



# Parasitology Workshop – Clinical lab

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# Parasitology diagnostic testing

Test menu

How many of you have a Parasitology subsection within your microbiology lab?

A. Yes

B. No



# What testing is being performed in your Parasitology lab? Select all that apply

- A. Ova and parasite microscopy
- B. Blood parasite microscopy
- C. Antigen testing
- D. Molecular testing
- ☒ E. Other



# Welcome to our lab!



70 total  
caregivers

- 8 fully trained  
in parasitology

O&P  
volume

- 4000 per year

Positivity  
rate:

- ~2%

# Diagnostic assays in Parasitology — Stool

- Intestinal Parasites
  - Ova and Parasite examination of stool specimens
    - Routine Trichrome staining
    - Modified Acid fast stain for Coccidia
    - Modified Trichrome stain for Microsporidia
  - Fecal immunoassays for intestinal protozoa
  - Larval Nematode culture
  - Other tests
    - Cellulose tape preparation/Swube for *Enterobius vermicularis*
    - Parasite identification for worms
  - Other specimens
    - Respiratory specimens & others – sputum, BAL, CSF
    - Aspirates
  - Molecular Testing

# Diagnostic assays in Parasitology — Blood

- Blood Parasites
  - Blood parasite microscopy
    - Thick and thin smear
    - Parasite identification
    - % parasitemia calculation
  - Antigen based testing
    - Binax Malaria Antigen
  - Blood concentration methods for detection
    - Buffy coat concentration
    - Knott concentration
    - Membrane filtration
  - Molecular Testing
  - Serology



# Diagnostic assays in Parasitology — Other

- Identification or culture based
  - Parasite identification – Arthropods and worms
    - Tick
    - Bed bugs
    - Scabies
    - Non-parasites
  - Free living Amoeba cultures



# Case 1. Stool tests

Diarrhea and disseminated infection in an Immunocompromised patient

# Patient History

## Patient History

- Living donor transplant 1.5 months ago
- Common variable immunodeficiency
- Crohns disease, COVID, low-grade CMV Viremia
- Severe and rapidly decompensating sepsis.
- Possibly improving diarrheal symptoms
- Asplenic
- Requiring high dose vasopressors

## Differential

- BROAD
- Asplenic – *S. pneumoniae*, *Haemophilus*, *Neisseria*
- Diarrhea – O & P
- From SW USA - *Coccidioides*
- Has a cat – *Toxoplasma*
- Possible neurologic symptoms - *Cryptococcus*

### STOOL GASTROINTESTINAL PANEL

Status: Final result

Test Result Released: No (seen, inaccessible in MyChart)

Specimen Information: Stool Random

0 Result Notes

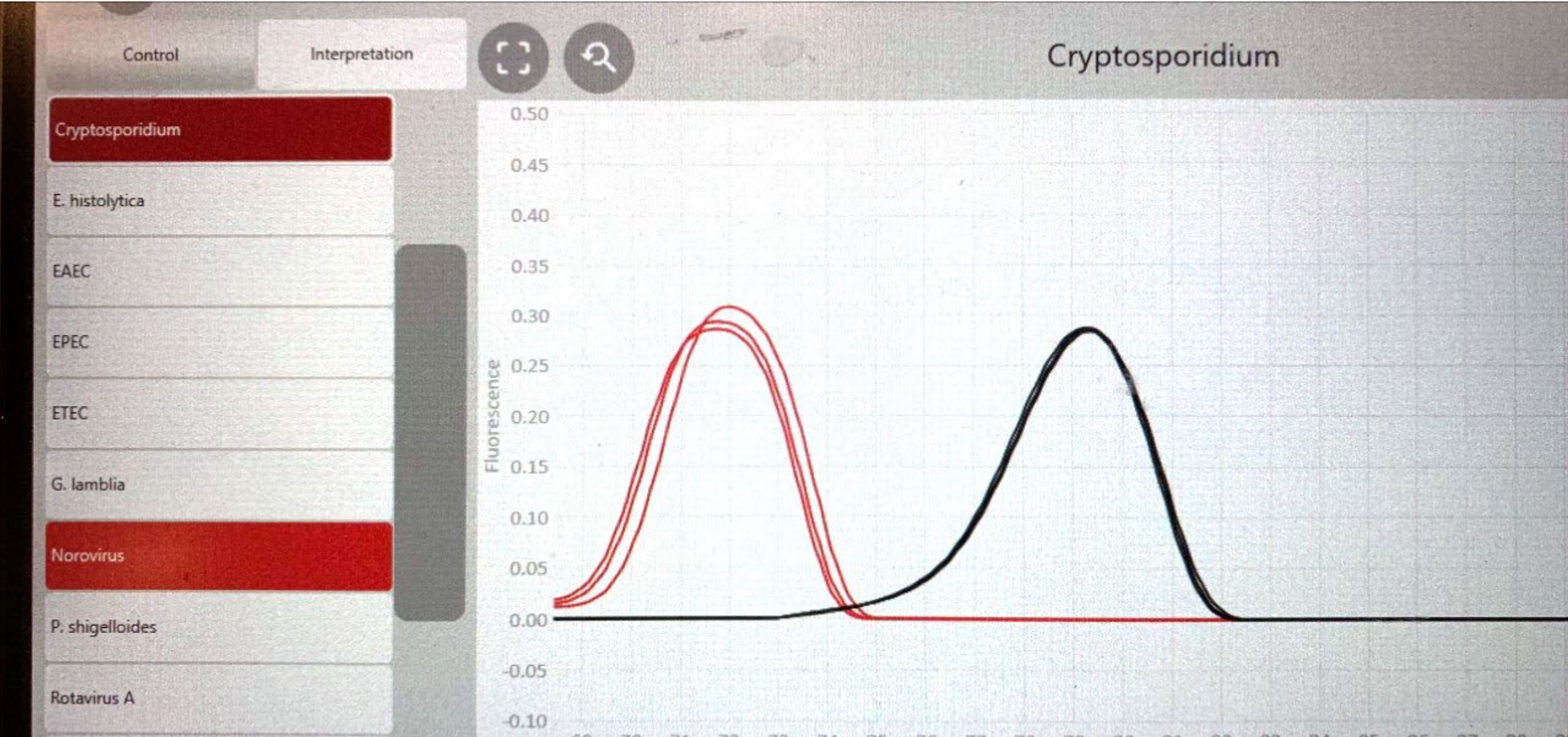
[Newer results are available.](#)

#### Component

Ref Range & Units

|                                                              |                |
|--------------------------------------------------------------|----------------|
| Campylobacter species (C. jejuni/C. coli/C. upsaliensis) DNA | Not detected   |
| Not Detected                                                 |                |
| Plesiomonas shigelloides DNA                                 | Not detected   |
| Not Detected                                                 |                |
| Salmonella species DNA                                       | Not detected   |
| Not Detected                                                 |                |
| Vibrio species DNA                                           | Not detected   |
| Not Detected                                                 |                |
| Vibrio cholerae DNA                                          | Not detected   |
| Not Detected                                                 |                |
| Enteropathogenic E. coli (EPEC) DNA                          | Not detected   |
| Not Detected                                                 |                |
| Enterotoxigenic E. coli (ETEC) DNA                           | Not detected   |
| Not Detected                                                 |                |
| Shiga-like toxin producing E. coli (STEC) DNA                | Not detected   |
| Not Detected                                                 |                |
| E. coli O157 DNA                                             | Not Applicable |
| Not Detected                                                 |                |
| Shigella/Enteroinvasive E. coli (EIEC) DNA                   | Not detected   |
| Not Detected                                                 |                |
| Cryptosporidium DNA                                          | Detected !     |
| Not detected                                                 |                |
| Cyclospora cayentanensis DNA                                 | Not detected   |
| Not Detected                                                 |                |
| Entamoeba histolytica DNA                                    | Not detected   |
| Not Detected                                                 |                |
| Giardia lamblia DNA                                          | Not detected   |
| Not Detected                                                 |                |
| Adenovirus F 40/41 DNA                                       | Not detected   |
| Not Detected                                                 |                |
| Astrovirus RNA                                               | Not detected   |
| Not Detected                                                 |                |
| Norovirus GI/GII RNA                                         | Detected !     |
| Not Detected                                                 |                |
| Rotavirus A RNA                                              | Not detected   |
| Not Detected                                                 |                |
| Sapovirus (Genogroups I, II, IV, V) RNA                      | Not detected   |
| Not Detected                                                 |                |
| Yersinia enterocolitica DNA                                  | Not detected   |
| Not Detected                                                 |                |
| Resulting Agency                                             | CCM            |

# Cryptosporidium and Norovirus?



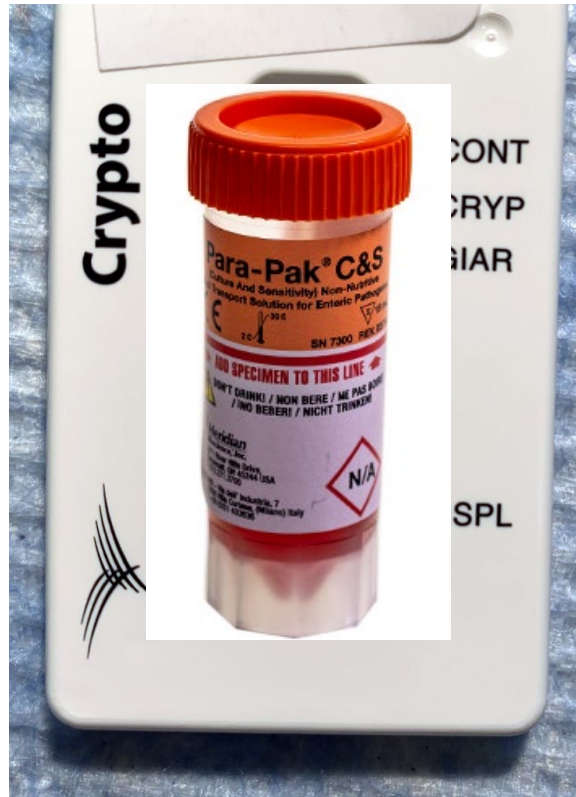
# How do we verify our findings?

- A. Ova and parasite microscopy
- B. Use other stains
- C. Antigen testing
- D. Repeat Molecular testing
- E. Don't do anything else





# How do we verify?



| Species                                       | RIDA Quick                           |        |        |        | Remel X/pect                         |                    |        |        | ImmunoCardSTAT!                      |        |        |        | Crypto-Strip                         |                    |        |        |
|-----------------------------------------------|--------------------------------------|--------|--------|--------|--------------------------------------|--------------------|--------|--------|--------------------------------------|--------|--------|--------|--------------------------------------|--------------------|--------|--------|
|                                               | No. of positive specimens/laboratory |        |        | Mean % | No. of positive specimens/laboratory |                    |        | Mean % | No. of positive specimens/laboratory |        |        | Mean % | No. of positive specimens/laboratory |                    |        | Mean % |
|                                               | Lab. A                               | Lab. B | Lab. C |        | Lab. A                               | Lab. B             | Lab. C |        | Lab. A                               | Lab. B | Lab. C |        | Lab. A                               | Lab. B             | Lab. C |        |
| <i>C. parvum</i> (n = 20)                     | 15                                   | 15     | 14     | 73.3   | 15                                   | 14/18 <sup>c</sup> | 14     | 74.1   | 16                                   | 15     | 13     | 73.3   | 9                                    | 10/18 <sup>c</sup> | 11     | 50.1   |
| <i>C. hominis</i> (n = 20)                    | 14                                   | 16     | 14     | 73.3   | 17                                   | 15                 | 18     | 83.3   | 17                                   | 17     | 18     | 86.7   | 13                                   | 10/17 <sup>c</sup> | 12     | 59.3   |
| Other <i>Cryptosporidium</i> species (n = 10) | 2                                    | 2      | 2      | 20     | 3                                    | 3                  | 3      | 30     | 3                                    | 4      | 3      | 33.3   | 1                                    | 1                  | 1      | 10     |
| <i>C. felis</i> (n = 6)                       | 1                                    | 1      | 1      |        | 2                                    | 2                  | 2      |        | 2                                    | 3      | 2      |        | 0                                    | 0/5 <sup>c</sup>   | 0      |        |
| <i>C. meleagridis</i> (n = 2)                 | 0                                    | 0      | 0      |        | 0                                    | 0                  | 0      |        | 0                                    | 0      | 0      |        | 0                                    | 0/1 <sup>c</sup>   | 0      |        |
| <i>C. canis</i> (n = 1)                       | 0                                    | 0      | 0      |        | 0                                    | 0                  | 0      |        | 0                                    | 0      | 0      |        | 0                                    | 0                  | 0      |        |
| <i>Cryptosporidium</i> sp. (n = 1)            | 1                                    | 1      | 1      |        | 1                                    | 1                  | 1      |        | 1                                    | 1      | 1      |        | 1                                    | 1                  | 1      |        |

# Is this disseminated?

## !! NOCARDIA CULT+STAIN

Status: Final result

Test Result Released: No (inaccessible in MyChart)

Specimen Information: Bronchoalveolar Lavage; Micro Specimen

0 Result Notes

[Newer results](#)

### Nocardia Culture

No growth 28 days

**Moderate Cryptosporidium species !!**

Organisms seen on direct smear only.

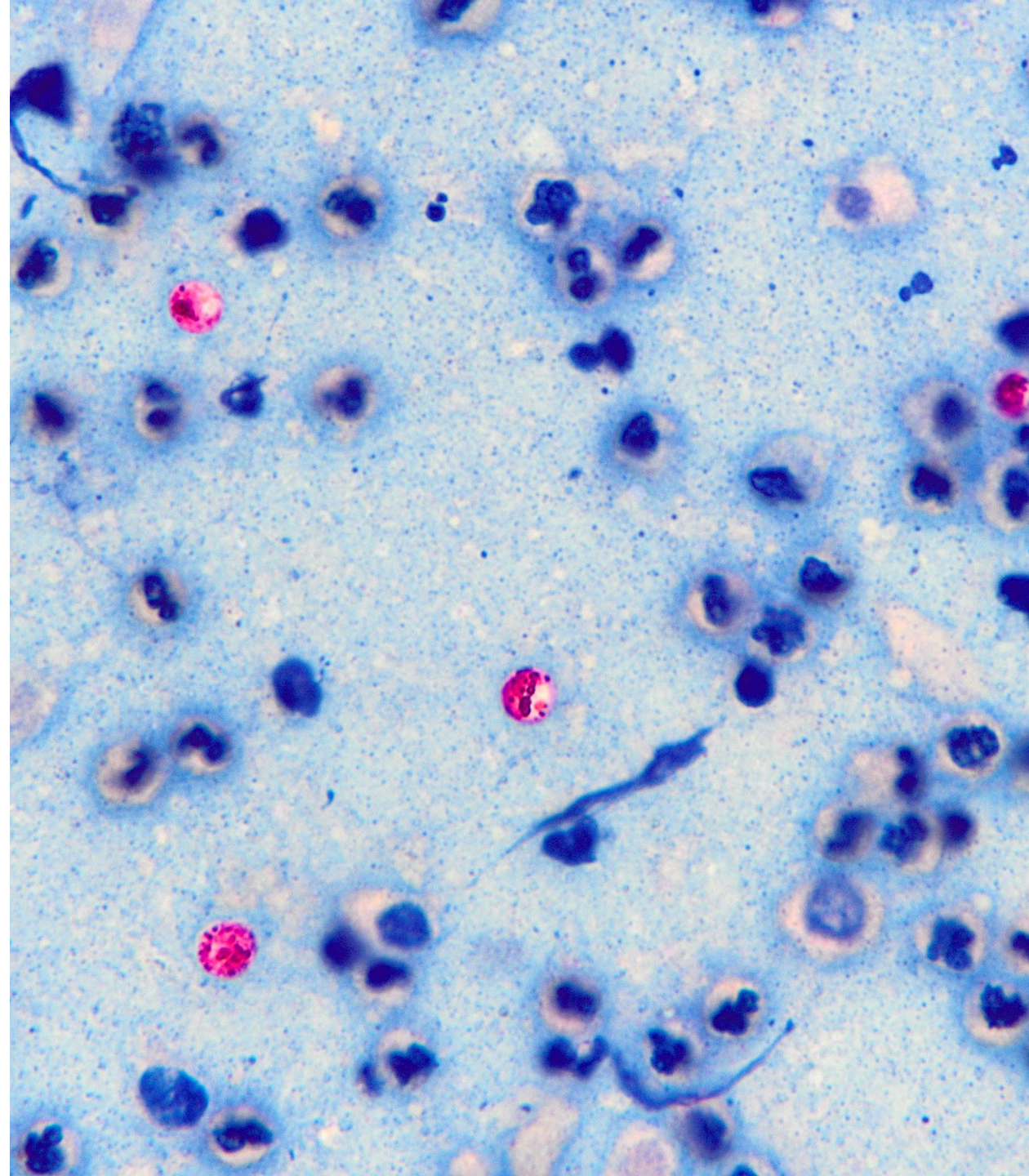
### Smear Result

No Nocardia seen.

Moderate

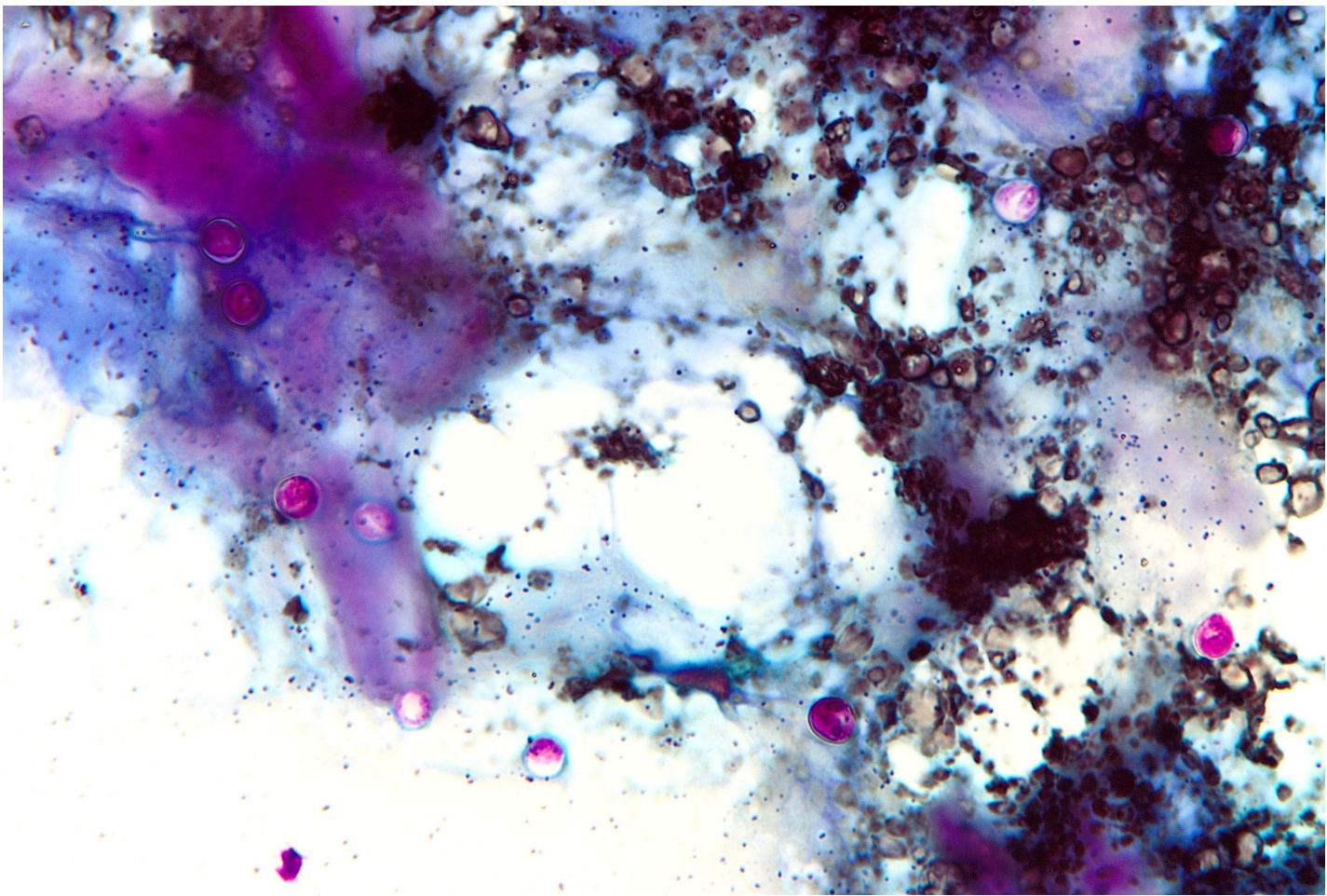
Cryptosporidium species

Resulting Agency: CCM





# Stool Modified Acid fast stain

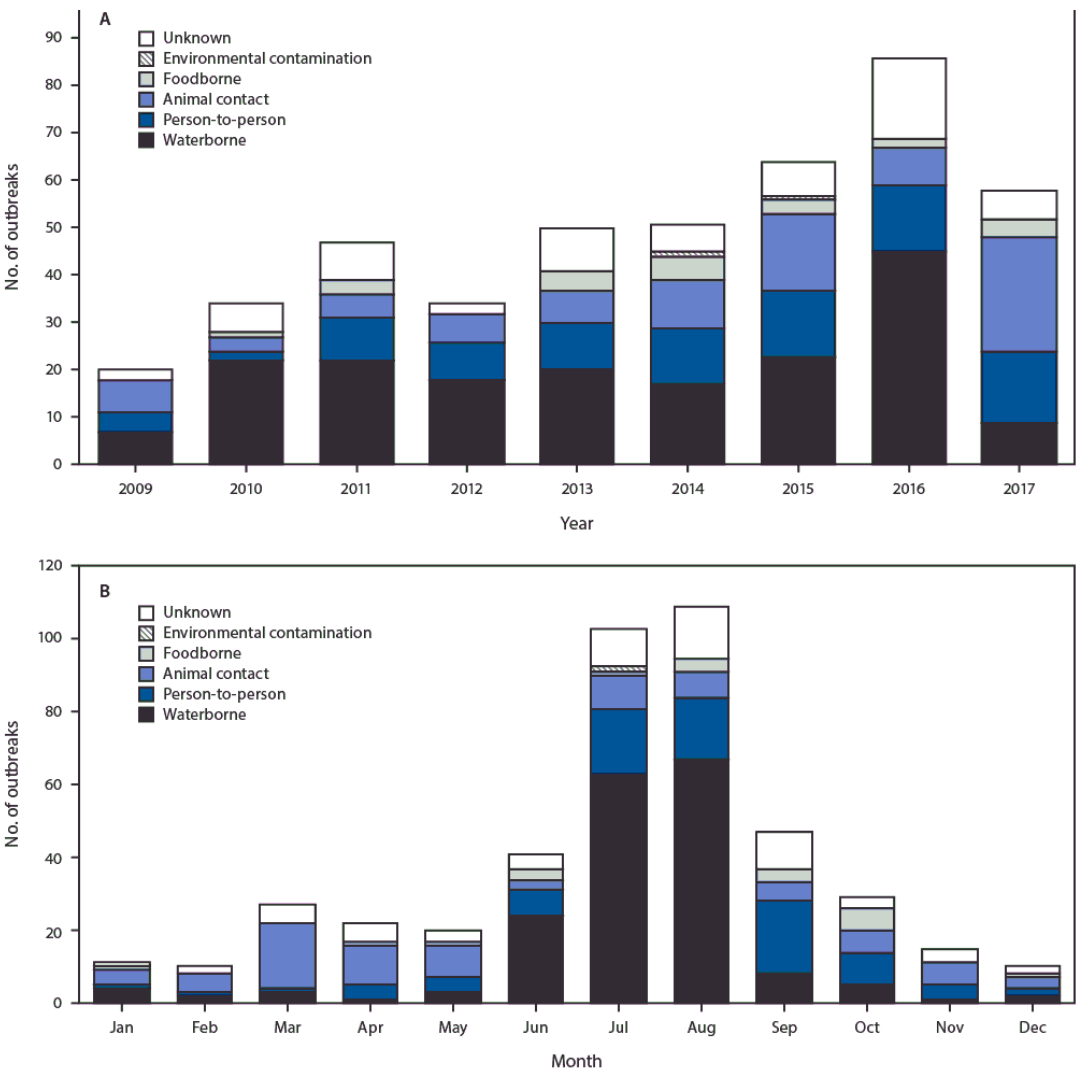
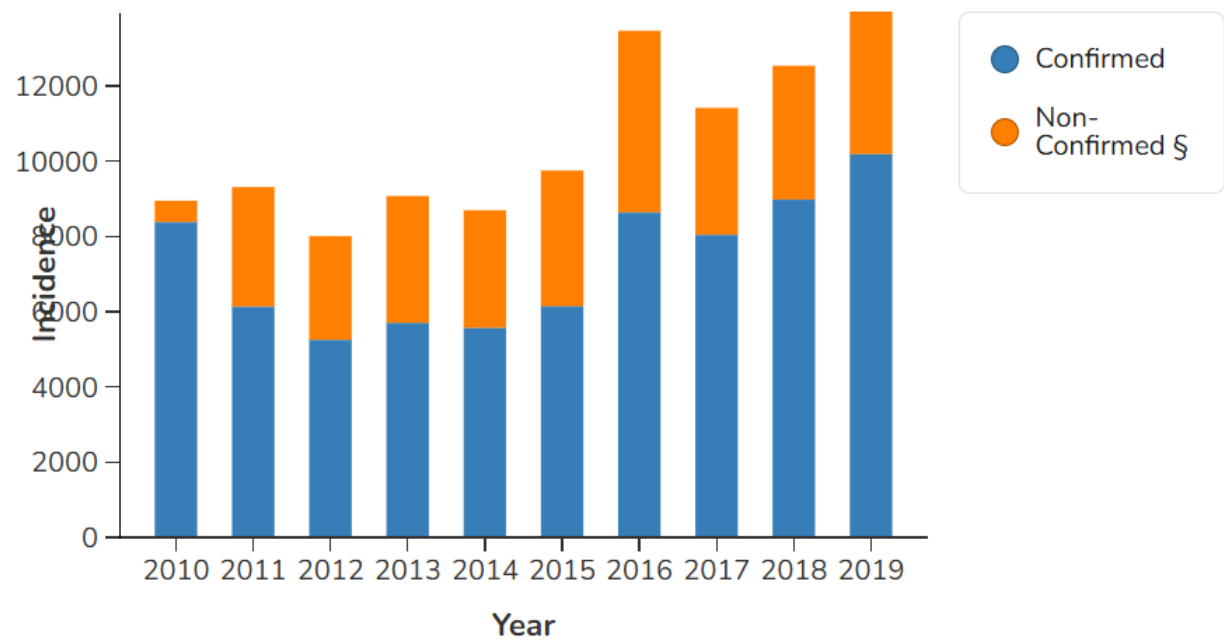


| Week    | 1    | 2    | 3        | 4        | 5    | 6    | 7        | 8    | 9        |
|---------|------|------|----------|----------|------|------|----------|------|----------|
| Results | Many | Many | Moderate | Moderate | Rare | Rare | Negative | Rare | Negative |



# CRYPTONET

Figure 1. Incidence\* of reported cryptosporidiosis cases, by year and case classification — National Notifiable Diseases Surveillance System, United States, — 2010–2019 (N=105,211)





## Molecular Typing Report for Cryptosporidiosis

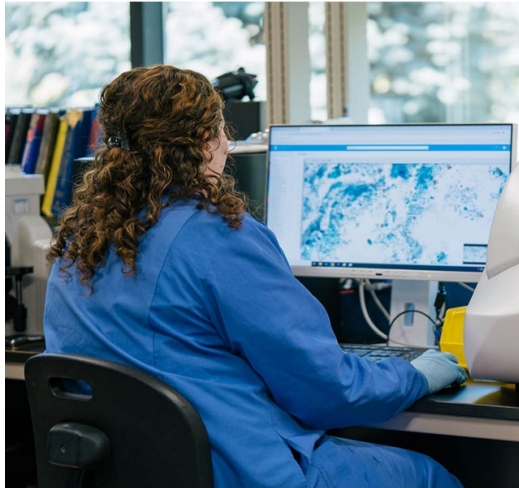
Molecular Epidemiology Lab, Waterborne Diseases Prevention Branch,  
Division of Foodborne, Waterborne and Environmental Diseases, NCEZID,  
CDC, 1600 Clifton Rd, MS-D66, Atlanta, GA 30333, USA

### I. Submitter Details

### II. Molecular Typing Results

Report Date: [REDACTED]

| Original ID                                                            | Host  | Species    | Subtype |
|------------------------------------------------------------------------|-------|------------|---------|
| <span style="background-color: black; color: black;">[REDACTED]</span> | Human | C. hominis | laA15R3 |



Blastocystis sp.

Giardia duodenalis

Combined D. frag / E. nana / Iodamoeba

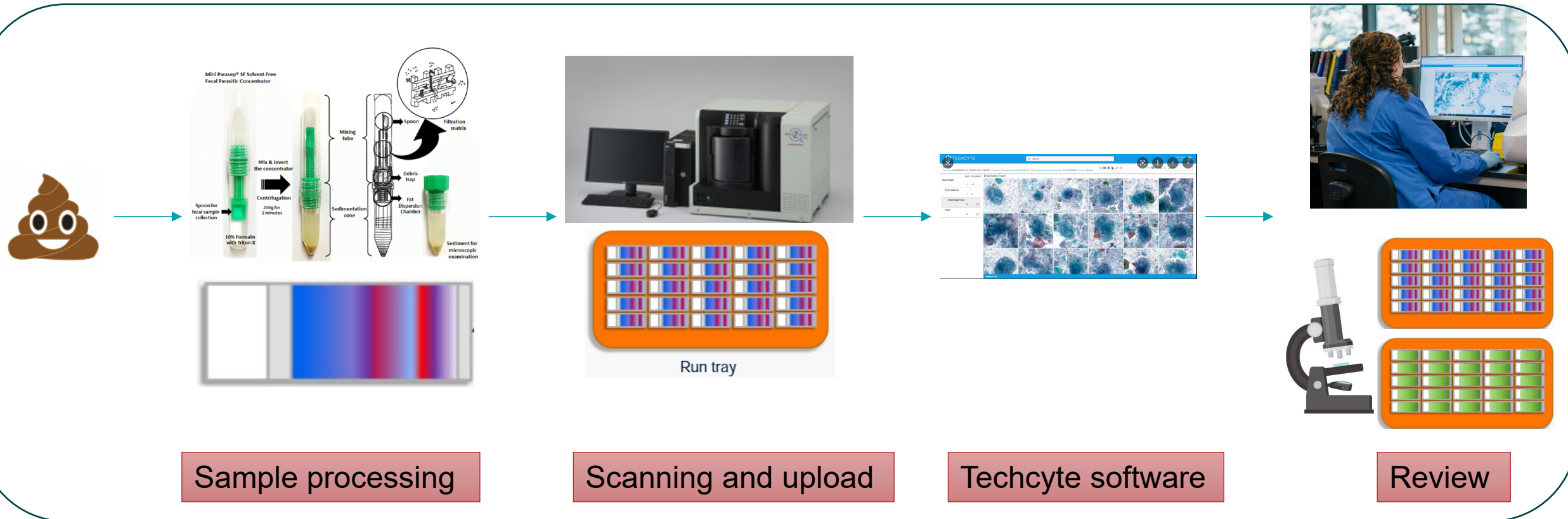
Chilomastix mesnili

Cyclospora cayetanensis

White blood cells

Red blood cells

# Integrating AI into O&P workflows



# Why bring on AI in our lab?

## Time



Current state: ~15 minutes reading per slide



With AI - Potential time savings of over 8 hours per week

## Training



Current state: Takes at least 3-4 months



With AI: Positives are rare, real-time feedback is difficult

Other benefits: Increased efficiency, consistency, and sensitivity. Reduction in technologist fatigue





## Case 2. Miscellaneous tests

Which tests are in and which tests are out

Patient post-transplant present with pulmonary symptoms. Ova and parasite testing was negative but.....



## What are we testing for here?

- A. *Enterobius vermicularis*
- B. *Acanthamoeba*
- C. *Entamoeba histolytica*
- D. *Strongyloides***
- E. Other



# Test characteristics for Strongyloides

- Sensitivity of serology can vary by the test performed.
  - Immunocompetent patients – Sensitivity 88-95%
  - Immunocompromised patients – Sensitivity 68%
- Highly likely to get a false negative in an immunocompromised patient.

| Diagnostic modality                                        | Sensitivity                                      | Comments                                                                |
|------------------------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|
| Single DS examination                                      | ~30%                                             | Poor sensitivity - due to irregular and low larval output in mild cases |
| Three DS examination                                       | ~46%                                             |                                                                         |
| FECT                                                       | Better than DS but still has low sensitivity     | Sensitivity is good if larvae >50/g stool                               |
| Stool culture method - Agar plate technique <sup>[7]</sup> | 60% (1.6- to 6-fold) than FECT                   | Most sensitive stool culture methods; time-consuming (72 h)             |
| Baermann technique <sup>[7]</sup>                          | Higher detection rate (3.6- to 4-fold) than FECT | Laborious and not available in clinical practice                        |
| Serology (ELISA and IFAT)                                  | High sensitivity; suitable for screening         | Cross-reactivity with other nematode infections                         |
| Molecular methods (PCR)                                    | Specificity of almost 100%                       | Sensitivity lower than serology and some stool-based methods            |

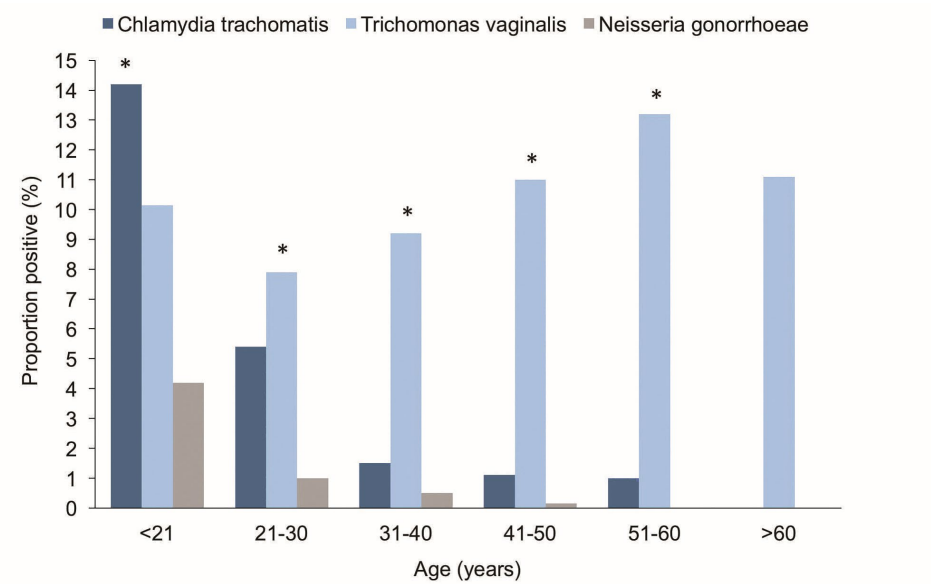
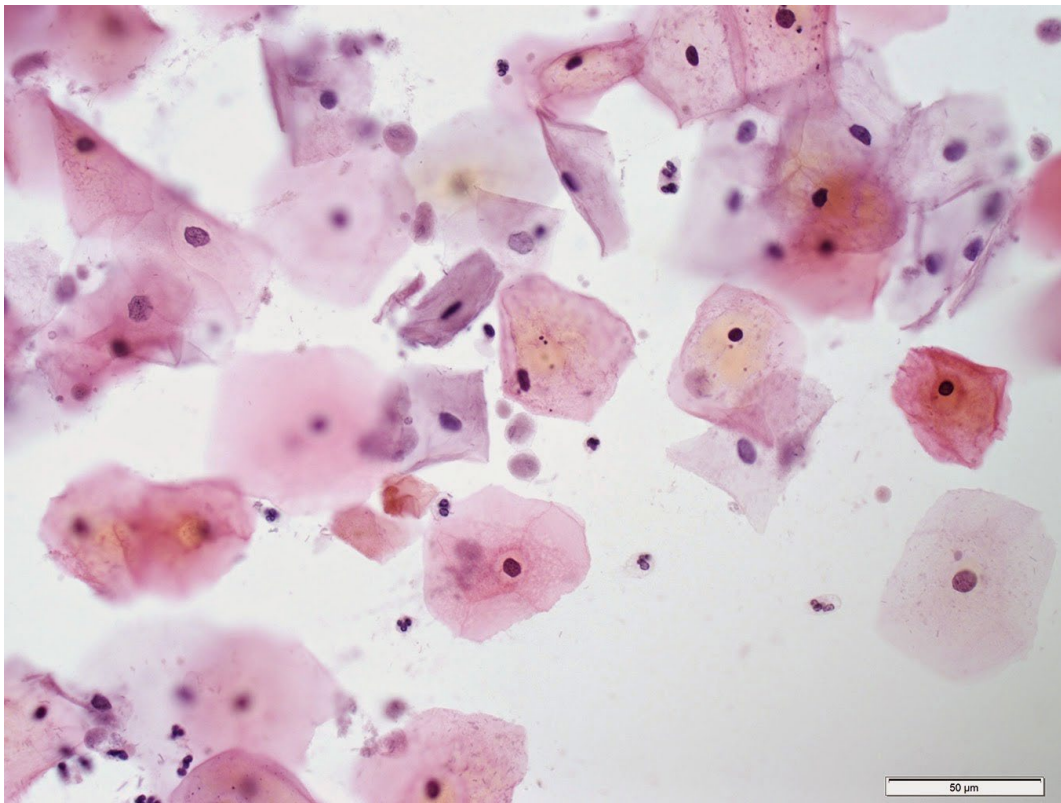
DS: Direct stool, FECT: Formalin-ether concentration technique, PCR: Polymerase chain reaction, IFAT: Indirect Immunofluorescence antibody test, ELISA: Enzyme-linked immunosorbent assay

What are some parasitology tests you have discontinued in the last 5 years?



# What have we discontinued?

Patient presents with complaints of dysuria and vaginal discharge. The following were seen on Papanicolaou stained cervical smear.



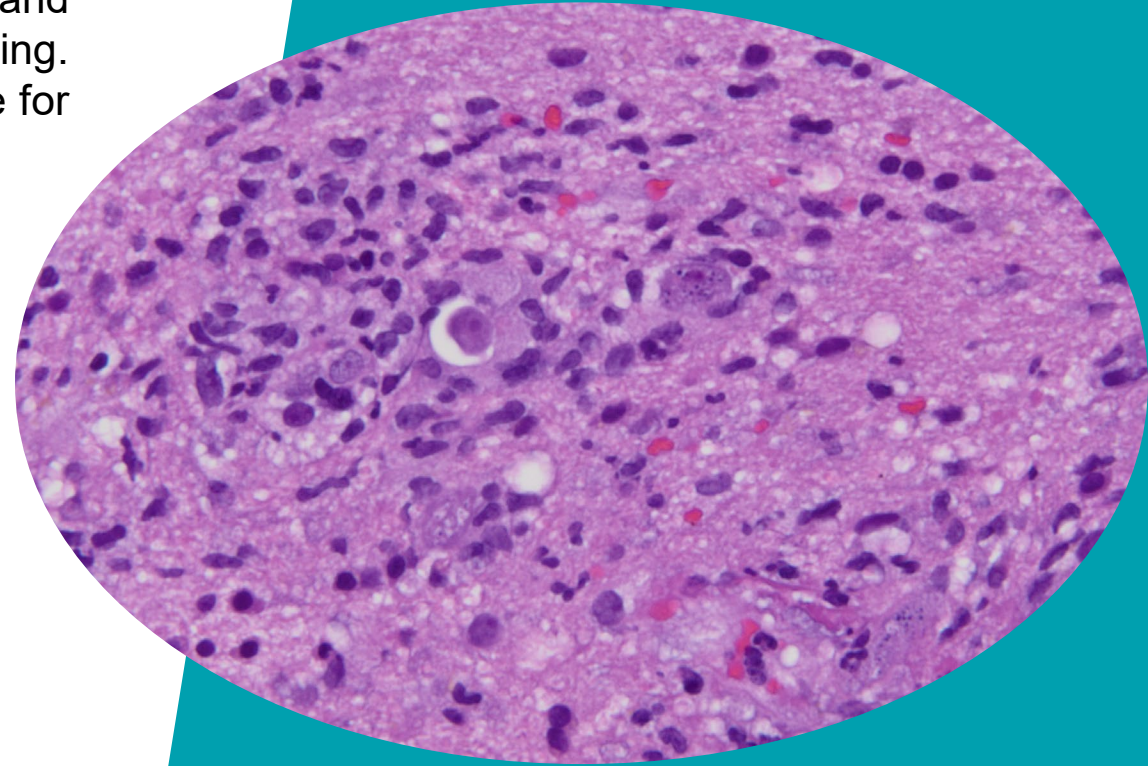
| Method                     | Sensitivity |
|----------------------------|-------------|
| Wet mount microscopy       | 51-65%      |
| Culture of vaginal samples | 75-96%      |
| Antigen detection          | 78-84%      |
| Aptima Trichomonas assay   | 95-100%     |

<https://parasitewonders.blogspot.com/2015/03/case-of-week-340.html>  
<https://clpmag.com/disease-states/routine-nucleic-acid-amplification-testing-trichomoniasis/Munson>  
Workowski KA et al. Sexually transmitted diseases treatment guidelines, 2015. *MMWR Recomm Rep*. 2015;64(RR3):1–137.  
Aptima *Trichomonas vaginalis* Assay (Panther System) [instructions for use, online]. San Diego: Hologic, 2018.



# What have we discontinued - a case?

Patient presented to the ED with weakness, headaches, and confusion. Patient was found to have multiple masses and hypodense lesions along the corpus callosum, right occipital lobe, left posterior temporal lobe and left mid frontal subcortical white matter. Neuro ruled out ischemic stroke. He was initiated on empiric antibiotics and admitted to the ICU. Extensive ID workup and an LP was unrevealing. 3 days post-admission the patient underwent a left frontal burr hole for brain biopsy.



# What have we discontinued - a case?

What is your test of choice?

- A. Cerebrospinal fluid microscopy
- B. Culture on agar
- C. Real time PCR
- D. Serology
- E. No other tests needed



# Results



1-800-533-1710

**FLARP**

Free-Living Amebae, Molecular Detection, PCR,  
Varies

|                                        |                   |  |
|----------------------------------------|-------------------|--|
| [Redacted Patient Information]         |                   |  |
| Account Information                    | Collected         |  |
| C7033529 Cleveland Clinic AP Molecular | 27 Dec 2024 18:12 |  |

## Free-living Amebae Detection, PCR

Specimen Source  
BRAIN BIOPSY

MCR

Acanthamoeba species PCR

MCR

Negative

Reference Value  
Negative

Naegleria fowleri PCR

**1** MCR

Negative

Reference Value  
Negative

Balamuthia mandrillaris PCR

MCR



Positive

Reference Value  
Negative



Critical result.

Received: 05 Jan 2025 13:54

Reported: 06 Jan 2025 13:20

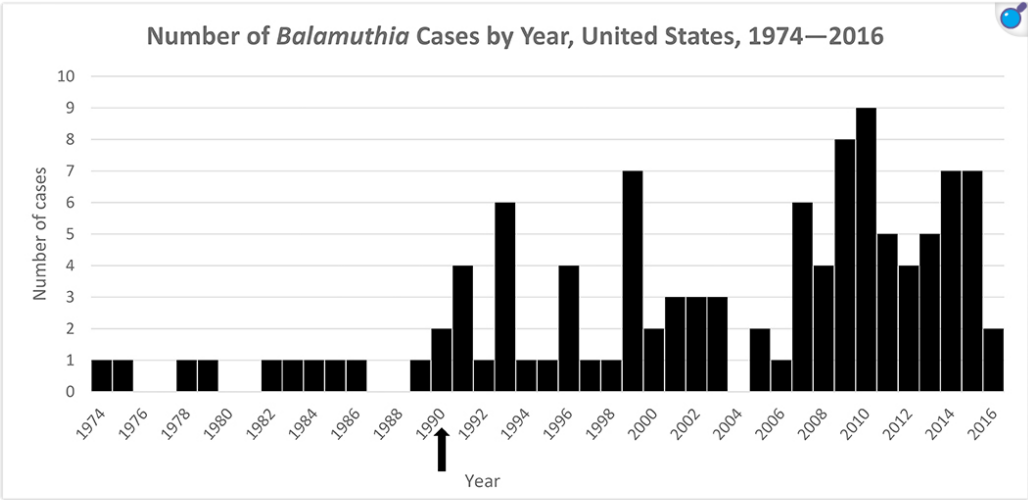


# What have we discontinued - a case?

What is your test of choice?

- ☒ A. Cerebrospinal fluid microscopy
- ☒ B. Culture on agar
- ☒ C. Real time PCR
- ☐ D. Serology
- ☐ E. No other tests needed





Arrow denotes the year *Balamuthia mandrillaris* was first described as a human pathogen. Cases reported prior to 1990 were retrospectively diagnosed.

Laboratory and Radiologic Findings in *Balamuthia* Disease Patients, United States, 1974–2016

| Cerebrospinal fluid values           | Median (Range) |
|--------------------------------------|----------------|
| WBC (cells/ $\mu$ L) (N=64)          | 106 (0–4100)   |
| % Neutrophil (N=38)                  | 0 (0–90)       |
| % Lymphocyte (N=38)                  | 57 (0–100)     |
| % Monocyte (N=38)                    | 9.5 (0–100)    |
| RBC (cells/ $\mu$ L) (N=54)          | 2 (0–44,500)   |
| Protein (mg/dL) (N=62)               | 105 (0–1042)   |
| Glucose (mg/dL) (N=62)               | 46 (0–240)     |
| <i>Balamuthia</i> diagnostic testing | N (%)          |
| Indirect Immunofluorescence          | 61/92 (66)     |
| PCR                                  | 43/92 (47)     |
| Histopathology                       | 41/92 (45)     |
| Culture                              | 3/92 (3)       |
| Combination                          | 54/92 (59)     |
| Brain biopsy performed               | 96/109 (88)    |



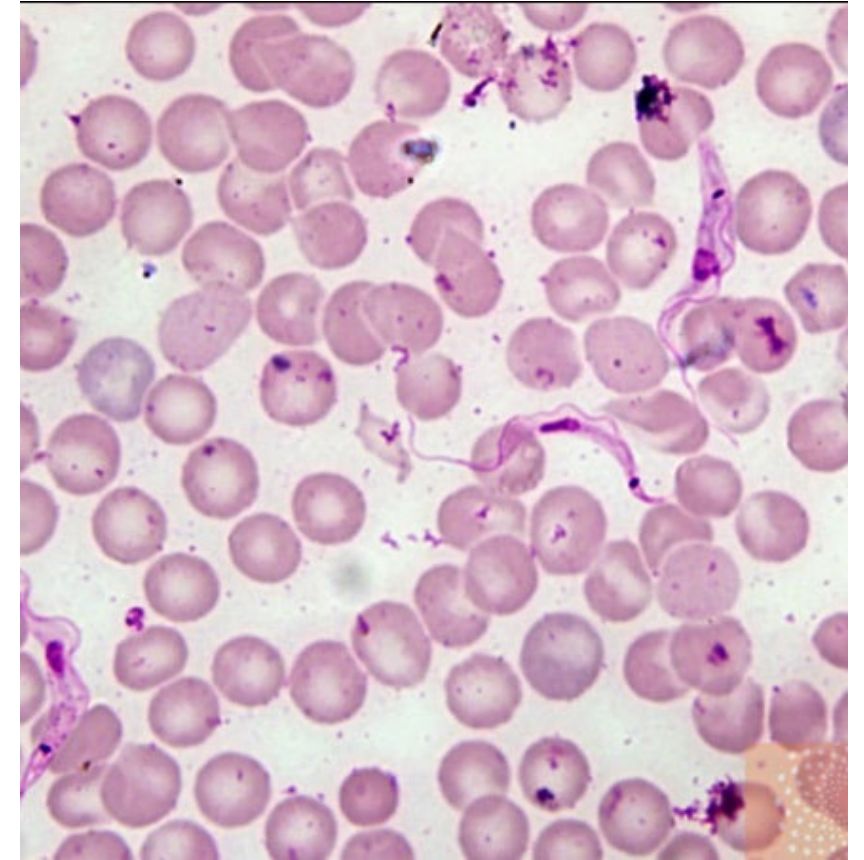


## Case 3.

Which tests are in and which tests do we have to send out

# Disease incidence

- Malaria: In 2022 249 million cases of malaria were estimated worldwide, resulting in over 600,000 deaths.
- Babesia: Vermont, Maine, and New Hampshire saw incidence of the infection rise more than 300% from 2011 to 2019.
- Trypanosoma cruzi: Annual incidence of 30,000 new cases, 12,000 deaths per year, and approximately 9,000 newborns become infected
- Trypanosoma brucei: Under 2000 cases in 2017 and under 1000 cases in 2018, remaining below that threshold as of 2022.



# Blood Parasite specimen collection

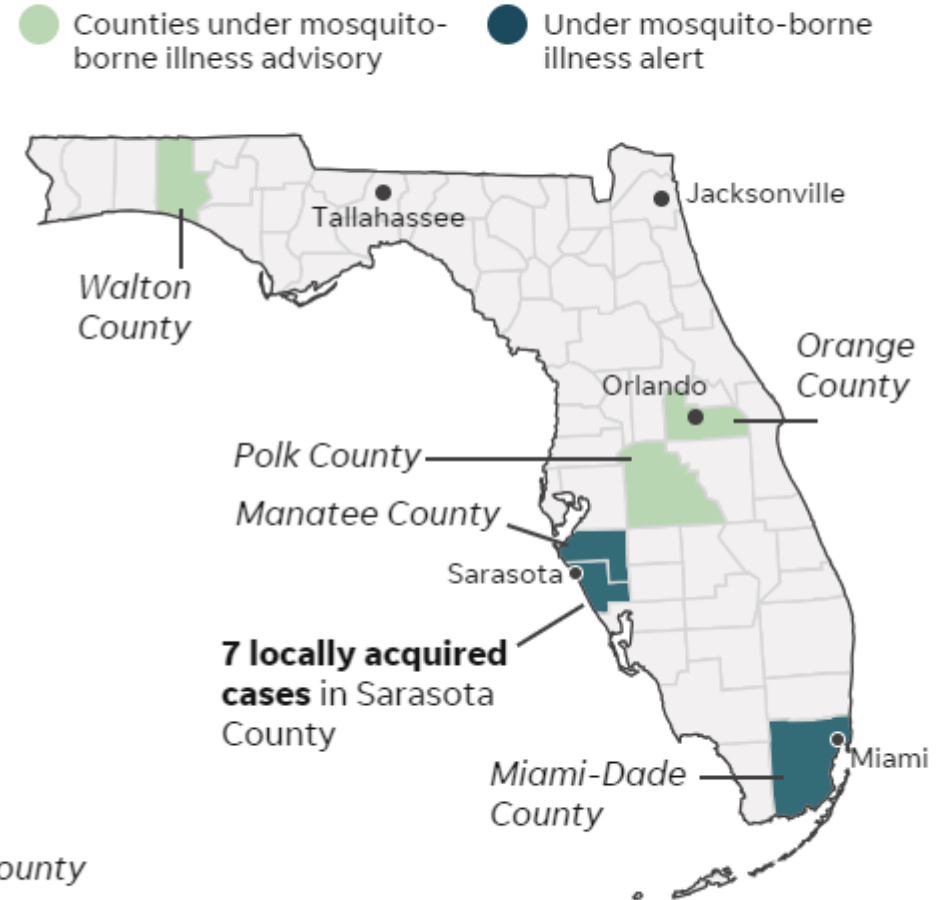
| Pathogen           | Ideal collection time                                                                             | Repeat testing?                                                                                              |
|--------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Malaria            | Immediately upon suspicion. Ideally midway between chills                                         | CLSI: Collected every 6 to 8 hours for 3 days.<br>CDC: 12 to 24 hours for a total of 3 evaluations           |
| Babesia            | Any time of day                                                                                   | CLSI: Collected every 6 to 8 hours for 3 days.<br>CDC: 12 to 24 hours for a total of 3 evaluations           |
| Trypanosoma cruzi  | Circulate during acute phase (1 <sup>st</sup> month of infection) and other febrile periods       | Buffy coat concentration recommended for increased sensitivity                                               |
| Trypanosoma brucei | Present during the acute phase.                                                                   | Buffy coat concentration recommended for increased sensitivity                                               |
| Microfilariae      | Nocturnal (midnight):<br>- Wuchereria bancrofti<br>- Brugia malayi<br>Diurnal (noon)<br>- Loa Loa | Concentration methods such as Knott's, citrate-saponin-acid, and the membrane filter method are recommended. |

## Malaria cases in Texas and Florida

Each year, Texas experiences about 120 cases of malaria brought on by travel. In 1994, Texas reported its last locally acquired case.

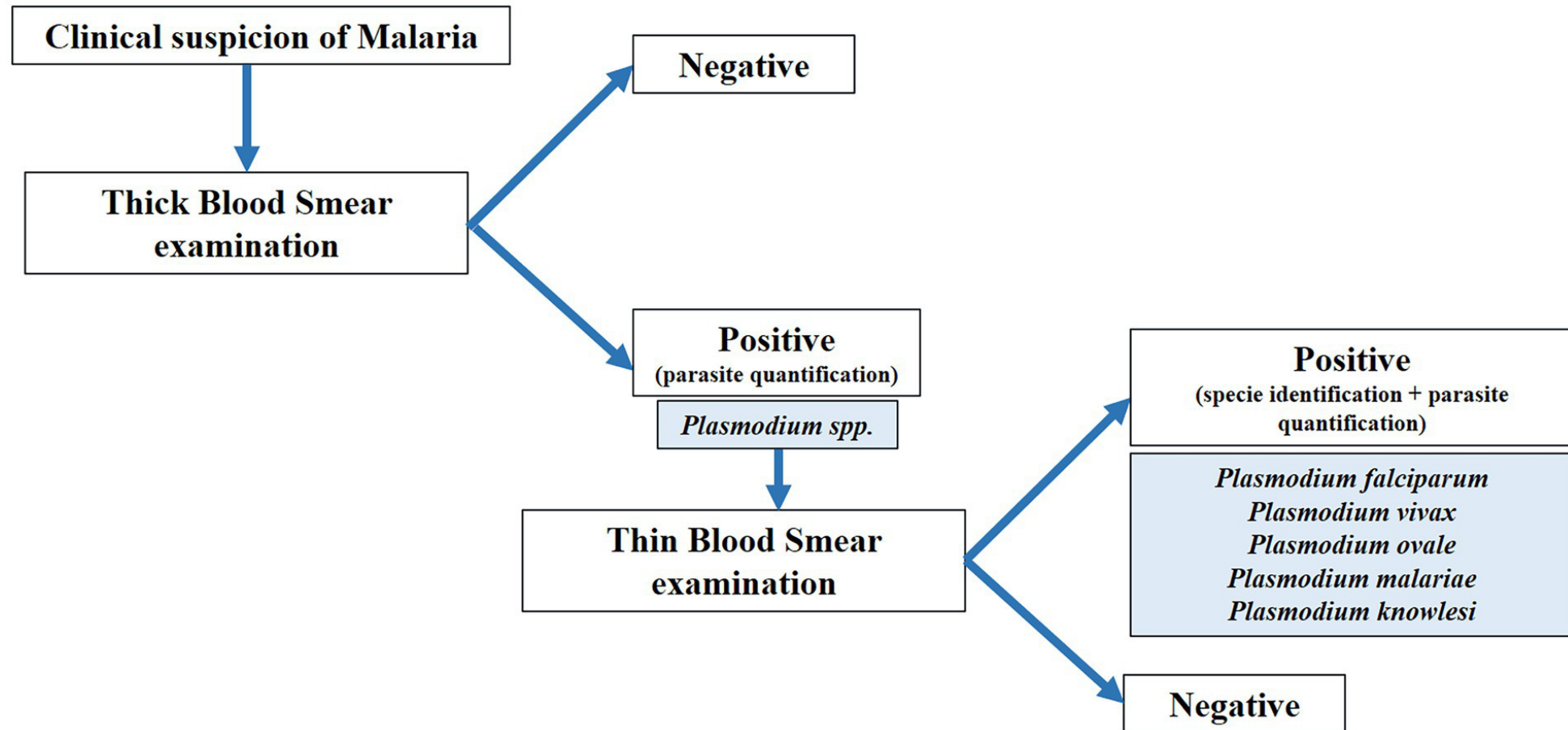


The number of locally acquired malaria infections in Florida this year has risen to seven as of July 18.



SOURCE [Florida Department of Health](#) from July 2-8, GRAPHIC Janet Loehrke/USA TODAY

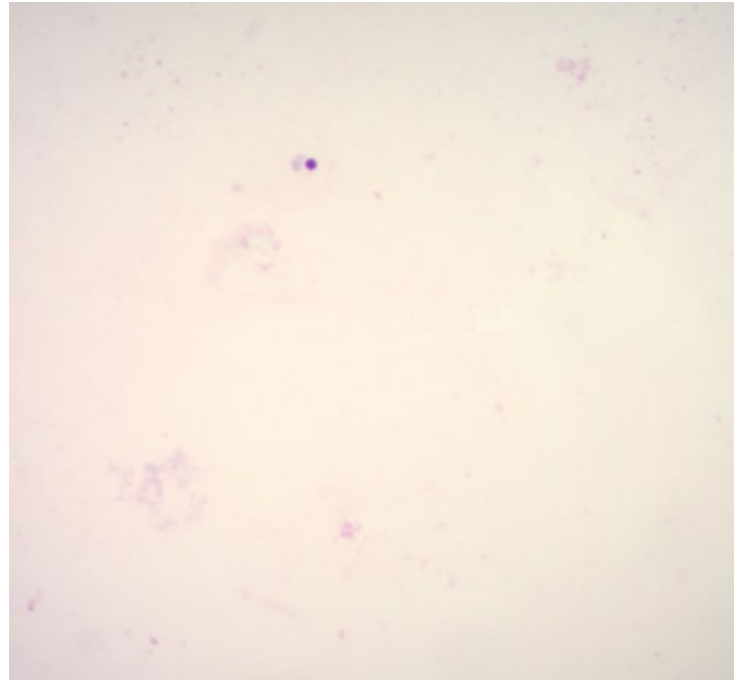
# Microscopy: gold standard



# Not really a case

Patient lived in Africa for over a year – travelled across the continent but was based in Sierra Leone. Treated for malaria a month ago, but did not complete treatment as she lost her medication while travelling back to the United States. She has been back to the US for 10 days and is presenting with Malaria like symptoms – fevers, chills and presents to the ED. Blood parasite smears are sent to the microbiology lab.

- Thick smear: 1 ring
- Thin Smear: Negative





# Case 3

Donor lung accepted from a patient residing in Central America who tested positive for Chagas by 1 out of 2 serology testing.

Donor was originally from Mexico.

Lived in various locations within US

| <u>Test</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <u>Interpretation</u>             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| T. cruzi AB EIA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Reactive                          |
| <u>Test</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <u>Result</u>                     |
| T. cruzi AB IB (TESA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Negative                          |
| <u>Test</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <u>Result</u>                     |
| T. cruzi Interpretation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Possible infection with T. cruzi* |
| <b>Comments and Disclaimers</b><br>* The test results indicate <b>Possible infection with T. cruzi</b> . Please submit a second specimen at least 2-4 weeks after the first collection date.<br>Diagnosis of chronic Chagas disease is established after concordant positive results are obtained with at least two different types of T. cruzi serologic assays. Clinical consultation is available at CDC (phone: 404-718-4745; parasites@cdc.gov) for interpretation of these serologic results and other diagnostic indicators, in the context of additional information. |                                   |
| <b>T. cruzi AB EIA Test Comments:</b> This test detects antibodies against T. cruzi recombinant antigens.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |
| <b>T. cruzi AB IB (TESA) Test Comments:</b> This test is an immunoblot assay which detects antibody reactivity to the 150-160kDa transialidase antigens of T. cruzi.                                                                                                                                                                                                                                                                                                                                                                                                          |                                   |
| The performance characteristics of the T. cruzi AB IB (TESA) and T. cruzi AB IFA tests were determined by validations performed at the Division of Parasitic Diseases and Malaria (DPDM) at the Centers for Disease Control and Prevention. They have not been cleared or approved by the U.S. Food and Drug Administration.                                                                                                                                                                                                                                                  |                                   |

# Chronic Chagas

- Molecular testing can be utilized in cases when serology is inconclusive in chronic infections. Multiple variables can impact sensitivity and specificity of the assay.
- PCR sensitivity is considerably lower (63%-74%) during the chronic phase
- Positive PCR can confirm diagnosis and identify treatment failures if *T. cruzi* DNA is continuously detected; however the absence of DNA does not indicate absence of disease or cure.

| ASSAY (MANUFACTURER)                                                 | METHOD       | ANTIGEN                                                                                                                                                        | REGULATORY STATUS                                                    |
|----------------------------------------------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| <b>Immunofluorescence assay (CDC)</b>                                | IFA          | Whole trypomastigote lysate antigens (unknown strain)                                                                                                          | Not FDA approved (conducted by CDC as LDT)                           |
| <b>TESA-blot (CDC)</b>                                               | Western blot | Trypomastigote excreted antigens SAPA and transialidase, among others. Published studies use <i>T. cruzi</i> Y (TcII), but unknown what strain is used by CDC. | Not FDA approved (conducted by CDC as LDT)                           |
| <b>Chagatest ELISA recombinant V3.0 (Wiener)</b>                     | ELISA        | Recombinant trypomastigote SAPA and epimastigote antigens (Ag1, Ag2, Ag13, Ag30, Ag36)                                                                         | FDA approved in 2004 for diagnostic testing                          |
| <b>Ortho T. Cruzi ELISA Test System (Ortho-Clinical Diagnostics)</b> | ELISA        | Whole cell lysate antigens ( <i>T. cruzi</i> Tulahuen strain, TcVI)                                                                                            | FDA approved in 2009 for both diagnostic testing and donor screening |
| <b>Hemagen Chagas Kit (Hemagen Diagnostics)</b>                      | EIA          | Epimastigote lysate antigen (unknown strain)                                                                                                                   | FDA approved in 1995 for diagnostic testing                          |
| <b>Abbott PRISM (Abbott)</b>                                         | ChLIA        | Recombinant antigens (FP3, FP6, FP10, TcF)                                                                                                                     | FDA approved in 2011 for donor screening only                        |
| <b>Abbott ESA Chagas (Abbott)</b>                                    | Lateral Flow | Recombinant antigens (FP3, FP6, FP10, TcF)                                                                                                                     | FDA approved in 2011 for donor confirmation only                     |
| <b>Chagas Detect Plus Rapid Test (InBios)</b>                        | Lateral Flow | Recombinant multiepitope fusion antigen ITC 8.2 (comprised of TcF, SAPA, Pep30, Pep36, KMP11, KMP11, Pep1)                                                     | FDA approved in 2016 for diagnostic testing                          |

# Case 3

Donor lung accepted from a patient residing in Central America who tested positive for Chagas by 1 out of 2 serology testing.

Donor was originally from Mexico.

Lived in various locations within US

Positive

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| <u>Test</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <u>Interpretation</u>             |
| T. cruzi AB EIA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Reactive                          |
| <u>Test</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <u>Result</u>                     |
| T. cruzi AB IB (TESA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Negative                          |
| <u>Test</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <u>Result</u>                     |
| T. cruzi Interpretation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Possible infection with T. cruzi* |
| <b>Comments and Disclaimers</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                   |
| * The test results indicate <b>Possible infection with T. cruzi</b> . Please submit a second specimen at least 2-4 weeks after the first collection date. Diagnosis of chronic Chagas disease is established after concordant positive results are obtained with at least two different types of T. cruzi serologic assays. Clinical consultation is available at CDC (phone: 404-718-4745; parasites@cdc.gov) for interpretation of these serologic results and other diagnostic indicators, in the context of additional information. |                                   |
| <b>T. cruzi AB EIA Test Comments:</b> This test detects antibodies against T. cruzi recombinant antigens.                                                                                                                                                                                                                                                                                                                                                                                                                               |                                   |
| <b>T. cruzi AB IB (TESA) Test Comments:</b> This test is an immunoblot assay which detects antibody reactivity to the 150-160kDa transialidase antigens of T. cruzi.                                                                                                                                                                                                                                                                                                                                                                    |                                   |
| The performance characteristics of the T. cruzi AB IB (TESA) and T. cruzi AB IFA tests were determined by validations performed at the Division of Parasitic Diseases and Malaria (DPDM) at the Centers for Disease Control and Prevention. They have not been cleared or approved by the U.S. Food and Drug Administration.                                                                                                                                                                                                            |                                   |

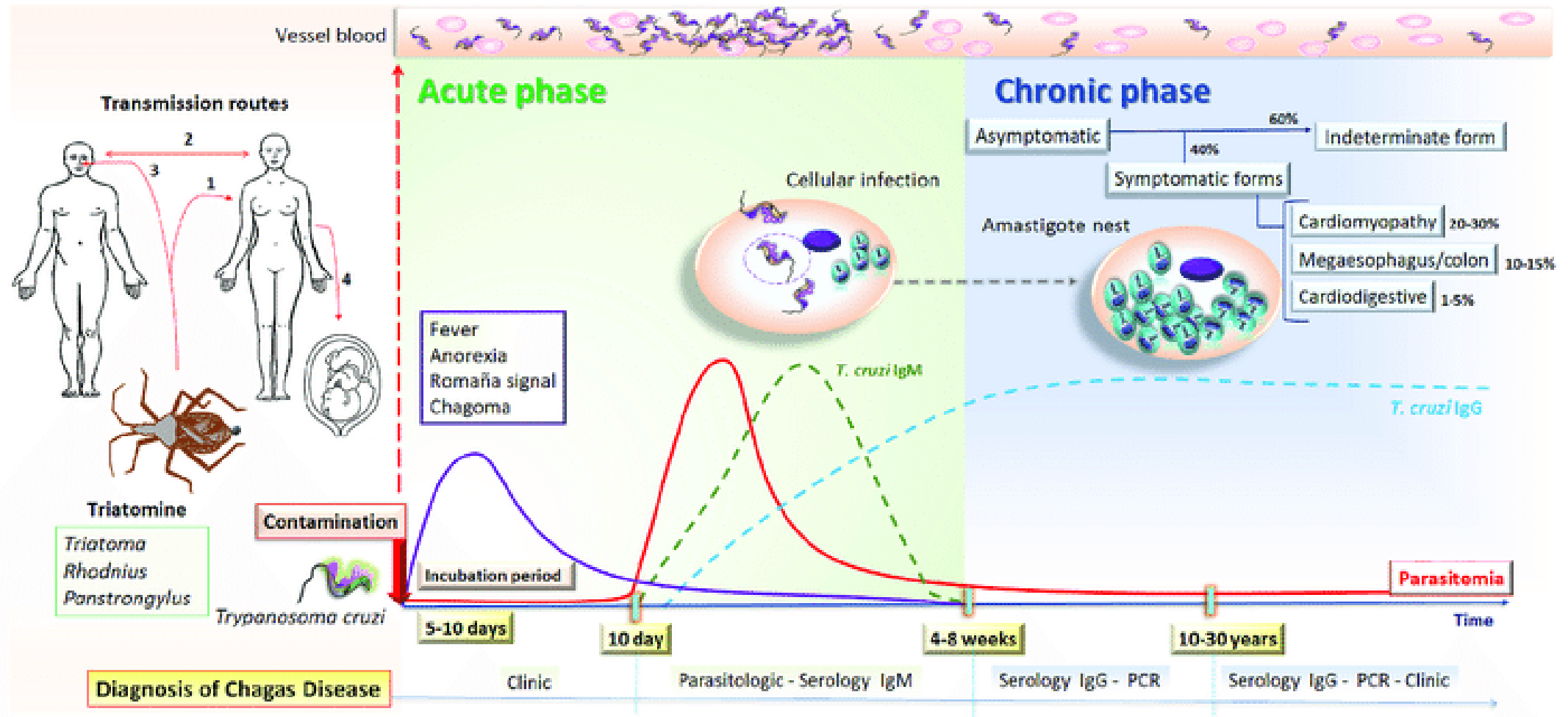
## Case 3

### Recipient Monitoring:

- First 2 months – Weekly monitoring
- 3<sup>rd</sup> month – Every fortnight
- 3 - 6/12 months – Monthly

# Trypanosoma cruzi:

## Natural course of infection and diagnosis



# Case 3

## Recipient Monitoring:

- First 2 months – Weekly monitoring
  - ❑ PCR
  - ❑ Blood parasite microscopy
- 3<sup>rd</sup> month – Every fortnight
- 3 - 6/12 months – Monthly

| Time post-transplant | Test Results |
|----------------------|--------------|
| 1 <sup>st</sup> week | Negative     |
| 2 <sup>nd</sup> week | Negative     |
| 3 <sup>rd</sup> week | Equivocal    |
| 4 <sup>th</sup> week | Equivocal    |

< 2006 – 1 target. Targets the kinetoplast (minicircle DNA). Positive from a single specimen considered positive

2006 – 2008 – 2 target. Addition of TCZ minisatellite target. If minicircle positive, cloned and sequenced for confirmation

2008 on – 3 target. Addition of small subunit ribosomal RNA gene. Positive PCR on 2 targets on 2 consecutive specimens



