

Heartland and Bourbon Virus Testing Update

July 20, 2018

Background

Heartland virus was first discovered as a cause of human illness in 2009 in Missouri. More than 35 cases of Heartland virus disease have been reported from states in the Midwestern and southern United States to date. Most people with the disease became sick during May through September.

Bourbon virus was recently discovered in Bourbon County, Kansas. Only a few cases of Bourbon virus disease have been identified in the U.S., and the geographic distribution appears to be similar to that of Heartland virus. Although it is not yet known how people become infected with Bourbon virus, most patients reported exposure to ticks before becoming ill and the virus has been identified in Lone Star ticks.

Since the discovery of these viruses, Kansas has identified one Heartland virus case and one Bourbon virus case.

Symptoms for both diseases have included fever, fatigue, anorexia, nausea, and diarrhea. Patients with Bourbon virus disease might also present with a diffuse, maculopapular rash. Both viruses have been found to cause leukopenia, thrombocytopenia, and elevated liver transaminases.

Update on status of Heartland and Bourbon virus testing

For several years, CDC has been working with state health departments under IRB-approved protocols to identify additional cases of Heartland and Bourbon virus disease and validate diagnostic tests for these viruses. Enrollment into these protocols has been concluded and CDC Arboviral Diseases Branch will now offer routine diagnostic testing for Heartland and Bourbon viruses.

Testing Criteria

Testing for Heartland or Bourbon virus should be considered for patients with an acute febrile illness within the past three months AND at least one epidemiologic criterion AND at least one clinical criterion.

Epidemiologic criteria

- 1) Known tick bite, finding a tick on body, or potential exposure to ticks through outdoor activities in the three weeks prior to illness onset during spring through fall (e.g., April-October); OR
- 2) Resides in or recently traveled to an area with previous evidence of Heartland or Bourbon virus (primarily eastern/central Kansas or Missouri)

Clinical criteria

- 1) Leukopenia (white blood cells <4,500 cells/ μ L) or thrombocytopenia (platelets <150,000 cells/mL) not explained by another known condition; OR
- 2) Suspected tickborne disease (e.g., ehrlichiosis, Rocky Mountain spotted fever) with no clinical response to appropriate treatment (e.g., doxycycline)

Samples collected >3 months after symptom onset will not be tested at this time based on limitations of current understanding of antibody response.

Testing for evidence of Heartland and Bourbon virus disease

As of July 2018, the following tests for Heartland and Bourbon virus are available at CDC:

Test	Heartland virus	Bourbon virus
RT-PCR	Yes	Yes
IgM MIA	Yes	Not available
IgG MIA	Yes	Not available
PRNT	Yes	Yes

Abbreviations: IgM – immunoglobulin M; IgG – immunoglobulin G; MIA – microsphere-based immunoassay; RT-PCR – reverse transcriptase-polymerase chain reaction; PRNT – plaque reduction neutralization test

For specimens collected <7 days after onset of symptoms, serum and/or whole blood should be submitted for Heartland and Bourbon virus RT-PCR and antibody testing.

For specimens collected \geq 7 days after onset of symptoms, serum specimens should be submitted for antibody testing. If the patient is immunocompromised, RT-PCR also may be performed on serum collected >7 days after onset.

Because there is no specific IgM antibody test yet available for Bourbon virus, acute and convalescent samples will be needed to make the diagnosis of an acute Bourbon virus infection using serologic assays.

Submitting specimens to CDC for testing

To submit samples for Heartland and Bourbon virus testing at the CDC Arboviral Disease Branch, please contact the KDHE Epidemiology Hotline at 877-427-7317 for approval.

Additional information

CDC Bourbon virus website: <http://www.cdc.gov/ncezid/dvbd/bourbon/index.html>

CDC Heartland virus website: <http://www.cdc.gov/heartland-virus/index.html>