



## DEPARTMENT OF HEALTH AND HUMAN SERVICES DIVISION OF PUBLIC HEALTH

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Date: May 19, 2017  
To: All North Carolina Clinicians  
From: Zack Moore, MD, MPH, State Epidemiologist  
Subject: Annual Update on Surveillance for Lyme disease in North Carolina (2 pages)

### Introduction

Lyme disease (LD) is caused by infection with the bacterium *Borrelia burgdorferi* sensu stricto transmitted by the bite of an infected *Ixodes scapularis* tick, commonly known as the deer tick or black legged tick. The North Carolina Division of Public Health (DPH) would like to ensure that health care providers consider the possibility of LD in patients with clinically compatible signs or symptoms. The diagnosis of LD should be based on a combination of symptoms, laboratory findings, and patient exposure history.

### Surveillance for Lyme disease

In North Carolina, health care providers are required to report cases of confirmed or suspected LD to their local health department within 7 days. Laboratories are also required to report positive tests for LD to DPH [1]. Surveillance for LD is based on a national case definition, which establishes uniform criteria for disease reporting in order to monitor trends and take action to reduce disease and improve public health [2]. In 2016, a total of 266 cases of LD were reported in NC (30 confirmed, 236 probable; provisional data). Since 2008, when the probable case classification was introduced, the number of reported confirmed cases of LD has remained relatively constant with an average of 28 cases per year. In contrast, the number of reported probable cases has increased more than seven-fold since 2008, from 31 to 236 (Fig. 1 & 2).

### High-Incidence vs. Low-Incidence States

Effective January 2017, the CDC amended the previous definition of exposure criteria from “endemic counties” to “high and low-incidence states”. High-incidence states are defined as those that have had an average of  $\geq 10$  confirmed cases of Lyme disease per 100,000 residents over the previous three reporting years [3]. Low-incidence states are defined as states with a disease incidence of  $< 10$  confirmed cases per 100,000 residents. Cases of erythema migrans with exposure to tick habitat in a high-incidence state are classified as confirmed. All late manifestations of LD (musculoskeletal, cardiac, and nervous) and early LD with exposure in a low-incidence state must also be accompanied by appropriate laboratory testing to fulfill the surveillance case definition requirements. As of January 2017, based on the criteria listed above, North Carolina is designated as a low-incidence state for surveillance purposes.

### Serologic Testing for Lyme disease

If LD is suspected, two tier serological testing is recommended [3,4]. Patients should first be tested by enzyme immunoassay (EIA) or immunofluorescent assay (IFA), and positive and equivocal results should be confirmed by further testing with the more specific Western blot test. Patients may test negative early in the course of infection, so if LD is highly suspected a convalescent sample should also be tested. For patients who have been ill for more than 4 weeks, IgG will usually be positive by Western blot, an isolated positive IgM in this timeframe is likely a false positive (Fig. 3).

### Erythema Migrans (EM) rash in NC

There are multiple differential diagnoses for patients presenting with EM, including STARI (southern tick-associated rash illness), ringworm, cellulitis and others [5]. STARI can occur after the bite of the lone star tick,

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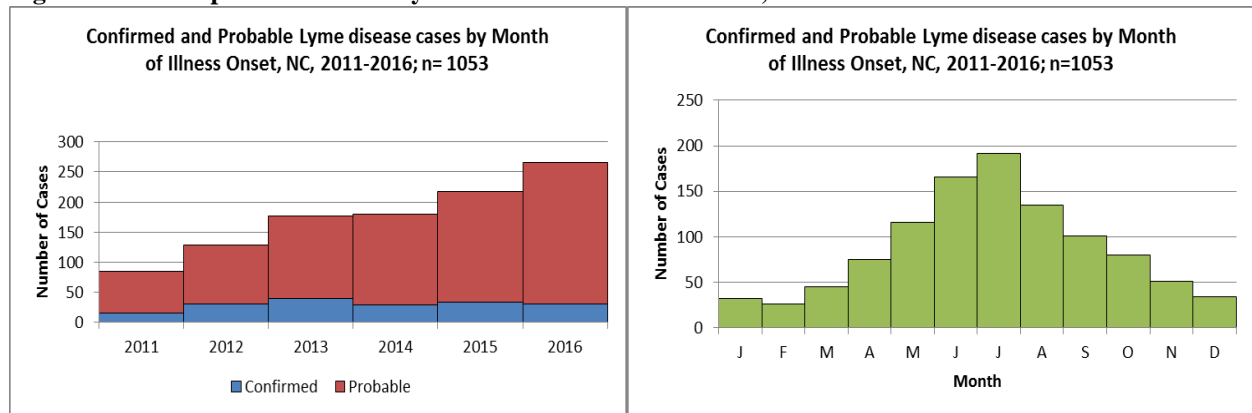
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*Amblyomma americanum*, the most common tick in North Carolina. Lone star ticks are not known vectors for *B. burgdorferi* [6]. The etiologic agent for STARI is unknown and there is no diagnostic test. STARI presents with an EM-like skin lesion which is clinically indistinguishable from an EM rash associated with LD. Therefore, it is recommended that all cases of EM should be accompanied by laboratory evidence of infection to confirm diagnosis, particularly in areas where LD and STARI may coexist. Treatment of EM rash should be initiated using the best judgment of the attending clinician.

**Education of patients, prevention of disease:**

We encourage all providers to educate their patients about personal protective measures to minimize their risk of acquiring tickborne illness. Lyme disease prevention materials are available from the CDC [9]. Please visit our website (<http://epi.publichealth.nc.gov/cd/diseases/ticks.html>) or contact Dr. Alexis M. Barbarin or Dr. Carl Williams at 919-733-3419 with any questions regarding surveillance of Lyme disease.

**Figures 1 & 2: Reported Cases of Lyme Disease in North Carolina, 2011–2016\***



\*Note: 2016 data are preliminary and subject to change

**References:**

- 10A NCAC 41A .0101 REPORTABLE DISEASES AND CONDITIONS. <http://www.ncogh.com/rules/>
- <https://www.cdc.gov/nndss/>
- North Carolina Communicable Disease Manual. <http://epi.publichealth.nc.gov/cd/lhds/manuals/cd/toc.html>
- Wormser, et. al. The Clinical Assessment, Treatment, and Prevention of Lyme Disease, Human Granulocytic Anaplasmosis, and Babesiosis: Clinical Practice Guidelines by the Infectious Diseases Society of America. CID 2006;43:1089-1134
- Shapiro. Lyme disease. N Engl J Med 2014;370:1724-31.
- Stromdahl, et. al. Borrelia burgdorferi not confirmed in human-biting Amblyomma americanum ticks from the southeastern United States. J Clin Microbiol. 2015 Mar 18.
- Blanton, et. al. Southern Tick Associated Rash Illness: Erythema Migrans is not always Lyme disease. Southern Medical Journal 2008;101(7):759-760
- Lantos, et. al. Empiric Antibiotic Treatment of Erythema Migrans-Like Skin Lesions as a Function of Geography: A Clinical and Cost Effectiveness Modeling Study. Vector Borne and Zoonotic Diseases 2013;13(12):877-83
- <https://www.cdc.gov/lyme/>

**Figure 3:**

**Two-Tiered Testing for Lyme Disease**

