Lyme Disease

(Borrelia burgdorferi)

DISEASE REPORTABLE WITHIN 24 HOURS OF DIAGNOSIS

Per NJAC 8:57, health care providers and administrators shall report by mail or by electronic reporting within 24 hours of diagnosis, confirmed cases of Lyme disease to the health officer of the jurisdiction where the ill or infected person lives, or if unknown, wherein the diagnosis is made. A directory of local health departments in New Jersey is available at http://www.state.nj.us/health/lh/directory/lhdselectcounty.shtml.

If the health officer is unavailable, the health care provider or administrator shall make the report to the Department by telephone to 609.826.5964, between 8:00 A.M. and 5:00 P.M. on non-holiday weekdays or to 609.392.2020 during all other days and hours.

CDS Communicable Disease Service

NEW JERSEY DEPARTMENT of HEALTH and SENIOR SERVICES

December 2008

1 THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Lyme disease (LD) is caused by the corkscrew-shaped bacterium (spirochete) *Borrelia burgdorferi*.

B. Clinical Description and Laboratory Diagnosis

While the chronology of signs and symptoms can vary significantly, there are three general stages in the clinical manifestation of LD: early localized, early disseminated, and late.

Early Localized

Signs and symptoms during the early illness tend to be nonspecific and include fever, muscle aches, headache, mild neck stiffness, and joint pain. Erythema migrans (EM) occurs at the site of the tick bite in approximately 70% to 80% of cases, although when these painless lesions occur in a location hidden from view (e.g., armpit, back), they are often not seen by the patient. EM usually develops within 3 to 30 days after the bite. Typically, EM rashes are circular and grow to a diameter of 5 to 15 cm, although the shape can be triangular, oval, or irregular. EM frequently clears in the center, resulting in the classic "bull's-eye" presentation, but this does not always occur. The rash may be reported as warm or itchy, but it is usually painless. Secondary lesions may also occur. EM may also present as an irregular erythematous patch (with or without central clearing), as an oval or triangular erythematous lesion, as an elongated erythematous lesion, or as multiple erythematous lesions. Annular erythematous lesions occurring within several hours of a tick bite represent hypersensitivity reactions and do not qualify as EM. In most patients, the expanding EM lesion is accompanied by other acute symptoms, particularly fatigue, fever, headache, mild stiff neck, arthralgias, or myalgias. These symptoms are typically intermittent. **For purposes of surveillance**, EM is a skin lesion that typically begins as a red macule or papule and expands over a period of days to weeks to form a large round lesion, often with partial central clearing. A solitary lesion must reach at least 5 cm in size. A physician must make the diagnosis of EM. Laboratory confirmation is recommended for persons with no known exposure.

Early Disseminated

In untreated persons, multiple EM rashes may appear within three to five weeks after the tick bite. These secondary lesions, indicative that the infection has spread into the blood, resemble the primary lesion but tend to be smaller. Common signs of early disseminated disease also include brief arthritis attacks, paralysis of facial muscles (Bell's palsy), and regional or generalized lymphadenopathy. At this stage, disruptions of heart rhythm occur in less than 10% of cases.

Late

After several months, approximately 60% of patients with untreated infection will begin to have intermittent bouts of arthritis, with severe joint pain and swelling. Large joints, particularly the knees and shoulders, are most often affected. Neurological signs may involve impairment of mood, sleep, or memory; paralysis of facial muscles; pain or tingling sensations in the extremities; and less commonly, meningitis and encephalitis. Late-stage symptoms can persist for several years but tend to resolve spontaneously.

Treatment

Most cases of LD can be cured with antibiotics, especially if treatment is started early in the course of illness. However, a small percentage of patients with LD have symptoms that last months to years after treatment with antibiotics. These symptoms can include muscle and joint pain, arthritis, cognitive defects, sleep disturbance, or fatigue. The cause of these symptoms is not known. There is some evidence that they result from an autoimmune response, in which a person's immune system continues to respond even after the infection has cleared.

Diagnosis

Diagnosis is currently based on clinical findings supported by serologic tests performed in two stages: immunofluorescence assay (IFA) or enzyme-linked immunosorbent assay (ELISA) and those with equivocal or positive results should be tested with Western blot (WB). Serodiagnosis early in infection is insensitive because the specific immune response in LD develops slowly (about four to six weeks).

C. Reservoirs

The primary vectors for LD are *Ixodes* ticks. In the Northeast and upper Midwest United States, the prominent vector is the blacklegged or deer tick, *Ixodes scapularis*. Ticks acquire the spirochete that causes LD in the larval or nymphal stage by feeding on infected animals, especially the white-footed mouse. Nymphal ticks pose the greatest threat of transmitting infectious organisms to animals and humans because they are small in size and may go undetected. Nymphs are most abundant between May and July, and they are typically found in wooded areas, brush, and grassy areas near woodland edge. Toward the end of summer through fall, the nymphs mature to the adult stage. Although adult ticks remain capable of transmitting *B. burgdorferi* to humans, they are larger in size and easier to detect. As such, adult ticks are often removed before they can transmit *B. burgdorferi*. Deer ticks can also carry and transmit babesiosis and human granulocytic ehrlichiosis and can possibly result in a co-infection with LD.

D. Modes of Transmission

LD is acquired from the bite of an infected tick. Laboratory data suggest that the tick must remain attached for 36 hours or more before the transmission of *B. burgdorferi* can occur. Since bites from *I. scapularis* are often painless and may occur on parts of the body that are difficult to observe, cases of diagnosed LD frequently have no known history of a tick bite.

E. Incubation Period

EM typically develops between seven and ten days after exposure (range: 3 to 30 days). However, an infected individual can remain asymptomatic until the later stages of LD, several months to one year later.

F. Period of Communicability or Infectious Period

LD is not communicable from person to person. Despite case reports of congenital transmission, epidemiologic studies have not shown a link between maternal LD and adverse outcomes of pregnancy.

G. Epidemiology

Reports of LD have increased dramatically in the United States since 1975 when the disease was first recognized in Lyme, Connecticut. While cases have been reported from nearly every state, the disease is far from uniformly distributed. The majority of cases are reported from ten states: Connecticut, Delaware, Maryland, Massachusetts, Minnesota, New Jersey, New York, Pennsylvania, Rhode Island, and Wisconsin. Approximately 20,000 new cases of LD are reported annually in the United States. In 2006, 19,931 cases of LD were reported, yielding a national average of 8.2 cases per 100,000 persons; in the ten states where LD is most common, the average was 30.2 cases per 100,000 persons. New Jersey ranks third in the highest number of LD cases reported each year, behind New York and Pennsylvania.

Reports of LD in New Jersey remained relatively constant since 2000. An average of 2,723 confirmed cases are reported each year in New Jersey. In 2007, the most recent year for which data are available, the number of confirmed cases was 3,134. Fluctuations in the number of cases confirmed each year may be due to changes in LD reporting and surveillance, rather than disease incidence. In order to determine if there is a true increase or decrease in disease incidence, additional prospective data will need to be collected.

In New Jersey, the highest risk for acquiring LD occurs in wooded rural or suburban environments. However, all parts of the state are considered endemic for LD, and human cases have been reported from all counties in New Jersey. Atlantic, Hunterdon, Morris, Sussex, and Warren counties have the five highest rates within the state. Most cases occur during April and October, when the risk of contact with nymphal ticks is greatest. LD does not affect one gender any more than the other. However, young children (ages 5 to 14) and adults aged 45 to 75 seem to be at a slightly increased risk for acquiring LD. While it is unclear why age appears to be a risk factor, it is most likely due to increased time spent outdoors and decreased likelihood of noticing and removing attached ticks.

2 NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES CASE DEFINITION

A. Clinical Description

A systemic, tick-borne disease with protean manifestations, including dermatologic, rheumatologic, neurologic, and cardiac abnormalities. The best clinical marker for the disease is EM.

For purposes of surveillance, EM is defined as a skin lesion that typically begins as a red macule or papule and expands over a period of days to weeks to form a large round lesion, often with partial central clearing. A single primary lesion must reach greater than or equal to 5 cm in size across its largest diameter. Secondary lesions also may occur. Annular erythematous lesions occurring within several hours of a tick bite represent hypersensitivity reactions and do not qualify as EM. The diagnosis of EM must be made by a physician. For most patients, the expanding EM lesion is accompanied by other acute symptoms, particularly fatigue, fever, headache, mildly stiff neck, arthralgia, or myalgia. These symptoms are typically intermittent and, in the absence of EM, are not criteria for case confirmation.

For purposes of surveillance, late manifestations include any of the following when an alternate explanation is not found:

- *Musculoskeletal system.* Recurrent, brief attacks (weeks or months) of objective joint swelling in one or a few joints, sometimes followed by chronic arthritis in one or a few joints. Manifestations not considered as criteria for diagnosis include chronic progressive arthritis not preceded by brief attacks and chronic symmetrical polyarthritis. In addition, arthralgia, myalgia, or fibromyalgia syndromes alone are not criteria for musculoskeletal involvement.
- *Nervous system.* Any of the following, alone or in combination: lymphocytic meningitis; cranial neuritis, particularly facial palsy (may be bilateral); radiculoneuropathy; or, rarely, encephalomyelitis. Encephalomyelitis must be confirmed by demonstration of antibody production against *B. burgdorferi* in the cerebrospinal fluid (CSF), evidenced by a higher titer of antibody in CSF than in serum. Headache, fatigue, paresthesia, or mildly stiff neck alone is not a criterion for neurologic involvement.
- *Cardiovascular system.* Acute onset of high-grade (second-degree or third-degree) atrioventricular conduction defects that resolve in days to weeks and are sometimes associated with myocarditis. Palpitations, bradycardia, bundle branch block, or myocarditis alone are not criteria for cardiovascular involvement.

B. Laboratory Criteria and Case Classification

Laboratory Criteria

For the purposes of surveillance, the definition of a qualified laboratory assay or acceptable laboratory result includes

- Isolation of *B. burgdorferi* from a clinical specimen, OR
- Demonstration of diagnostic immunoglobulin M (IgM) or immunoglobulin G (IgG) antibodies to *B. burgdorferi* in serum or CSF.
    - A two-tier test approach is recommended. Initial testing should use a sensitive enzyme immunoassay (enzyme-linked immunosorbent assay [ELISA]/enzyme immunoassay [EIA]) or IFA; specimens yielding positive or equivocal results should be tested further by using a specific Western immunoblot assay (Western blot, or WB) and interpreted using established criteria*:
        - Two-tier test including positive or equivocal ELISA/EIA/IFA followed by a positive IgM WB within 30 days of symptom onset
        - Two-tier test including positive or equivocal ELISA/EIA/IFA followed by a positive IgG WB
        - Single-tier test including a positive IgG WB

      *The Centers for Disease Control and Prevention (CDC) defines an IgM WB as positive if two of the following three bands are present (24, 39, 41 kilodaltons [kDa]). The CDC defines an IgG WB as positive if five of the following ten bands are present (18, 21, 28, 30, 39, 41, 45, 58, 66, 93 kDa).

Exposure

Exposure is defined as having been, 30 or fewer days before onset of EM, in wooded, brushy, or grassy areas (i.e., potential tick habitats) in a county in which LD is endemic. A history of a tick bite is not required. Endemic county is defined as one in which at least two confirmed cases have been acquired in the county or in which established populations of a known tick vector are infected with *B. burgdorferi*. Lyme disease is endemic in all 21 counties in New Jersey, and exposure should be assumed for all reported cases.

Case Classification

CONFIRMED
A case of EM with a known exposure (as defined above), OR

A case of EM with laboratory evidence of infection (as defined above) and without a known exposure, OR

A case with at least one late manifestation that has laboratory evidence of infection.

PROBABLE
Any other case of physician-diagnosed LD that has laboratory evidence of infection (as defined above).

POSSIBLE

A case of EM where there is no known exposure (as defined above) and no laboratory evidence of infection (as defined above), OR

A case with laboratory evidence of infection but no clinical information available (e.g., a laboratory report).

C. Differences from CDC Case Definition

The New Jersey Department of Health and Senior Services (NJDHSS) and the CDC case definitions are the same.

3 LABORATORY TESTING AVAILABLE

Several forms of laboratory testing for LD are available, some of which have not been adequately validated. Most recommended tests are blood tests that measure IgM and IgG antibodies made in response to the infection. These tests may be falsely negative in patients with early disease, but they are quite reliable for diagnosing later stages of disease.

Enzyme-linked immunoassay (EIA or ELISA) or IFA can be performed to determine if a person has developed antibodies to LD. These tests are sometimes called LD screens and can be reported as positive results or as titers. These tests normally measure the amount of IgM and IgG together. Occasionally, a physician will order the test for IgM or IgG independently. All tests should be interpreted using the reference range provided on the lab slip. These tests are designed to be very "sensitive," meaning that almost everyone with LD, and some people who do not have LD, will test positive. If the ELISA or IFA is negative, it is highly unlikely that the person has LD, and no further testing is recommended. If the ELISA or IFA is positive or indeterminate (sometimes called "equivocal"), a WB should be performed to confirm the results.

A WB can also be performed to determine if a person has developed antibodies to LD. Used appropriately, this test is designed to be "specific," meaning that it will usually be positive only if a person has been truly infected. If the WB is negative, it suggests that the first test was a false positive. Two types of WB are performed, IgM and IgG. Patients who are positive by IgM but not IgG should have the test repeated a few weeks later if they remain ill. If they are still positive only by IgM and have been ill longer than one month, this is likely a false positive.

CDC does not recommend testing blood by WB without first testing it by ELISA or IFA. Doing so increases the potential for false positive results. Such results may lead to patients being treated for LD when they do not have it and not getting appropriate treatment for the true cause of their illness.

Some laboratories offer LD testing using assays whose accuracy and clinical usefulness have not been adequately established. These tests include urine antigen tests, immunofluorescent staining for cell-wall-deficient forms of B burgdorferi, and lymphocyte transformation tests.

In general, the CDC does not recommend these tests. Patients are encouraged to ask their physicians whether their testing for LD was performed using validated methods and whether results were interpreted using appropriate guidelines.

The NJDHSS Public Health and Environmental Laboratories (PHEL) provides tick identification and culturing for the detection of *B. burgdorferi*. PHEL does not provide testing for human sera (i.e., blood test) for LD.

4 PURPOSE OF SURVEILLANCE AND REPORTING AND REPORTING REQUIREMENTS

A. Purpose of Surveillance and Reporting

- To identify locally acquired cases of LD to better understand the local epidemiology of infection with *B. burgdorferi*
- To recognize areas in New Jersey where LD incidence has changed (increased or decreased)
- To focus LD preventive education
- To target tick control measures
- To evaluate laboratory tests that may aid in the process of identifying true cases of LD

B. Laboratory Reporting Requirements

The New Jersey Administrative Code (NJAC 8:57-1.6) stipulates that laboratories report (by telephone, confidential fax, or over the Internet using the Communicable Disease Reporting and Surveillance System [CDRSS]) all cases of LD to the local health officer having jurisdiction over the locality in which the patient lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located. The report shall contain, at a minimum, the reporting laboratory's name, address, and telephone number; the age, date of birth, gender, race, ethnicity, home address, and telephone number of the person tested; the test performed; the date of testing; the test results; and the healthcare provider's name and address.

C. Healthcare Provider Reporting Requirements

The New Jersey Administrative Code (NJAC 8:57-1.4) stipulates that healthcare providers report (by telephone, confidential fax, or in writing) all cases of LD to the local health officer having jurisdiction over the locality in which the patient lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located. The report shall contain the name of the disease; date of illness onset; and name, age, date of birth, race, ethnicity, home address, and telephone number of the person being reported. In addition, it shall contain the name, address, institution, and telephone number of reporting official, and other information as may be required by NJDHSS concerning a specific disease.

D. Health Officer Reporting and Follow-up Responsibilities

The New Jersey Administrative Code (NJAC 8:57-1.7) stipulates that each local health officer must report the occurrence of any case of LD within 24 hours of receiving the report. Written or electronic copies of the reports must be made to NJDHSS and may be submitted over the Internet using the confidential and secure CDRSS.

5 CASE INVESTIGATION

A. Forms

It is requested that the local health officer complete a 2008 Lyme Disease Case Investigation form, which can be found at the end of this chapter (Attachment A), by interviewing the clinician, patient, and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the patient's healthcare provider or the medical record. Information requested on this form is needed to determine case status.

B. Laboratory Reports

If the laboratory or provider report is received by the local health department (LHD), the LHD should investigate the LD case by contacting the patient or physician and documenting the findings in CDRSS.

If the laboratory or provider report is received by NJDHSS, copies of paper lab reports received by NJDHSS will NOT be mailed to LHDs if they have been entered into CDRSS. If patient addresses are not listed on reports, they will be sent back to the lab or physician for a complete address. Once NJDHSS receives completed information, reports will be forwarded to the LHD for investigation and documentation in CDRSS.

C. Entry into CDRSS

The mandatory fields in CDRSS include disease, last name, county, municipality, gender, race, ethnicity, case status, and report status.

The following table can be used as a quick reference guide to determine which CDRSS fields need to be completed for accurate and complete reporting of LD. The "Tab" column includes the tabs that appear along the top of the CDRSS screen. The "Required Information" column provides detailed explanations of what data should be entered.

CDRSS Screen	Required Information
Patient Info	Enter the disease name ("LYME DISEASE"), patient demographic information, illness onset date, and the date the case was reported to the LHD.

CDRSS Screen	Required Information
Clinical Status	Enter any treatment that the patient received and record the names of the medical facilities and physician(s) involved in the patient's care. If the patient received care from two or more hospitals or healthcare providers, be sure that all are entered so the case can be accessed by other jurisdictions.
Signs/Symptoms	Check appropriate boxes for signs and symptoms and indicate their onset date. Make every effort to get complete information by interviewing the physician, nurse, or office manager abstracting medical information from the patient's chart, or the patient. Also, information regarding the resolution of signs and symptoms should be entered.
Risk Factors	Enter complete information about risk factors to facilitate study of Lyme disease in New Jersey. Enter information about outdoor activity suspected as Lyme disease exposure, including the municipality and county, in the "COMMENTS" section.
Laboratory Eval	Select as follows: • "BORRELIA BURDORFERI ANTIBODY (SCREENING TEST)" if an ELISA, EIA, or IFA was performed for combined IgM and IgG (or if separate antibody tests were not specified). • "BORRELIA BURGDORFERI ANTIBODY WESTERN BLOT" if WB was performed for combined IgM and IgG (or if separate antibody tests were not specified). • "BORRELIA BURDORFERI IGG ANTIBODY" if an ELISA, EIA, or IFA was performed for IgG only. • "BORRELIA BURDORFERI IGM ANTIBODY" if an ELISA, EIA, or IFA was performed for IgM only. • "BORRELIA BURDORFERI IGG WESTERN BLOT" if WB was performed for IgG only. • "BORRELIA BURDORFERI IGM WESTERN BLOT" if WB was performed for IgM only. Specimen type, specimen collection date, test result, and, if applicable, test value should also be recorded. Other lab results not specified in the drop-down menu should be documented in the "COMMENTS" section. In addition, if the physician did not order a laboratory test it should be documented in the "COMMENTS" section.

CDRSS Screen	Required Information
Contact Tracing	Information regarding contacts is not required for this disease.
Case Comments	Information about physician diagnosis of Lyme disease (i.e., when physician specifically writes "LYME DISEASE" in the patient's medical chart) should be documented in the "COMMENTS" section. Also, enter general comments (i.e., information that is not discretely captured by a specific topic screen or drop-down menu) in the "COMMENTS" section. **NOTE:** Select pieces of information entered in the "COMMENTS" section CANNOT be automatically exported when generating reports. Therefore, whenever possible, record information about the case in the fields that have been designated to capture this information; information included in these fields CAN be automatically exported when generating reports.
Epidemiology	Information regarding epidemiology is not required for this disease.
Case Classification Report Status	Case classification options are "REPORT UNDER INVESTIGATION (RUI)," "CONFIRMED," "PROBABLE," "POSSIBLE," and "NOT A CASE." • All cases entered by laboratories (including LabCorp electronic submissions) should be assigned a case status of "REPORT UNDER INVESTIGATION (RUI)." • Cases still under investigation by the LHD should be assigned a case status of "REPORT UNDER INVESTIGATION (RUI)." • Upon completion of the investigation, the LHD should assign a case status on the basis of the Lyme disease surveillance case definition (options include "CONFIRMED," "PROBABLE," "POSSIBLE," and "NOT A CASE"). For more information on assigning a case status, refer to the 2008 Lyme disease surveillance algorithm included at the end of this chapter (Attachment B). Report status options are "PENDING," "LHD OPEN," "LHD REVIEW," "LHD CLOSED," "DELETE," "REOPENED," "DHSS OPEN," "DHSS REVIEW," and "DHSS APPROVED." • Cases reported by laboratories (including LabCorp electronic submissions) should be assigned a report status of "PENDING." • Once the LHD begins investigating a case, the report status should be changed to "LHD OPEN." • The "LHD REVIEW" option can be used if the LHD has a person who reviews the case before it is closed (e.g., health

CDRSS Screen	Required Information
	officer or director of nursing). • Once the LHD investigation is complete and all the data are entered into CDRSS, the LHD should change the report status to "LHD CLOSED." • "LHD CLOSED" cases will be reviewed by DHSS and be assigned one of the DHSS-specific report status categories. If additional information is needed on a particular case, the report status will be changed to "REOPENED" and the LHD will be notified by e-mail. Cases that are "DHSS APPROVED" cannot be edited by LHD staff (see section 5D below). If a case is inappropriately entered (e.g., a different reportable disease or condition was erroneously entered as a case of Lyme disease) the case should be assigned a report status of "DELETE." A report status of "DELETE" should NOT be used if a reported case of Lyme disease simply does not meet the case definition.

D. Other Reporting/Investigation Issues

1. It is not always possible to obtain all the information necessary to determine the case status of a patient. A minimum of three attempts should be made to obtain necessary information. If at this time information is not acquired, the case should be entered into CDRSS with as much information as is known, attempts (dates and results of the attempts) should be documented in the "COMMENTS" section, and the case status changed to "NOT A CASE" and report status to "LHD CLOSED."

2. Case report forms (Lyme Disease Case Investigation form and labs) DO NOT need to be mailed to NJDHSS as long as mandatory fields indicated in section 5C are completed.

3. Once an LHD completes its investigation and assigns a report status of "LHD CLOSED," NJDHSS will review the case. NJDHSS will approve the case by changing the report status to "DHSS APPROVED." At this time, the case will be submitted to CDC, and the case will be locked for editing. If additional information is received after a case has been placed in "DHSS APPROVED," an LHD will need to contact NJDHSS to reopen the case. This should be done only if the additional information changes the case status of the report.

4. Every effort should be made to complete the investigation within three months of opening a case. Cases that remain open for three months or more and have no investigation or update notes will be closed by NJDHSS and marked as "NOT A CASE."

6 CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (NJAC 8:57-1.10)

Because LD is not transmitted from person to person, there are no restrictions for case-patients or contacts of case-patients.

B. Protection of Contacts of a Case

Because LD is not transmitted from person to person, there are no recommendations for protection of contacts of a case.

C. Managing Special Situations

Locally Acquired Case

Although LD is endemic in all 21 counties in New Jersey, the local health officer should try to obtain accurate exposure information, including outdoor activity during the incubation period (i.e., 30 days prior to symptom onset). Information about LD exposure is used to develop prevention messages for New Jersey residents and people traveling to the state.

Reported Incidence Is Higher Than Usual/Outbreak Suspected

There are no outbreak situations with LD.

Response to a Tick Bite

Ticks should be removed as soon as they are found on the skin. Fine-tipped tweezers should be used to firmly grasp the tick very close to the skin. Using a steady motion, the tick's body should be pulled away from the skin. The skin should be cleansed with soap and warm water. The tick can be discarded with household trash.

Crushing the tick's body should be avoided. The tick's mouthparts may remain in the skin and should not be cause for concern. Once the mouthparts are removed from the rest of the tick, it can no longer transmit the LD bacteria. If the tick accidentally gets crushed, clean skin with soap and warm water or alcohol.

Petroleum jelly, a hot match, nail polish, or other products should not be used to remove a tick. An area of redness occurring within several hours of a tick bite represents hypersensitivity reactions and does not represent an EM. The date of tick attachment should be documented so if symptoms develop this information can be relayed to a healthcare provider.

Prophylactic antibiotic therapy may be indicated after a tick bite. Antimicrobial prophylaxis with a single dose of antibiotic, given within 72 hours after a confirmed bite by an *I scapularis* tick, may be effective in preventing LD in highly endemic areas.

Tick Testing

In general, identification and testing of individual ticks is not useful for deciding if a person should get antibiotics following a tick bite. Tick testing can provide information regarding what organism the tick may have been carrying but does not necessarily mean that transmission of that organism during the bite occurred. Tick testing should always be done in coordination with a healthcare provider.

D. Preventive Measures

Environmental Measures

Prevention of LD involves keeping wildlife (especially deer and rodents) out of the backyard and making it less attractive to ticks through

- Removing leaf litter and brush from around the home
- Pruning low-lying bushes to let in more sunlight
- Mowing lawns regularly
- Making sure any plants near the home are not varieties that attract deer
- Keeping woodpiles in sunny areas and off the ground
- Cleaning up the ground around bird feeders
- When using acaricides around the home, always follow the label instructions and never use near streams or other bodies of water

Personal Preventive Measures/Education

The best preventive measure is to avoid tick-infested areas. In areas where contact with ticks may occur, individuals should be advised to do the following:

- Wear long-sleeved shirts and long, light-colored pants tucked into socks or boots.
- Stay on trails when walking or hiking and avoid high grass.
- Use insect repellents properly. Repellents that contain DEET (diethyltoluamide) should be used in concentrations no higher than 30% and DEET should never be used on children less than two months old. Permethrin is a repellent that can be applied only to clothing, not to exposed skin.
- After each day spent in tick-infested areas, check yourself, your children, and your pets for ticks. Parts of the body ticks like most include the back of the knee, armpit, scalp, groin, and back of the neck.
- Promptly remove any attached ticks (see section 6C).

E. Immunization

A vaccine was made available for LD (LYMErix, GlaxoSmithKline) in December 1998. In clinical trials, the vaccine was demonstrated to be about 70% to 80% effective in protecting individuals aged 15 to 70 years who received three doses of the vaccine according to the approved administration schedule. The vaccine was taken off the market in 2002 by the manufacturer due to lower than expected demand. Vaccination status should be considered

when evaluating laboratory tests on possible LD cases because antibody titers may be false positive.

Additional Information

A LD Fact Sheet is available at the NJDHSS Web site at http://www.state.nj.us/health/cd/.

Additional information can also be found on the CDC Web site at http://www.cdc.gov/ncidod/dvbid/lyme/index.htm.

References

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NEW JERSEY LYME DISEASE SURVEILLANCE CASE INVESTIGATION FORM

I. PATIENT INFORMATION:

Name: _____

Sex (Check one): □ Male □ Female

Address: _____

_____

County: _____

Municipality of residence: _____

Phone #: (_____) _____-_____ Date of Birth: _____/_____/_____
mm dd yyyy

II. NAME OF PERSON COMPLETING FORM:

Name: _____

Agency: _____

Phone #: (____) _____-_____

III. TREATING PHYSICIAN:

Name: _____

Address: _____

Phone **#: (_____) _____-_____**

IV. ILLNESS (check all that apply):

Date of Onset: ____/____/____
mm dd yyyy

A. Rash:
□ Erythema migrans
(Size > 5 cm)

B. Musculoskeletal Symptoms:
□ Arthritis characterized by brief (weeks or months) attacks of objective joint swelling

C. Neurologic Symptoms:
□ Cranial neuritis
□ Lymphocytic meningitis
□ Radiculoneuropathy
□ Encephalitis
□ Bell's palsy

D. Cardiac Symptoms:
□ Acute onset of high grade (2^{nd} or 3^{rd}degree) atrioventricular conduction defects
□ Myocarditis

E. Other Symptoms (specify):

_____
_____
_____

F. Was there a physician diagnosis of Lyme disease? □ Yes □ No □ Unknown

G. Antimicrobial / other therapy:

□ Antibiotic(s) name: _____
□ Antibiotic(s) dosage and duration: _____
□ No antibiotics prescribed
□ Unknown
□ Other therapy (specify): _____

V. EXPOSURE (include exact location and type of outdoor activity):

_____
_____
_____

VI. LABORATORY DATA:

□ Isolation from clinical specimen date and result: _____
□ ELISA / IFA (screening test) date and result: _____
□ WB IgM (≥2 of 3 bands) date and result: _____
□ WB IgG (≥5 of 10 bands) date and result: _____
□ Other lab (specify type) date and result: _____
□ No labs ordered by physician
□ No lab data obtained

IX. ADDITIONAL COMMENTS:

_____
_____
_____

Local Health Department Only:

CDRSS Case ID# _____

Case classification:

□ Confirmed □ Probable □ Possible □ Not a Case

Case closed on: _____/_____/_____
dd mm yyyy

Attachment B