

Laboratory Testing for Human Parasites

Intestinal, Blood, and Tissue

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Parasitic Protozoa and Helminths

“In the late 1800s, scientists sometimes referred to parasitology as medical zoology. They were referring to the way they had to understand parasites as real organisms, with natural histories of their own, before they could try to fight the diseases the parasites caused.”

Carl Zimmer, *Parasite Rex*



Neglected Tropical Diseases

- **Diseases caused by parasites are ancient conditions that are among the most common infections of the world's poorest people. They make up the majority of what are called "Neglected Tropical Diseases" or NTDs.**
- **In 2015, an estimated 214 million cases of malaria occurred worldwide and 438,000 people died. About 1,500 cases of malaria are diagnosed in the United States each year. (CDC)**
- **In 2014, at least 1.7 billion people required mass or individual treatment and care for NTDs, in 185 countries. Of these, 1.1 billion were in lower-middle-income countries. (WHO)**



Parasitic Disease Exposures

- **Fecally contaminated environment:** Lack of sanitation infrastructure; zoonotic exposure
- **Foodborne:** Unsanitary food handling; contaminated or infected food
- **Arthropod vector:** Mosquitoes, triatomines, biting flies
- **Miscellaneous:** Infection with free living organisms in the environment; sexual transmission; congenital transmission; transfusion/transplant acquired



A few more to keep on your radar ...

Angiostrongylus

Giardia

Toxocara

Toxoplasma

Trichomonas

Baylisascaris

Diphyllobothrium

Schistosoma

Strongyloides

Traditional Parasitology

- **Microscopic visualization of parasites has long been the traditional method of laboratory diagnosis – still a standard.**
- **Most human parasites are intestinal infections.**
 - **Fecal specimens are the specimen of choice.**
 - **A complete fecal O&P examination consists of two preparations:**
 - *A concentration of the specimen, to be viewed as a wet mount, and a stained smear.*
 - *An examination of both preps with a good microscope, by a well trained technologist, provides the best opportunity to detect the full range of intestinal parasites.*
 - *Supplemental tests targeting particular organisms are appropriate and helpful, but don't replace an O&P.*

Other Testing

- **Serology**
- **Histopathology**
- **Special stains**
- **Fluorescent antibody tests**
- **UV autofluorescence**
- **Antibiotic susceptibility tests**
- **Cultures**
- **Rapid immunoassays**
- **Molecular tests**
- **Whole genome sequencing**

Morphological Testing at DSHS

- Routine fecal Ova & Parasite exam (concentrate & trichrome)
- Acid-fast stain for *Cryptosporidium*/*Cyclospora*/*Cystoisospora*
- Chromotrope stain for *Microsporidia*
- Giemsa stain for malaria and other blood parasites (thick & thin smears)
- Knott concentration for microfilariae
- Examination of miscellaneous body fluids by various methods
- Worm identification



Other Parasite Testing at DSHS

- **Schistosoma serology**
- **Strongyloides serology**
- **Chagas serology (near future)**
- **Malaria PCR**
- **Cyclospora PCR (very near future)**
- **Triatomine identification**

Protozoa Testing at CDC

Serological

Free Living Amoeba

Babesia

Chagas (T. cruzi)

Leishmania (visceral)

Malaria

Morphological

All protozoa

Molecular

Free Living Amoeba

Babesia

Chagas (T. cruzi)

Cyclospora

Entamoeba histolytica/dispar

Leishmania

Malaria

Microsporidia

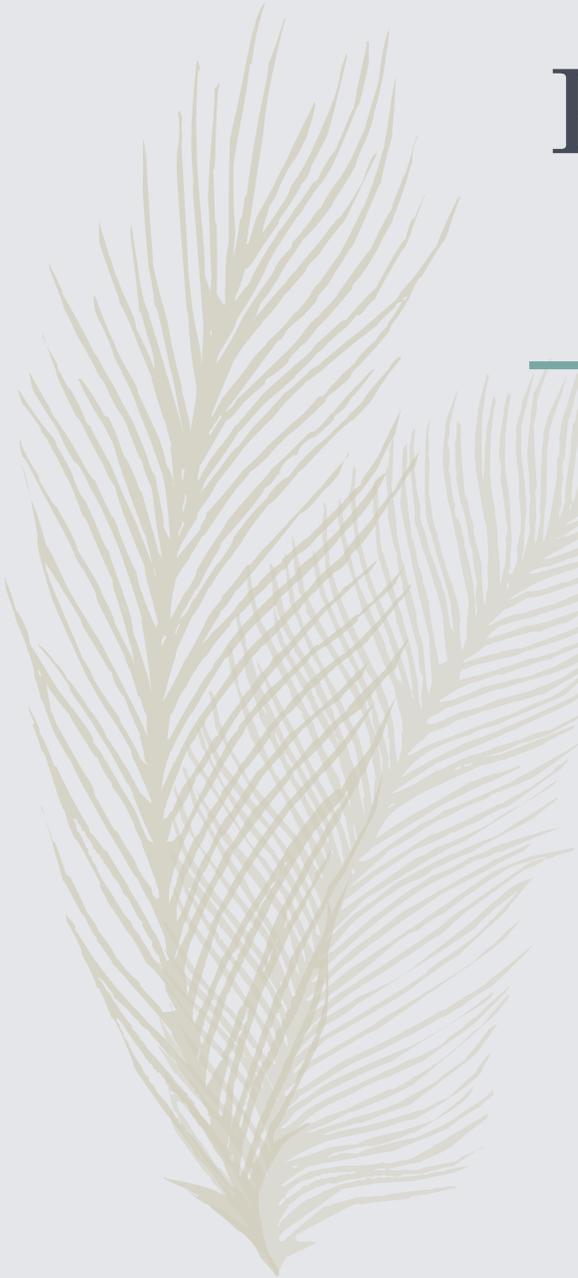
Trypanosoma cruzi (in triatomine)

Other

Antibiotic susceptibility

Identification (multiple tests)

Special Studies



Helminth Testing at CDC

Serological

Baylisascaris

Cysticercosis

Echinococcus

Filariasis (Brugia, Wuchereria)

Paragonimus

Schistosoma

Strongyloides

Toxocara

Trichinellosis

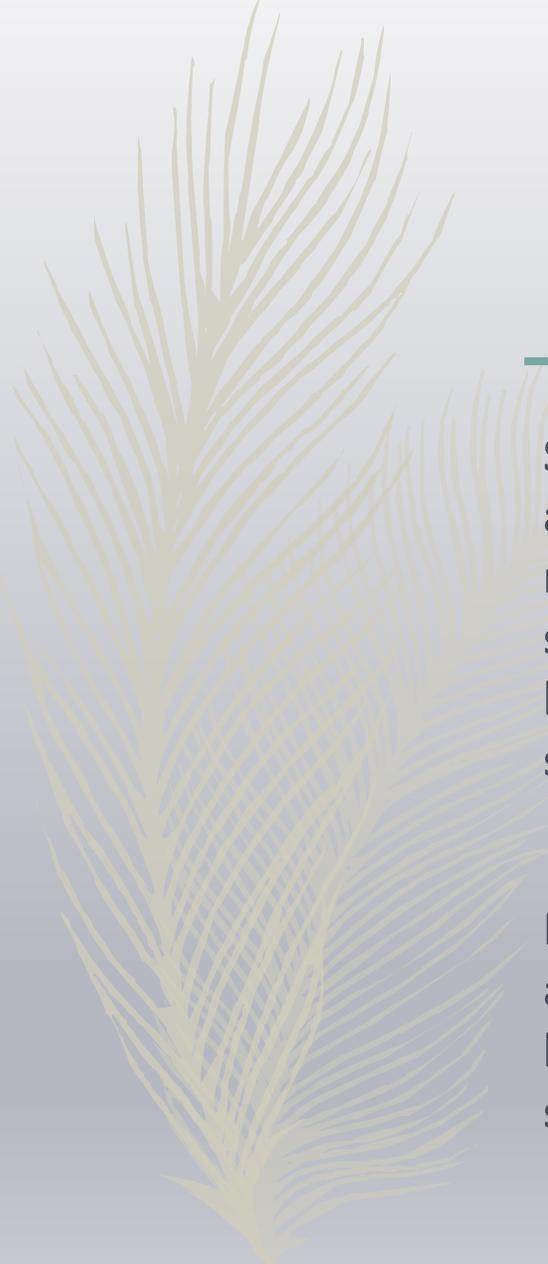
Molecular

Angiostrongylus

Morphological

All helminths





CDC Referral Testing

State health departments and federal agencies may submit specimens for reference testing to CDC. All submissions need approval of the state health department unless part of a special study or surveillance project.

Private citizens, health practitioners, and hospitals must contact their local health department to submit specimens.

CDC Shipping address:

Point of contact

Centers for Disease Control & Prevention

RDSB/STAT

1600 Clifton Road, NE

Atlanta, GA 30333

Contact's telephone number

CDC Referral Testing

CDC Infectious Diseases Laboratory Test Directory:

- <http://www.cdc.gov/laboratory/specimen-submission/cdc-lab-tests.pdf>

CDC Specimen Submission Form:

- <http://www.cdc.gov/laboratory/specimen-submission/pdf/form-50-34.pdf>

Please call or email DSHS Medical Parasitology or the Infectious Disease Control Unit to inform us that you are sending specimen to CDC. Thanks 😊

State PHL Information:

Dr. Grace Kubin, PhD

Texas Dept. of State Health Services
Laboratory Services Section, MC 1947

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P.O. Box 149347

Austin TX 78714-9347

1-512-7767318

1-512-7767294

Lab.Microbiology@DSHS.state.tx.us



Shipping to DSHS Lab

Submit fecal specimens for O&P testing in appropriate preservatives (10% formalin and PVA). Ship at room temperature.

Submit serology specimens for CDC referral with serum separated from red blood cells (gel separator tubes are acceptable). Ship all blood specimens on a cold pack.

For other questions regarding specimen type, collection, or handling, please call DSHS Parasitology Team at 512-776-7560.

For questions regarding shipping, please call Specimen Acquisition at 512-776-7598, or refer to:

– http://www.dshs.texas.gov/lab/MRS_shipping.shtm

To get DSHS submission forms, please call Lab Reporting at 512-776-7578, or refer to:

– http://www.dshs.texas.gov/lab/mrs_forms.shtm

CDC Telediagnosis



- DPDx website address: <http://www.cdc.gov/dpdx/>
- DPDx is a web site developed and maintained by CDC's Division of Parasitic Diseases and Malaria (DPDM).
- For diagnostic assistance, laboratory and other health professionals can ask questions and/or send digital Images of specimens for expedited review and consultation with DPDx staff.
 - The DPDx Team will require a CDC submission form to be submitted with images in order to receive a formal, written lab report.
 - Please send your diagnostic request to dpdx@cdc.gov.



Other CDC links

CDC Immigrant and Refugee Health

- <http://www.cdc.gov/immigrantrefugeehealth/guidelines/domestic/intestinal-parasites-domestic.html>
- <http://www.cdc.gov/immigrantrefugeehealth/guidelines/domestic/malaria-guidelines-domestic.html>

CDC Travelers' Health

- <http://wwwnc.cdc.gov/travel/>



Contact me:

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