CHAGAS DISEASE

1. **Agent**: *Trypanosoma cruzi*, a bloodborne protozoan, that occurs in humans as a hemoflagellate (trypomastigote) and as an intracellular parasite (amastigote).

2. **Identification**:

   a. **Symptoms**:

      Acute Disease: Usually asymptomatic. Only a small proportion of cases are recognized because of the mild and nonspecific nature of most symptoms and the lack of access to medical care in endemic countries. The first signs occur one to three weeks after infection and most commonly present with fever, lymphadenopathy, malaise, and occasional hepatosplenomegaly. A chagoma, or Romaña's sign, is an inflammatory reaction at the site of inoculation of the protozoa. Acute disease usually will resolve in weeks or months on its own, but if untreated will persist in an asymptomatic chronic form. Overt central nervous system signs manifesting as acute encephalitis are rarely seen with the exception of those with profound immunocompromise (transplant recipients and AIDS patients).

      Chronic Disease: Chronic irreversible sequelae, cardiac and gastrointestinal, are estimated to occur in up to 30% of infected persons years to decades after initial infection. The most frequent cardiac abnormalities include nonspecific electrocardiographic changes, life-threatening arrythmias, and cardiomyopathy resulting in congestive heart failure; classically, intestinal tract involvement leads to megaesophagus and/or megacolon.

   b. Differential Diagnosis:
   Acute Chagas infection: Preseptal cellulitis, Infectious mononucleosis, Acute HIV infection

   c. **Diagnosis**: During the acute phase of infection diagnosis can be made through PCR, stained blood smear, hemoculture, or xenodiagnosis. Serological testing is utilized most often for blood donor screening and clinical diagnostics. The standard approach is to apply two or more serological tests that use different techniques and/or that detect antibodies to different antigens. Blood donor positive screening and commercial positive tests should be confirmed at the CDC.

3. **Incubation**: 5-14 days after the bite of the vector; 30-40 days after blood transfusion.

4. **Reservoir**: Humans and over 150 domestic and wild mammalian species, including dogs, cats, rats, mice, marsupials, rodents, carnivores, and primates.

5. **Source**: Infected species of Reduviidae (cone-nosed bugs or kissing bugs) especially various species from the genera *Triatoma*, *Rhodnius*, and *Panstrongylus*. Occurs in the Americas from the southern U.S. to southern Argentina, mainly in poor, rural areas of Mexico, Central America, and South America.

6. **Transmission**: Infected reduviid bugs pass trypanosomes in their feces which are deposited after feeding and contaminate conjunctiva, mucous membranes, abrasions, or skin wounds. The bugs become infected when they feed on a parasitemic human or other mammal.

   Infected blood donor units can transmit the infection to recipients (especially those immunocompromised). Blood is routinely screened for *T. cruzi* in the U.S. and many parts of South and Central America. Perinatal transmission may occur in 2% to 8% of pregnancies for those infected.

7. **Communicability**: Reduviid bugs become infective 10-30 days after biting an infected host with gut infection in the bug persisting for life (up to 2 years). The trypanosome is present in the blood of infected individuals or mammals during the acute phase of infection and may persist at low levels in symptomatic and asymptomatic hosts.

8. **Specific Treatment**: Treatment options are limited and are most effective during the acute stage of infection. However, treatment is also a consideration for chronic stages. Two parasitic drugs are available commercially:

benznidazole (http://www.benznidazoletablets.com/en/) and nifurtimox. Confirmatory diagnostic testing at CDC is recommended prior to treatment. Additional information regarding Chagas Disease treatment and diagnostics is available at the CDC Chagas disease web page or by calling the CDC at 404-718-4745.

REPORTING PROCEDURES

1. Chagas disease and asymptomatic blood donors became reportable in Los Angeles County by clinicians, laboratories, and blood banks in December 2019. Report any cases or suspected cases within 7 calendar days to ACDC or Morbidity Unit. *California Code of Regulations*, Title 17, Section 2500.

ACDC will investigate all cases, including those related to blood transfusion and transplant recipients as well as suspected local transmission. ACDC will notify the California Department of Public Health immediately upon receiving notice of a case of suspected transplant or transfusion associated Chagas disease, and will supervise the investigation and control measures. Investigation will be coordinated with local Organ Procurement Organization.

2. **Report Form**: Chagas Disease Case History Form and Chagas Disease Form for Non-confirmed Cases (Internal REDCap Form for ACDC use only)

3. **Epidemiologic Data**:

   a. History of travel to or residing in endemic areas within the incubation period.

   b. Transplant and blood transfusion history

   c. History of exposure to reduviid bugs.

CONTROL OF CASE, CONTACTS & CARRIERS

ACDC will supervise investigation and control measures.

CASE: No restrictions.

CONTACTS: No restrictions.

CARRIERS: Not applicable.

PREVENTION-EDUCATION

1. Infected Blood Donors are notified by blood banks of the serological positive diagnosis with regards to Chagas disease and the need for medical evaluation. They are informed that they can no longer donate blood to others but they may be able to donate blood to themselves (autologous donation) if the need arises. Positive donors should be re-tested by their provider, followed by serologic confirmation at the CDC prior to treatment.

2. ACDC will assist with referrals for clinical evaluation of Chagas disease, especially for those without health insurance. ACDC will refer individuals without insurance to the Chagas Center of Excellence for medical evaluation and possible treatment at Olive View Medical Center in Sylmar, California. The director of the Center, Dr. Sheba Meymandi, can be reached at (747) 210-4289 and smeymandi@dhs.lacounty.gov.

DIAGNOSTIC PROCEDURES

Clinical and epidemiologic history is required to aid the laboratory in test selections. Testing is available through the CDC Parasitic Diseases Branch. CDC Pre-approval is needed for all Chagas testing.

1. **Serology**: The preferred method to diagnose chronic infection. CDC uses an enzyme immunoassay (EIA) and trypomastigote excreted-secreted antigen (TESA) blot. If initial EIA and TESA results are discordant, a second specimen is requested and testing is repeated. If results of the second EIA and TESA are discordant, an immunofluorescence assay (IFA) is used as a “tie-breaker” test.

   Laboratory Form: CDC 50.34 Specimen Submission Form.

   Exam Requested: Chagas Disease Serology

   Material: Serum.

   Amount: Minimum 0.5 mL

Storage: Serum should be collected, centrifuged and transferred to leak proof tubes. Serum can be stored at refrigerated temperature (2-8°C) for up to 7 days prior to freezing or stored frozen (-20°C or lower) for up to 8 weeks.

Remarks: Send one CDC Specimen Submission Form and one separate tube for each test requested.

2. **PCR**: Recommended for acute infection, including cases of transfusion or transplant transmission or congenital Chagas.

Laboratory Form: CDC 50.34 Specimen Submission Form.

Exam Requested: Chagas Disease Molecular Detection

Material: EDTA-treated whole blood, unpreserved heart tissue, and CSF.

Amount: Blood: 2.2 mL . CSF: 0.2mL.

Storage: Specimens shall be stored in leak-proof containers.

Blood, CSF and unpreserved tissue can be stored refrigerated (2-8°C) when specimens will be received by CDC within 7 days of collection. After 7 days from collection, CSF and unpreserved heart tissue can be frozen (-20 °C or lower) when specimens will be received at CDC within 30 days from day of collection.

ADDITIONAL LABORATORY PROCEDURES

PCR: Testing is available for triatomine bugs. Identification of the insect must be verified prior to submission and can be done with CDPH or local vector control districts through an emailed photo. CDC Pre-Approval is not needed for testing. CDPH can facilitate testing of bugs and send them to CDC. CDPH contact and address to send the bug to:

Marco E. Metzger, Ph.D.
Public Health Biologist
Vector-Borne Disease Section
California Department of Public Health
2151 Convention Center Way, Suite 226
Ontario, CA 91764
(909) 937-3448
(909) 937-3456 FAX
Marco.Metzger@cdph.ca.gov

Container: N/A

Laboratory Form: CDC 50.34 Specimen Submission Form.

Exam Requested: Trypanosoma cruzi Molecular Detection-Insects

Material: Triatomine insect.

Amount: N/A.

Storage: Dry or in 70% ethanol.

Remarks: Insects should be shipped in a crush-proof container in a box or shipping tube. Padded envelopes are not acceptable. Ship at ambient temperature in compliance with local and Federal guidelines. Send by regular mail or overnight Monday-Thursday to avoid weekend deliveries. Provide detailed information of the human exposure to the insect and where the insect was found (kitchen, bed, porch, etc.) in the Comments field of the CDC 50.34 Specimen Submission Form.