

Nebraska Department of Health and Human Services

Health Alert Network

UPDATE

April 21, 2023

Lyme Disease & Nebraska

Lyme disease is transmitted by the tick *Ixodes scapularis* (black-legged tick or deer tick). In 2019, established populations of this tick were identified in Douglas, Sarpy, and Saunders counties. In 2021, as part of an epidemiological investigation into a cluster of Lyme disease cases, an established population was detected for the first time in Thurston County. The ticks collected from Thurston County were tested and positive for *Borrelia burgdorferi*, the bacteria that causes Lyme disease. This was the first time the *B. burgdorferi* has ever been detected in ticks collected in Nebraska. **The local identification of both the vector and pathogen of Lyme disease, in association with documented Lyme disease cases, demonstrates that *B. burgdorferi* can be acquired in eastern Nebraska. However, Nebraska will likely remain a low prevalence state for Lyme disease. At this time, the full extent of local human health risk is unknown.** Tick surveillance efforts are expanding through partnerships with several state agencies and universities.

Lyme disease is highly regional in the United States, with most cases reported from the Northeast and Upper Midwest. In 2022, Nebraska reported 9 (8 confirmed, 1 probable) cases to CDC. Six cases where exposure could be determined had exposure/acquisition in regions of the country where this tick is highly endemic. Two reported cases, after epidemiological investigations, revealed that the infections were likely acquired in eastern Nebraska. Nebraska is in a zone where the tick vector appears to be expanding further, **providers suspecting Lyme disease must be vigilant and obtain thorough patient histories including: any travel 30 days prior to symptom onset, reported tick attachments/bites, reported exposure to tick habitat (e.g., tall grass or wooded areas), etc. Additionally, providers should take great care to order the correct serologic tests in the correct order.**

Testing

Serologic testing for Lyme disease is currently the best method for diagnosis. The standard method **requires a strict two-step process.** The first required test is either an enzyme immunoassay (EIA) or immunofluorescence assay (IFA). If this test is negative and the patient is within 30 days from symptom onset, the provider may treat the patient and follow up with a convalescent serum. If this test is negative and the patient is more than 30 days from symptom onset, the provider should consider an alternative diagnosis. If the first test yields positive or equivocal results, two options are available: 1) if the patient has had symptoms for less than or equal to 30 days, an IgM and IgG Western blot is performed; 2) if the patient has had symptoms for more than 30 days, the IgG Western blot is performed. **The IgM should not be used if the patient has been ill for more than 30 days.** Positive serologic evidence **requires both the EIA (or IFA) and Western blot to be positive.** This testing algorithm optimizes sensitivity and specificity in untreated patients (<https://www.cdc.gov/lyme/healthcare/index.html>).

In 2019, **CDC updated its recommendations** regarding serologic diagnosis of Lyme disease to include a modified standard method in addition to the standard two-tier system, where two different FDA approved EIAs are performed either sequentially or concurrently without the use of immunoblots (<https://www.aphl.org/aboutAPHL/publications/Documents/ID-2021-Lyme-Disease-Serologic-Testing-Reporting.pdf>).

Treatment of Lyme Disease per CDC Guidance (<https://www.cdc.gov/lyme/treatment/index.html>)

Erythema Migrans Rash:

- People treated with appropriate antibiotics in the early stages of Lyme disease usually recover rapidly and completely. Early diagnosis and proper antibiotic treatment of Lyme disease can help prevent late Lyme disease

Table 1. Treatment Regimens for Erythema migrans Rash

Age Category	Drug	Dosage	Maximum	Duration, Days*
Adults	Doxycycline OR	100 mg, twice per day orally	N/A	10-14
	Amoxicillin OR	500 mg, three times per day orally	N/A	14
	Cefuroxime	500 mg, twice per day orally	N/A	14
Children	Doxycycline OR	4.4 mg/kg per day orally, divided into 2 doses	100 mg/dose	10-14
	Amoxicillin OR	50 mg/kg per day orally, divided into 3 doses	500 mg/dose	14
	Cefuroxime	30 mg/kg per day orally, divided into 2 doses	500 mg/dose	14

*When different durations of antibiotics are shown to be effective for treatment of Lyme disease, the shorter duration is preferred to minimize adverse effects, including infectious diarrhea and antimicrobial resistance.

Note: For people intolerant of amoxicillin, doxycycline, and cefuroxime- azithromycin may be used, although it is less effective. People treated with azithromycin should be closely monitored to ensure that symptoms resolve.

Neurologic Lyme Disease:

- In patients with facial palsy who are unable to close one or both eyes, eye drops, or an eye patch may be needed to prevent dry eyes.
- Neurologic symptoms do not necessarily indicate central nervous system infection in a patient with Lyme disease.
- Two-step serologic testing for Lyme diseases is the recommended diagnostic test for neurologic Lyme disease.
- CSF analysis is not necessary to diagnose Lyme meningitis but can help exclude other causes of illness such as bacterial meningitis.
- Consider Lyme radiculoneuritis in patients who report severe limb or truncal radicular pain without preceding trauma who live in or who traveled to Lyme-endemic areas.

Table 2. Treatment Regimens for Facial Palsy

Age Category	Drug	Dosage	Maximum	Duration, Days
Adults	Doxycycline	100 mg, twice per day orally	N/A	14-21
Children (any age)	Doxycycline	4.4 mg/kg per day orally, divided into 2 doses	100 mg/dose	14-21

Table 3. Treatment Regimens for Lyme Meningitis or Radiculoneuritis

Age Category	Drug	Dosage	Maximum	Duration, Days
Adults	Doxycycline OR	200 mg per day orally, divided into 1 or 2 doses	N/A	14-21
	Cefuroxime*	2 grams intravenously, once a day	N/A	14-21

Age Category	Drug	Dosage	Maximum	Duration, Days
Children (any age)	Doxycycline OR	4.4 mg/kg per day orally, divided into 1 or 2 doses	100/per dose	14-21
	Cefuroxime*	50-75 mg/kg intravenously once a day	2g/day	14-21

*Oral therapy can be substituted when the patient is stabilized or discharged to complete the course.

Lyme Carditis:

- Ask all patients with suspected Lyme disease about cardiac symptoms, e.g., palpitations, chest pain, light headedness, fainting, shortness of breath, and difficulty breathing with exertion.
- Ask all patients with acute, unexplained cardiac symptoms about possible tick exposure and symptoms of Lyme disease.
- Treat patients with suspected Lyme carditis with appropriate antibiotics immediately – do not wait for Lyme disease test results. **Patients with suspected severe Lyme carditis require immediate hospitalization for cardiac monitoring and intravenous antibiotics.**

Table 4. Treatment of Mild Lyme Carditis (1st degree AV block with PR interval <300 milliseconds)

Age Category	Drug	Dosage	Maximum	Duration, Days
Adults	Doxycycline OR	100 mg, twice per day orally	N/A	14-21
	Amoxicillin OR	500 mg, three times per day orally	N/A	14-21
	Cefuroxime	500 mg, twice per day orally	N/A	14-21
Children (any age)	Doxycycline OR	4.4 mg/kg per day orally, divided into 2 doses	100mg/dose	14-21
	Amoxicillin OR	50 mg/kg per day orally, divided into 3 doses	500mg/dose	14-21
	Cefuroxime	30 mg/kg per day orally, divided into 2 doses	500mg/dose	14-21

Table 5. Treatment of Severe Lyme Carditis (symptomatic, 1st degree AV block with PR interval ≥300 milliseconds)

Age Category	Drug	Dosage	Maximum	Duration, Days
Adults	Cefuroxime*	2 grams intravenously, once a day	N/A	14-21
Children (any age)	Cefuroxime*	50-75 mg/kg intravenously once a day	2g/day	14-21

*After resolution of symptoms and high-grade AV block, consider transitioning to oral antibiotics to completed treatment course (see Table 4).

Lyme Arthritis:

- Antibody-based Lyme disease tests have excellent sensitivity in patients with Lyme arthritis. PCR can be used as an adjunctive diagnostic test to identify DNA in synovial fluid but should not be the first lab test used.
- Lyme arthritis can be mistaken for septic arthritis, especially in children. Whereas septic arthritis may require surgical intervention, Lyme arthritis generally does not.

Table 6. Oral Antibiotic Treatment Regimens for Lyme Arthritis*

Age Category	Drug	Dosage	Maximum	Duration, Days
Adults	Doxycycline OR	100 mg, twice per day orally	N/A	28
	Amoxicillin OR	500 mg, three times per day orally	N/A	28
	Cefuroxime	500 mg, twice per day orally	N/A	28
Children (≥8 years old)	Doxycycline OR	4.4 mg/kg per day orally, divided into 2 doses	100mg/dose	28
	Amoxicillin OR	50 mg/kg per day orally, divided into 3 doses	500mg/dose	28
	Cefuroxime	30 mg/kg per day orally, divided into 2 doses	500mg/dose	28
Children (≤8 years old)	Amoxicillin OR	50 mg/kg per day orally, divided into 3 doses	500mg/dose	28
	Cefuroxime	30 mg/kg per day orally, divided into 2 doses	500mg/dose	28

*For patients with an initial episode of Lyme arthritis, a full course of oral antibiotics is recommended. For patients with improving but persistent symptoms after an initial course of oral antibiotics, a second course of the same oral antibiotic or observation alone can be considered.

Table 7. Parenteral Antibiotic Regimens for Lyme Arthritis^

Age Category	Drug	Dosage	Maximum	Duration, Days
Adults	Ceftriaxone*	2 grams intravenously, once a day	N/A	14-28
Children (any age)	Ceftriaxone*	50-75 mg/kg intravenously once a day	2g/day	14-28

^Intravenous ceftriaxone is the preferred regimen for the second course of antibiotics for patients without any response after the initial course of antibiotics.

For More Information Please Visit:

- CDC Lyme Disease Page: <https://www.cdc.gov/lyme/index.html>
- CDC Treatment of Lyme Disease Page: <https://www.cdc.gov/lyme/treatment/index.html>
- CDC Tickborne Diseases of the US: A Reference Manual for Health Care Providers, Sixth Edition (2022): <https://www.cdc.gov/ticks/tickbornediseases/TickborneDiseases-P.pdf>
- IDSA, AAN, and ACR Guidelines Summary for the Prevention, Diagnosis, and Treatment of Lyme Disease: https://www.idsociety.org/globalassets/idsa/practice-guidelines/lyme/idsa_aan_acr-lyme-disease-guideline--clinician-summary.pdf

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