

Lyme's Disease in Nebraska

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The Nebraska Department of Health and Human Services (NDHHS) was notified of two potential cases of Lyme disease from a local public health jurisdiction. An epidemiological investigation determined that the first case met the CDC confirmed case definition for Lyme disease. A further investigation revealed no known tick attachment or out-of-state travel; however, residence near a wooded area and exposure to that wooded area was confirmed.

The second case was a non-Nebraska resident who worked in a wooded area near the residence of the first case and reported several known tick bites. The patient was diagnosed with Lyme disease by a healthcare provider which also met the CDC's probable case definition. Due to the spatial-temporal association between both cases, epidemiologists began an environmental investigation (i.e. tick survey) at the suspected exposure sites. While previous environmental investigations of suspected locally acquired Lyme disease failed to identify the tick vector, *Ixodes scapularis* (commonly called deer tick or black-legged tick), the current investigation successfully identified *Ix. scapularis* at both sites of reported exposure. In total, 14 *Ix. scapularis* (8 female and 6 male) were collected from the sites of likely exposure which meets CDC criteria for defining an established population.

These Lyme disease cases, in absence of travel history in combination with presence of the tick vector, marks the first reported evidence of this disease likely acquired in Nebraska. A subset of the ticks collected (n= 10) has been sent to the CDC's Division of Vector-Borne Disease for pathogen testing to detect the bacteria (*Borrelia burgdorferi sensu stricto*) responsible for causing Lyme disease. Results of this testing are pending and if any of these samples come back positive, this will mark the first detection of *B. burgdorferi* circulating in Nebraska tick populations.

The detection of an established population of *Ix. scapularis* in Nebraska, directly connected to a cluster of Lyme disease cases acquired locally, increases the likelihood of further establishment of the tick vector and associated pathogens in other areas of the state. This raises the potential risk of residents acquiring Lyme disease and other diseases vectored by this tick locally within the state. Detection further demonstrates the need for tick surveillance and pathogen testing of ticks in Nebraska to determine what tick species are present, their distribution within the state, and what pathogens they may contain.

NDHHS applied and received funding through the CDC's Epidemiology and Laboratories Capacity (ELC) grant for tick surveillance and tick pathogen testing to begin in the spring of 2022. The information garnered from this surveillance will be invaluable for to determine risk of acquiring tick-borne diseases in Nebraska. This will also allow for public health officials to target public health education and mitigation approaches regarding tick-borne diseases in the state.



Figure 1 State and local health department personnel collecting *Ixodes scapularis* (black-legged ticks) during a tick survey. Photo courtesy of Halie Smith (Nebraska DHHS).



Figure 2. Four (3 female; 1 male) *Ixodes scapularis* (black-legged ticks) collected from two exposure sites. The male tick is located at the top of the image with the three other ticks female. Photo courtesy of Jeff Hamik (Nebraska DHHS).