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Health and Human Services

Texas Department of State Health Services

Zoonotic Disease One-Health Investigations

Epidemiology and Laboratory Capacity Workshop – Oct. 2018

DSHS Zoonosis Control Branch

Session Topics

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- 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 trans-disciplinary 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/

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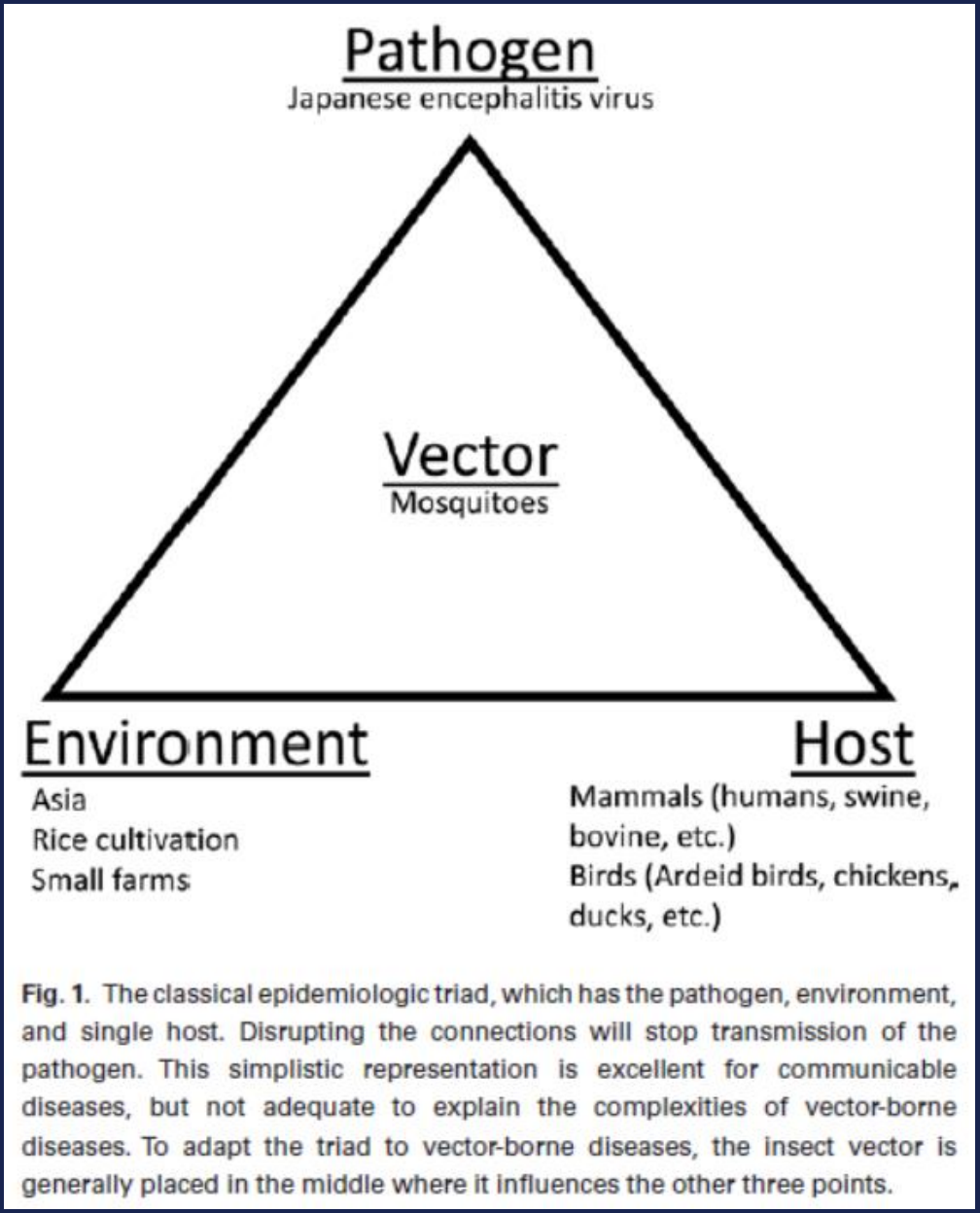

Fig. 1. The classical epidemiologic triad, which has the pathogen, environment, and single host. Disrupting the connections will stop transmission of the pathogen. This simplistic representation is excellent for communicable diseases, but not adequate to explain the complexities of vector-borne diseases. To adapt the triad to vector-borne diseases, the insect vector is generally placed in the middle where it influences the other three points.

Japanese Encephalitis Virus: Placing Disease Vectors in the Epidemiologic Triad. ARS Oliveira, LW Cohnstaedt, N Cernicchiaro. *Annals of the Entomological Society of America*, https://doi.org/10.1093/aesa/say025

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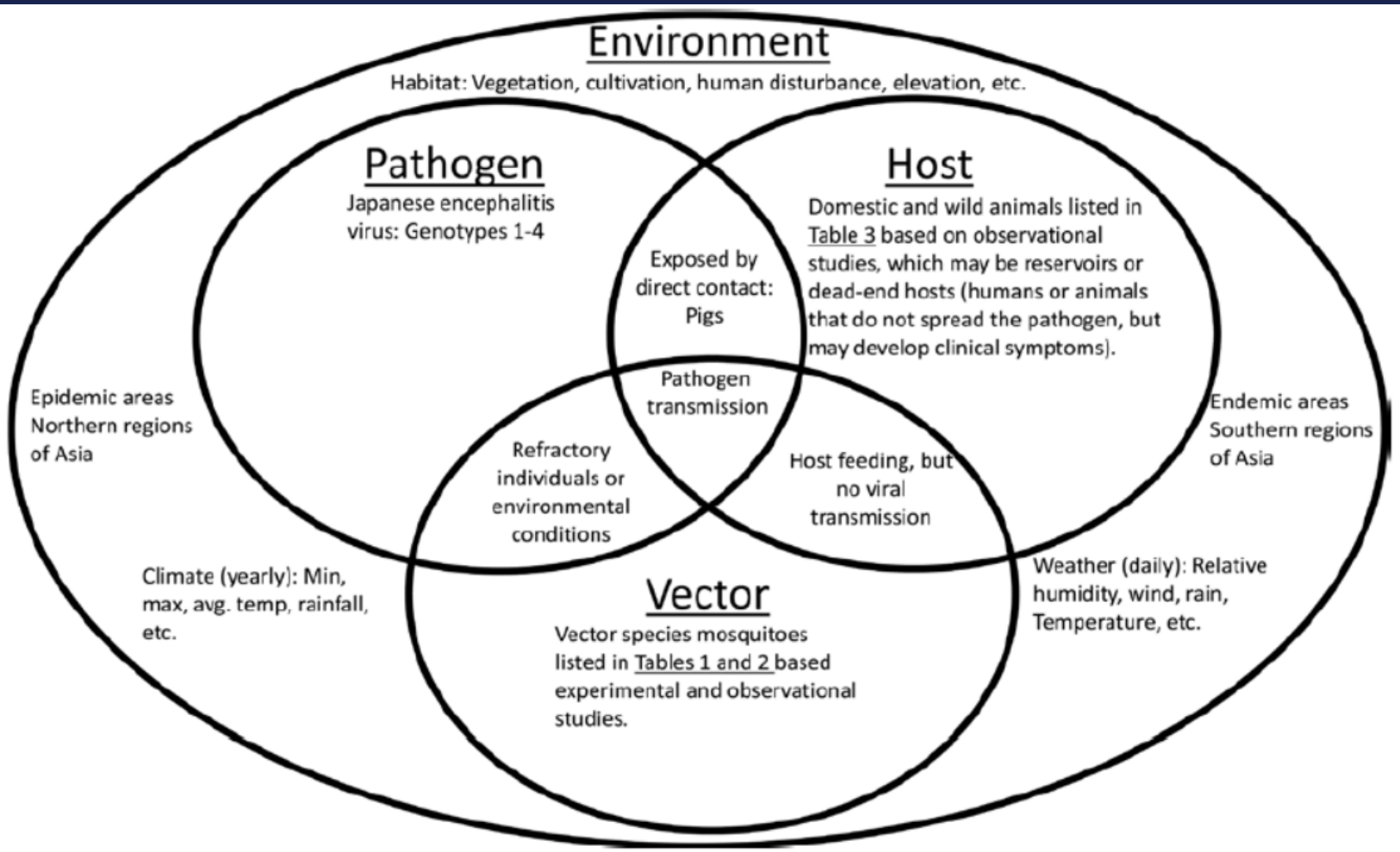

Fig. 2. A more descriptive representation of the epidemiologic triad which incorporates the insect vector. This depiction demonstrates that controlling the vector is as important as controlling the pathogen or treating the hosts. Adding a second organism as the disease vector complicates the interactions 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.

Japanese Encephalitis Virus: Placing Disease Vectors in the Epidemiologic Triad. ARS Oliveira, LW Cohnstaedt, N Cernicchiaro. *Annals of the Entomological Society of America*, https://doi.org/10.1093/aesa/say025

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

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Reportable Zoonoses

Anaplasmosis	Lyme disease
Anthrax	Malaria
Arbovirus infections	Plague
Babesiosis	Q fever
Brucellosis	Rabies, human
Chagas disease	Spotted fever group rickettsioses
Cysticercosis	*Taenia solium*/Taeniasis
Echinococcosis	Trichinosis
Ehrlichiosis	Tularemia
Hantavirus infection	Typhus
Leishmaniasis	Yellow fever

Texas Administrative Code (TAC)

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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)**.

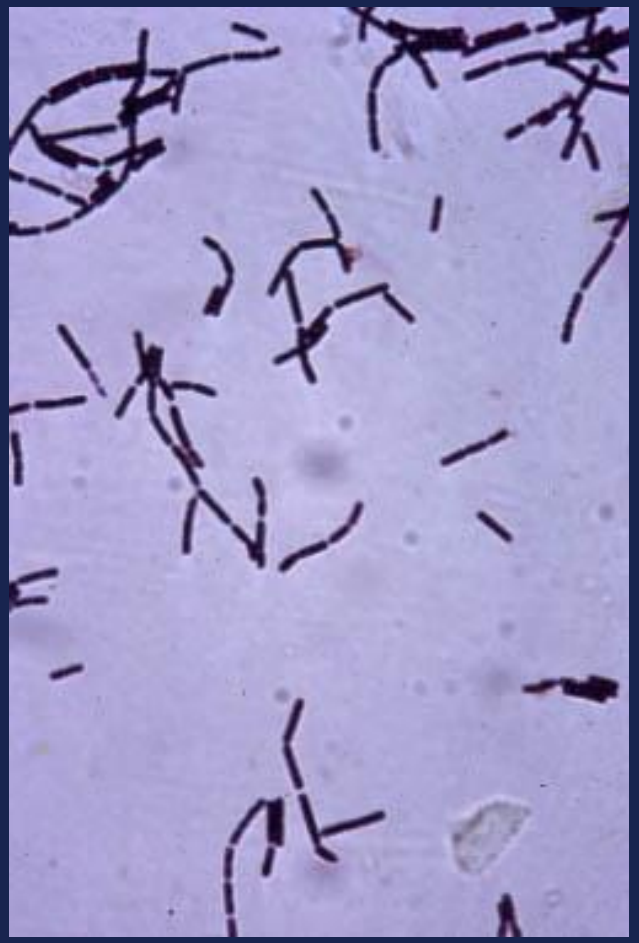
Reportable Zoonoses in Animals

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

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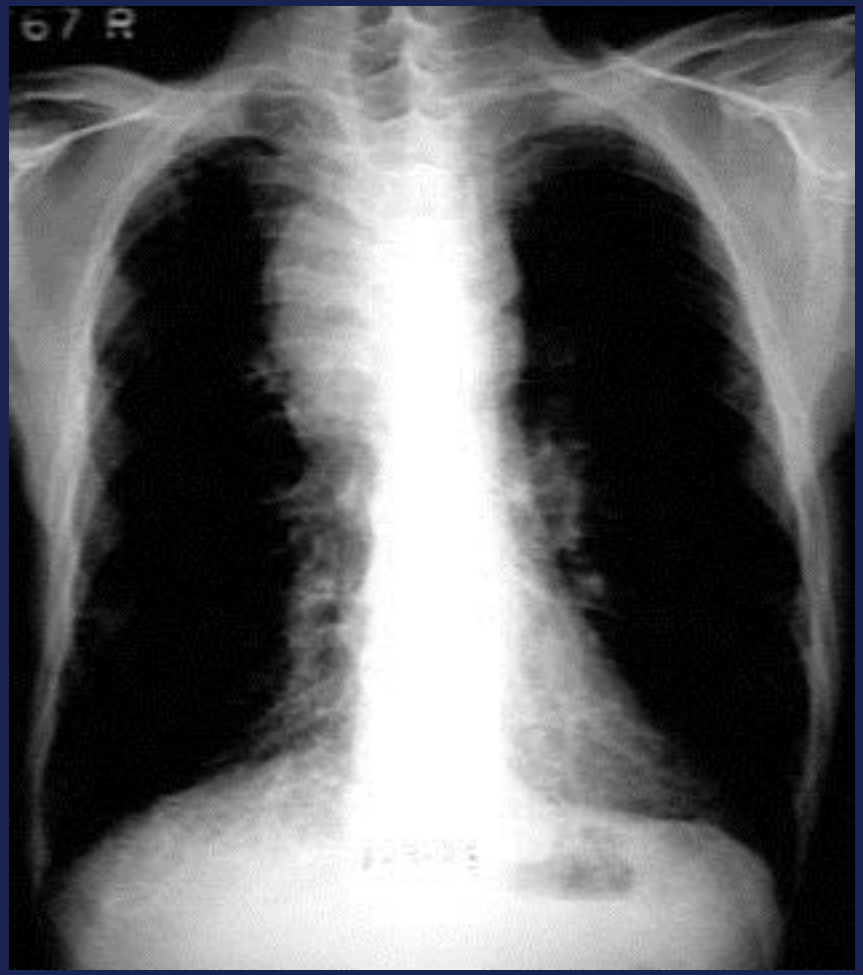
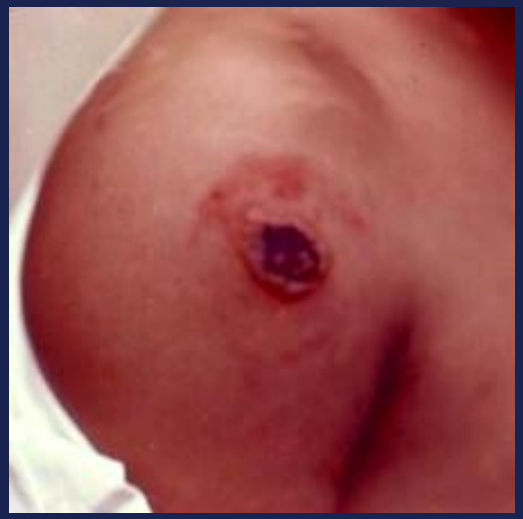
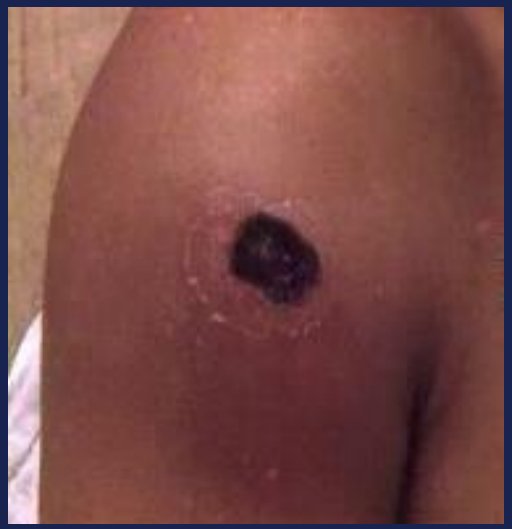
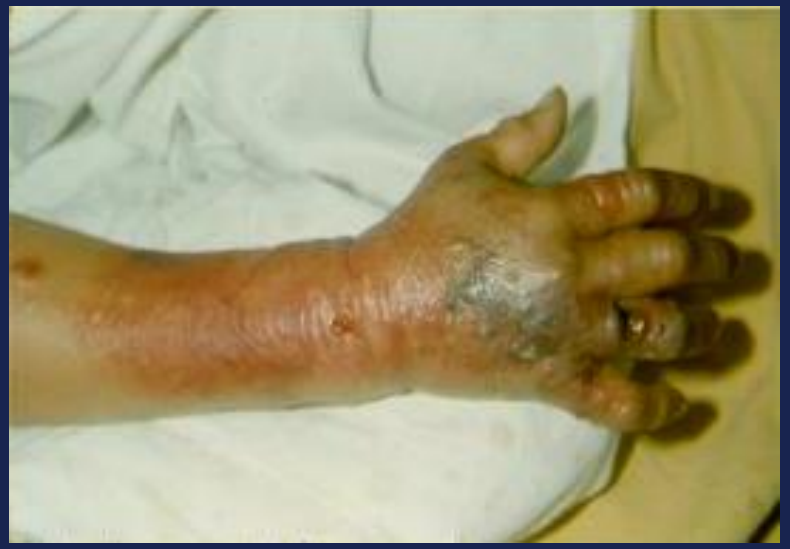
Widened mediastinum



Cutaneous Anthrax

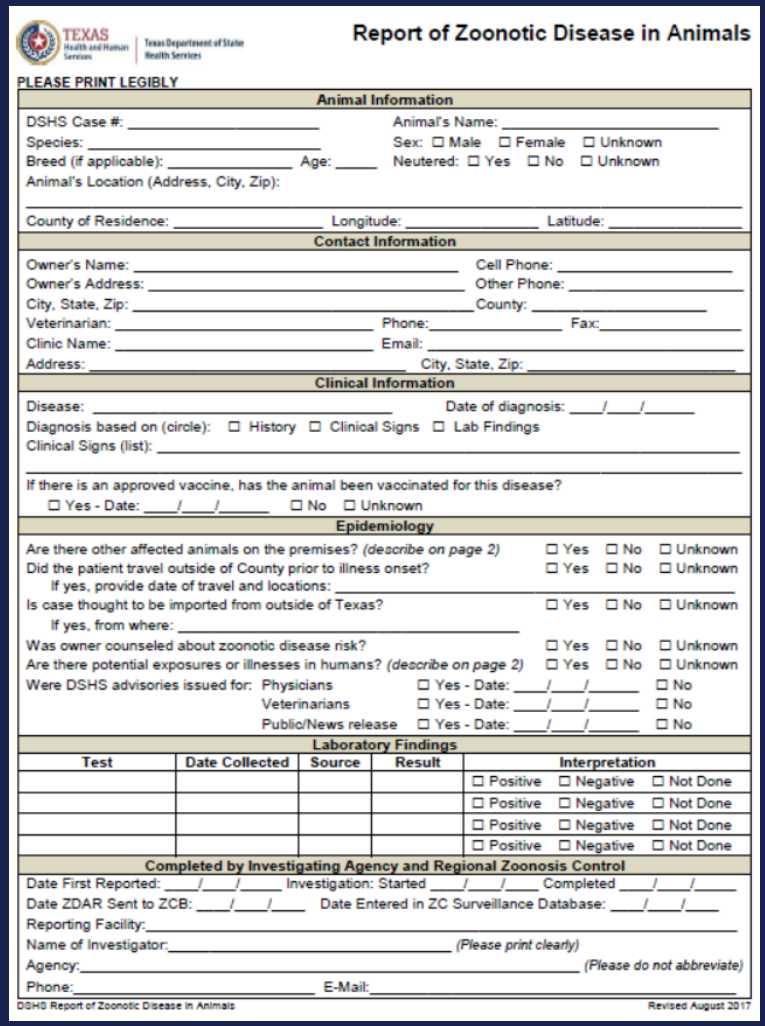






Anthrax in Texas

- 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



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Report of Zoonotic Disease in Animals

PLEASE PRINT LEGIBLY

Animal Information

DSHS Case #: _____ Animal's Name: _____
Species: _____ Sex: ☐ Male ☐ Female ☐ Unknown
Breed (if applicable): _____ Age: ____ Neutered: ☐ Yes ☐ No ☐ Unknown
Animal's Location (Address, City, Zip):
_____
County of Residence: _____ Longitude: _____ Latitude: _____

Contact Information

Owner's Name: _____ Cell Phone: _____
Owner's Address: _____ Other Phone: _____
City, State, Zip: _____ County: _____
Veterinarian: _____ Phone: _____ Fax: _____
Clinic Name: _____ Email: _____
Address: _____ City, State, Zip: _____

Clinical Information

Disease: _____ Date of diagnosis: ____/____/_____
Diagnosis based on (circle): ☐ History ☐ Clinical Signs ☐ Lab Findings
Clinical Signs (list): _____
_____
If there is an approved vaccine, has the animal been vaccinated for this disease?
☐ Yes - Date: ____/____/_____ ☐ No ☐ Unknown

Epidemiology

Are there other affected animals on the premises? *(describe on page 2)* ☐ Yes ☐ No ☐ Unknown
Did the patient travel outside of County prior to illness onset? ☐ Yes ☐ No ☐ Unknown
If yes, provide date of travel and locations: _____
Is case thought to be imported from outside of Texas? ☐ Yes ☐ No ☐ Unknown
If yes, from where: _____
Was owner counseled about zoonotic disease risk? ☐ Yes ☐ No ☐ Unknown
Are there potential exposures or illnesses in humans? *(describe on page 2)* ☐ Yes ☐ No ☐ Unknown
Were DSHS advisories issued for: Physicians ☐ Yes - Date: ____/____/_____ ☐ No
Veterinarians ☐ Yes - Date: ____/____/_____ ☐ No
Public/News release ☐ Yes - Date: ____/____/_____ ☐ No

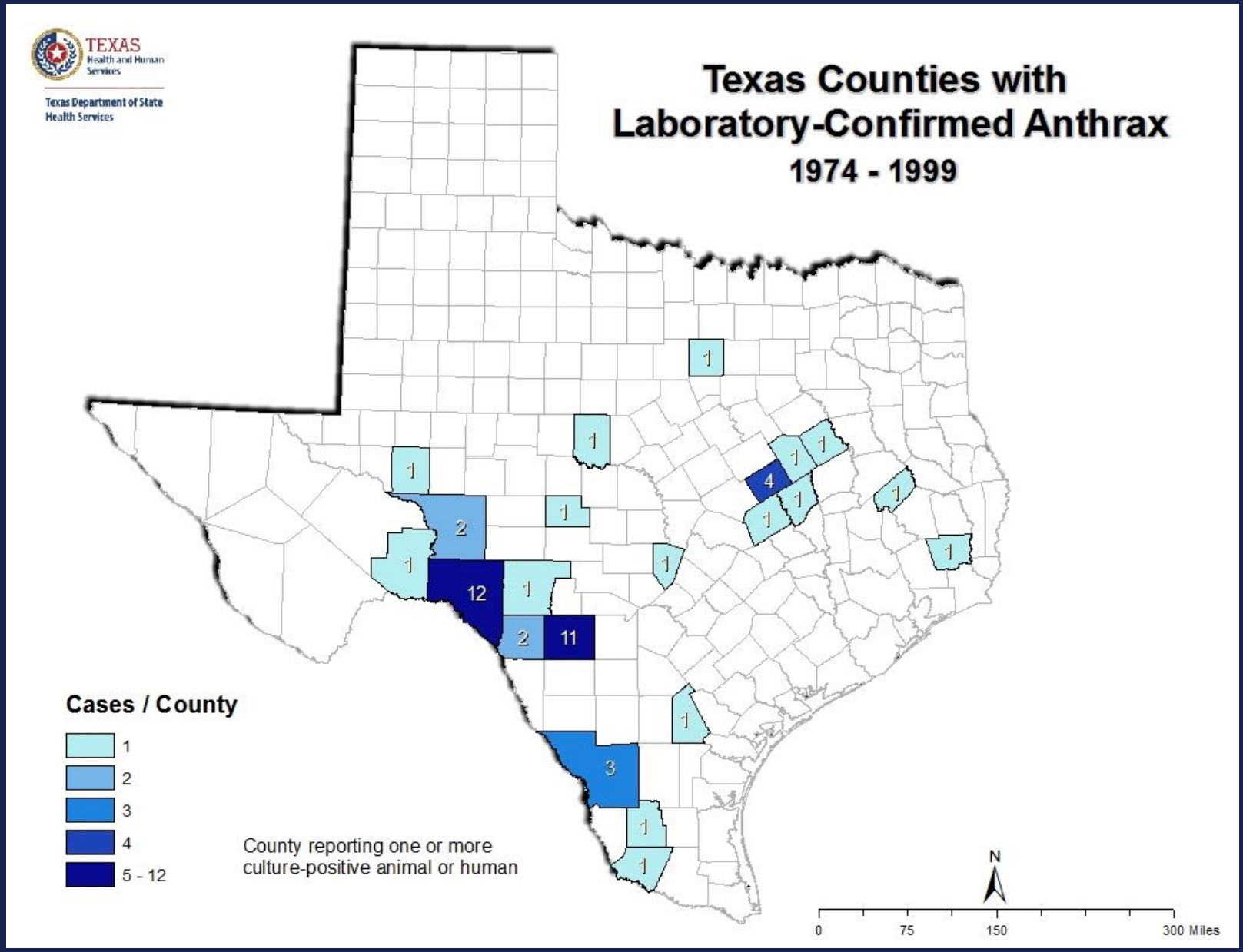
Laboratory Findings

Test	Date Collected	Source	Result	Interpretation
				☐ Positive ☐ Negative ☐ Not Done
				☐ Positive ☐ Negative ☐ Not Done
				☐ Positive ☐ Negative ☐ Not Done
				☐ Positive ☐ Negative ☐ Not Done

Completed by Investigating Agency and Regional Zoonosis Control

Date First Reported: ____/____/_____ Investigation: Started ____/____/_____ Completed ____/____/_____
Date ZDAR Sent to ZCB: ____/____/____ Date Entered in ZC Surveillance Database: ____/____/____
Reporting Facility: _____
Name of Investigator: _____ *(Please print clearly)*
Agency: _____ *(Please do not abbreviate)*
Phone: _____ E-Mail: _____

DSHS Report of Zoonotic Disease in Animals Revised August 2017



https://www.dshs.texas.gov/idcu/disease/anthrax/information/data/

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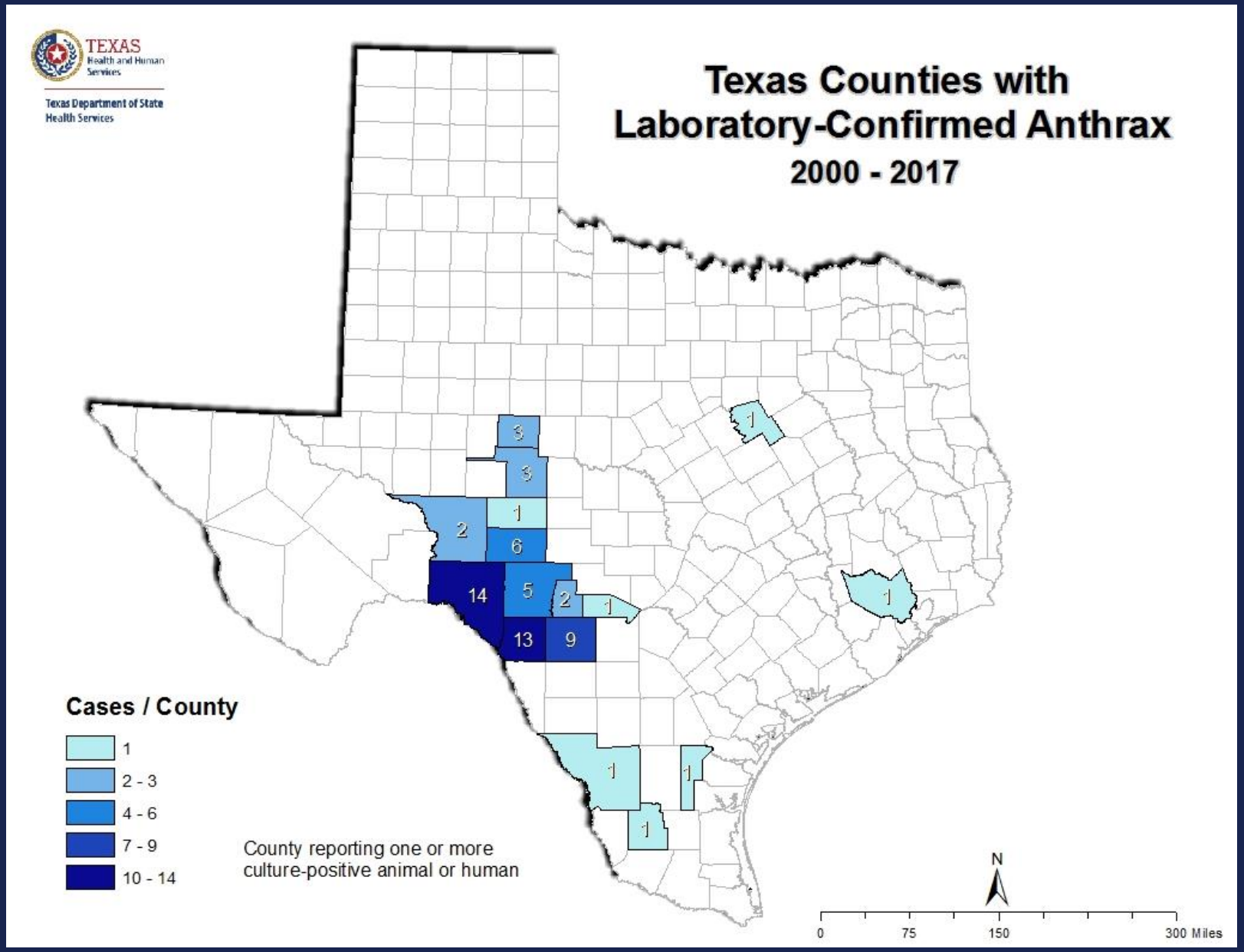

Counties in Texas where anthrax usually occurs:

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

NBS Patient ID: _____ Patient Name: _____ Case Status: _____

Onset Date: ___/___/___ Date Reported: ___/___/___ Date Reported to Central Office: ___/___/___

Action	Public Health Control Measure Initiated	Date Initiated	Within 2 days of Report?
1. Contact medical provider. Obtain clinical data, lab reports, verify diagnosis, and provide recommendations.	☐ Provide medical provider with disinfection precautions for suspected cases.	1. ___/___/___	1. ☐ Yes ☐ No If no, reason:
2. Alert laboratory personnel when tularemia is suspected so procedures can be conducted in recommended biosafety level conditions.	☐ Alert laboratory personnel when tularemia is suspected so procedures can be conducted in recommended biosafety level conditions.	2. ___/___/___	2. ☐ Yes ☐ No If no, reason:
3. Consult with laboratory regarding select agent requirements for *Francisella tularensis* isolates.	☐ Educate laboratory personnel regarding select agent requirements for Francisella tularensis isolates including (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.	3. ___/___/___	3. ☐ Yes ☐ No If no, reason:
4. Interview case patient. Complete patient history and identify potential source of exposure.	☐ Educate case patient on measures to avoid disease transmission. ☐ Identify potential source of infection. (Describe)	4. ___/___/___	4. ☐ Yes ☐ No If no, reason:
Outbreaks			
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.	☐ Report suspected outbreaks or intentional exposures. ☐ Initiate bio-terrorism response procedures as needed.	5. ___/___/___	5. ☐ Yes ☐ No If no, reason:
6. Look for additional cases and interview them to determine scope and source of outbreak.	☐ Initiate active case finding ☐ Alert the medical community to enhance case recognition, reporting, and prompt treatment	6. ___/___/___	6. ☐ Yes ☐ No If no, reason:
7. Search for sources of infection related to arthropods, animal hosts, water, and environments soiled by small mammals including hay.	☐ Conduct field studies. ☐ Compare exposure histories.	7. ___/___/___	7. ☐ Yes ☐ No If no, reason:

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Brucellosis in Texas: 2008 - 2017

Sepehr Arshadmansab, MPH
Zoonosis Control Branch
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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

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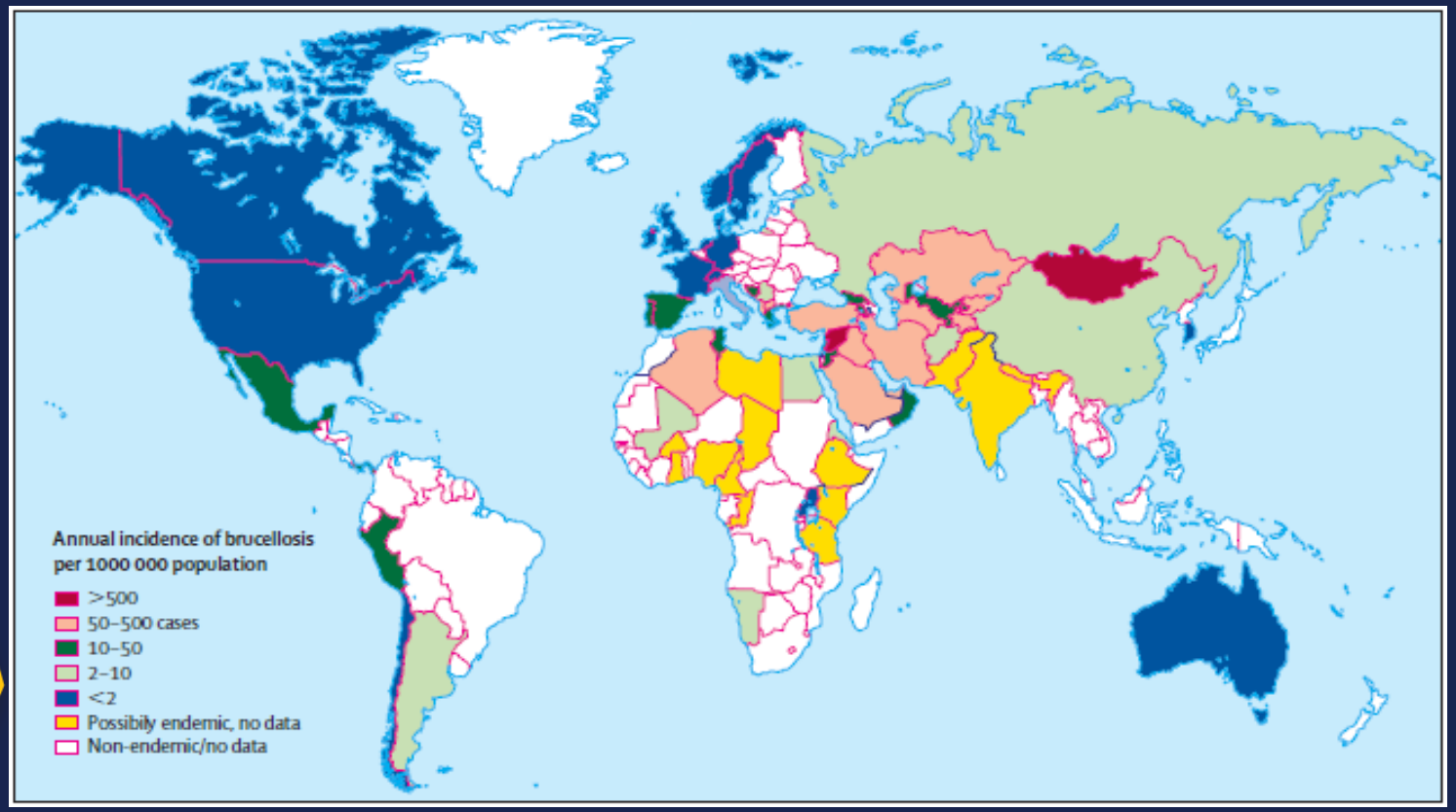
Brucellosis: Worldwide Distribution



Source: Pappas, G., et al. (2006) The new global map of human brucellosis. *Lancet Infect Dis*, 6, 91-99.

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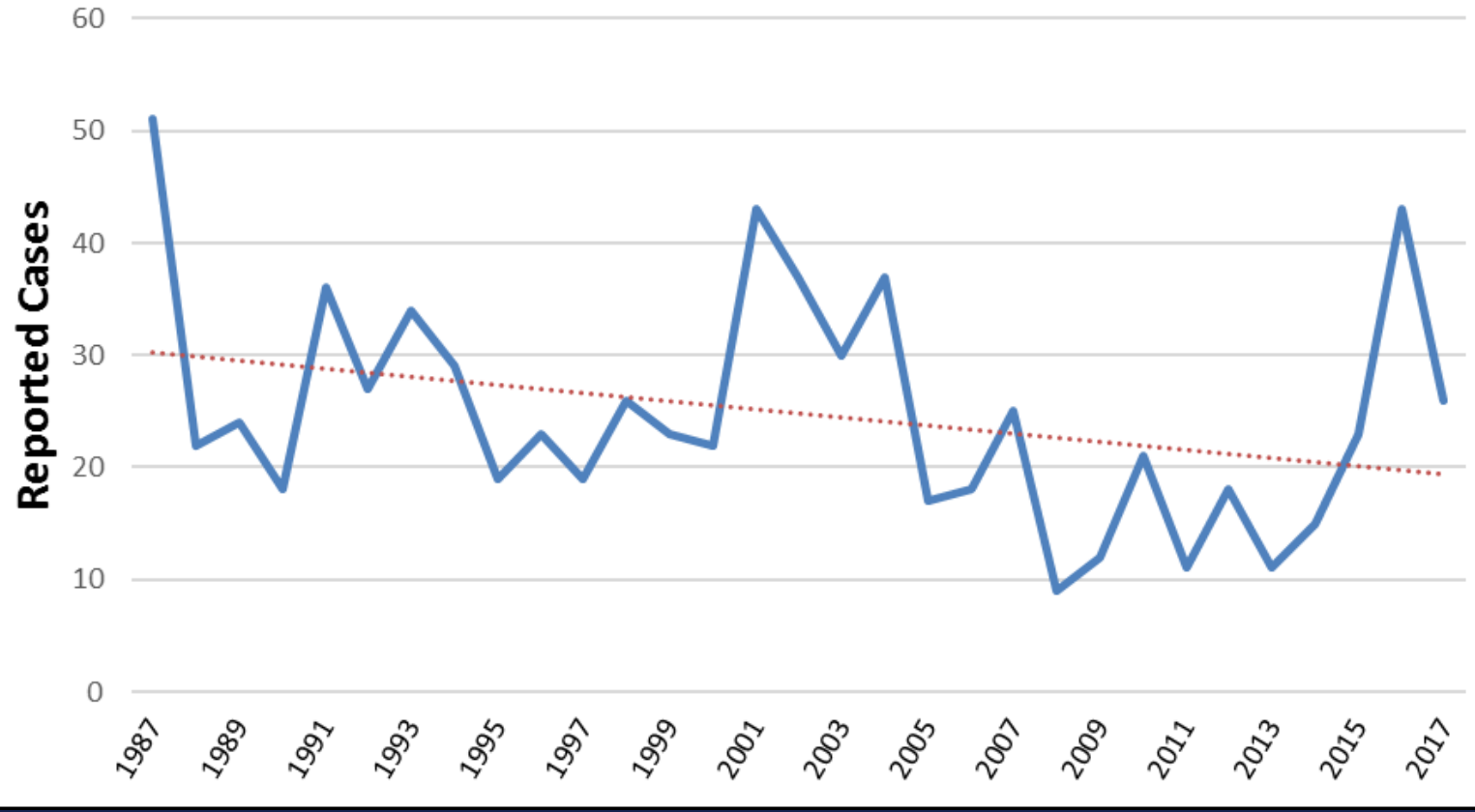
Reported Cases of Brucellosis in Texas, 1987 - 2017 (N=769)



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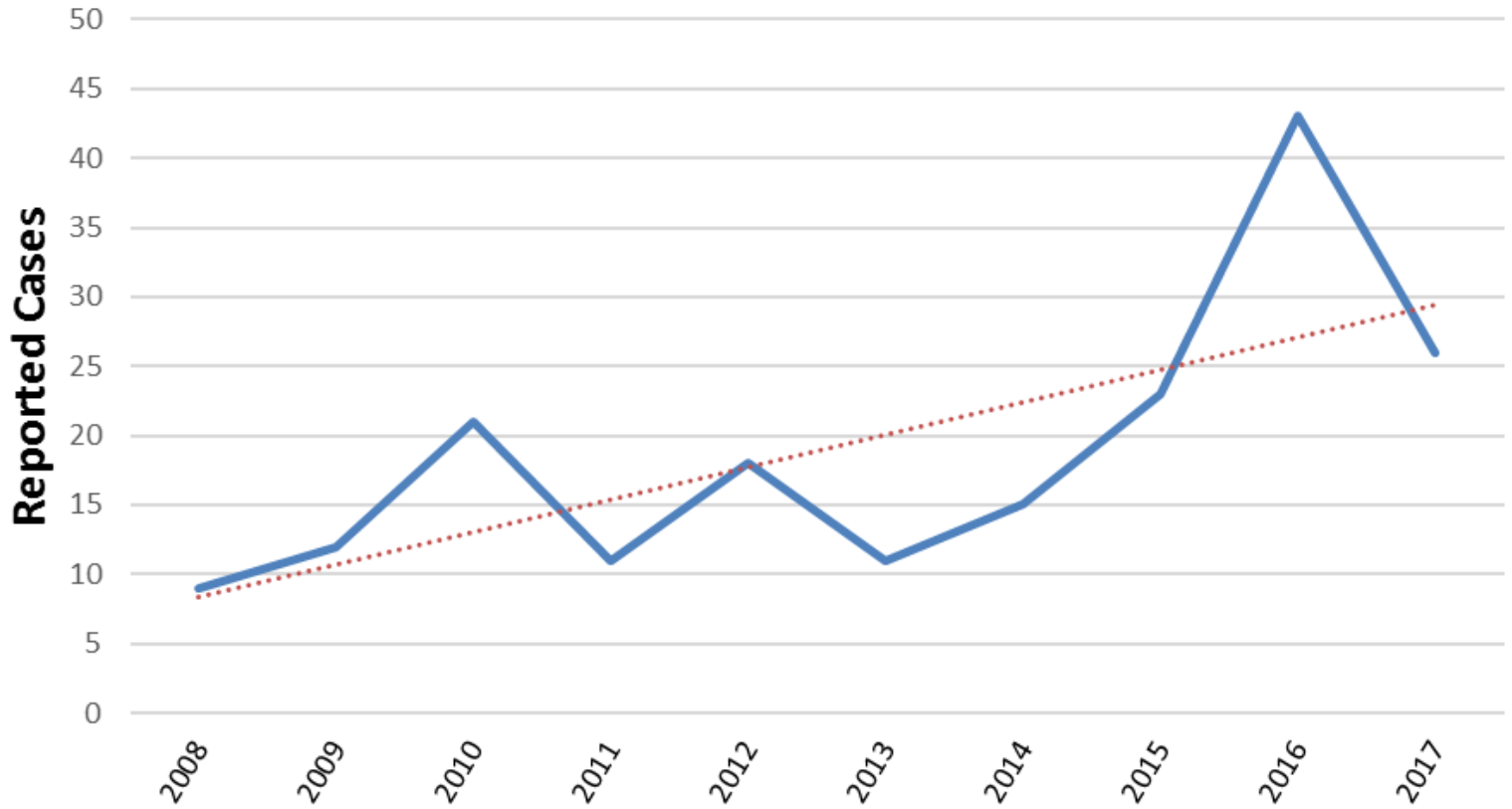
Reported Cases of Brucellosis in Texas, 2008 - 2017 (N=189)



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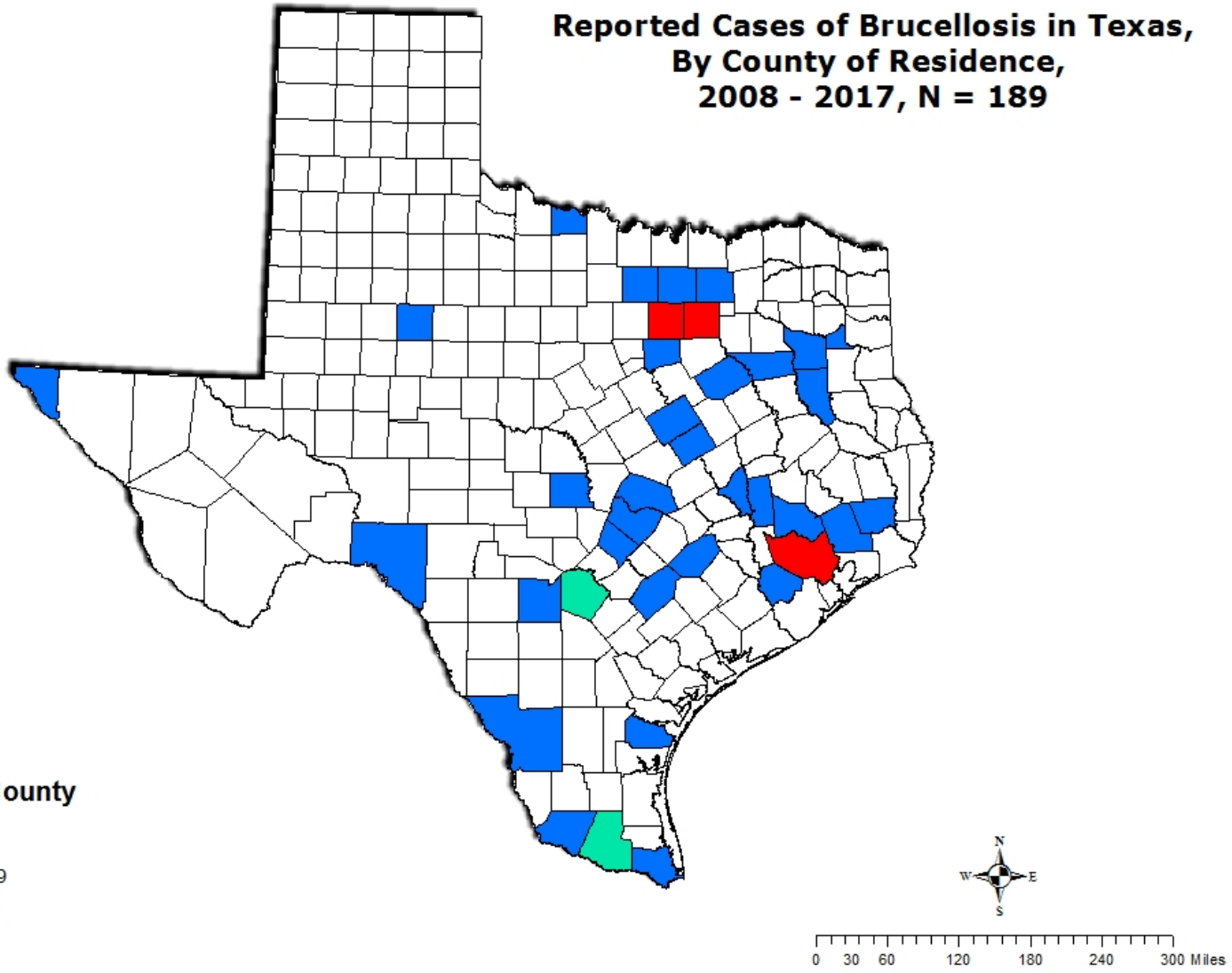

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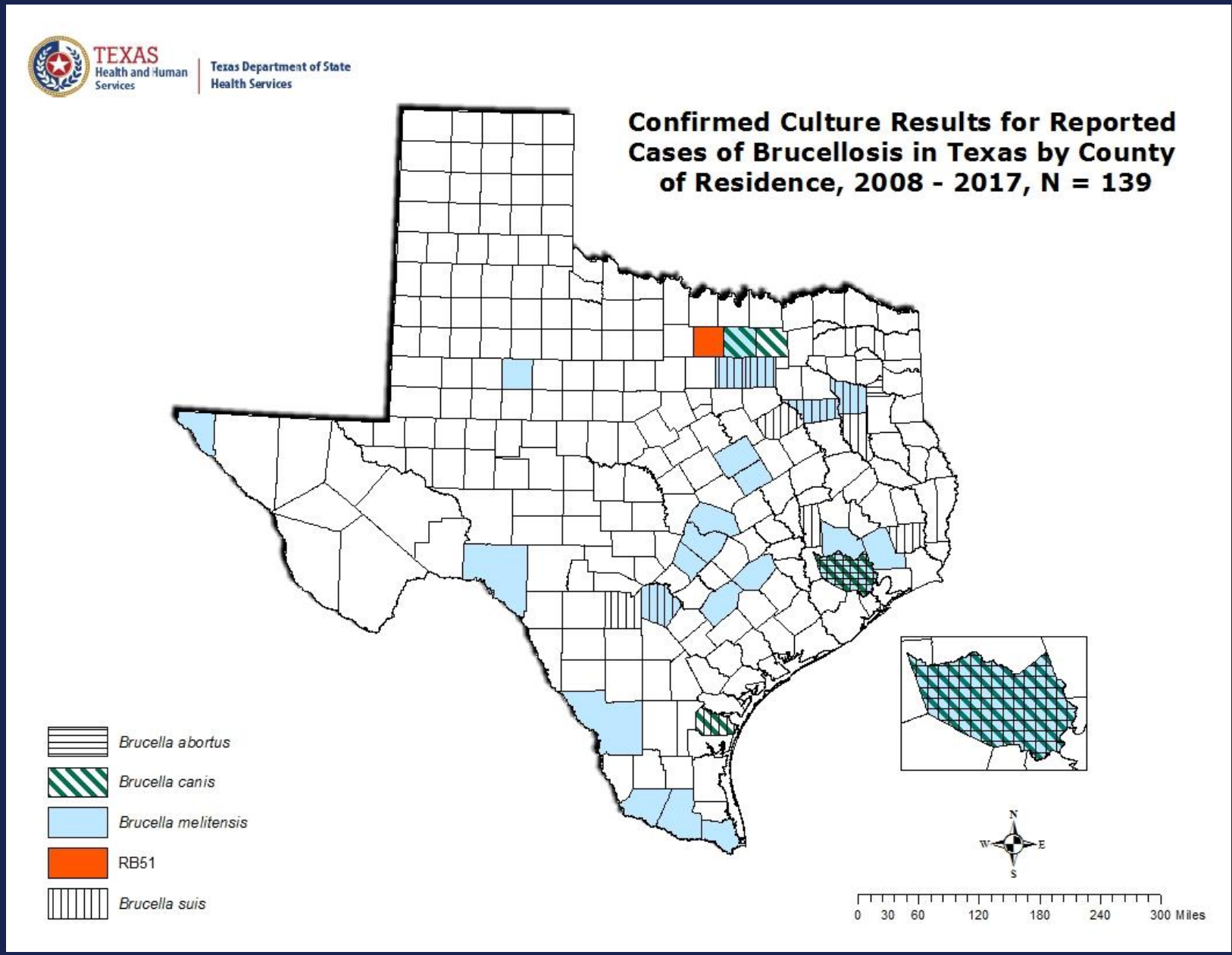

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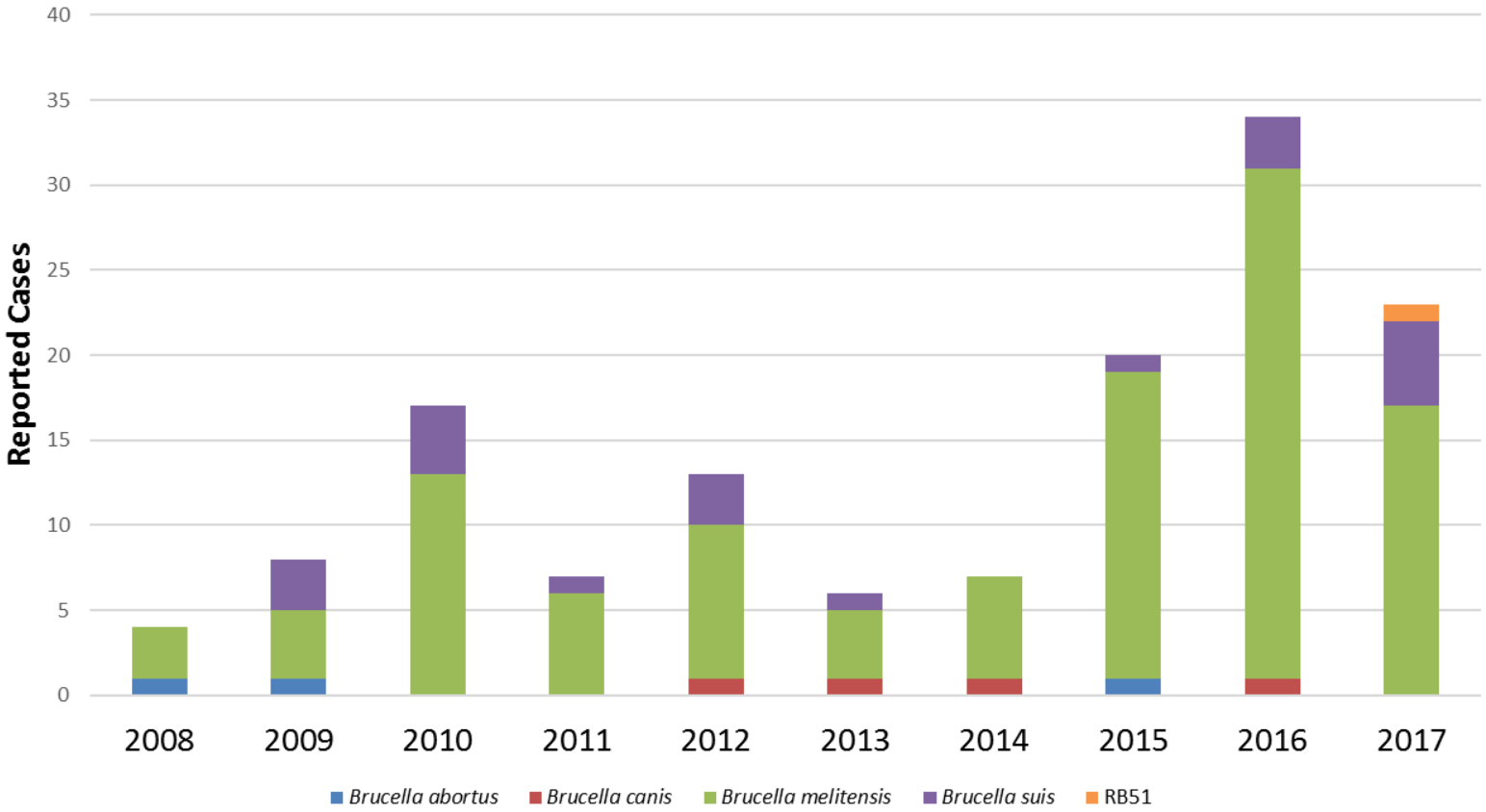
Brucella Species Identified in Confirmed Cases by Year, Texas, 2008-2017 (N = 139)



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

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Reported Symptoms of Brucellosis Cases in Texas, 2008-2017

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

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

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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

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Brucellosis: Lab Exposures

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- 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

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Source: https://emergency.cdc.gov/agent/agentlist-category.asp

Brucellosis Laboratory Exposure Questionnaire

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- 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

MINIMAL RISK		
Exposure scenario	**PEP recommendations**	**Follow-up/ monitoring**
Person who manipulates *Brucella* 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 *Brucella* isolate in a certified Class II biosafety cabinet.	None	N/A

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Brucellosis: Low Risk Lab Exposures

LOW RISK		
Exposure scenario	**PEP recommendations**	**Follow-up/ monitoring**
Person present in the lab at a distance of greater than 5 feet from someone manipulating *Brucella* isolate).	May consider if immunocompromised or pregnant. Discuss with health care provider (HCP). **Note**: RB51 is resistant to rifampin *in vitro*, and therefore this drug should not be used for PEP or treatment courses.	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.

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Brucellosis: High Risk Lab Exposure

HIGH RISK		
Exposure scenario	**PEP recommendations**	**Follow-up/ monitoring**
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.	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.	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.

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Chagas Disease in Texas

Data, Case Classification, and Testing Guidance

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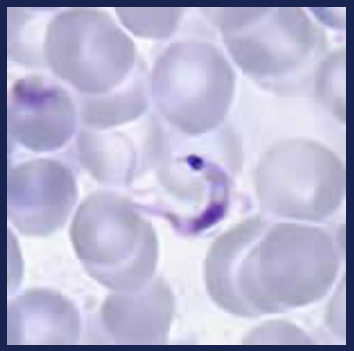
Department of State Health Services
Austin, Texas

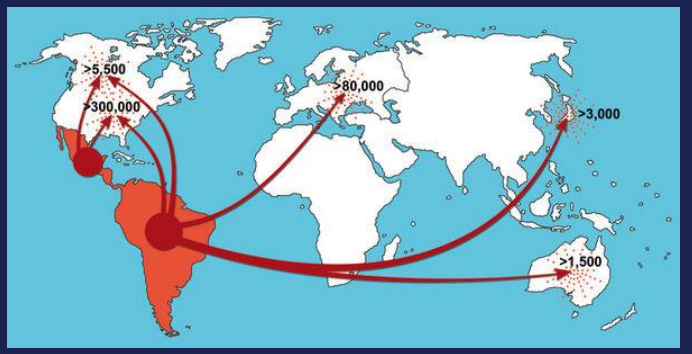
Chagas Disease: Background

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.



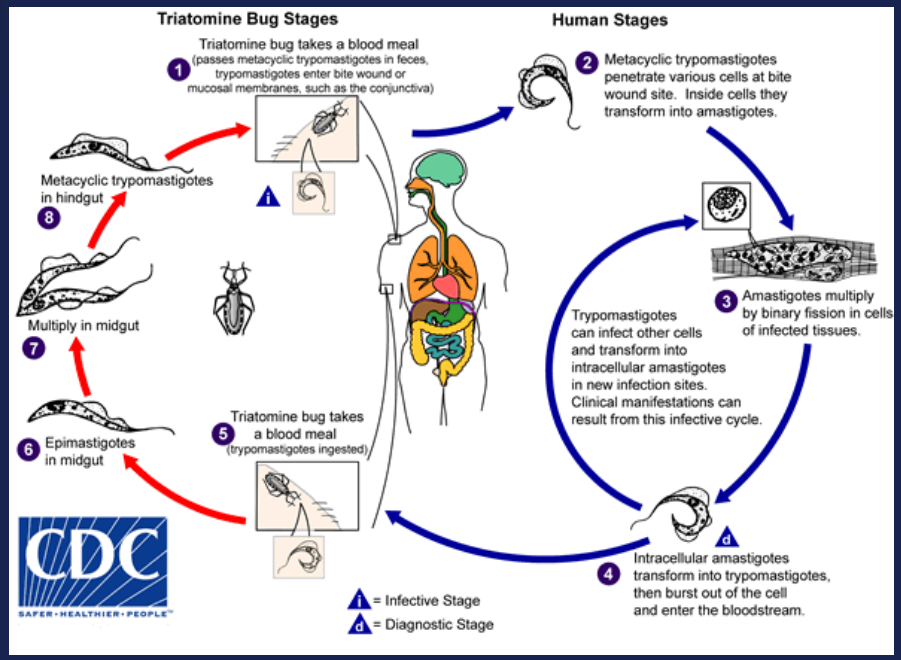
www.cdc.gov/parasites/chagas/diagnosis.html



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

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

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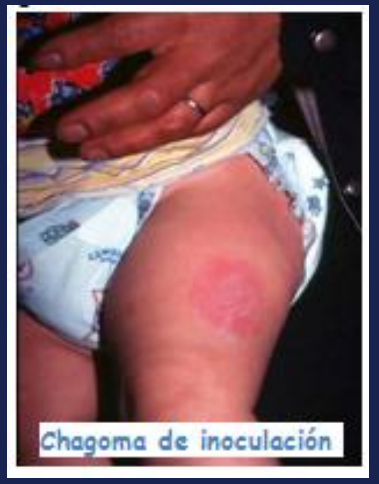
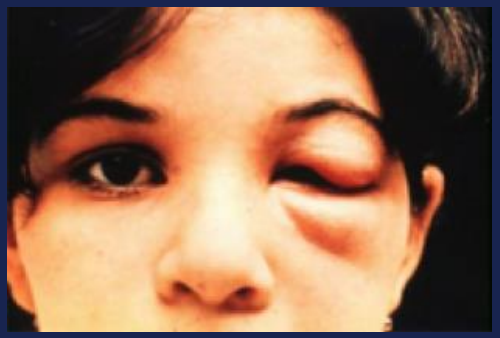
Three clinical phases:

- 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



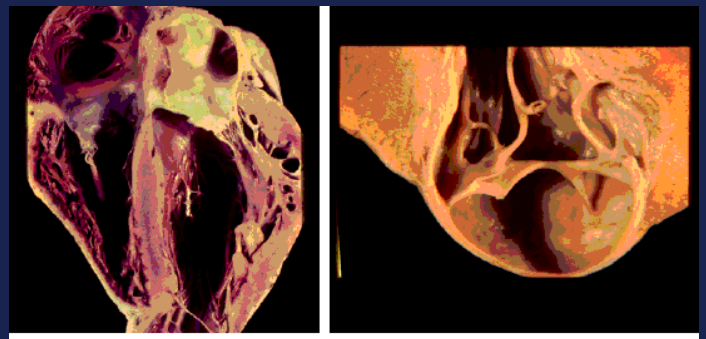
www.centromandela.com/?p=10640



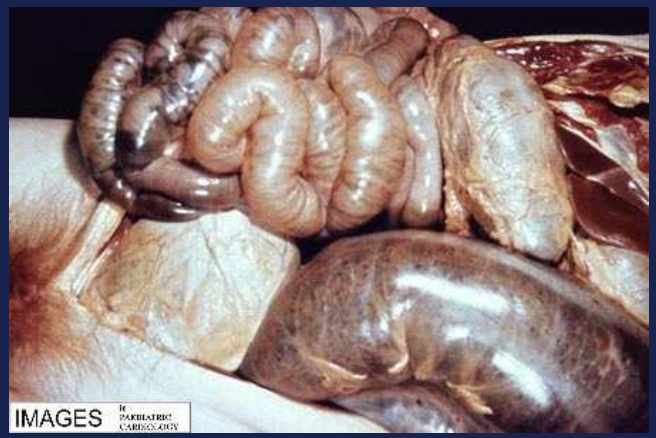
Romaña's sign – Photo courtesy of WHO/TDR.

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 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

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

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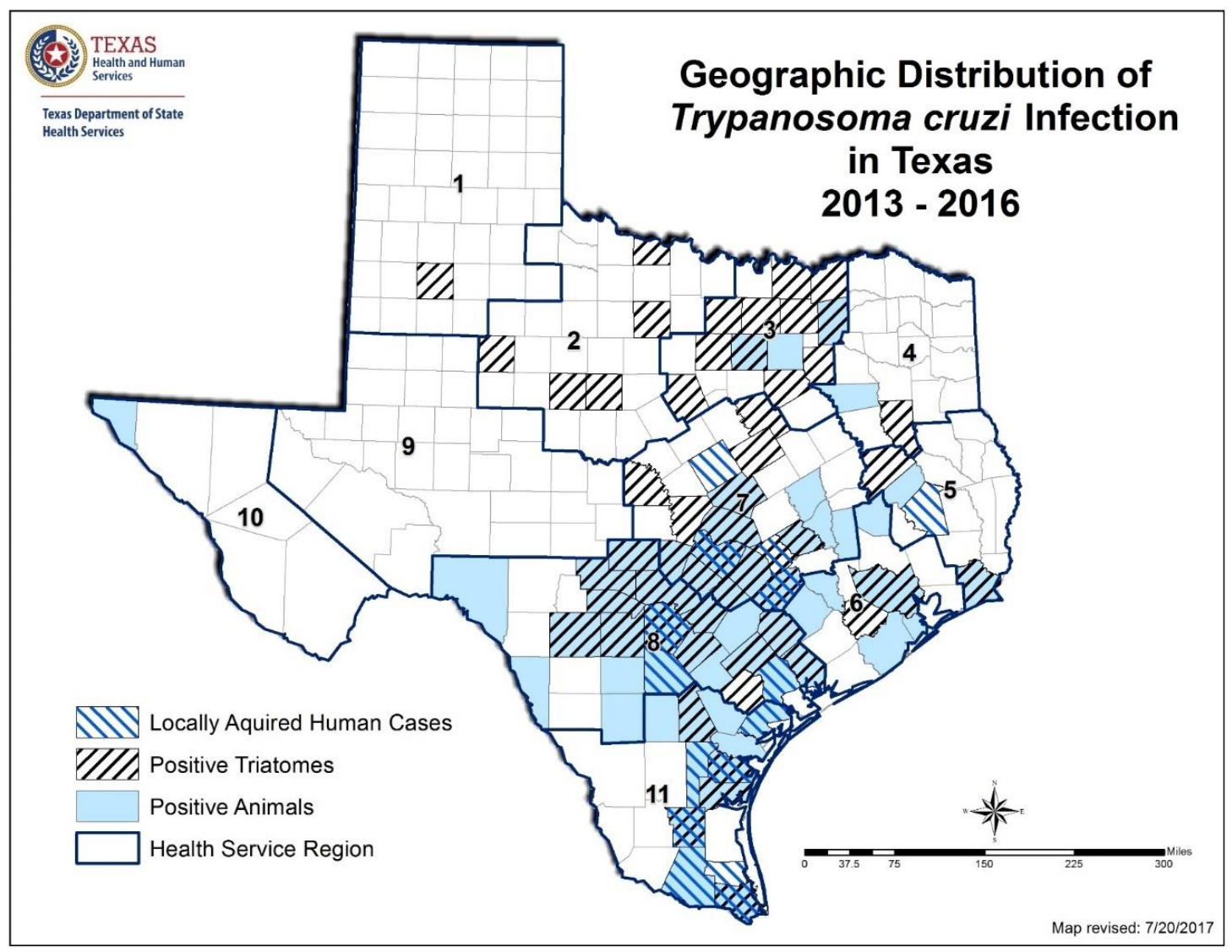
- Chagas disease became reportable in Texas in 2013
  www.dshs.texas.gov/idcu/disease/chagas/data/
- 124 Chagas Disease Cases
  - 22 locally acquired
  - 78 imported
  - 24 unknown
- Case Classification
  - 98 Chronic Indeterminate
  - 26 Chronic Symptomatic

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

County	Locally Acquired	Imported	Unknown	Grand Total
Anderson County		1		1
Atascosa County	1			1
Bell County			1	1
Bexar County	6	2	2	10
Brazoria County		3		3
Brazos County		1		1
Brooks County	1			1
Cameron County	1	6	1	8
Collin County			1	1
Coryell County	1			1
Dallas County		17	4	21
Denton County		1		1
El Paso County		1		1
Fayette County	1			1
Fort Bend County		1		1
Gillespie County		1		1
Guadalupe County			1	1
Harris County		27	8	35
Hidalgo County	2	3	2	7
Henderson County		1		1
Jackson County		1		1
Jim Wells County	1			1
Lee County	1			1
McLennan County		1		1
Matagorda County			1	1
Montgomery County		1	1	2
Nueces County	2	2	1	5
Polk County	1			1
Potter County		1		1
Refugio County	1			1
San Patricio County			1	1
Shelby County		1		1
Travis County	1	4		5
Victoria County	1	1		2
Wilbarger County		1		1
Willacy County	1			1
Grand Total	22	78	24	124

Chagas Disease:
Geographic Distribution, Texas, 2013-2016



Chagas Disease: DSHS Online Resources

TEXAS Health and Human Services
Texas Department of State Health Services

www.TexasZoonosis.org

Home > Infectious Disease Control > Chagas

Chagas

Chagas Disease

Chagas disease is caused by the parasite *Trypanosoma cruzi*. This parasite is spread by triatomine 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
- Triatomine 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

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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

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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/

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

Rev. 9-18

1

Person exposed or potentially exposed to a triatomine bug and the bug or photo of the bug is available for identification

- Email the digital photo(s) to DSHS at bonny.mayes@dshs.texas.gov, whitney.qualls@dshs.texas.gov and the.vet@dshs.state.tx.us
- If bug appears to be a triatomine or no photo is available, send the bug to DSHS for identification and testing (instructions and submission form are available at www.dshs.state.tx.us/idcu/disease/chagas/)
  - If the bug is not a triatomine, the person is NOT at risk for Chagas disease
  - If the bug tests **positive** for *T. cruzi*, go to process 2 or 3, depending on timeframe
  - If the bug tests **negative** for *T. cruzi*, the person is NOT at risk for Chagas disease
- If the bug appears to be a triatomine, but is not available for testing and you wish to pursue clinical testing, go to process 2

2

Person tests positive at a blood bank
OR
Person exposed or potentially exposed to a triatomine bug >8 weeks prior
OR
Person with onset of cardiac disease compatible with chronic Chagas disease
OR
Person with Chagas-positive mother or sibling
OR
Person potentially exposed to blood or tissue from an infected person or animal >8 weeks prior (e.g. needlestick injury, tissue transplant)

- Perform serology at a commercial lab

Negative serology – person does NOT have Chagas disease

Positive serology – request that any remaining sample be forwarded to the DSHS lab or collect a new sample and send to DSHS lab for routing to CDC (select "Chagas disease" in Section 10: CDC Reference Tests on the G2A submission form)

3

Person exposed or potentially exposed to a *T. cruzi* positive triatomine bug ≤8 weeks prior
OR
Person traveled to a Chagas-endemic area and has acute symptoms
OR
Person potentially exposed to blood or tissue from an infected person or animal ≤8 weeks prior (e.g. needlestick injury, tissue transplant)

- Prior to sample submission, consult with Regional DSHS Zoonosis Control staff to determine if PCR testing is warranted
- If CDC agrees to test by PCR, submit the appropriate sample to the DSHS Lab for routing to CDC (select "Chagas disease" in Section 10: CDC Reference Tests on the G-2A submission form)
- If CDC recommends serologic testing instead of PCR testing, the sample should be sent to a commercial lab (follow process 2)

- If the person is confirmed **positive** at the CDC, consult with CDC staff regarding clinical evaluation, management, and treatment* of Chagas disease
- If the person tests **negative** at CDC, the person does NOT have Chagas disease

** Benznidazole approved by FDA for use in children 2-12 years of age; Nifurtimox is available as an investigational drug through CDC*

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

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- 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

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- 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)

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

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*

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

http://kissingbug.tamu.edu/found-a-bug/#non-kissing-bugs

Three species of triatomines ("kissing bugs") that can be found in Texas:

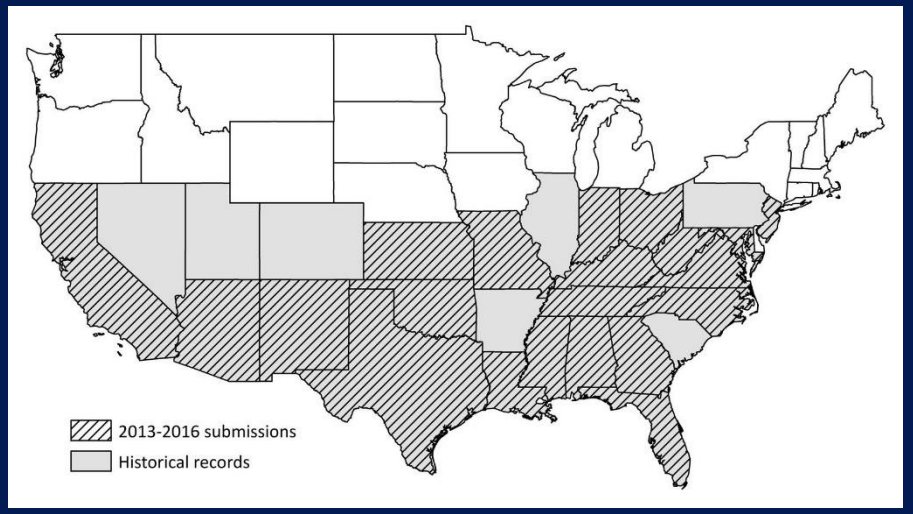
- ***Triatoma sanguisuga***
- ***Triatoma gerstaeckeri***
- ***Triatoma protracta***

wheel bug

squash bug

assassin bug

leaf-footed bug



Chagas Disease: Technical Resources

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- 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/
- 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.
- "Chagas Disease," by Yves Carlier et al on the eMedicine website, www.emedicine.com/MED/topic327.htm

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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

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Biology

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.)

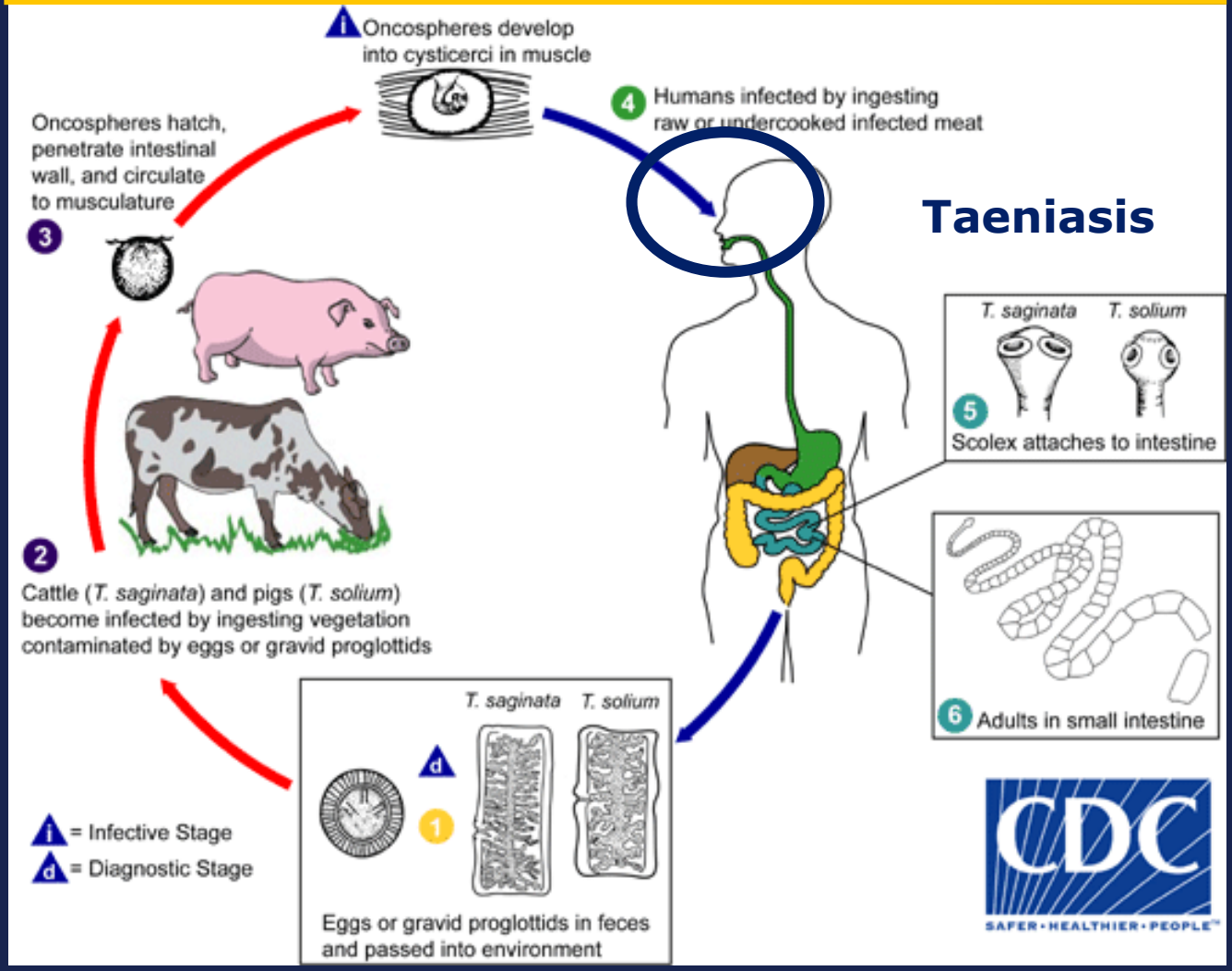

Image courtesy of the Centers for Disease Control and Prevention (CDC)

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Biology (cont.)

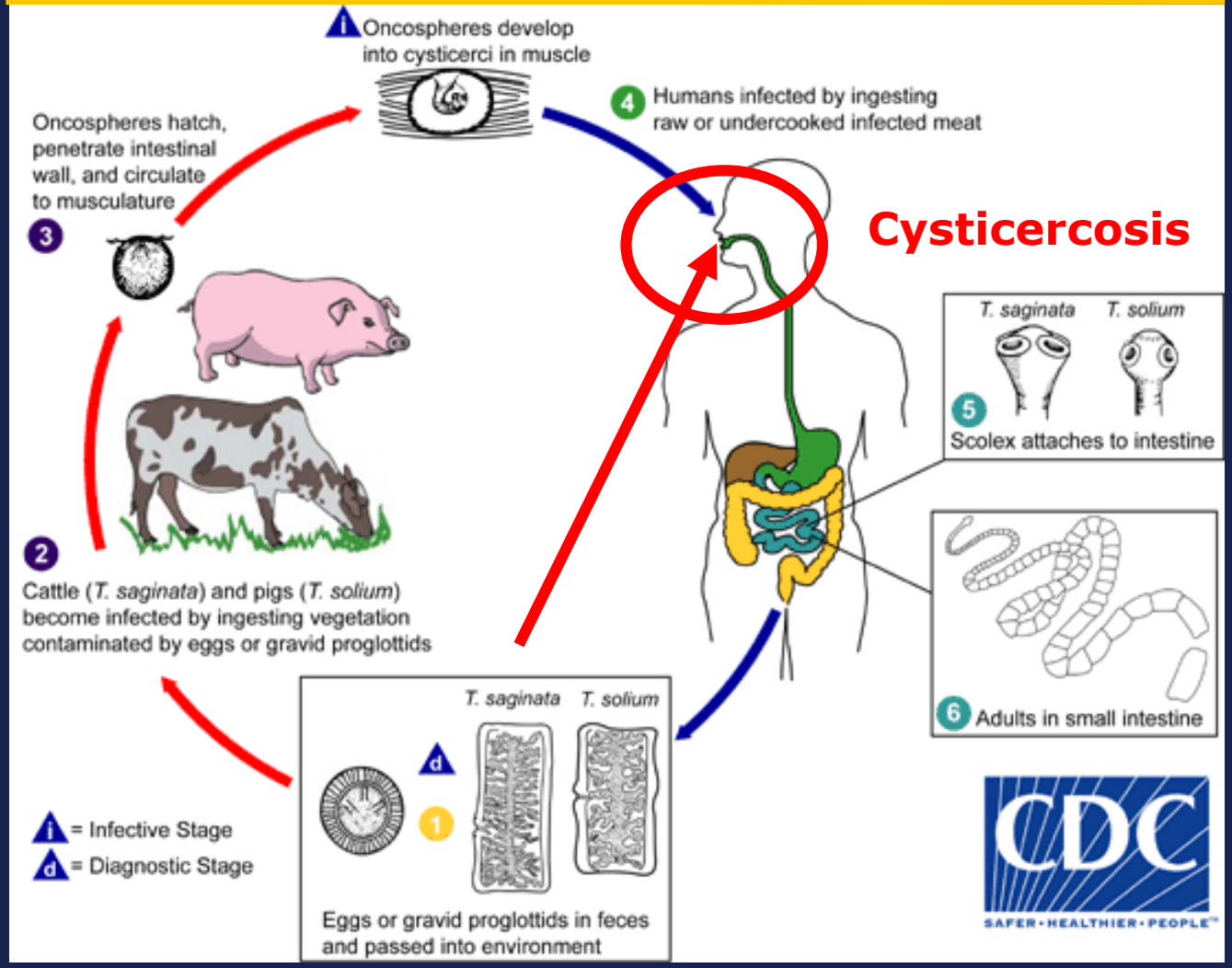

Image courtesy of the Centers for Disease Control and Prevention (CDC)

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Disease

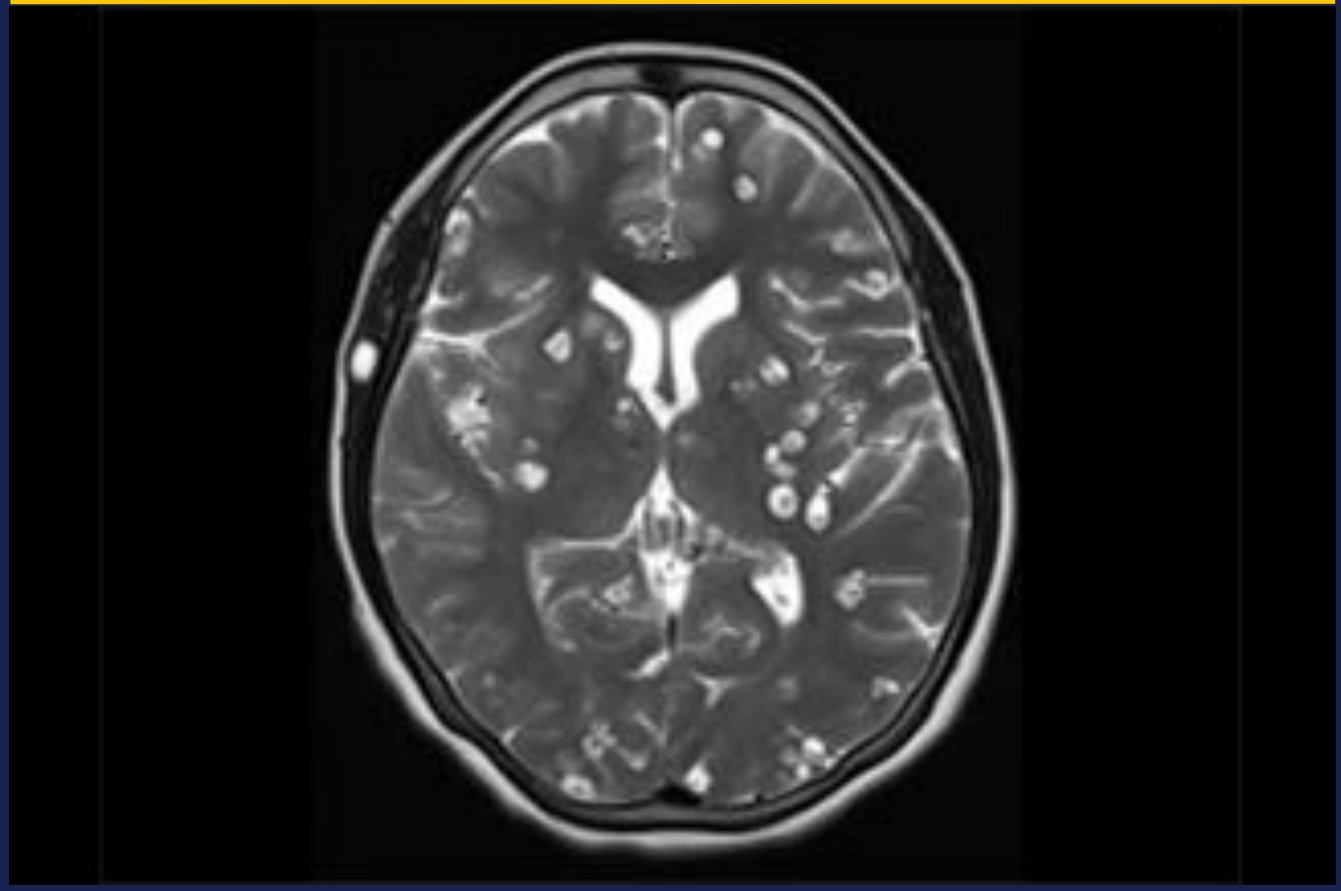
Taeniasis

- 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

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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.)

Reporting Facility/Provider	Date Collected	Test Results	Associated With
Reporting Facility: CDC	04/05/2018	**Taenia solium antibody:** Cysticercosis AB IB positive	[redacted] **Cysticercosis**

Reporting Facility/Provider	Date Collected	Test Results	Associated With
Reporting Facility: LABCORP **Ordering Provider:** [redacted]	03/29/2018	**Taenia solium larva Ab:** Positive **Reference Range:** (Negative) - (Final)	[redacted] **Cysticercosis**

Reporting Facility/Provider	Date Collected	Test Results	Associated With
Reporting Facility: TX.Austin.SPHL	12/16/2017	**Ova+Parasites identified in Stool by Concentration:** Taenia species	[redacted] **T.solium-undiff Taenia**

Images courtesy of Bonny Mayes

Cases in Texas
(2015-2018)

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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

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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

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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
- World Health Organization 10 Facts About Neurocysticercosis: http://www.who.int/features/factfiles/neurocysticercosis/photos/en/
- Oregon State University Small Farms Website: http://smallfarms.oregonstate.edu/beef/meat-measles

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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

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Rejection Criteria

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Missing/incorrect information:

- Incorrect case status or condition selected
- Full Name
- Date of Birth
- Address
- County
- Missing laboratory data

Rejection Criteria
continued

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- Inconsistent information
  - e.g. Report date is a week <u>before</u> 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

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- 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)

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

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

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Reporting Zoonoses

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

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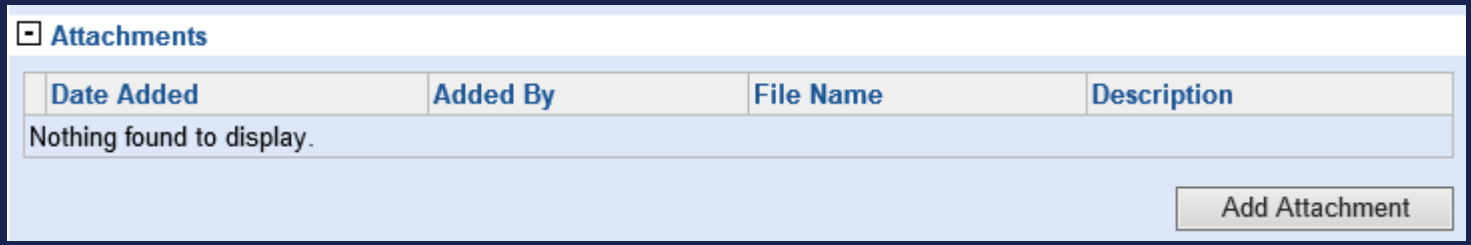
Attaching Documents in NEDSS

- **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"



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Resources

- TDSHS Zoonosis website: http://www.dshs.texas.gov/idcu/health/zoonosis/
- IDCU: http://www.dshs.texas.gov/idcu/default.shtm
- NBS Data Entry Guide (DEG): https://txnedss.dshs.state.tx.us:8009/PHINDox/UserResources/
- Epi Case Criteria Guidelines (ECCG): https://txnedss.dshs.state.tx.us:8009/PHINDox/UserResources/

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Questions?

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Thank you

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