WEST VIRGINIA Department of Health & Human Resources
BUREAU FOR PUBLIC HEALTH

2017 LYME DISEASE

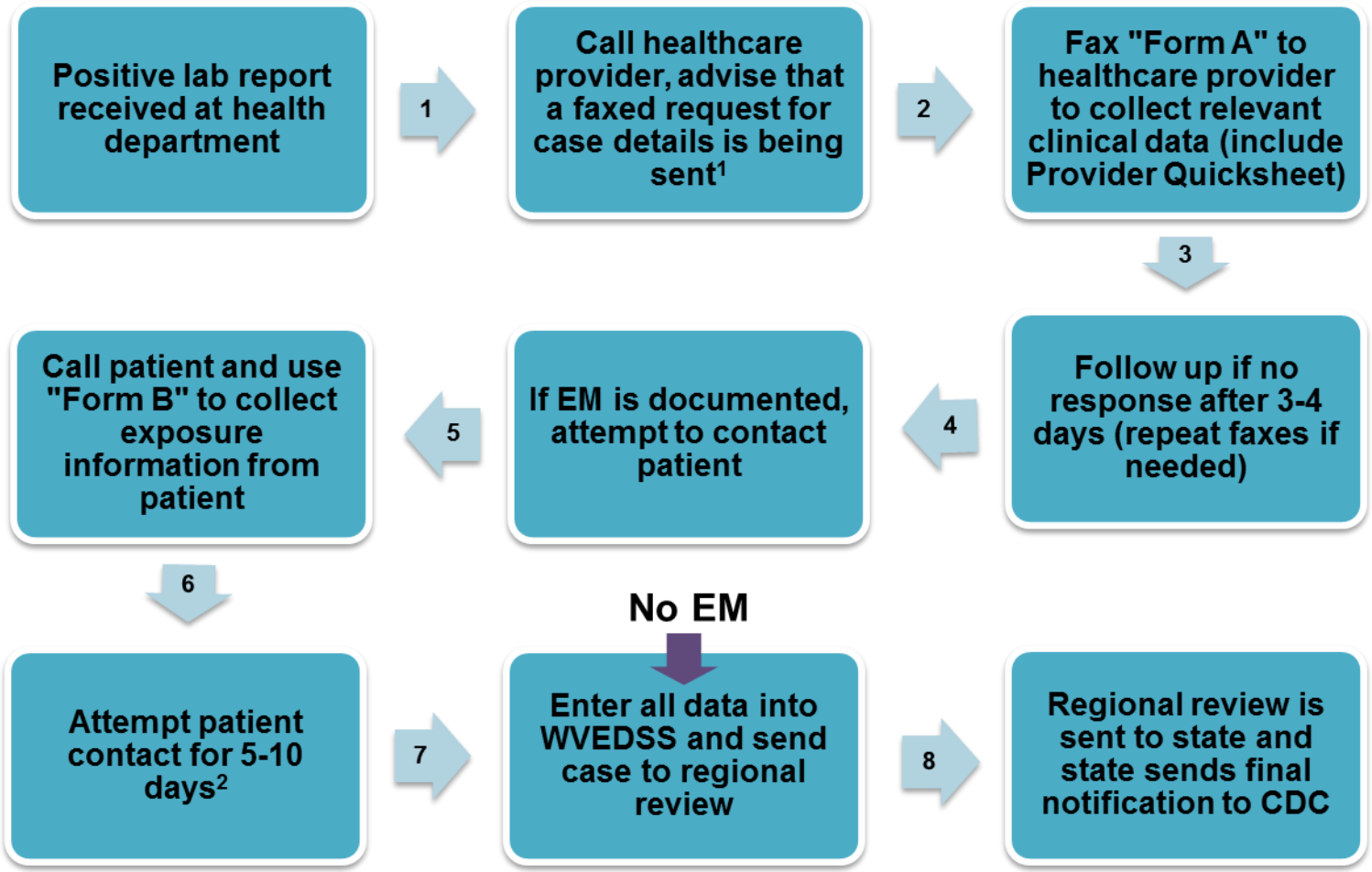
CASE INVESTIGATION TOOLKIT

This toolkit can be used by local health department staff to facilitate Lyme disease case investigations. Items in the toolkit include:

- **Case Investigation Flowchart**
- **Form A for Healthcare Providers**
- **Form B for Patients with Erythema Migrans (EM)**
- **Enzyme Immunoassay (EIA) Tips**
- **Interpretation IgM/IgG Western Blots**
- **2017 Case Ascertainment Guide**
- **Provider Quicksheet**
- **2017 Low and High Incidence Lyme Disease States**

Division of Infectious Disease Epidemiology
350 Capitol Street, Room 125, Charleston, WV 25301-3715 Phone: (304) 558-5358 or (800) 423-1271 Fax: (304) 558-8736 www.dide.wv.gov

Lyme Disease Case Investigation Flowchart



[1] Request copies of any supplemental lab results; also ask for demographic data (e.g. race and ethnicity).

[2] Attempt to get in contact with patients through different methods. Try calling at least three times at different times of the day. Try alternate contact numbers and addresses. Mail a certified letter to the patient's address. Be sure to document all attempts.

WEST VIRGINIA Department of Health & Human Resources
BUREAU FOR PUBLIC HEALTH

Division of Infectious Disease Epidemiology
350 Capitol Street, Room 125, Charleston, WV 25301-3715
Phone: 304.558.5358 or (800) 423-1271 Fax: 304.558.8736 (www.dide.wv.gov)

Form A: Lyme Disease Assessment Tool (2017)
For Healthcare Providers

WEST VIRGINIA Department of Health & Human Resources BUREAU FOR PUBLIC HEALTH

Dear Healthcare Provider:
The _____ County Health Department has been notified of a positive Lyme disease laboratory report for patient _____ (DOB: ____/____/____). In order to comply with state and federal infectious disease reporting requirements, we are requesting the following information about this patient. Please return this completed sheet via fax to **(304 _____-_____)** within 72 hours of receipt.

A. Have you contacted this patient about Lyme disease positive laboratory results? ☐YES ☐NO
B. Date of first symptom onset (*month/day/year*): ____ / ____ / _____ ☐YES ☐NO
C. Did this patient have an erythema migrans measuring at least 5 cm in diameter? ☐YES ☐NO
If yes, where was the patient when he/she was likely bitten by an infected tick in the past 30 days?
(County): _____ (State): _____
D. Did patient exhibit any of the following symptoms of late-stage Lyme disease? ☐YES ☐NO

Rheumatologic/musculoskeletal *(mark one)*:
☐Recurrent, brief attacks objective joint swelling (one or few joints)
☐Chronic arthritis preceded by brief attacks (one or few joints)
☐Other: _____
☐No rheumatologic/musculoskeletal symptoms associated with LD were observed

Neurologic (*mark all that apply*):
☐Lymphocytic meningitis ☐Facial palsy (may be bilateral) ☐Cranial neuritis
☐Radiculoneuropathy ☐Encephalomyelitis ☐Other: _____
☐No neurologic symptoms associated with LD were observed

Cardiovascular (*mark one*):
☐Acute onset of high-grade (2nd or 3rd degree) atrioventricular conduction defects (*that resolves in days to weeks)*
☐Other: _____
☐No cardiac symptoms associated with LD were observed

E. Did you diagnose this patient as having Lyme disease? ☐YES ☐NO

F. Please indicate what testing was ordered for this patient and any known results.

Test Ordered	Date	Result
Serology screen (IFA/EIA)	/ /	☐ Positive ☐Negative ☐Equivocal ☐ Pending
Borrelia burgdorferi IgG WB	/ /	☐ Positive ☐Negative ☐ Pending
Borrelia burgdorferi IgM WB	/ /	☐ Positive ☐Negative ☐ Pending
Other:	/ /	☐ Positive ☐Negative ☐ Pending

A. Why was Lyme disease testing ordered for this patient? *Mark all that apply*.
☐Patient had clinical evidence of infection ☐Patient requested Lyme testing
☐Patient had exposure to tick habitats ☐Other: _____
B. Did you prescribe antibiotics for this patient? ☐YES ☐NO
If yes, indicate type of antibiotic and # of days: _____

Comments: _____

Thank you for filling out this form. This information is important to Lyme disease surveillance in West Virginia.

Division of Infectious Disease Epidemiology
350 Capitol Street, Room 125, Charleston, WV 25301-3715 Phone: (304) 558-5358 or (800) 423-1271 Fax: (304) 558-8736 www.dide.wv.gov

Form B: Patient Lyme Disease Exposure Assessment Tool (2017)
Note: *Call patients with erythema migrans (EM)*

****THIS STEP SHOULD BE LIMITED TO CASES WITH DOCUMENTED EM BY HEALTHCARE PROVIDER****

Optional Script

"Hello, this is (**your name**), a (**nurse/sanitarian**) from (**county name**) County Health Department. I am following up on a recent report our department received about (**case name**)'s Lyme disease illness. In order for us to better understand the risk for Lyme disease in our county, I would like to ask you a few questions about the time leading up to your illness."

A. On what date were symptoms first noticed? (month/day/year): _____/_____/_____

B. Did you travel outside of your home county within 30 days of the start of your symptoms?
☐YES ☐NO

a. If yes, report travel information:

Destination (city, state)	Date of departure (month/day/year)	Date of return (month/day/year)

C. Is there anything else you would like to share about your illness?

_____
_____
_____

Thank the patient, and end the call.

Division of Infectious Disease Epidemiology
350 Capitol Street, Room 125, Charleston, WV 25301-3715Phone: (304) 558-5358 or (800) 423-1271 Fax: (304) 558-8736 www.dide.wv.gov

Enzyme Immunoassay (EIA) Interpretation Tips

- EIA tests detect the amount of antibodies produced by the patient. Immunoglobulin M (IgM), immunoglobulin G (IgG), and combined (or quantitative) IgM/IgG EIA tests are common for Lyme disease diagnostics.
  - IgM antibodies are produced by the body *early* in an infection. The presence of IgG antibodies indicates that the patient was infected with Lyme disease *at some point* in life.

- If the Lyme disease test result you receive has numbers like "0.91"or "5.65," it is an EIA/IFA test.
  - The higher the number, the more antibodies are being produced.

- Some tests will have a reference ranges for "**positive**," "**equivocal**," and "**negative**" test results listed on the laboratory report (see example below).

- An "**indeterminate**" or "**equivocal**" result means that the level of antibodies detected in the patient's specimen is low. It could also indicate a false positive result. Either way, more information is needed to determine if the patient's immune system produced a response to an infection with Lyme disease; therefore, the EIA **and** IgM/IgG Western blot are recommended.

- "**Positive**" also means "**reactive**." "**Negative**" also means "**non-reactive**."

Sample reference ranges for LabCorp

≤0.90	Negative
0.91-1.09	Equivocal
≥1.10	Positive

WEST VIRGINIA Department of Health & Human Resources
BUREAU FOR PUBLIC HEALTH

Division of Infectious Disease Epidemiology
350 Capitol Street, Room 125, Charleston, WV 25301-3715
Phone: (304) 558-5358 or (800) 423-1271 Fax: (304) 558-8736 (www.dide.wv.gov)

Interpreting IgG and IgM Western Blots

IgM Western Blot

An IgM immunoblot should be considered positive if **two of the following three bands** are present:

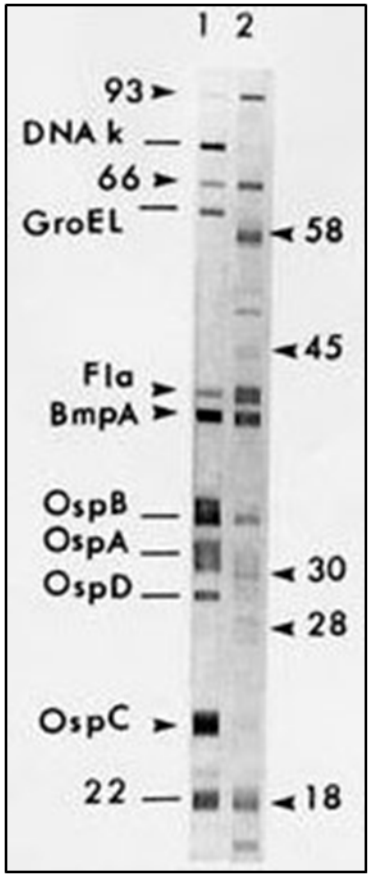
-24 kDa (OspC) band
-39 kDa (BmpA) band
-41 kDa (Fla) band

Visit the CDC's Lyme disease testing page for more information:
http://www.cdc.gov/lyme/diagnosistesting/index.html

IgG Western Blot

An IgG immunoblot should be considered positive if **five of the following ten bands** are present:

-18 kDa band
-21 kDa (OspC) band
-28 kDa band
-30 kDa band
-39 kDa (BmpA) band
-41 kDa (Fla) band
-45 kDa band
-58 kDa band
-66 kDa band
-93 kDa band

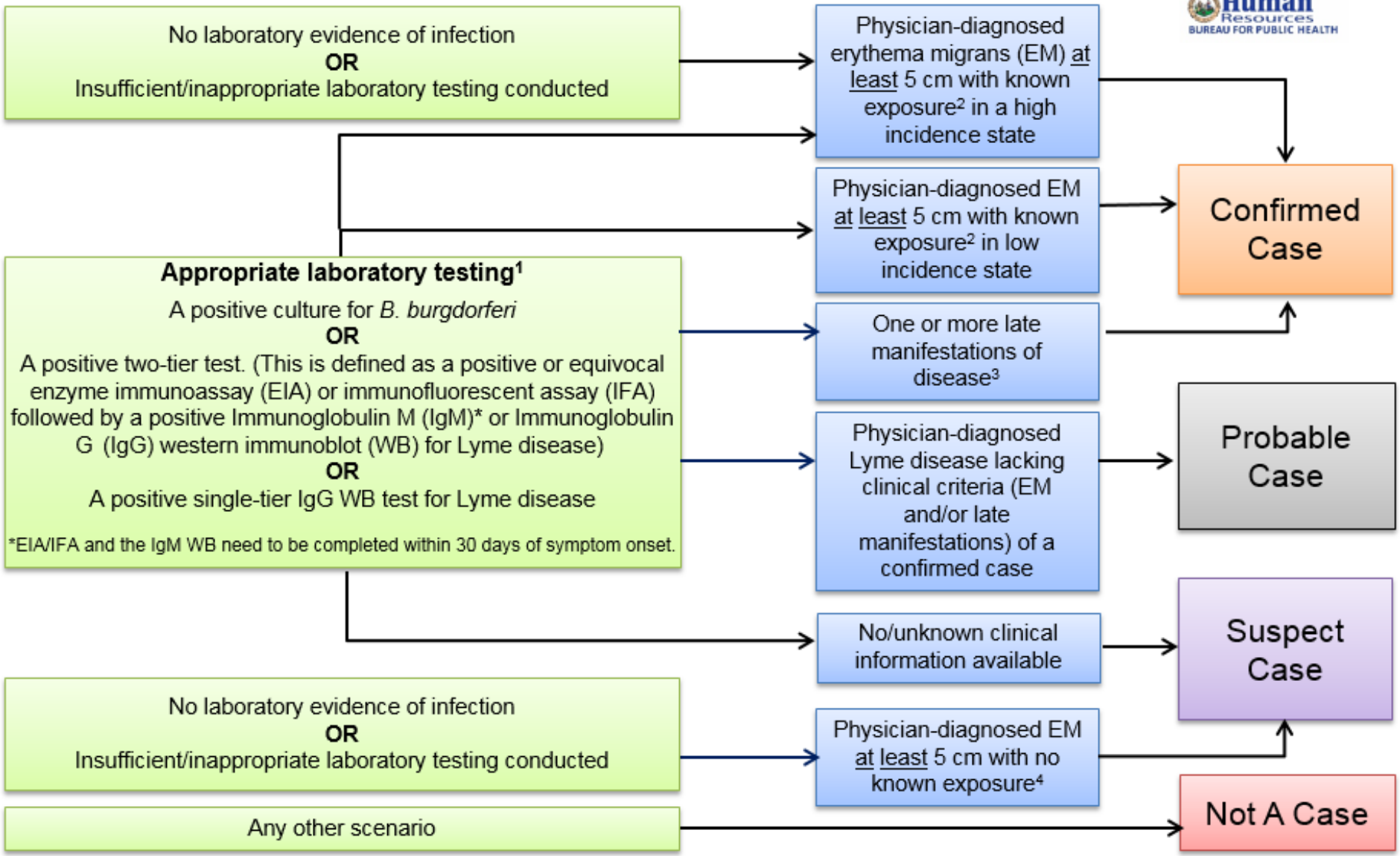


Sample Western blot

WEST VIRGINIA Department of Health & Human Resources BUREAU FOR PUBLIC HEALTH

Division of Infectious Disease Epidemiology
350 Capitol Street, Room 125, Charleston, WV 25301-3715
Phone: (304) 558-5358 or (800) 423-1271 Fax: (304) 558-8736 (www.dide.wv.gov)

Lyme Disease Case Ascertainment Guide (2017)



[1]Laboratory tests in this guide are the only ones recommendation for case ascertainment. Other diagnostic tests (e.g. PCR) should not be used. CDC recommends a two-tier approach for Lyme disease testing using serum (EIA/IFA with reflex to Western blot). CSF and synovial fluid are not considered appropriate specimens for two-tier testing.

[2]Exposure is defined as having been (less than or equal to 30 days before onset of EM) in wooded, brushy, or grassy areas (i.e., potential tick habitats) of Lyme disease vectors. Since infected ticks are not uniformly distributed, a detailed travel history to verify whether exposure occurred in a high or low incidence state is needed. An exposure in a high-incidence state is defined as exposure in a state with an average Lyme disease incidence of at least 10 confirmed cases/ 100,000 for the previous three reporting years. A low-incidence state is defined as a state with a disease incidence of <10 confirmed cases/100,000 (*see* https://www.cdc.gov/lyme/stats/tables.html). A history of tick bite is not required.

[3]Late manifestations include musculoskeletal (recurrent, brief attacks of join swelling followed by chronic arthritis), nervous system (lymphocytic meningitis, cranial neuritis, facial palsy (may be bilateral), and radiculoneuropathy, or rarely encephalomyletitis), and cardiovascular (acute onset 2nd -3rd atrioventricular conduction defects that resolve in days to weeks) signs of disease.

[4]Exposure in a low-incidence state is considered unknown exposure.

PROVIDER QUICKSHEET: LYME DISEASE
JANUARY 2017

WEST VIRGINIA Department of Health & Human Resources
BUREAU FOR PUBLIC HEALTH

IMPORTANT INFORMATION ABOUT SELECTING LABORATORY TESTS

1. CDC recommends a two-tier approach for testing serological specimens: IFA/EIA antibody screen, followed by IgM[1] and IgG western blot if IFA/EIA is positive or equivocal.

2. Other CDC recommended diagnostic assays for Lyme disease include:
   - A positive culture for *B. burgdorferi*, **OR**
   - A positive single-tier IgG[2] WB test for Lyme disease[3].

[1] IgM WB is considered positive when at least two of the following three bands are present: 24 kilodalton (kDa) outer surface protein C (OspC)*, 39 kDa basic membrane protein A (BmpA), and 41 kDa (Fla). Disregard IgM results for specimens collected >30 days after symptom onset.
[2] IgG WB is considered positive when at least five of the following 10 bands are present: 18 kDa, 24 kDa (OspC)*, 28 kDa, 30 kDa, 39 kDa (BmpA), 41 kDa flagellin (Fla), 45 kDa, 58 kDa (not GroEL), 66 kDa, and 93 kDa.
[3] While a single IgG WB is adequate for surveillance purposes, a two-tier test is still recommended for patient diagnosis.
*Depending upon the assay, OspC could be indicated by a band of 21, 22, 23, 24 or 25 kDA.

THE USE OF SINGLE-TIER IGM WESTERN BLOT TESTING IS NOT RECOMMENDED AND WILL NOT BE CONSIDERED CONFIRMATORY FOR PUBLIC HEALTH SURVEILLANCE PURPOSES

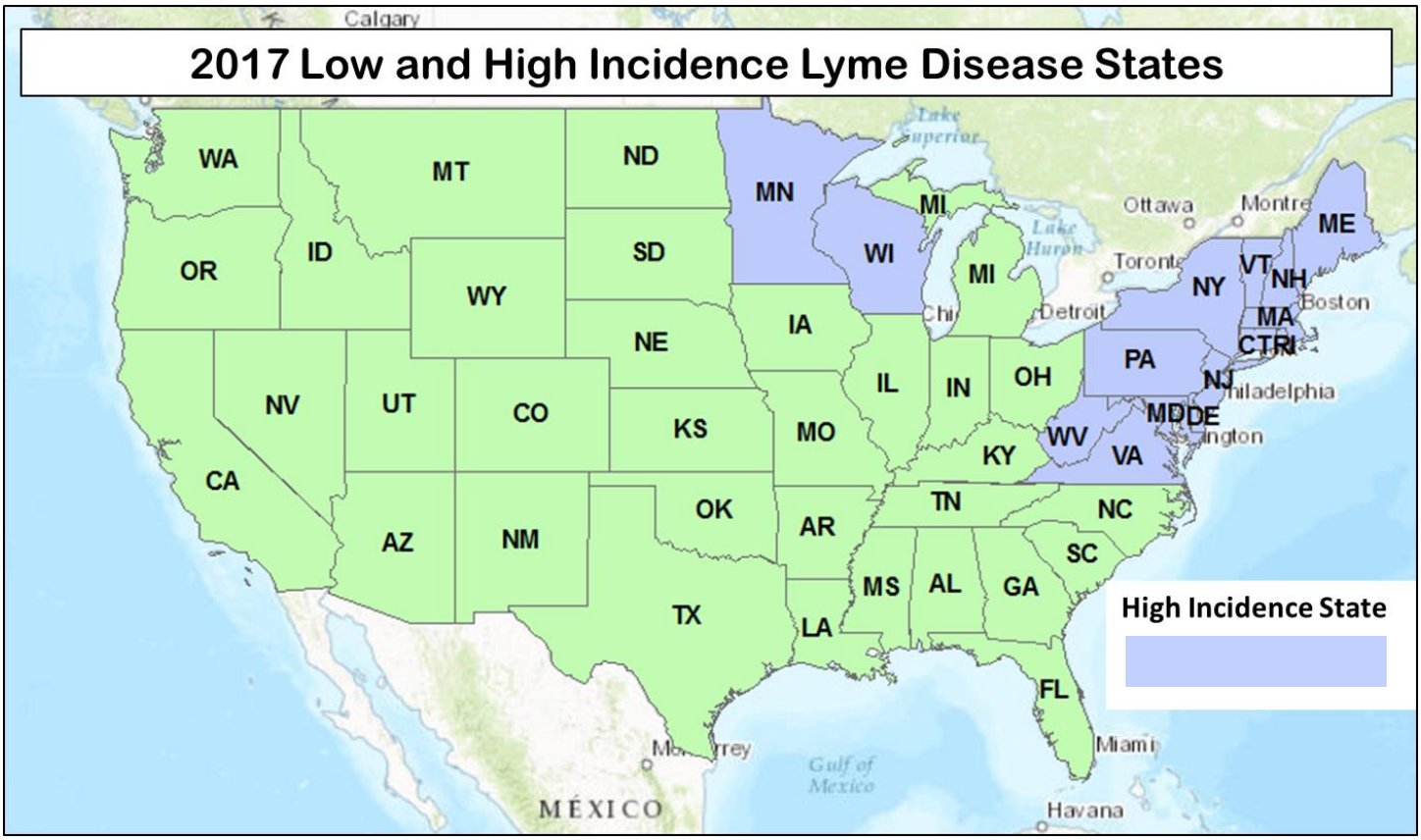
RESOURCES FOR PATIENTS

- CDC website has several brochures and info sheets for patients: http://www.cdc.gov/lyme/.

RESOURCES FOR HEALTHCARE PROVIDERS

- CDC has a "Resources for Clinicians" page available at: http://www.cdc.gov/lyme/healthcare/clinicians.html
- Information about two-tier testing for Lyme disease is available at: http://www.cdc.gov/lyme/diagnosistesting/LabTest/TwoStep/index.html
- The Infectious Disease Society of America (IDSA) has developed a FREE online CME case study about the diagnosis and management of Lyme disease available at: http://lymecourse.idsociety.org/
- The West Virginia Department of Health and Resources provides information about the state's Lyme disease surveillance system as well as links to useful resources available at: http://www.dhhr.wv.gov/oeps/disease/Zoonosis/Tick/Pages/Lyme.aspx
- The CDC has a "Tickborne Diseases of the United States", reference manual for healthcare providers located at: https://www.cdc.gov/lyme/resources/tickbornediseases.pdf
- The American Academy of Family Physicians (AAFP) provides a diagnostic guideline to aid healthcare providers in diagnosing Lyme disease available at: http://www.aafp.org/afp/2005/0715/p297.pdf

Division of Infectious Disease Epidemiology
350 Capitol Street, Room 125, Charleston, WV 25301-3715 Phone: (304) 558-5358 or (800) 423-1271 Fax: (304) 558-8736 www.dide.wv.gov



Division of Infectious Disease Epidemiology
350 Capitol Street, Room 125, Charleston, WV 25301-3715 Phone: (304) 558-5358 or (800) 423-1271 Fax: (304) 558-8736 www.dide.wv.gov