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Editor's Note: Tick photos are available. When embargo lifts, URL for study:
<http://www.ajtmh.org/content/early/2013/07/18/ajtmh.13-0209.full.pdf+html>

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Scientists Prove Ticks Harbor Heartland Virus, A Recently Discovered Disease in the United States

Three Years After Mysterious Virus Infected Two Missouri Men, Causing Severe Illness, Scientists Report Isolating Pathogen in Nearby Tick Population

DEERFIELD, IL. (JULY 22, 2013)— Scientists have for the first time traced a novel virus that infected two men from northwestern Missouri in 2009 to populations of ticks in the region, providing confirmation that lone star ticks are carrying the recently discovered virus and humans in the area are likely at risk of infection. The findings were published online today in the [American Journal of Tropical Medicine and Hygiene](#).

Dubbed Heartland virus or HRTV, the infection causes fever, headaches, and low white blood cell and platelet counts. The two men infected in 2009, who live about 70 miles apart, were sufficiently ill to require hospitalization. They eventually recovered, and no other cases have been reported. Disease experts anticipate, however, that more people could become infected. The Missouri Department of Health and Senior Services is working with the US Centers for Disease Control and Prevention (CDC) to identify additional cases and determine the role of this novel virus as a human pathogen.

“Ten samples of ticks tested positive for the Heartland virus, nine of which were collected from the property of one of the patients and one that came from conservation lands nearby,” said Harry M. Savage, PhD, a research entomologist at CDC in Fort Collins, Colorado and the lead author of the paper. “It’s pretty strong evidence that the virus is persisting from season to season in tick populations and that these ticks play an important role in disease transmission.”

There is no treatment available for HRTV. Unlike other tick-borne diseases like Lyme, ehrlichiosis and Rocky Mountain spotted fever, HRTV is a virus and thus does not respond to antibiotics.

Disease Hunting

HRTV was discovered when a doctor at the hospital treating the two infected men, who had reported being bitten by ticks, sent blood samples to a CDC laboratory in Atlanta for testing. All involved assumed the tests would reveal ehrlichiosis, the tick-borne disease that is most common in the area. Instead, the tests revealed a virus that had never been recognized. Subsequent analysis showed that HRTV belongs to a group of viruses known as phleboviruses, which can be carried by sandflies, mosquitoes or ticks. Savage said there is a separate team of researchers conducting tests with animals in the area in an effort to identify the “reservoir hosts” that are carrying the virus and passing it along to ticks.

Since the HRTV discovery, which was reported in August 2012 in the *New England Journal of Medicine*, scientists have been combing the area for the source of the infection. Savage and his team, which included investigators from Missouri Western State University, collected 56,428 ticks from April to August of 2012. They employed a variety of collection methods. Flannel pads used in infant bedding were mounted to bamboo poles to act as a sort of fly-paper for ticks. Plastic food containers were “baited” with dry ice, which emits carbon dioxide—a natural attractant for the ticks. Researchers even removed ticks from horses and dogs.

“Finding a virus in ticks requires the collection and testing of large numbers of ticks,” Savage said. The virus infection rate in nymph stage ticks from one farm owned by a patient was about one in five hundred over the study period. Humans are likely to become infected when they are bitten by a tick carrying the virus. Savage said one of the HRTV patients recounted pulling dozens of ticks off his body each night before bed.

According to Savage, the ticks that carry the virus—known as lone star ticks for the single white spot found on females—are common in the area and in many other parts of the country as well. Currently, there are no reports of HRTV in any other tick populations aside from those isolated in northwestern Missouri. He said it’s hard to predict where the virus might be located in the US and if the virus will spread.

HRTV appears to be related to another new disease recently discovered in China, a life-threatening virus called severe fever with thrombocytopenia (SFTSV). SFTSV also appears to be tick-borne, though there is evidence of person-to-person transmission as well.

“This research illustrates the ever-changing world we live in and why we must sustain our nation’s investment in research into these types of diseases that the majority of Americans will never hear of,” said David H. Walker, MD, president of the American Society of Tropical Medicine and Hygiene, whose research has included a focus on tick-borne diseases. “It is only by getting trained experts into the field and doing the necessary work of collecting and testing thousands of specimens, as these scientists did, that we can be one step ahead of what could become another serious health threat carried by ticks.”

To prevent Heartland virus and other diseases spread by ticks, CDC recommends taking the following steps:

- Wear repellent
- Check for ticks daily
- Shower soon after being outdoors
- Call your doctor if you get a fever or rash

For more information on tick-borne diseases, visit <http://www.cdc.gov/ticks>.

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