Laboratory Response Network Newsletter

Summer 2023

Images of Biodefense Laboratory by M. Wren, NYSDOH

Lab Highlight: Biodefense

The Biodefense Laboratory was established after the 2001 anthrax attacks in which letters containing anthrax spores were sent through the mail, infecting 22 individuals and killing five (CDC link). In the first three years following the attacks, the Biodefense Laboratory ruled out *B. anthracis* and other biothreat agents in approximately 70 suspicious white powder incidents each year. After increasing training for First Responders, submissions of non-credible samples have decreased drastically and we now average fewer than 15 white powder incidents each year.

But our work as a Reference Lab in the Centers for Disease Control and Prevention's (CDC) Laboratory Response Network (LRN) is not limited to white powder incidents. Our laboratory supports the nation's ability to detect and respond to all types of health threats - not just potential bioterrorism agents such as *Bacillus anthracis*, smallpox, and ricin, but also emerging infectious diseases such as Ebola and mpox.

The Biodefense Laboratory is responsible for confirmation of Federal Select Agent Program designated Tier 1 Select agents and toxins in clinical specimens; suspicious powders sent through the mail for biothreats such as *B. anthracis*

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Updates

- Lab highlight: Biodefense
- Current outbreaks: Marburg Virus
- New testing: Chagas Disease

In Case You Missed It

- Q&A: Re-classification of *Ochrobactrum spp.*

Stay in Touch

We want to hear from you!

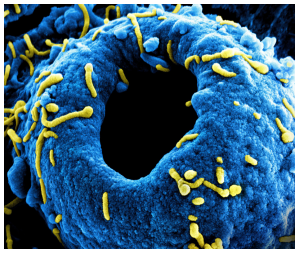
- Let us know where trainings and refreshers are wanted or needed.
- Contact us: btrlab@health.ny.gov

Please distribute this newsletter to all microbiology laboratory staff.

- To ensure you receive this newsletter, use this link to subscribe: https://www.surveymonkey.com/r/P5WS5BQ

NEW YORK STATE | Department of Health | Wadsworth Center

Current Outbreaks:



Colorized scanning electron micrograph of Marburg virus particles (yellow) both budding and attached to the surface of an infected VERO E6 cell (blue). Image captured at the NIAID Integrated Research Facility in Fort Detrick, Maryland.

Image Credit: NIAID

Marburg Virus Disease

Background

Marburg virus, a member of the Filoviridae family and closely related to the Ebolaviruses, can cause severe hemorrhagic fever in humans and non-human primates. First discovered in 1967, the natural reservoir host of Marburg virus is the Egyptian rousette bat (fruit bat), which can be found in caves throughout Africa. Sporadic outbreaks of Marburg virus disease (MVD) have occurred over the years, often starting among miners working in bat-infested mines and then spreading within their families and healthcare workers caring for ill individuals. There are no approved vaccines or specific antiviral treatments approved for MVD and the case fatality rate can be as high as 88%. Treatment is supportive and can improve survival.

Recently, there were declarations of two unrelated MVD outbreaks in Equatorial Guinea and the United Republic of Tanzania.

Equatorial Guinea

Equatorial Guinea's Ministry of Health declared their first-ever outbreak of Marburg virus disease in February of 2023 after identifying a positive specimen among nine suspicious deaths in Kie Ntem Province. As of May 2023, 17 lab-confirmed cases have been reported. Twelve of the confirmed cases have died, four recovered, and the outcome for one is unknown. Equatorial Guinea has also identified 23 probable cases, all of whom have died. Cases have been identified in multiple provinces with Litoral having the highest number. The last confirmed case was reported April 20.

United Republic of Tanzania

The United Republic of Tanzania declared an outbreak of MVD, also their first-ever, on March 21, 2023. Eight laboratory-confirmed and one probable case, with six deaths, were reported by the end of April. All cases have been in the Kagera region, and the last case was identified on April 11th.

New York Response

The New York State Department of Health and the New York City Department of Health and Mental Hygiene distributed a joint health advisory to partners including clinical laboratories on April 6th which can be found on the Health Commerce System. The advisory contains recommendations for clinicians, laboratorians, and healthcare facilities should a suspected case of MVD present in New York. The risk of travel-associated MVD in the United States is very low and symptomatic patients with associated travel to these countries should be tested for other more likely conditions. If MVD testing is warranted after consultation with the health department, specimens can be sent to the Biodefense Laboratory for analysis. The BioFire FilmArray NGDS Warrior Panel is used for MVD and Ebolavirus testing. Fortunately, both outbreaks have been declared over, but the capability exists in the public health lab if this testing if ever needed. If you have any questions, concerns, or would like to know more information about MVD, please email btrlab@health.ny.gov.

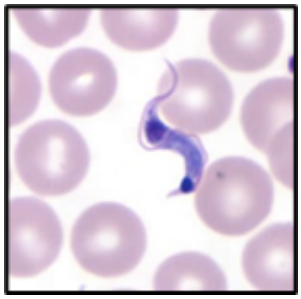
New Testing:

Chagas Disease

Chagas disease, also known as American trypanosomiasis, is caused by the parasite *Trypanosoma cruzi* which can be transmitted through the bite of an infected insect. *T. cruzi* is most commonly found in rural Latin America; cases of Chagas disease identified in New York have typically been acquired while the individual was living in an endemic area. While the swelling of a child's eyelid, called Romaña's sign, is a clear indicator of acute Chagas disease, many people do not realize they are infected with *T. cruzi* as symptoms of acute infection can be non-specific (fever, fatigue, body aches, etc.) or not occur at all. If the infection is not identified and treated with anti-parasitic medication, most individuals will resolve any acute symptoms on their own but remain chronically infected. Infected immunocompromised individuals are at risk of reactivation of the parasites with potentially severe outcomes. Among all untreated infections, an estimated 20-30% eventually develop complications (most often cardiomyopathy) which can ultimately lead to severe illness and death. Appropriate diagnosis and effective treatment are clearly important in managing Chagas disease.

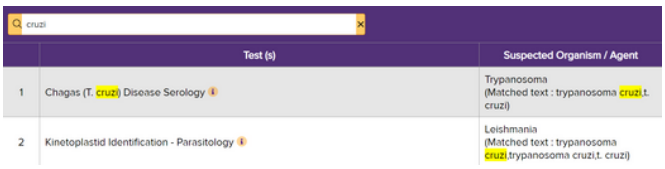
Did you know?

Beyond vector-borne transmission, *T. cruzi* can be acquired via blood transfusion or organ transplantation, transplacentally, and in laboratory accidents.



Credit: CDC DPDX Image Gallery

In previous years, the Centers for Disease Control and Prevention (CDC) controlled the approval for and distribution of medication for the treatment for Chagas disease in the United States. There was no need for state laboratories to test specimens as they were required to be re-tested at CDC. As FDA-approved medications are now available through commercial pharmacies, confirmatory serologic testing for Chagas disease is now being offered at Wadsworth Center to reduce time to results and ultimately improve earlier access to treatment. The Diagnostic Immunology Laboratory offers Chagas disease antibody testing of serum specimens with a positive result from a clinical laboratory or by prior consultation for confirmation of infection. Molecular detection (real-time PCR) in blood specimens for monitoring of transplant patients, acute or reactivated infections is available in the Parasitology Laboratory and does not require prior approval. Placing orders electronically via the Wadsworth Center Laboratory Information Management System (CLIMS) is preferred. Learn more about CLIMS at www.wadsworth.org/clims.



If you have additional questions or would like to learn more about Chagas disease, please email outreachsupport@health.ny.gov.

Q&A with Newsletter Readers!

Question:

Recently I heard there has been a name change of *Ochrobactrum spp.* to *Brucella spp.* Do we consider organisms that were formerly called *Ochrobactrum spp.* a select agent? If we identify *Brucella anthropi* on the MALDI, should we be concerned about a *Brucella* exposure?

Did you know?

In addition to answering your questions, we offer trainings and assistance with biothreat rule-out/refer procedures and biosafety.

Answer:

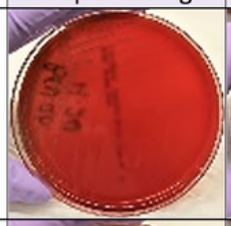
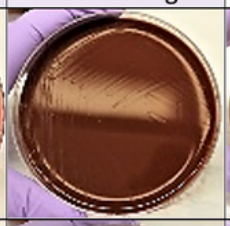
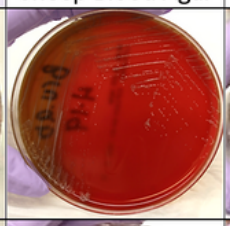
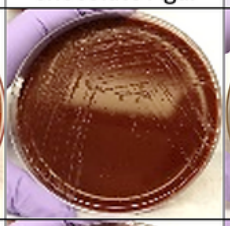
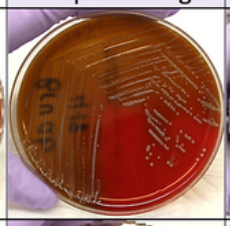
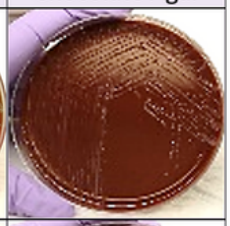
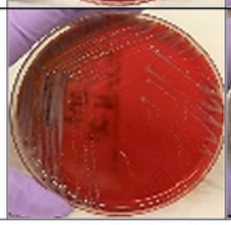
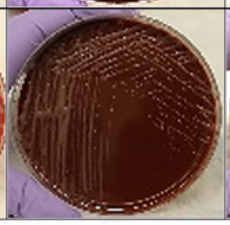
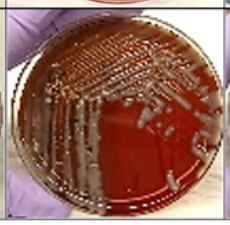
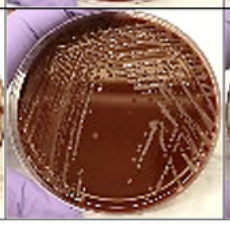
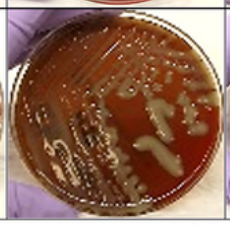
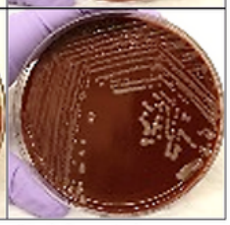
This is a great question! Yes, organisms that used to fall under *Ochrobactrum spp.* have now been reclassified as *Brucella spp.* based on their genetic similarities; however, these newly reclassified organisms have differences in reservoirs, ability to cause disease, and treatment recommendations. The reclassification of *Ochrobactrum spp.* into the *Brucella* genus does have implications for laboratory management as three classic *Brucella* species are designated as select agents (*B. abortus*, *B. melitensis*, and *B. suis*).

Reclassified *Brucella spp.* (i.e., *Brucella anthropi*, *Brucella intermedia*, and others) are environmental opportunistic pathogens that have been known to cause catheter-associated infections in healthcare settings. As seen in the table and images below, the growth rate, colony morphology, and biochemical testing profile of these reclassified organisms differ from classic *Brucella spp.* as do the recommended treatment regimens (plus likelihood of antibiotic resistance).

	Classic *Brucella spp.*	Reclassified *Brucella spp.*
Reservoir	Animals	Environmental
Disease – Clinical Significance	Brucellosis – Infections with high morbidity	Opportunistic infections – often found as colonizers in clinical specimens
Colony Growth	Slow grower, 48-72 hrs	>0.5 mm, 24 hrs
Gram Stain	Pinpoint Gram-negative coccobacilli (0.4x0.8 µm, approximately the diameter of staphylococci and smaller)	Gram-negative coccobacilli to rods (1.0-1.5x2.0 µm, approximately the length of *Escherichia coli*)
Morphology on Blood* and Chocolate Agars	Non-hemolytic, smooth, white or translucent, small colonies at 48 hrs	Non-hemolytic, smooth, shiny, creamy mucoid colonies, tend to be large
Morphology on MacConkey Agar	No growth	Non-lactose fermenting colonies, >0.5 mm
Motility	Negative	Positive/Variable
Catalase	Positive	Positive
Oxidase	Positive	Positive
Urease	Positive	Positive/Variable
Resistance	Rare	Yes
Treatment Regimen	Combination Therapy: Doxycycline and rifampin for at least 6-8 weeks	Imipenem, fluoroquinolones, trimethoprim-sulfamethoxazole or aminoglycosides

Q&A Continued:

Classic *Brucella spp*. vs Reclassified *Brucella spp*. on Sheep Blood Agar* and Chocolate Agar

	@ 24 hours		@ 48 hours		@ 72 hours	
	Sheep Blood Agar	Chocolate Agar	Sheep Blood Agar	Chocolate Agar	Sheep Blood Agar	Chocolate Agar
Brucella abortus						
Brucella (Ochrobactrum) anthropi						

*Blood agar: Tryptic soy agar with 5% sheep's blood

Images courtesy of the Biodefense Laboratory

Many rapid microbial identification systems (MALDI-TOF, nucleic acid detection, etc.) used in clinical laboratories have already updated their library to reflect the new classification. If you receive a rapid ID of *Brucella (Ochrobactrum) anthropi* or *Brucella (Ochrobactrum) intermedia*, consider including additional comments on the laboratory results report that clearly communicate to clinicians the distinction between classic *Brucella spp.* and *Brucella (Ochrobactrum) spp.* and their recommended treatment regimens. The American Society for Microbiology has additional information: *Brucella* and *Ochrobactrum* Taxonomic Updates for Laboratories

In the clinical laboratory, after ruling out select agent *Brucella* species with the ASM rule-out testing algorithm, isolates can be handled using standard BSL-2 clinical laboratory precautions. The infection control concerns differ from classic *Brucella spp.* as well: potential laboratory exposures to reclassified *Brucella spp.* do not require post-exposure management.

If your laboratory identified reclassified *Brucella spp.*, isolates can be safely worked up in the laboratory. If you are unable to differentiate classic from reclassified *Brucella spp.* using microbiological methods, the isolate must be referred to Wadsworth Center for rule-out testing.

Did you know?

Infections with classic *Brucella* spp. can be naturally acquired through exposures to infected animals or animal products.

Only three species have been designated as select agents because they have the potential to become aerosolized and used as an agent of bioterrorism: *B. abortus*, *B. melitensis*, and *B. suis*.

Per CDC, brucellosis is the most commonly reported laboratory-associated bacterial infection. Learn more here.

Wrap-up:

Continued from page 1: Biodefense Laboratory

and ricin toxin; testing of food using methods developed at Wadsworth Center as part of the Food Emergency Response Network; detection of mpox and other *Orthopoxviruses*; and analysis of suspect cases of botulism in humans, food, and animals. Our most commonly used testing methodology is PCR-based; however, we also utilize an endopeptidase-based matrix-assisted laser desorption/ionization time-of-flight mass spectrometry assay (MALDI-TOF MS) for detection of botulinum neurotoxins and *Bacillus spp*. identification. The laboratory also performs next generation sequencing and whole genome sequencing for surveillance and characterization of biothreat pathogens.

Learn more about the national Laboratory Response Network:
https://emergency.cdc.gov/lrn/index.asp

In addition to our clinical testing responsibilities, we are involved in assay development, validation studies, and various research projects. No two days are exactly the same in the Biodefense Laboratory and our scientists must be adaptable and willing to work with many different types of testing platforms and novel technologies; however, every day is a fantastic opportunity to experience something new! After hearing a little more about us, if you have any questions or would like to hear more about certain topics or would like us to visit your laboratory to provide assistance on biothreat rule-out procedures or biosafety, please reach out to btrlab@health.ny.gov.

Coming this fall: The New York State Department of Health (NYSDOH) is improving data security by implementing Multi-Factor Authentication (MFA) functionality for the Wadsworth Center Laboratory Information Management System (CLIMS) application in the Health Commerce System (HCS). Keep an eye out for more information!

Additional References and Resources:

Marburg
https://www.who.int/emergencies/disease-outbreak-news/item/2023-DON467
https://www.cdc.gov/vhf/marburg/index.html
Wadsworth Center Biodefense Laboratory

Chagas
https://www.cdc.gov/parasites/chagas/
Wadsworth Center Diagnostic Immunology Laboratory
Wadsworth Center Parasitology Laboratory

Brucella
https://www.cdc.gov/locs/calls/documents/01_23_2023_slides_508.pdf
https://www.cdc.gov/locs/calls/documents/transcript_01_23_2023.pdf
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