tr>
<td>Brucellosis</td>
<td>Rabies, human</td>
</tr>
<tr>
<td>Chagas disease</td>
<td>Spotted fever group rickettsioses</td>
</tr>
<tr>
<td>Cysticercosis</td>
<td>Taenia solium/Taeniasis</td>
</tr>
<tr>
<td>Echinococcosis</td>
<td>Trichinosis</td>
</tr>
<tr>
<td>Ehrlichiossis</td>
<td>Tularemia</td>
</tr>
<tr>
<td>Hantavirus infection</td>
<td>Typhus</td>
</tr>
<tr>
<td>Leishmaniasis</td>
<td>Yellow fever</td>
</tr>
</tbody>
</table>
Texas Administrative Code (TAC)

Chapter 97: Communicable Diseases
§97.2 Who Shall Report
(a) A physician, dentist, veterinarian, ... shall report, as required by these sections, each patient (person or animal) he or she shall examine and who has or is suspected of having any notifiable condition, and shall report any outbreak, exotic disease, or unusual group expression of illness of any kind whether or not the disease is known to be communicable or reportable.

(e) Any person having knowledge that a person(s) or animal(s) is suspected of having a notifiable condition should notify the local health authority or the department and provide all information known to them concerning the illness and physical condition of such person(s) or animal(s).
Reportable Zoonoses in Animals

TAC §97.3(b)
Clinically diagnosed or laboratory-confirmed:
- Anthrax
- Arboviral encephalitis
- *Mycobacterium tuberculosis* complex in animals other than those housed in research facilities
- Plague
- All non-negative rabies tests performed on animals from Texas
- Any outbreak, exotic disease, or unusual group expression of disease which may be of public health concern
Anthrax

- Caused by *Bacillus anthracis*, a spore-forming Gram positive rod
- Humans are infected through skin contact or inhalation
- Category A Select Agent
- Suspected isolates sent to LRN Labs
Inhalational Anthrax

Widened mediastinum
Cutaneous Anthrax

[Images of skin lesions]
Anthrax in Texas

- Primarily affects livestock and deer, which ingest spores in contaminated pastures
- Causes staggering, difficulty breathing, collapse and death, usually with bleeding from body orifices
- Reported to DSHS and TAHC
Texas Counties with Laboratory-Confirmed Anthrax 1974 - 1999

Cases / County

- 1
- 2
- 3
- 4
- 5 - 12

County reporting one or more culture-positive animal or human

https://www.dshs.texas.gov/idcu/disease/anthrax/information/data/
Counties in Texas where anthrax usually occurs: Val Verde, Kinney, Uvalde, Sutton, Edwards, Crockett
Tularemia

• Caused by *Francisella tularensis*, a small gram-negative coccobacillus.

• Affects more than 250 kinds of wild and domestic mammals, birds, reptiles, and fish as well as humans.

• Transmitted by the bite of insects (such as ticks) or by handling or eating an animal that died of tularemia.

• Also called “rabbit fever”

• 1-2 cases reported each year in Texas

• Category A Select Agent
Tularemia

• Transmission from tick bites or contact with infectious materials may cause fever, an ulcerative skin sore, and painful swollen lymph glands.

• Ingestion of the organism may produce a throat infection, abdominal pain, diarrhea and vomiting.

• Inhalation of the organism may produce a fever alone or combined with a pneumonia-like illness.

• Suspected isolates must be submitted to DSHS or LRN laboratory for identification.
# PHEP Surveillance Control Measure Tracking Form - Tularemia

<table>
<thead>
<tr>
<th>Action</th>
<th>Public Health Control Measure Initiated</th>
<th>Date Initiated</th>
<th>Within 2 days of Report?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contact medical provider. Obtain clinical data, lab reports, verify diagnosis, and provide recommendations.</td>
<td>□ Provide medical provider with disinfection precautions for suspected cases.</td>
<td>1. <strong>/</strong>/___</td>
<td>1. □ Yes □ No If no, reason:</td>
</tr>
<tr>
<td>2. Alert laboratory personnel when tularemia is suspected so procedures can be conducted in recommended biosafety level conditions.</td>
<td>□ Alert laboratory personnel when tularemia is suspected so procedures can be conducted in recommended biosafety level conditions.</td>
<td>2. <strong>/</strong>/___</td>
<td>2. □ Yes □ No If no, reason:</td>
</tr>
<tr>
<td>3. Consult with laboratory regarding select agent requirements for Francisella tularensis isolates.</td>
<td>□ Educate laboratory personnel regarding select agent requirements for Francisella tularensis isolates (1) Unless directed otherwise by the HHS Secretary or Administrator, within seven calendar days after identification, transfer the isolate in accordance with § 73.16 or 9 CFR part 121.16 or destroy it on-site by a recognized sterilization or inactivation process, (2) Secure the isolate against theft, loss, or release during the period between identification and transfer or destruction and report any theft, loss, or release of the isolate, and (3) Report the identification of Francisella tularensis to DSHS and to CDC or APHIS immediately by telephone. This report must be followed by submission of APHIS/CDC form 4 within seven calendar days after identification.</td>
<td>3. <strong>/</strong>/___</td>
<td>3. □ Yes □ No If no, reason:</td>
</tr>
<tr>
<td>4. Interview case patient. Complete patient history and identify potential source of exposure.</td>
<td>□ Educate case patient on measures to avoid disease transmission. □ Identify potential source of infection. (Describe)</td>
<td>4. <strong>/</strong>/___</td>
<td>4. □ Yes □ No If no, reason:</td>
</tr>
</tbody>
</table>

## Outbreaks

<table>
<thead>
<tr>
<th>Action</th>
<th>Public Health Control Measure Initiated</th>
<th>Date Initiated</th>
<th>Within 2 days of Report?</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Initiate alerts to public health preparedness staff locally and at central office and law enforcement if there is an unusual presentation such as a cluster of cases or pneumonic illness.</td>
<td>□ Report suspected outbreaks or intentional exposures. □ Initiate bio-terrorism response procedures as needed.</td>
<td>5. <strong>/</strong>/___</td>
<td>5. □ Yes □ No If no, reason:</td>
</tr>
<tr>
<td>6. Look for additional cases and interview them to determine scope and source of outbreak.</td>
<td>□ Initiate active case finding □ Alert the medical community to enhance case recognition, reporting, and prompt treatment</td>
<td>6. <strong>/</strong>/___</td>
<td>6. □ Yes □ No If no, reason:</td>
</tr>
<tr>
<td>7. Search for sources of infection related to arthropods, animal hosts, water, and environments soiled by small mammals including hay.</td>
<td>□ Conduct field studies. □ Compare exposure histories.</td>
<td>7. <strong>/</strong>/___</td>
<td>7. □ Yes □ No If no, reason:</td>
</tr>
</tbody>
</table>
Brucellosis in Texas: 2008 - 2017

Sepehr Arshadmansab, MPH
Zoonosis Control Branch
Department of State Health Services
Austin, Texas
Brucellosis: Overview

• Human brucellosis is a zoonotic disease caused by infection with *Brucella* bacteria
• In Texas, *B. melitensis*, *B. suis*, *B. abortus* (and RB51), and *B. canis* have been identified in humans
• Transmitted to humans via:
  ➢ Consumption of undercooked meat, raw milk, and dairy products from infected animals
  ➢ Inhalation of aerosolized bacteria
  ➢ Contact with contaminated animal tissue and fluids through open wounds or mucous membranes
  ➢ Occupational exposures
• Category B select agent (*B. abortus*, *B. melitensis*, *B. suis*)
• Treatment regimens typically include combination of doxycycline and rifampin, or streptomycin (RB51 is resistant to rifampin and penicillin)

Source: https://www.cdc.gov/brucellosis/transmission/index.html
Brucellosis: Worldwide Distribution

Reported Cases of Brucellosis in Texas, 1987 - 2017 (N=769)
Reported Cases of Brucellosis in Texas, 2008 - 2017 (N=189)
Reported Cases of Brucellosis in Texas, By County of Residence, 2008 - 2017, N = 189

Cases / County

- Blue: 1 - 9
- Green: 10 - 19
- Red: >=20

0 30 60 120 180 240 300 Miles

N  E  S  W
Confirmed Culture Results for Reported Cases of Brucellosis in Texas by County of Residence, 2008 - 2017, N = 139
**Brucella** Species Identified in Confirmed Cases by Year, Texas, 2008-2017 (N = 139)
Brucellosis: Clinical Presentation

- Incubation: 1-2 months (range: 5 days to 5 months)
- Initial symptoms are non-specific and may include:
  - Fever
  - Sweats
  - Malaise
  - Anorexia
  - Headache
  - Fatigue
- Chronic and persistent clinical signs and symptoms may include:
  - Recurrent fevers
  - Arthritis
  - Endocarditis
  - Hepatomegaly
  - Splenomegaly
  - Neurologic symptoms

Source: https://www.cdc.gov/brucellosis/symptoms/index.html
### Reported Symptoms of Brucellosis Cases in Texas, 2008-2017

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>175</td>
<td>92.6%</td>
</tr>
<tr>
<td>Sweating</td>
<td>122</td>
<td>64.6%</td>
</tr>
<tr>
<td>Anorexia</td>
<td>96</td>
<td>50.8%</td>
</tr>
<tr>
<td>Headache</td>
<td>95</td>
<td>50.3%</td>
</tr>
<tr>
<td>Weakness</td>
<td>93</td>
<td>49.2%</td>
</tr>
<tr>
<td>Myalgia</td>
<td>93</td>
<td>49.2%</td>
</tr>
<tr>
<td>Chills</td>
<td>77</td>
<td>40.7%</td>
</tr>
<tr>
<td>Severe Malaise</td>
<td>64</td>
<td>33.9%</td>
</tr>
<tr>
<td>Splenomegaly</td>
<td>18</td>
<td>9.5%</td>
</tr>
<tr>
<td>Hepatomegaly</td>
<td>11</td>
<td>5.8%</td>
</tr>
<tr>
<td>Leukopenia</td>
<td>7</td>
<td>3.7%</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>7</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

Source: Zoonosis Control Branch, DSHS
Brucellosis: Diagnostic Laboratory Tests

- Culture and identification of *Brucella* spp from a clinical specimen*
- Detection of *Brucella* antibody by standard tube agglutination test (SAT) or *Brucella* microagglutination test (BMAT)**
- Detection of *Brucella* DNA by PCR
- NOTE: As required by the TAC, all *Brucella* sp. isolates must be submitted to the DSHS laboratory

* Confirmatory
** Confirmatory if four-fold rise in titer between acute and convalescent phase serums collected ≥ 2wks apart
Brucellosis: 2018 Case Definition

- **Confirmed:** A clinically compatible case that is laboratory confirmed

- **Probable:** A clinically compatible illness that does not meet the confirmed case definition, but does meet one of the following criteria:
  - Epidemiologically linked to a confirmed human or animal case, **OR**
  - *Brucella* total antibody titer ≥ 160 by standard agglutination test (SAT) or by *Brucella* microagglutination test (BMAT) in one or more serum specimens obtained after onset of symptoms, **OR**
  - Detection of *Brucella* DNA in a clinical specimen by PCR assay
Brucellosis: Lab Exposures

- Brucellosis is the most commonly reported laboratory-associated bacterial infection
- *B. abortus, B. melitensis, and B. suis* are designated as Category B select agents
- Use of Biosafety level (BSL)-2 facility is recommended for routine clinical specimen and BSL-3 facility for cultures

Source: www.cdc.gov/brucellosis/laboratories/index.html
CDC: Category B Select Agent

- Second highest priority agent
- Moderately easy to disseminate
- Result in moderate morbidity rates and low mortality rates
- Require specific enhancements of CDC’s diagnostic capacity and enhance disease surveillance

Source: https://emergency.cdc.gov/agent/agentlist-category.asp
Brucellosis Laboratory Exposure Questionnaire

• Collect information on type of exposure:
  ➢ Manipulation of specimen
    ▪ What was done with the isolate
    ▪ Proximity to isolate being manipulated
  ➢ Safety precautions
    ▪ Biosafety cabinet
    ▪ Personal protective equipment
• Assist with risk classification:
  ➢ Minimal
  ➢ Low
  ➢ High
• Provide post-exposure prophylaxis and testing recommendations

https://www.cdc.gov/about/lab-safety/improvelabsafety.html
## Brucellosis: Minimal Risk Lab Exposures

<table>
<thead>
<tr>
<th>MINIMAL RISK</th>
<th>Exposure scenario</th>
<th>PEP recommendations</th>
<th>Follow-up/ monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure scenario</td>
<td>Person who manipulates <em>Brucella</em> isolate in a certified Class II biosafety cabinet, with appropriate personal protective equipment (i.e., gloves, gown, eye protection). Person present in the lab while someone manipulates <em>Brucella</em> isolate in a certified Class II biosafety cabinet.</td>
<td>None</td>
<td>N/A</td>
</tr>
</tbody>
</table>
# Brucellosis: Low Risk Lab Exposures

<table>
<thead>
<tr>
<th>Exposure scenario</th>
<th>PEP recommendations</th>
<th>Follow-up/monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person present in the lab at a distance of greater than 5 feet from someone manipulating <em>Brucella</em> isolate.</td>
<td>May consider if immunocompromised or pregnant.</td>
<td>Regular symptom watch (e.g., weekly) and daily self-fever checks through 24 weeks post-exposure, after last known exposure. Sequential serological monitoring at 0 (baseline), 6, 12, 18, and 24 weeks post-exposure, after last known exposure. Note: No serological monitoring is currently available for RB51 and <em>B. canis</em> exposures in humans.</td>
</tr>
<tr>
<td></td>
<td>Discuss with health care provider (HCP).</td>
<td>Note: RB51 is resistant to rifampin <em>in vitro</em>, and therefore this drug should not be used for PEP or treatment courses.</td>
</tr>
</tbody>
</table>

*Note:* RB51 is resistant to rifampin *in vitro*, and therefore this drug should not be used for PEP or treatment courses.
## Brucellosis: High Risk Lab Exposure

### Exposure scenario

Person who manipulates *Brucella* isolate outside of a certified Class II biosafety cabinet (BSC) or within BSC without appropriate personal protective equipment (i.e., gloves, gown, eye protection).

All persons present during the occurrence of aerosol-generating events (e.g., centrifuging without sealed carriers, vortexing, sonicating, spillage/splashes) with manipulation of *Brucella* isolate on an open bench.

### PEP recommendations

Doxycycline 100mg twice daily, and rifampin 600 mg once daily, for three weeks.

For patients with contraindications to doxycycline or rifampin: TMP-SMZ, in addition to another appropriate antimicrobial, should be considered. Two antimicrobials effective against *Brucella* should be given.

Pregnant women should consult their obstetrician.

**Note:** RB51 is resistant to rifampin *in vitro*, and therefore this drug should not be used for PEP or treatment courses.

### Follow-up/monitoring

Regular symptom watch (e.g., weekly) and daily self-fever checks through 24 weeks post-exposure, after last known exposure.

Sequential serological monitoring at 0 (baseline), 6, 12, 18, and 24 weeks post-exposure, after last known exposure.

**Note:** No serological monitoring is currently available for RB51 and *B. canis* exposures in humans.
Chagas Disease in Texas
Data, Case Classification, and Testing Guidance

Bonny Mayes, MA, RYT
Zoonosis Control Branch
Department of State Health Services
Austin, Texas
Chagas Disease: Background

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

- **Causative Agent:**
  - *Trypanosoma cruzi*, a hemoflagellate protozoan parasite
- **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

Chagas Disease: Lifecycle

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
Chagas Disease: Acute Clinical Course

Three clinical phases:

- **Acute Phase**: often asymptomatic or mild and non-specific symptoms
  - Signs and symptoms may include fever, hepato/splenomegaly, subQ edema, non-pruritic rash, chagoma, Romaña’s sign
  - Rarely, acute myocarditis, meningoencephalitis, or pneumonitis
  - If present, symptoms usually resolve spontaneously in 3-8 weeks
Chagas Disease: Chronic Clinical Course

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

- **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 megasymphones
  - Parasitemia below detectable levels

www.emedmd.com/content/chagas-disease
Chagas Disease: Laboratory Diagnosis

**Acute Phase**
- **Definitive Tests**
  - Blood Smear, observation of trypomastigotes
  - Polymerase Chain Reaction (PCR) – more sensitive than blood smears; performed only at CDC
- **Suggestive Tests:**
  - *T. cruzi* IgG (or IgM) Serology – antibodies may not be present early,* but testing still recommended
    *not likely to be detected if less than two weeks after exposure to a triatomine

**Chronic Indeterminate Phase/Chronic Symptomatic Phase**
- *T. cruzi* IgG Serology at a commercial lab (high sensitivity)
- Confirmatory testing at CDC
Chagas Disease: Case Definitions and Classification

- Chagas disease, Acute
  - Confirmed – case that has confirmatory lab testing (Detection of *T. cruzi* DNA by PCR OR Identification of trypanosomes by microscopy)
  - Probable – clinically compatible case with supportive lab testing and documented exposure within 8 weeks of onset (Positive diagnostic serology for *T. cruzi* antibodies OR Positive blood donor screening test PLUS a positive supplemental test)
Chagas Disease: Case Definitions and Classification

- **Chagas disease, Chronic**
  - **Indeterminate** – an asymptomatic case in a person >9 months of age
  - **Symptomatic** – a physician diagnosed, clinically compatible case of chronic Chagas disease in a patient >9 months of age
    - Confirmed – case that has confirmatory lab testing (Detection of antibody specific to *T. cruzi* by TWO distinct diagnostic tests - must be performed at CDC)
    - Probable – case with supportive lab testing (Positive diagnostic serology for *T. cruzi* IgG antibodies **OR** Positive blood donor screening test PLUS a positive supplemental test)
Chagas Disease: Human Cases

- Chagas disease became reportable in Texas in 2013
  [www.dshs.texas.gov/idcu/disease/chagas/data/](http://www.dshs.texas.gov/idcu/disease/chagas/data/)

- 124 Chagas Disease Cases
  - 22 locally acquired
  - 78 imported
  - 24 unknown

- Case Classification
  - 98 Chronic Indeterminate
  - 26 Chronic Symptomatic

### Human Chagas Cases Reported, by County and Acquisition Method, Texas, 2013-2017

<table>
<thead>
<tr>
<th>County</th>
<th>Locally Acquired</th>
<th>Imported</th>
<th>Unknown</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson County</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
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<tr>
<td>Atascosa County</td>
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<td>1</td>
<td></td>
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<tr>
<td>Bell County</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Bexar County</td>
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<td>2</td>
<td>2</td>
<td>10</td>
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<tr>
<td>Brazoria County</td>
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<td>Cameron County</td>
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<td>Willacy County</td>
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<tr>
<td><strong>Grand Total</strong></td>
<td>22</td>
<td>78</td>
<td>24</td>
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Chagas Disease: Geographic Distribution, Texas, 2013-2016

Geographic Distribution of *Trypanosoma cruzi* Infection in Texas 2013 - 2016

- Locally Acquired Human Cases
- Positive Triatomates
- Positive Animals
- Health Service Region

Map revised: 7/20/2017
Chagas Disease

Chagas Disease

Chagas disease is caused by the parasite *Trypanosoma cruzi*. This parasite is spread by triatominé or “kissing” bugs. Animals, including dogs, and people can be affected by this disease.

- [Chagas Disease](#) (PDF, 109 KB)
- [Chagas Disease in Humans](#)
  Laboratory Diagnosis of Chagas Disease in Humans - Information for Healthcare Providers
- [Chagas Disease in Dogs](#) (PDF, 9 KB)
- [Chagas Disease Data](#)
- [Triatominé Bug/Kissing Bug/Cone-Nose Bug/Vinchuca Submission and Testing](#)
  Instructions and form for submitting bugs for identification and testing for *T. cruzi*
- Kissing Bug and Chagas Disease Guide
  - [English](#) (PDF, 2.3 MB)
  - [Spanish](#) (PDF, 1.7 MB)
Chagas Disease in Humans
Testing Guidance for Providers

Serologic screening tests for chronic Chagas disease are available at several commercial laboratories. Confirmatory serologic testing for chronic Chagas disease and molecular testing (PCR) for acute Chagas disease are available at the CDC. If you wish to test a patient for Chagas disease, please note the following:

1. CDC will not accept serologic specimens for initial screening for chronic Chagas disease. Serologic screening should first be performed at a commercial laboratory. Patients testing positive are eligible for confirmatory testing at CDC.

2. All specimens to be tested at CDC must be submitted to the DSHS laboratory and not directly to CDC. The DSHS laboratory will forward all specimens to CDC.

3. Providers wishing to submit samples to CDC must consult with the DSHS Regional Zoonosis Control (ZC) program prior to sample submission.
Chagas Disease in Humans
Testing Guidance for Providers

Laboratory testing recommendations for Chagas disease can be complex. Below are links to a primer on Chagas disease, a clinical testing algorithm and list of major commercial laboratories that test for Chagas disease, and contact information for DSHS Regional ZC staff:

- DSHS Chagas Disease Communique (PDF)
- Chagas Disease Exposure and Testing Flowchart and List of Commercial Laboratories (PDF)
- ZC Regional Contacts (PDF)

http://www.dshs.texas.gov/IDCU/disease/Chagas/humans/
Chagas Disease: Commercial Laboratory Testing

- **Mayo Medical Lab**
  - ELISA for *T. cruzi* Ig

- **ARUP**
  - ELISA for *T. cruzi* IgG
  - IFA for *T. cruzi* IgM

- **Quest/Focus Diagnostics**
  - *Trypanosoma cruzi* Antibody, IgG

Disclaimer of Endorsement: Reference herein to any specific commercial laboratory or test does not necessarily constitute or imply its endorsement, recommendation, or favoring by the Texas Department of State Health Services.
Chagas Disease: Reporting

• Chagas Disease is a notifiable condition in Texas!
• Communicable disease reporting is required under the Texas Health and Safety Code Section 81.042 and Texas Administrative Code Section 97.2.
• Major Commercial Labs report via Electronic Lab Reports (ELRs)
Chagas Disease: Blood Donor Reporting

- For **Blood Collection Agencies**, providing the following data points will suffice: Collection Agency; Unique BUI #; Collection Date; Last Name, First Name, Donor Phone Number, Donor Address, Date of Birth, Age, Sex, Race, and Hispanic Ethnicity (Y/N).
- To report, simply send a secure email to WNV@DSHS.TEXAS.GOV or fax the report to 512-776-7454.
- If your location has a city or county health department, we recommend that you also share this same information with them. Contact information for the health department(s) serving the county where you are located can be found at: www.dshs.texas.gov/idcu/investigation/conditions/contacts/
Chagas Disease: Vector Testing

Triatomine bugs (also called reduviid bugs, “kissing” bugs, assassin bugs, cone-nosed bugs, and blood suckers)

DSHS, in conjunction with CDC, provides free testing of triatomine bugs implicated in a human exposure* for the parasite Trypanosoma cruzi

*For Texas residents only

Triatoma sanguisuga on arm - Picture courtesy of Dr. Ed Wozniak & Christina Wozniak
Chagas Disease: Vector Testing

• Download and complete a Texas Triatomine Bug Submission Form: www.dshs.texas.gov/idcu/health/zoonosis/Triatominae/

• Place bug (dead or alive) in suitable container and mail to DSHS Zoonosis Control Branch in Austin

• Bugs are shipped to CDC for testing – turnaround time ranges from one week to months, depending on workload

• Submitters are notified of results ASAP by their ZC Regional office

Triatoma sp. (5th nymphal instar) found in crib – Photo courtesy of Dr. Ed Wozniak
Three species of triatomines ("kissing bugs") that can be found in Texas:

- *Triatoma sanguisuga*
- *Triatoma gerstaeckeri*
- *Triatoma protracta*

http://kissingbug.tamu.edu/found-a-bug/#non-kissing-bugs
Chagas Disease: Technical Resources

- DSHS Zoonotic Control Branch Subject Matter Experts – Bonny Mayes (Epidemiologist) 512-2888 bonny.mayes@dshs.texas.gov, Kelly Broussard (Epidemiologist) 512-776-6920, and Whitney Qualls (Entomologist) 512-776-2790
- DSHS Laboratory Subject Matter Expert - Cathy Snider, DSHS Medical Parasitology Team, 512-458-7560
- CDC Parasitic Diseases Inquiries – parasites@cdc.gov, 404-718-4745
- CDC Chagas Disease website www.cdc.gov/chagas/
- DSHS Zoonosis Control Chagas Disease website www.dshs.texas.gov/idcu/disease/chagas/
One Tapeworm, Two Diseases: An Overview of the Differences Between Taeniasis and Cysticercosis

Briana O’Sullivan, MPH
Zoonosis Control Branch
Department of State Health Services
Austin, Texas
Objectives

• Describe differences between taeniasis and cysticercosis disease and transmission
• Characterize cases of taeniasis and cysticercosis in the state of Texas
• Provide guidance on common NEDSS mistakes specific to these diseases
• Provide information on upcoming changes for these diseases
Taeniasis

- Caused by consuming raw/undercooked meat with cysticerci
  - Beef → *T. saginata*
  - Pork → *T. solium* and *T. asiatica*
- Over two months, develops into an adult *Taenia* spp. worm in small intestine
- Adult worm sheds eggs or segments that are passed in stool

Cysticercosis

- Caused by consuming eggs or worm segments containing eggs
  - Mainly *T. solium*
- Cysticerci migrate to muscles, organs and/or nervous system
- Unless person also has taeniasis, they do not shed eggs in their stool
Biology (cont.)

Image courtesy of the Centers for Disease Control and Prevention (CDC)
Biology (cont.)

Cysticercosis

Image courtesy of the Centers for Disease Control and Prevention (CDC)
Disease

**Taeniasis**
- Often asymptomatic
- Gastrointestinal symptoms
  - Abdominal pain
  - Weight loss
  - Passing of worm segments in stool
- Diagnosed by microscopy
- Serology sometimes done, but cross-reactive with other parasites and not in case definition

**Cysticercosis**
- Lumps under the skin
- Neurocysticercosis
  - Headaches
  - Seizures
  - Hydrocephaly
  - Stroke
- Diagnosed by MRI, CT scan or X-ray
- Serology sometimes done, but cross-reactive with other parasites and not in case definition
Disease (cont.)

CT scan showing neurocysticercosis caused by *T. solium*; Image courtesy of the World Health Organization
Case Criteria

Taeniasis
• Symptoms not necessary
• Based on lab evidence
  • Microscopy showing proglottids or eggs
  • *Taenia* antigen
**Confirmation of *T. solium* through examination of tapeworm scolex or gravid proglottids
• TL;DR specific *Taenia* spp. identification needed for confirmation

Cysticercosis
• Symptoms not necessary
• Need confirmation of cysticercus in tissue
  • MRI or CT scan
  • X-ray
  • If surgery necessary, cyst can be biopsied
**Documentation of imaging results should be included in case investigation
• TL;DR need to show cyst in tissue
### Case Criteria (cont.)

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<thead>
<tr>
<th>Reporting Facility/Provider</th>
<th>Date Collected</th>
<th>Test Results</th>
<th>Associated With</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reporting Facility:</td>
<td>04/05/2018</td>
<td>Taenia solium antibody: Cysticercosis AB IB positive</td>
<td>Cysticercosis</td>
</tr>
<tr>
<td>CDC</td>
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<td></td>
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</table>

<table>
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<tbody>
<tr>
<td>LABCORP Ordering Provider:</td>
<td>03/29/2018</td>
<td>Taenia solium larva Ab: Positive Reference Range: (Negative) - (Final)</td>
<td>Cysticercosis</td>
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<tr>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Reporting Facility/Provider</th>
<th>Date Collected</th>
<th>Test Results</th>
<th>Associated With</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX Austin SPHL</td>
<td>12/16/2017</td>
<td>Ova+Parasites identified in Stool by Concentration: Taenia species</td>
<td>T.sollium-undiff Taenia</td>
</tr>
</tbody>
</table>

Images courtesy of Bonny Mayes
Cases in Texas (2015-2018)

**Taeniasis**
- 10 cases
  - Most in 2015 (6)
  - Primarily black, non-Hispanic (60%)
  - Average age 31 years (11-56)
  - Most cases of unknown origin (60%)
    - Majority have some exposure in Africa (70%), with Ethiopia being most common country

**Cysticercosis**
- 48 cases
  - Most in 2016 (16)
  - Primarily white, Hispanic (92%)
  - Average age 43 years (22-74)
  - Most acquired outside of US (52%)
    - Mexico most commonly reported country
NEDSS Tips

• Travel history
  • Countries visited with high Taenia prevalence
  • Travel dates

• Raw/undercooked meat exposures
  • Ethiopian food: kitfo, tere siga, kurt
  • Pork with measles

• Comments
  • NBS numbers for other linked cases
  • Which Taenia species identified
Upcoming Changes

- ZCB looking to rework the Taeniasis case report form
  - Identified risk factor differences between two diseases
  - Look to better characterize exposures
- Working on SOPs
  - Case criteria
  - Control measures
References

• CDC’s Taeniasis website: https://www.cdc.gov/parasites/taeniasis/index.html
• CDC’s Cysticercosis website: https://www.cdc.gov/parasites/cysticercosis/index.html
• Oregon State University Small Farms Website: http://smallfarms.oregonstate.edu/beef/meat-measles
Don’t be a Reject!
Helpful tips to keep your notification from being rejected

Kamesha Owens, MPH
Zoonosis Control Branch
Department of State Health Services
Objectives

• Rejection Criteria
• How to document in NBS (NEDSS)
• How to Report
Rejection Criteria

Missing/incorrect information:
• Incorrect case status or condition selected
• Full Name
• Date of Birth
• Address
• County
• Missing laboratory data
Rejection Criteria

continued

• Inconsistent information
  • e.g. Report date is a week before onset date
• Case investigation form not received by ZCB within 14 days of notification
  • ZCB recommends that notification not be created until the case is closed and the investigation form has been submitted
Rejection Criteria continued

• Condition-specific information necessary to report the case is missing:
  • Travel history for Zika and other non-endemic conditions
  • Evidence of neurological disease for WNND case
  • Supporting documentation for Lyme disease case determination
# How to Document in NBS (NEDSS)

<table>
<thead>
<tr>
<th><strong>Do</strong></th>
<th><strong>Don’t</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Add detailed comments in designated comments box under case info tab.</td>
<td>Leave us guessing!</td>
</tr>
<tr>
<td><em>(strongly recommended not required)</em></td>
<td>If you decide not to enter comments, please make sure information on</td>
</tr>
<tr>
<td></td>
<td>paper form is <strong>legible</strong>.</td>
</tr>
<tr>
<td>Ensure all fields required to be entered are filled in or selected.</td>
<td>Leave important fields blank,</td>
</tr>
<tr>
<td>• <strong>Check your dates</strong> <em>(Onset date, date of report, etc.)</em> to ensure</td>
<td>i.e. symptoms, lab results, date of report, etc.</td>
</tr>
<tr>
<td>the timeline reflected makes sense and is accurate.*</td>
<td></td>
</tr>
<tr>
<td>Check NBS entry against paper form to make sure the information is the</td>
<td>Leave out <strong>Condition-specific</strong> information necessary to report a case</td>
</tr>
<tr>
<td>same.</td>
<td><em>(i.e. travel dates and history for Zika cases).</em></td>
</tr>
<tr>
<td>Enter a comment in <strong>ALL positive ELRs</strong> for non-cases explaining why</td>
<td>Leave positive ELRs comments section blank or not associate relevant</td>
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<tr>
<td>the case-patient does not meet case definition or is</td>
<td>appropriate labs to case investigations.</td>
</tr>
<tr>
<td>“lost to follow-up” <em>(LTF)</em> unless the ELRs are associated with an</td>
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</tr>
<tr>
<td>NBS investigation.</td>
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Reporting Zoonoses

• **For LHDs:** Scan and attach, fax, or send via secure e-mail the completed investigation form with relevant lab reports to your Regional ZC office for review

• After review, the Regional ZC staff will forward to ZCB Central Office for final review and approval
For ZC Regional Staff:
Scan and attach, fax, or send via secure e-mail completed case investigation form with relevant lab reports to Central Office ZCB epidemiologists for review and approval.
Attaching Documents in NEDSS

- Not all Conditions allow this
- Scan/Save the completed form and laboratory reports as a pdf
- Attach the document under the Supplemental Info tab of the case investigation
  - Scroll down until you see “Attachments” under the “Notes and Attachments” section, then click on the button that is labeled “Add Attachment”
Resources

- TDSHS Zoonosis website: http://www.dshs.texas.gov/idcu/health/zoonosis/
- IDCU: http://www.dshs.texas.gov/idcu/default.shtm
Questions?
Thank you

Laura Robinson, DVM, MS
Kamesha Owens, MPH
Bonny Mayes, MA, RYT
Sepehr Arshadmansab, MPH
Briana O’Sullivan, MPH
Zoonosis Control Branch Epi Team