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## **Lyme Disease in Illinois (Information for Health Care Providers)**

Lyme disease, caused by the spirochete *Borrelia burgdorferi*, is the most common tickborne infection in North America and Europe and is transmitted by the bite of ticks of the genus *Ixodes*. Reported Lyme disease incidence in Illinois has increased from 32 cases in 2001 to 127 cases in 2005. The known distribution of *Ixodes scapularis* (also known as the deer tick or blacklegged tick), which is responsible for transmission of Lyme disease in Illinois and the upper mid-west, also has been increasing in recent years. (See accompanying map.)

Physicians throughout the state should be familiar with all aspects of this disease, including transmission, clinical presentation, diagnosis, prophylaxis, treatment, reporting and prevention measures.

### **Transmission**

*Borrelia burgdorferi* is transmitted to humans by the bite of *Ixodes* genus ticks. Ticks can become active when ground temperatures reach 40° F and reports of tick attachment after being in wooded areas during winter months in Illinois are becoming more common. Person-to-person transmission of Lyme disease has not been reported. While the placenta of pregnant women may be infected, studies to date do not show consistent adverse effects of gestational Lyme disease on the fetus. However, timely and appropriate diagnosis and treatment of the pregnant woman infected with Lyme disease is recommended. Lyme disease has not been reported to be transmitted in breast milk. Although there have been no cases of transfusion-associated Lyme disease, those with Lyme disease should not donate blood until completing antibiotic therapy.

### **Clinical Presentation**

Individuals with Lyme disease may or may not give a history of a tick bite and, unless questioned carefully, may give no history of recent travel or exposure to potential tick habitats. Seventy percent to eighty percent of patients infected with *B. burgdorferi* develop the characteristic circular rash called erythema migrans (EM).<sup>1</sup> EM is classically described as having a bull's-eye or target appearance, but it is often homogeneous in pattern and color, especially early in its course. EM typically appears three to 32 days after the tick bite and may be pale red to dark purple. A hallmark of EM is that it expands over days to weeks; rashes as large as 70 cm or more in diameter have been reported. EM may be accompanied by secondary skin lesions in 20 percent of patients. EM lesions typically occur on parts of the body where ticks have attached including flexor creases, near elastic clothing straps and the hairline, all unusual locations for cellulitis.

Untreated infection may manifest over variable amounts of time and may result in unilateral or bilateral facial palsy, heart block, and arthritis. Lyme arthritis typically presents unilaterally, often in a large, weight-bearing joint and may recur if not properly treated. Less common manifestations include meningitis, encephalitis and radiculopathy.

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<sup>1</sup>Note: In southern states, EM lesions may be due to southern tick-associated rash illness, or STARI, for which the causative organism is unknown. See <http://www.cdc.gov/ncidod/dvbid/stari/>.

## **Diagnosis**

Although the diagnosis of Lyme disease is often clinical, e.g., presentation with EM rash and history of exposure to a potential tick habitat within 32 days of onset, properly ordered and interpreted laboratory tests can provide useful information in certain situations.

The U.S. Centers for Disease Control and Prevention (CDC) recommend that, initially, serum specimens be tested by EIA or IFA. Samples with positive or equivocal results from these tests should be re-tested using a standardized Western blot procedure. When Western blot is used during the first four weeks of disease onset, both IgM and IgG testing should be performed. IgM and IgG antibodies typically occur within two to four and four to six weeks respectively.

In persons with illness duration greater than four weeks, a positive IgM Western blot test alone should not be used for diagnosing Lyme disease as the likelihood of an isolated positive result being false positive is high in this situation.

The CDC does not typically recommend the following tests for diagnosing Lyme disease: urine antigen tests, immunofluorescent staining for cell wall-deficient forms of *Borrelia burgdorferi* and lymphocyte transformation tests.

For additional information about laboratory testing, see:

[http://www.cdc.gov/ncidod/dvbid/lyme/ld\\_humandisease\\_diagnosis.htm](http://www.cdc.gov/ncidod/dvbid/lyme/ld_humandisease_diagnosis.htm)

## **Prophylaxis**

Prophylaxis may be considered when all of the following conditions are met:

- The attached tick can be reliably identified as a nymphal or adult *Ixodes scapularis* tick estimated to have been attached for >36 hours.
  - see <http://www.idph.state.il.us/public/hb/hblyme.htm> for images or <http://www.idph.state.il.us/envhealth/tickkey.htm> for decision-aid. Also, IDPH can identify ticks; see <http://www.idph.state.il.us/forms/ohp/ArthropodSpecimenForm.pdf>
- No more than 72 hours has passed since the tick was removed.
- The local rate of infection of ticks with *B. burgdorferi* is  $\geq 20$  percent.
  - Tick populations in southwest suburban forest preserve areas and northwest suburbs of Cook County, central DuPage County and along the east branch of the DuPage River and the eastern portion of Lake County have infection rates  $\geq 20$  percent.
  - Prophylaxis also should be considered for patients exposed in areas of Illinois where Lyme disease cases are routinely reported following exposures: Jo Daviess County, the central portion of Ogle County, wooded areas near the Mississippi River in Rock Island County and along the Mississippi in the northwestern section of Carroll County.
- Doxycycline is not contraindicated, e.g., doxycycline should not be used in pregnant patients; other contraindications also may apply.

If these criteria are met for adults, a single dose of doxycycline 200mg PO may be considered. For children  $\geq 8$  years of age, prophylaxis is with a single dose of doxycycline 4mg/kg. If these criteria are not met, observation for signs or symptoms is recommended.

## **Treatment**<sup>2 3</sup>

Treatment of Lyme disease is directed by signs and symptoms:

### **Erythema migrans**

Preferred – Doxycycline 100mg PO BID x 10-14d (2mg/kg BID in children 8 or older)

Alternatively – Amoxicillin 500mg PO TID x 14d (50mg/kg/d divided TID in children)

or Cefuroxime axetil 500mg BID x 14d (30mg/kg/d divided BID in children)

### **Facial Nerve Palsy**

Preferred – Doxycycline 100mg PO BID x 14d (2mg/kg BID in children 8 or older)

Alternatively – Amoxicillin 500mg PO TID x 14d (50mg/kg/d divided TID in children)

### **More Serious Neurologic Disease**

Ceftriaxone 2g Q24h IV x 14d (50-75mg/kg/d in children 8 or older)

or Cefotaxime 2g Q8h IV x 14d (150-200mg/kg/d in three to four divided doses, max 6g/d in children)

### **Mild Cardiac Disease (1<sup>st</sup> degree AV block, PR <30msec)**

Preferred – Doxycycline 100mg PO BID x 14d (Doxycycline 2mg/kg BID in children 8 or older)

Alternatively – Amoxicillin 500mg PO TID x 14d (50mg/kg/d divided TID in children)

### **More Serious Cardiac Disease**

Ceftriaxone 2gm Q24h IV x 14d (50-75mg/kg/d in children 8 or older)

or Cefotaxime 2g Q8h IV x 14d (150-200mg/kg/d in three to four divided doses, max 6g/d in children)

### **Arthritis (without neurologic disease)**

Preferred – Doxycycline 100mg PO BID x 28d (Doxycycline 2mg/kg BID in children 8 or older)

Alternatively – Amoxicillin 500mg PO TID x 28d (50mg/kg/d divided TID in children)

### **Persistent or Recurrent Arthritis**

Ceftriaxone 2gm Q24h IV x 14d (50-75mg/kg/d in children 8 or older)

or Cefotaxime 2g Q8h IV x 14d (150-200mg/kg/d in three to four divided doses, max 6g/d in children)

## **Reporting**

Like the majority of reportable diseases, Lyme disease is believed to be under-reported. IDPH's Rules and Regulations for the Control of Communicable Disease and Related Documents require that Lyme disease be reported to the local public health department as soon as possible and within seven days.

### **Note: Other tickborne diseases in Illinois**

Anaplasmosis, ehrlichiosis and Rocky Mountain spotted fever (RMSF) also occur in Illinois and, while less common than Lyme disease, are also reportable conditions. Anaplasmosis (formerly known as human granulocytic ehrlichiosis or HGE) can be caused by the bite of an infected deer tick, ehrlichiosis (human monocytic ehrlichiosis) can be caused by the bite of an infected lone star tick and RMSF can be caused by the bite of an infected American dog tick.

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<sup>2</sup>Current full prescribing information available in the package insert of each drug should be consulted before prescribing any product.

<sup>3</sup>Note: About 15 percent of patients treated for Lyme disease have a Jarisch-Herxheimer-type reaction within 24 hours of initiation of treatment.

## **Prevention**

In an effort to prevent Lyme disease and other tickborne illnesses, patients should be counseled to use tick precautions. This includes avoidance, when possible, of areas with tall grass, leaf litter, and wooded or bushy areas, especially in April, May, June and the autumn months when *Ixodes scapularis* ticks are most active.

If patients plan to go to these wooded or grassy areas, regular tick checks of skin and clothing are important, even after only a brief time outdoors or in the yard. Light-colored, long-sleeved shirts and long pants, shoes and socks can help in identifying ticks before they have time to attach. Proper use of insect repellent with 20 percent to 30 percent DEET on exposed skin and clothing can prevent tick bites. Additionally, permethrin, a repellent available at outdoor and hunting stores, kills ticks on contact and can be applied to clothes but not to the skin.

Although the likelihood of contracting Lyme disease is very small if a tick carrying *Borrelia burgdorferi* is attached for less than 36 hours, early identification and proper removal of ticks is advisable. Rocky Mountain spotted fever can be transmitted by the dog tick (*Dermacentor variabilis*), which is found throughout the state, in as little as four hours. As such, tick checks should be performed every two to three hours during activities in tick habitats. Outdoor pets and farm animals may bring ticks into contact with humans and they also should be inspected for ticks. A veterinarian may be consulted for products useful in repelling ticks from animals.

To remove a tick properly, advise patients to grasp the tick as near to the skin as possible with finely-tipped tweezers if possible. If tweezers are not available, a cloth or tissue barrier around the fingers will reduce the risk of exposure to tickborne disease pathogens during tick removal. Additional information about preventing tick bites may be found in the IDPH Fact Sheet “Common Ticks” at <http://www.idph.state.il.us/envhealth/pccommonticks.htm> .

## **Conclusion**

Physicians can minimize morbidity due to tickborne illnesses by counseling patients on the use of preventive measures and being vigilant in identifying and treating tickborne illnesses, including Lyme disease, anaplasmosis, HME and RMSF. Reports of tickborne illnesses from physicians allow IDPH and local public health departments to define geographic and temporal trends in tickborne illnesses and to target prevention activities and educational messages for the public and health care providers.

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