



Update: Ticks and Lyme Disease in Lake County

Board of Health Meeting

April 25, 2018

Mike Adam, Senior Biologist

Dr. Sana Ahmed, MD, Medical Epidemiologist



Objectives

- Overview of tick species in Lake County
- History of the deer tick
- Results of tick testing
- Public health importance and epidemiology of Lyme disease
- Clinical presentation and diagnostic testing
- Treatment
- Prevention

Overview of Tick-borne Diseases



BLACKLEGGED TICK (deer tick)
Ixodes scapularis

Where found: Widely distributed in the northeastern and upper Midwestern US.

Transmits: Lyme disease, anaplasmosis, babesiosis, and Powassan disease.



LONE STAR TICK
Amblyomma americanum

Where found: Widely distributed in the southeastern and eastern US.

Transmits: *Ehrlichia chaffeensis* and *Ehrlichia ewingii* (which cause human ehrlichiosis, tularemia, and STARI).



AMERICAN DOG TICK
Dermacentor variabilis

Where found: Widely distributed east of the Rocky Mountains and in limited areas on the Pacific Coast.

Transmits: Tularemia and Rocky Mountain spotted fever.

Tick Sampling

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Survey for *Ixodes* spp. and *Borrelia burgdorferi* in Southeastern Wisconsin and Northeastern Illinois

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Forested areas adjacent to Milwaukee, Wis., and Chicago, Ill., were investigated for rodents and ticks infected with *Borrelia burgdorferi*, the causative agent of Lyme disease. White-footed mice (*Peromyscus leucopus* or *Peromyscus maniculatus*), meadow voles (*Microtus pennsylvanicus*), and eastern chipmunks (*Tamias striatus*) were captured; and specimens from these animals were cultured for *B. burgdorferi* to define whether the midwestern Lyme disease area currently encompasses these large metropolitan centers. During 1988, *B. burgdorferi* was successfully cultured from the tissues of two *M. pennsylvanicus* voles captured from the Chicago area. However, no *Ixodes* spp. ticks were captured. None of 274 animals captured from sites 13 and 12 additional sites in Wisconsin and Illinois during the summer of 1989 were infected with *B. burgdorferi* or *Ixodes* spp. In addition, no ticks were recovered when the underbrush in 11 contiguous areas was flagged. Apparently, *B. burgdorferi* is rarely found in these areas because of the absence of the appropriate tick vectors. Further studies are needed to monitor the dispersal of *B. burgdorferi*-infected *Ixodes dammini* into this heavily populated midwestern region.

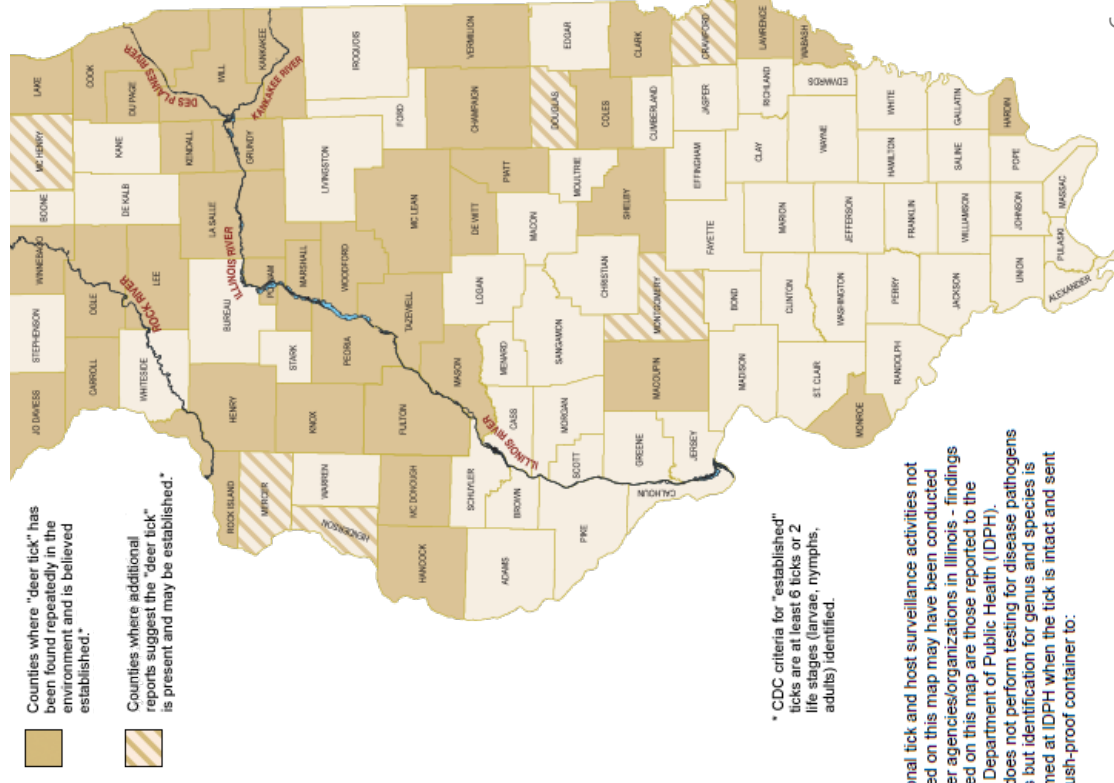
Deer Ticks mid-2000's

- Reports from LCHD and Lake County Forest Preserve staff
- Pilot surveys in Eastern portion of Lake County
- 37% of deer ticks tested were positive for *Borrelia burgdorferi*



Known Geographic Distribution of *Ixodes scapularis* by county in Illinois 2017

Ixodes scapularis is also known as the "deer tick" and the "black-legged tick". *Amblyomma americanum*, the lone star tick, and *Dermacentor variabilis*, the American dog tick, should be presumed present throughout the state.



Deer Tick Distribution, 2017

Tick Sampling and Testing



- No statewide program
- Dr. Jeff Nelson, Rush Medical Center and North Park University, Chicago
- University of Massachusetts lab
- Private labs (\$40-60/tick)
- *Borrelia*, *Anaplasma*, *Babesia*, some viruses
- Adults only
- Research by University of Illinois

Tick Sampling and Testing

Rush/North Park U. lab

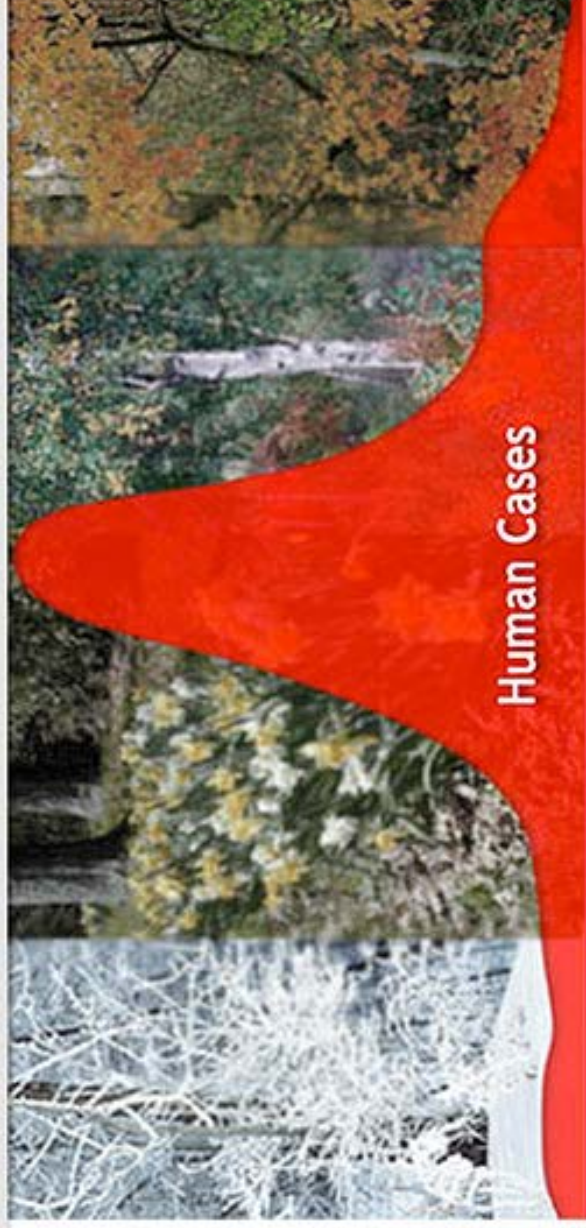
- >600 deer ticks over 3 years (Lake and northern Cook)
- 30-40% positive for *Borrelia burgdorferi*
- 6 of 260 positive for *Anaplasma*
- *Babesia* found but so far only *Babesia oedecoli* (infects deer family), not *B. microti* (infects humans)

Tick Sampling and Testing

University of Massachusetts lab

- 117 deer ticks since 2013
- 31% positive for *Borrelia burgdorferi*
- One positive for *Borrelia miyamotoi*
- Negative: *Anaplasma* and *Babesia*

Seasonal Pattern Of Lyme Disease Cases



Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec



Adult Deer Tick

Abundant October to May



Nymphal Deer Tick

Abundant May to Late July



Larval Deer Tick

Abundant August to October



Adult Deer Tick

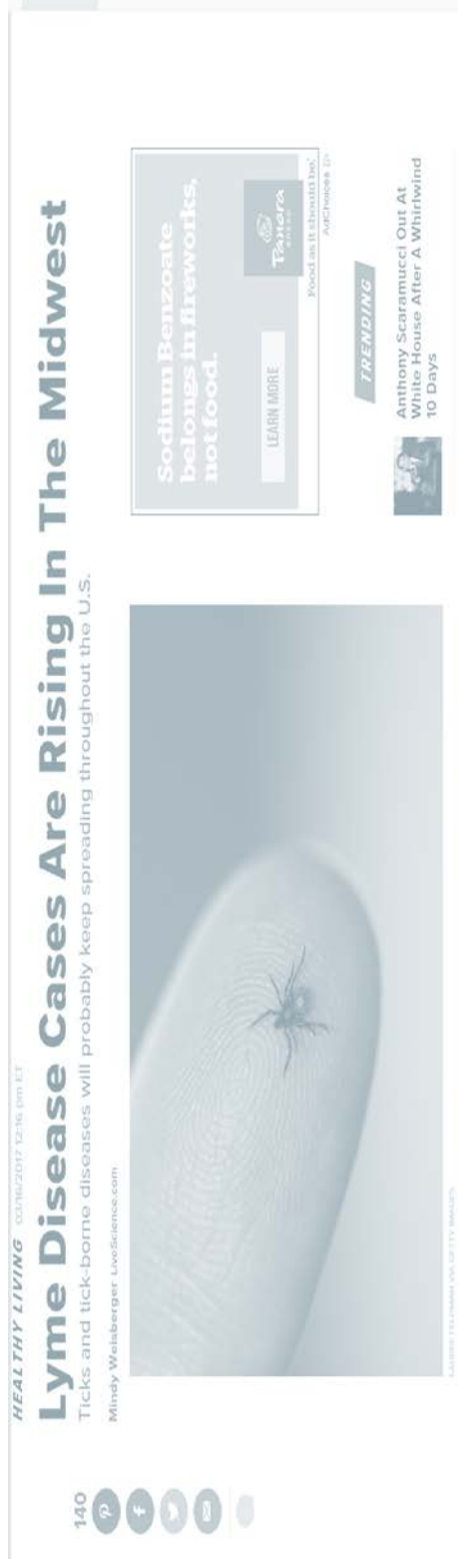
Abundant October to May

Seasonal Activity Of Deer Tick Life Stages



Public Health Importance

- 240,000–444,000 persons infected with Lyme Disease per year in the US¹
- 20,000–40,000 of confirmed and probable cases reported per year in the US²
- Estimated direct medical costs \$712 million–\$1.3 billion a year

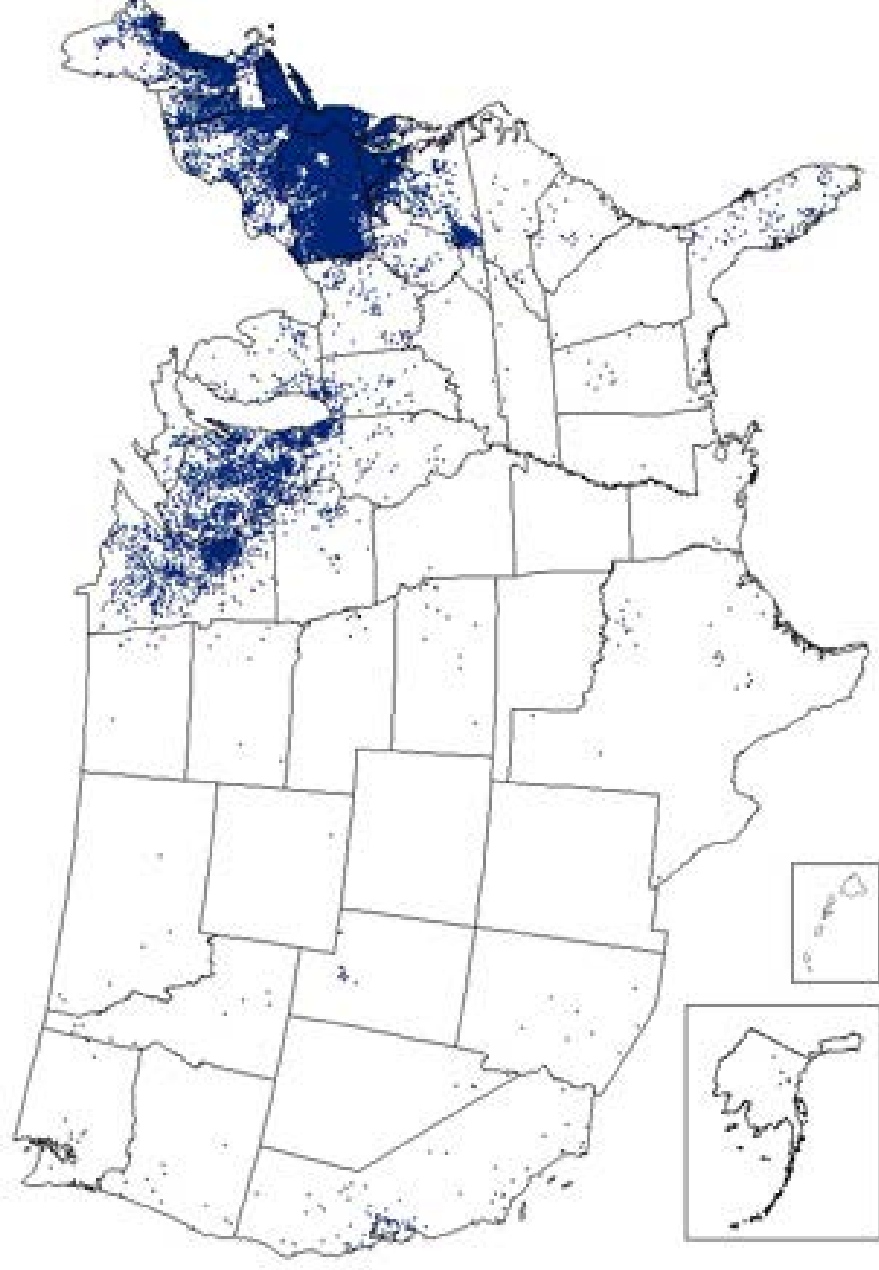


¹Hinckley L, et al. *Clinical Infectious Diseases*, Volume 59, Issue 5, 1 Sept 2014

²Schwartz AM, et al. Surveillance for Lyme Disease — United States, 2008–2015. *MMWR Surveill Summ* 2017.

Lyme Disease Epidemiology

Reported Cases of Lyme Disease—US, 2016

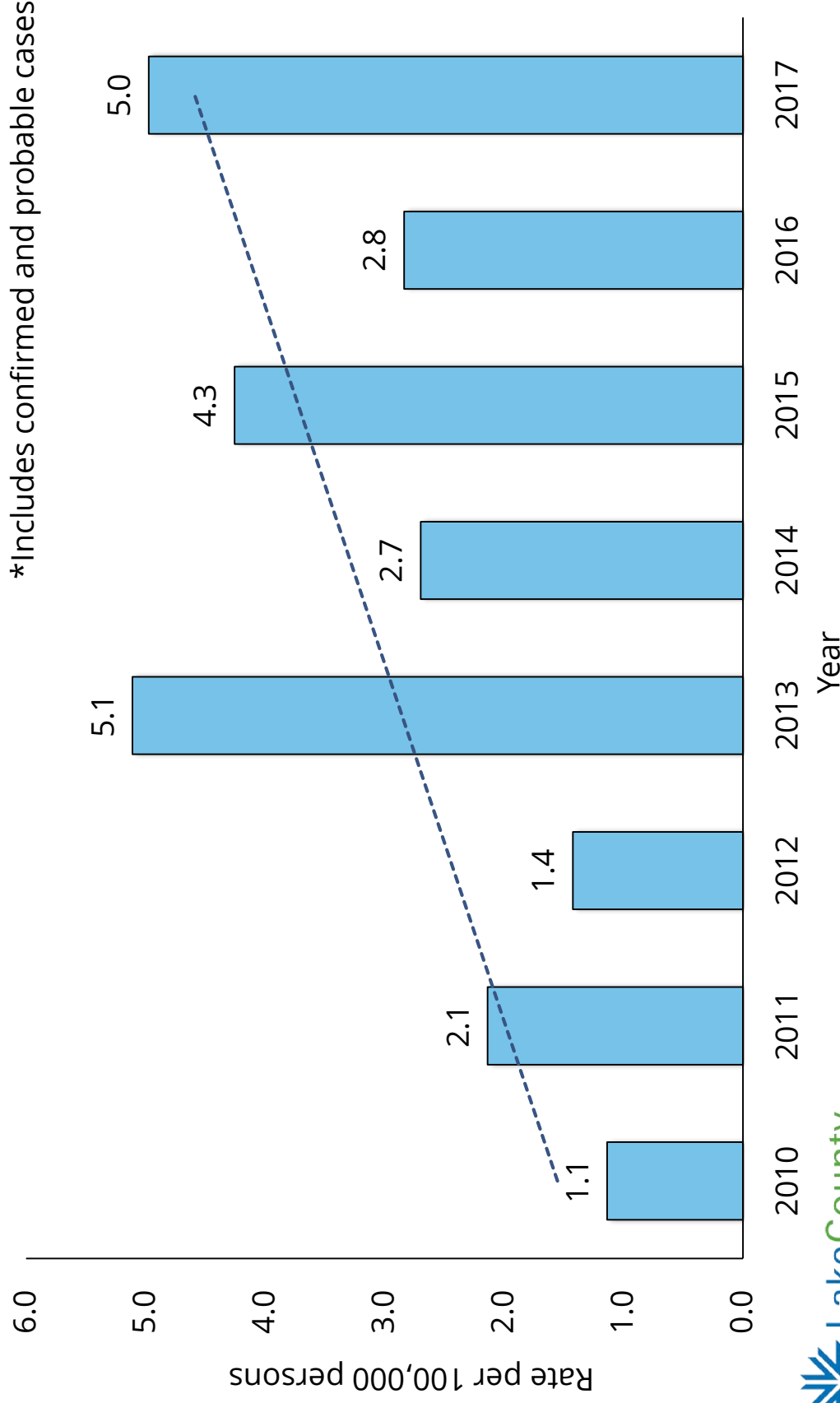


1 dot placed randomly within county of residence for each confirmed case

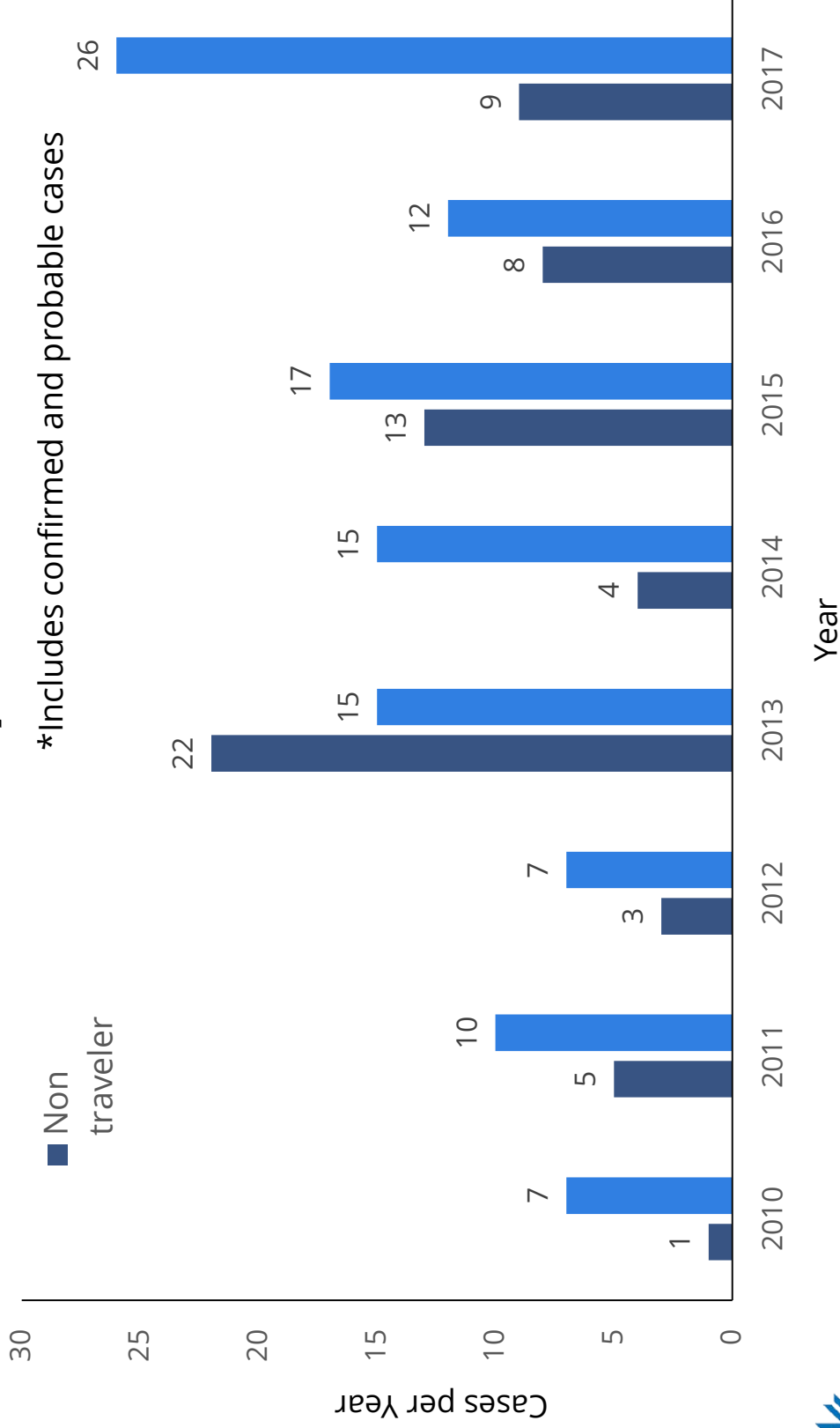
Lyme Disease Incidence Rates by State, 2006 and 2016

State	2006	2016	2014–2016 average
Incidence Rate (cases per 100,000 persons)			
Illinois	0.9	1.8	2.0
Indiana	0.4	1.9	1.7
Iowa	3.3	2.4	3.4
Wisconsin	26.4	26.0	22.0
Minnesota	17.7	23.6	20.5

Rates of Lyme disease* in Lake County, 2010–2017



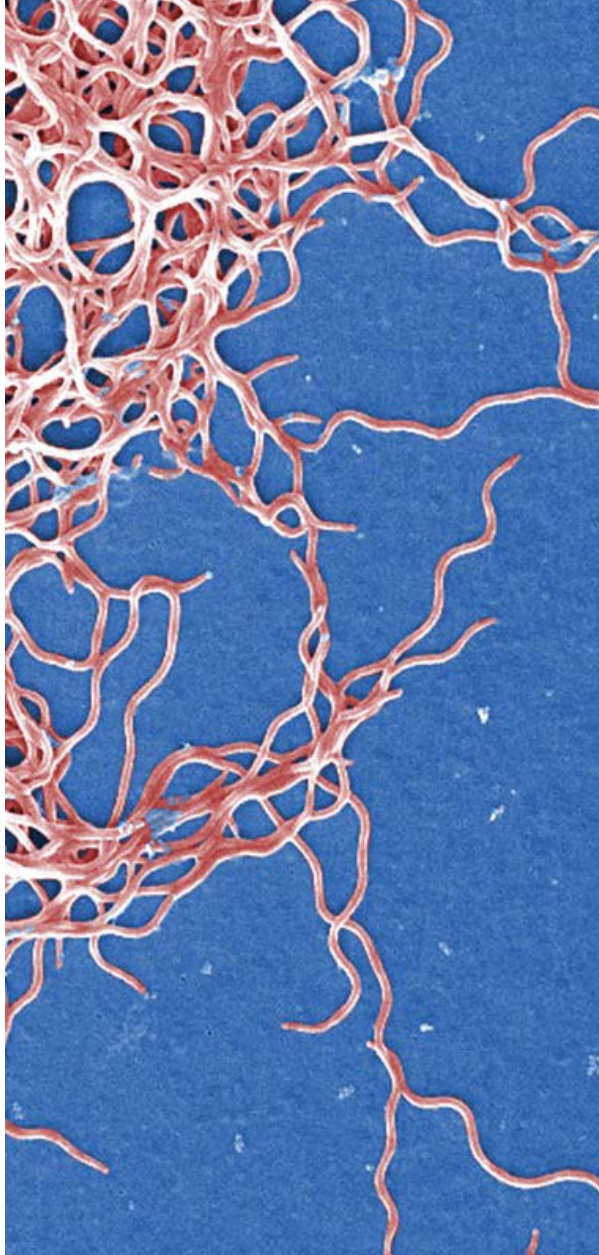
Cases of Lyme Disease among travelling vs. non-travelling Lake County residents, 2010-2017



Characteristics of Lyme disease cases among non-travelling Lake County residents, 2010–2017

- 60% of cases were male
- 30% of residents were >60 years old and 25% were < 20 years old
- 10 or more cases were reported among residents of Lake Forest and Waukegan

Lyme Disease



Credit: CDC/ Claudia Molins photo: Janice Haney Carr

- Caused by bacterium *Borrelia burgdorferi*
- Transmitted by bites from deer ticks
- most frequently reported vector-borne infection in US

Vectors



Clinical Manifestations



Early signs/symptoms:

Erythema migrans

- 70-80% of infected patients
- 3-20 days after tick bite
- Location of tick attachment
- Non-pruritic, “bulls-eye” appearance

Clinical Manifestations



<https://emedicine.medscape.com/article/1051695-overview>

Late signs/symptoms (days to months after tick bite):

- Carditis (inflammation of the heart)
- Facial palsy
- Meningitis, encephalitis
- Peripheral neuropathy
- Acrodermatitis chronica atrophicans
- Arthritis

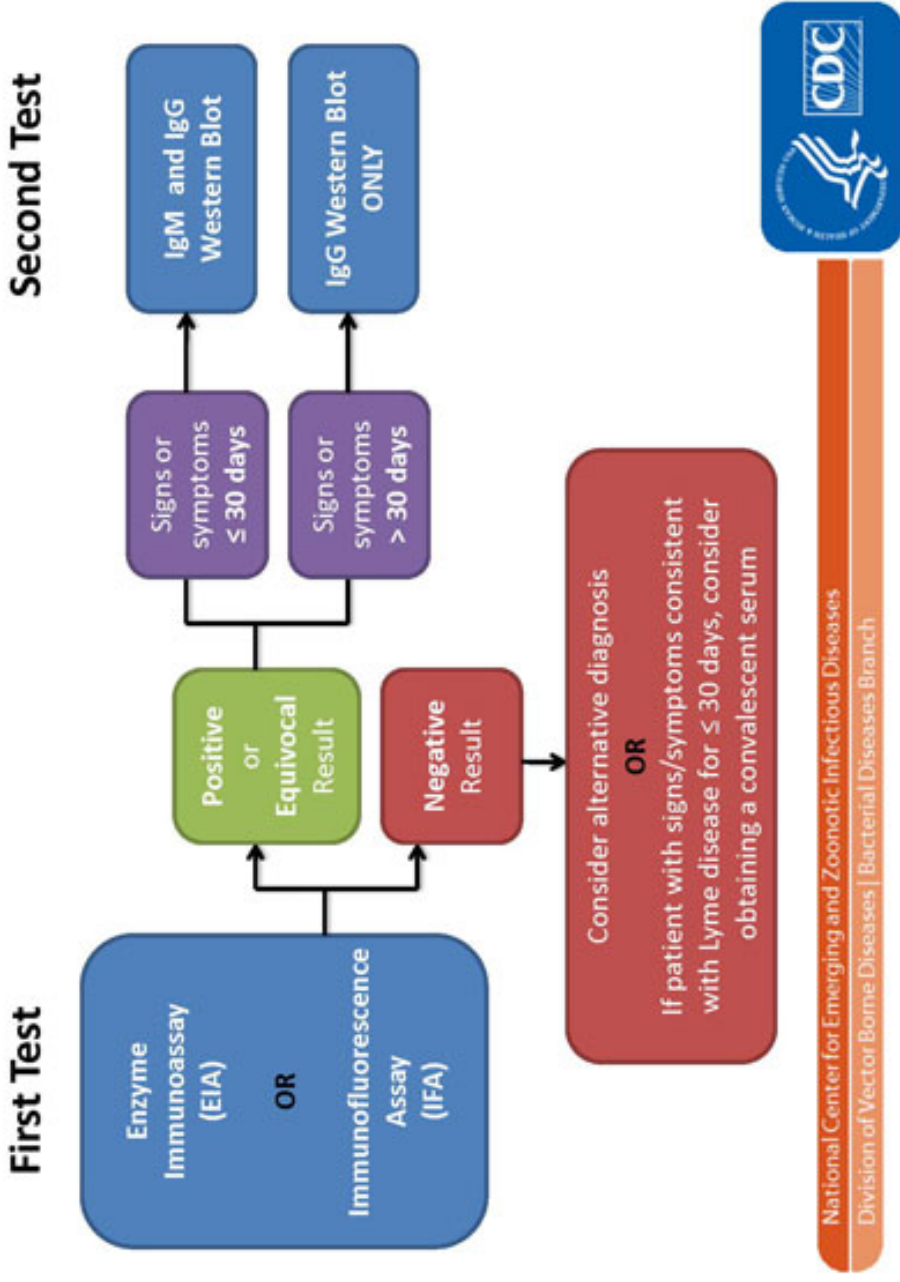
Post-Lyme Disease Syndrome

“Chronic Lyme Disease”

- No well-accepted definition
- No biologic evidence for the existence of symptomatic, chronic *B. burgdorferi* infection among patients after recommended therapy
- Antibiotic therapy has not proven to be useful and is not recommended for patients with chronic (>6 months) subjective symptoms after therapy.

Diagnostic Testing

Two-Tiered Testing for Lyme Disease



Treatment of Lyme Disease

Indication	Treatment	Duration of therapy, days (range)
Tick bite in US	Doxycycline single dose or and/or observation	---
Erythema migrans	Amoxicillin, doxycycline, cefuroxime axetil (oral)	14 (14–21)
Early neurologic disease: • Meningitis/radiculopathy • Cranial nerve palsy	Ceftriaxone, (parenteral) Oral regimen	14 (10–28) 14 (14–21)
Cardiac disease	Oral or parenteral regimen	14 (14–21)
Borrelial lymphocytoma	Oral regimen	14 (14–21)
Late disease: • Arthritis • Central/peripheral nervous system disease • Acrodermatitis chronica atrophicans	Oral regimen Parenteral regimen Oral regimen	28 14 (14–28) 21 (14–28)
Post-Lyme disease syndrome	Repeated courses antibiotics not recommended	



- IL/IN SeaGrant
- Ticks and mosquitoes
- Targeting outdoor professionals
 - Landscapers
 - Forest Preserve employees
 - Garden groups (i.e., Chicago Botanic Garden)
- One in Spanish



Vector-borne Diseases

- Mosquitoes
- Ticks
- Protecting Yourself
- Fly & Tell
- Keys

WOMEN



EXIT



12' 6"

Fight the Bite

Mosquito → West Nile Virus Deer Tick → Lyme Disease

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Lake County
Health Department and
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003079

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Prevention: Recommendations

- FIGHT THE BITE!
- Avoid wooded areas, tall grass, stay on trails
- Wear light-colored, full-sleeved, and long-pant clothing
- Tick “checks” and proper removal
- Protect pets
- Insect Repellents (always read labels!!)
 - DEET
 - Permethrin
- Landscaping

LakeCounty
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HealthDepartment



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