

Tickborne Disease Prevention in Schools and Communities



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Tickborne Diseases in Massachusetts

Lyme disease:

- *Borrelia burgdorferi* transmitted by blacklegged tick (*Ixodes scapularis*)
- Northeast and Upper Mid-west
- Non-specific “flu-like” early symptoms (chills, fever, muscle/joint aches, stiff neck, headache, swollen lymph nodes, etc.) and/ or presence of typical *erythema migrans* or atypical rash

Babesiosis:

- Caused by malaria-like parasite (*Babesia microti*) from blacklegged tick (*Ixodes scapularis*)
- Northeast and Upper Midwest
- Symptoms can take 1-6 weeks to present: fatigue, myalgia, chills, high fever, headache

Anaplasmosis:

- *Anaplasma phagocytophilum* transmitted by blacklegged tick (*Ixodes scapularis*)
- Other names: Human Granulocytic Erlichiosis or Human Granulocytic Anaplasmosis
- Typical symptoms: fever, headache, chills, night sweats, myalgia

Borrelia Miyamotoi disease (BMD)

- Closely related to *Borrelia burgdorferi* bacteria and transmitted by blacklegged tick
- Symptoms; Fever with headache, myalgia, fatigue
- Cases first reported in Japan in 1995; then reported in Russia 2011; USA 2013.

Deer Tick Virus/Powasson

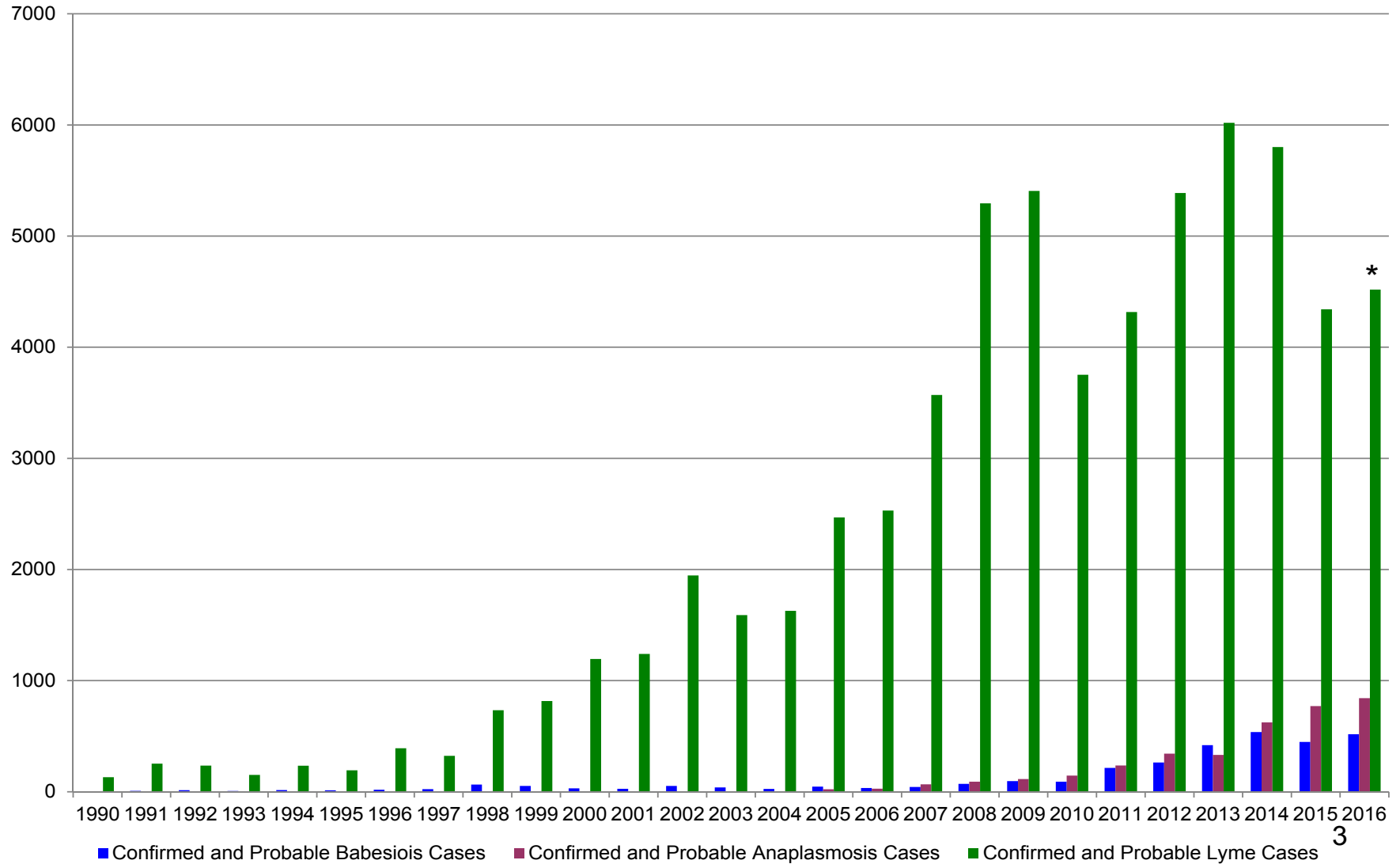
- Transmitted by blacklegged tick
- Isolated in 1997 from deer ticks in MA and CT
- Reportable in MA since 2013

Surveillance and Reporting

Lyme Disease in Massachusetts: A Report Issued by the Special Commission to Conduct an Investigation and Study of the Incidence and Impacts of Lyme Disease (Feb. 28, 2013)

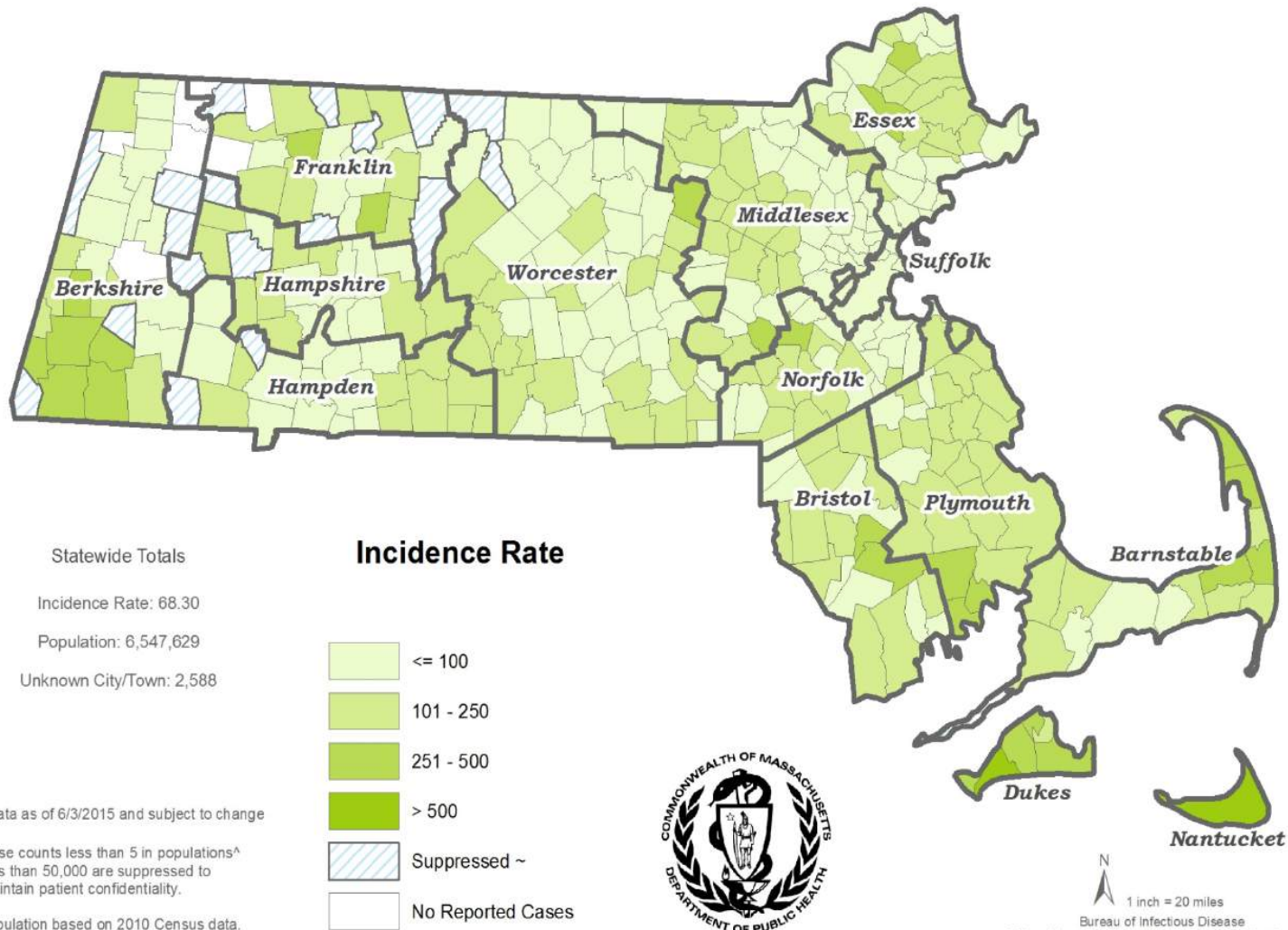
- “The scourge of Lyme Disease in the Commonwealth has been described as having reached epidemic proportions and as endemic to all Massachusetts.”
- “Regions of particularly high incidence include Cape Cod and the Islands, as well as some areas in Norfolk, Middlesex, Essex and southern Berkshire counties.”
- “Incidence of tick borne disease (Lyme disease and co-infections) is on the rise, both numerically and geographically...MA ranks among the most highly endemic states...”
- Cost of Lyme disease in MA: millions of dollars lost in employee absences; hundreds of school children miss school; millions of dollars spent in medical care.
- MDPH estimates 5-10 fold under reporting for Lyme Disease
- CDC – true prevalence of Lyme disease underestimated by a factor of 10.

Confirmed and Probable Cases of Lyme Disease, Anaplasmosis and Babesiosis by Year, Reported to MDPH



Update: Tickborne Disease Surveillance in Massachusetts (2017) Catherine M. Brown, DVM, MSc, MPH, Deputy State Epidemiologist & State Public Health Veterinarian, MDPH

Incidence Rates (per 100,000 population[^]) for Confirmed and Probable Lyme Disease in Massachusetts 2010-2014*



Update: Tickborne Disease Surveillance in Massachusetts (2017) Catherine M. Brown, DVM, MSc, MPH, Deputy State Epidemiologist & State Public Health Veterinarian, MDPH

Tickborne Diseases are Preventable!

Our challenge:

*We know how to prevent these diseases;
we need to get people to do prevention.*

Health Belief Model: emphasizes people must

- (1) believe they are susceptible to the disease;
- (2) believe the disease has potentially significant adverse consequences for their well-being;
- (3) believe that preventive behavior is effective;
- (4) believe they have the ability to engage in the preventive behaviors.

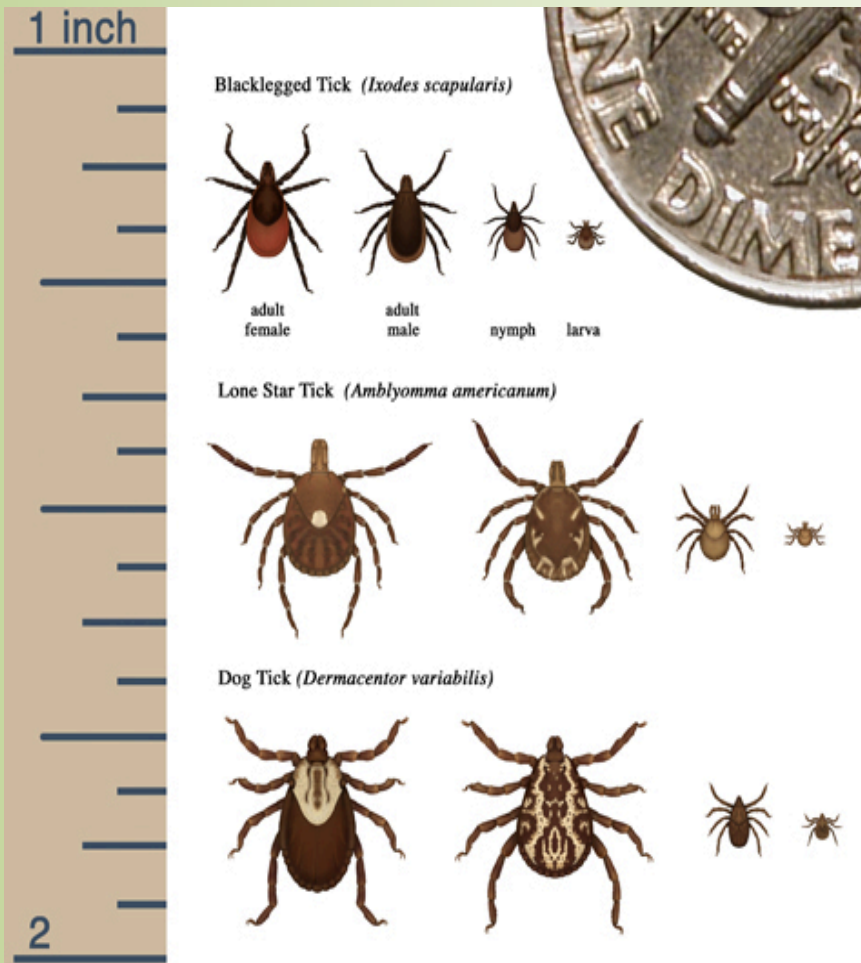
(Lyme Disease in Massachusetts, p.30)

Prevention Education in Schools and Communities

What information do individual residents, students in our care and their families need to know about tickborne diseases?

- Tick information: appearance and life cycle
- Risky times to be bitten
- Risky activities
- Symptoms of diseases
- Diagnosis
- Treatment
- Personal protection strategies
- Personal advocacy with healthcare providers

Tick Appearance & Size Comparison



California Department of Public Health

www.cdc.gov/ticks

Nymph Ticks

**It is Spring time and TICKS are hatching...
this is the size of tick you have to watch out for!**



For more important information, please go to www.coflyme.com

Engorged Deer Tick

Risk of infection *may* be high for a partly or fully engorged tick:

- 30% for a nymphal tick
- 60% for an adult tick (though usually lower)

Infected tick + engorged tick =
Infection highly likely

(*Tick Management Handbook*, State of Connecticut)



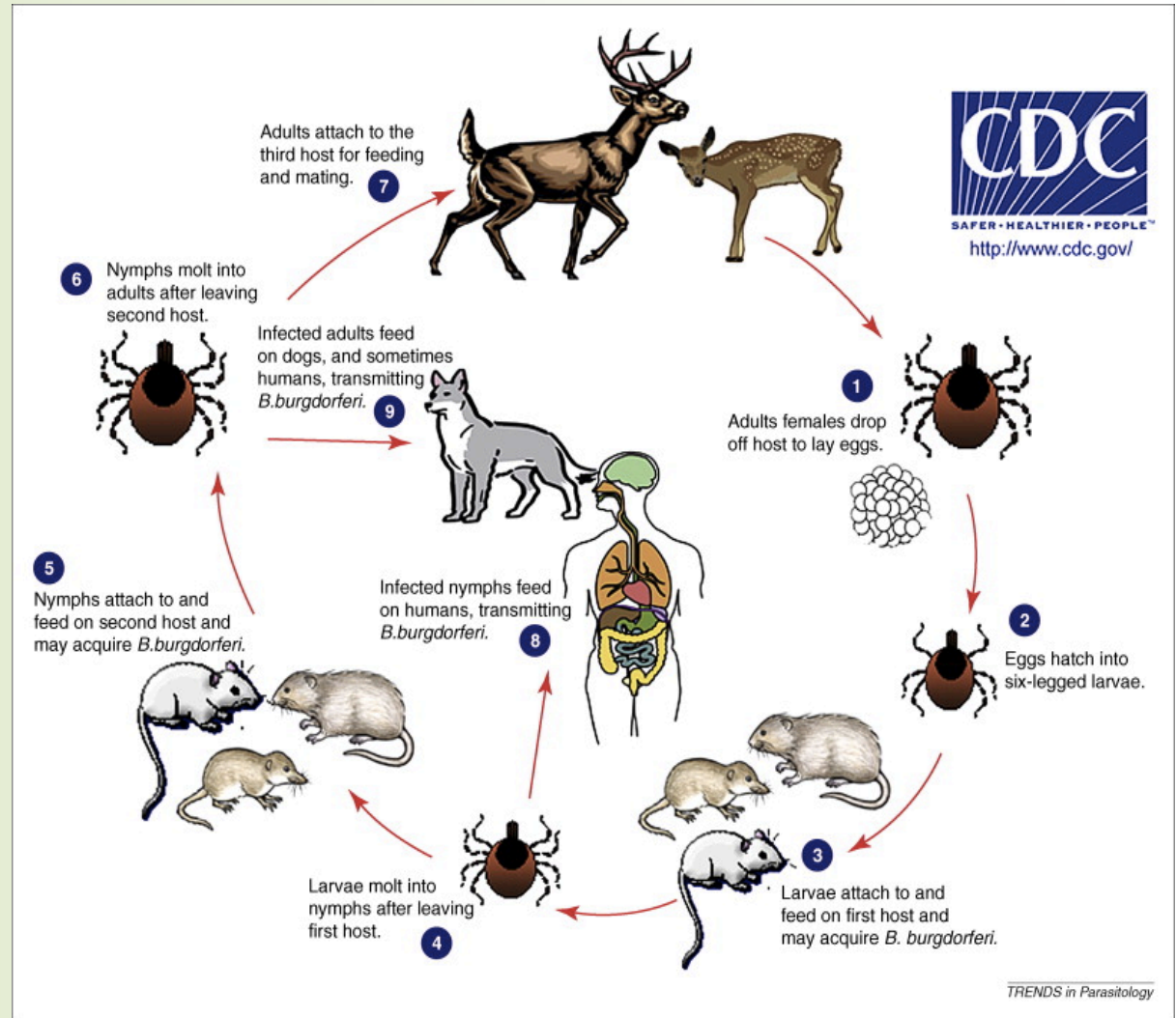
www.path.sunyb.edu/labs/ticpics



www.health.Westchestergov.com/tick-borne-diseases/deer-tick-identification

Deer Tick Life Cycle

- 2 year life cycle
- 4 Stages:
 - Eggs
 - Larvae
 - Nymphs
 - Adults
- 2 blood meals required for adulthood



Risky Times and Activities

Risky Times:

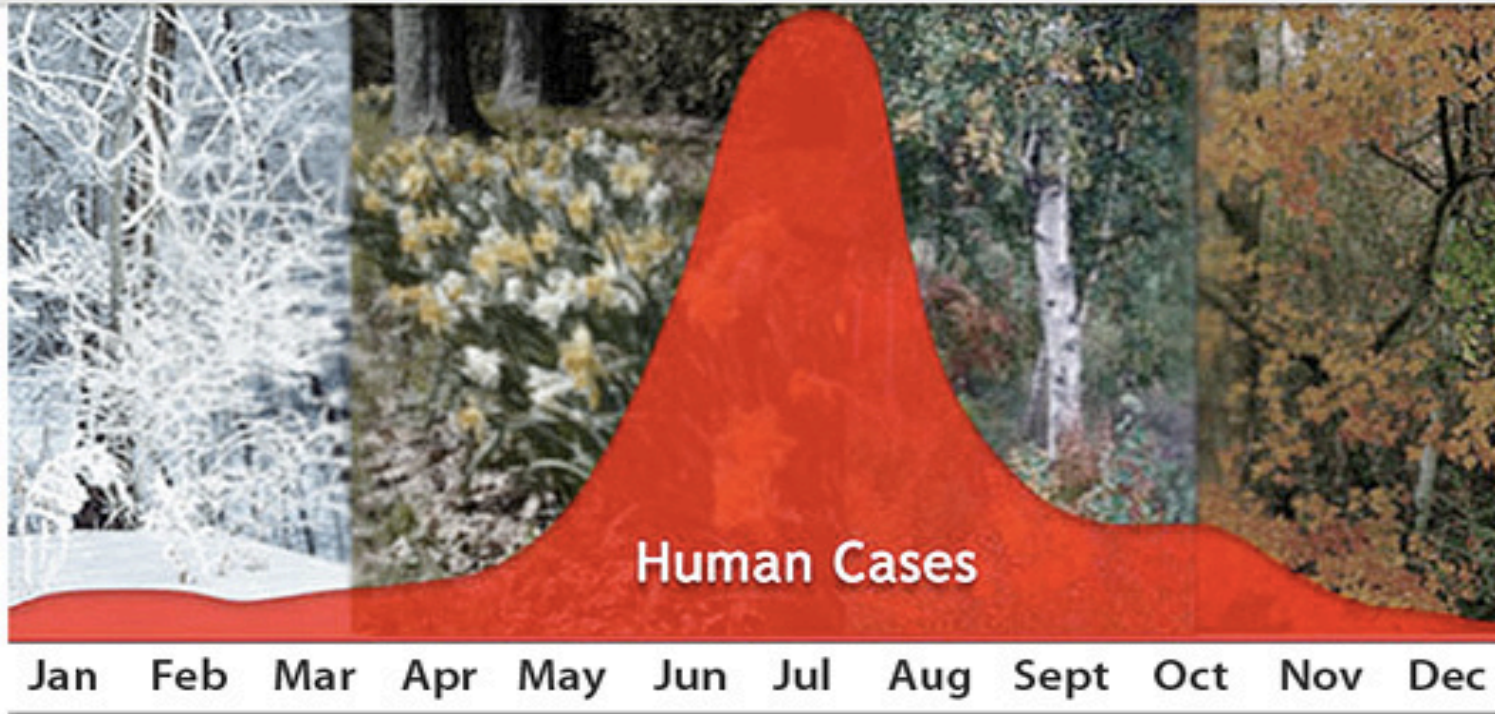
- Ticks active all year with right temperature (>32 degrees) and humidity (85% at level of vegetation)
- Nymph Feeding Stage: May – August
- Adult ticks most active during Spring and Fall

Avoid:

- Wooded, bushy, moist, and grassy areas
- Off trail walking
- Shaded areas
- Leaf litter
- Sitting on stone walls or logs near high grass or weeds



Seasonal Pattern Of Lyme Disease Cases



Seasonal Activity Of Deer Tick Life Stages

Diagnosis: Anaplasmosis

Incubation Period: 1–2 weeks

Signs and Symptoms:

- Fever, shaking, chills
- Severe headache
- Malaise
- Myalgia
- Gastrointestinal symptoms (nausea, vomiting, diarrhea, anorexia)
- Cough
- Rash (rare cases)

Laboratory Confirmation:

- Detection of DNA by PCR of whole blood. This method is most sensitive during the first week of illness; sensitivity may decrease after administration of antibiotics.
- Demonstration of a four-fold change in IgG-specific antibody titer by indirect immunofluorescence antibody (IFA) assay in paired serum samples. Antibodies to *A. phagocytophilum* are usually detectable within 7–10 days after illness onset.

(CDC-Tickborne Diseases of the United States- A Reference Manual for Health Care Providers, Fourth Edition, 2017)

Diagnosis: Babesiosis

Incubation Period: 1–9+ weeks

Signs and Symptoms:

- Fever, chills, sweats
- Malaise, fatigue
- Myalgia, arthralgia, headache
- Gastrointestinal symptoms, such as anorexia and nausea
(less common: abdominal pain, vomiting)
- Dark urine
- Less common: cough, sore throat, emotional lability, depression, photophobia, conjunctival injection. Mild splenomegaly, mild hepatomegaly, or jaundice may occur in some patients

Laboratory Diagnosis

- Identification of intraerythrocytic Babesia parasites by lightmicroscopic examination of a peripheral blood smear; **or**
- Positive Babesia (or *B. microti*) polymerase chain reaction (PCR) analysis; **or**
- Isolation of Babesia parasites from a whole blood specimen by animal inoculation (in a reference laboratory).

(CDC-Tickborne Diseases of the United States- A Reference Manual for Health Care Providers, Fourth Edition, 2017)

Diagnosis: Lyme Disease

STAGE 1 (early localized Lyme disease)

- Occurs 1 – 30 days post tick bite
- **Erythema migrans:** occurs in 2/3 of patients with LD; develops on average 7 days after bite at or near site of bite; may be bull's eye rash or uniform color in appearance; untreated may persist for 2-3 weeks.
- **Flu-like symptoms:** occurs within days to one week; low grade fever, fatigue, myalgia, arthralgia, headache, neck stiffness; may resolve spontaneously.

STAGE 2 (early disseminated LD)

- develops 2-10 weeks after inoculation
- Approximately 25% of patients infected with *B burgdorferi* have signs and symptoms of disseminated disease at presentation.
- **Musculoskeletal:** intermittent inflammatory arthritis involving knee, ankle, wrist; occurs within 6 months of erythema migrans lesion; untreated episodes last approximately 1 week; recurrences involving > one joint may occur every few months; recurrent episodes usually lessen in severity and usually resolve over 10 year period.
- **Neurologic:** reported in 5-20% of cases; clinical facial neuropathy (Bell palsy) in 3% of cases; meningitis (headache – waxes and wanes; mild to severe; neck pain or stiffness); photophobia).
- **Cardiac:** palpitations, chest pain, or shortness of breath.
- **Cutaneous:** multiple erythema migrans lesions – small papules (1-5 cm) and oval-shaped.

Lyme Disease -- Erythema migrans



- Estimated that 60-80% of Infected persons have a rash – not always a bull's eye rash.
- Begins at or near site of tick bite after an average of 7 days
- May have diameter of 2-6 inches and lasts for about 3-5 weeks.
- Usually feels warm to the touch, but is rarely itchy or painful
- Sometimes leads to multiple rashes in later stages of disease

Diagnosis: Lyme Disease

STAGE 3 (late or chronic Lyme disease)

- Occurs months to years after initial infection; may occur after a period of latency.
- Most patients do not have a history of erythema migrans lesion; important to check history of Bell palsy, aseptic meningitis, arthritis, peripheral neuropathy, cognitive dysfunction.
- **Rheumatologic:** Hallmark of Stage 3 involves large joints (knee involved 90% of time); arthritis must be differentiated from early presenting arthralgia.
- **Neurologic:** Both central and peripheral nervous systems: subacute encephalopathy, chronic, progressive encephalopathies, late axonal neuropathies, fibromyalgia symptoms, radicular pain from acute disc disease.
- **Cardiac:** Conduction abnormalities; myocarditis, pericarditis
- **Neuropsychiatric:** Decreased concentration and short-term memory loss; anxiety; depression; sleep disorders; irritability.

(<https://emedicine.medscape.com>. Updated June 29, 2017)

(CDC-Tickborne Diseases of the United States- A Reference Manual for Health Care Providers, Fourth Edition, 2017)

Lyme Disease Controversy

There has been controversy regarding the clinical presentation, diagnosis and treatment of Lyme disease (LD) for more than a decade by two medical infectious disease organizations.

Infectious Diseases Society of America (IDSA) believes that Lyme disease is:

- a rare illness localized to well-defined areas of the world;
- easily diagnosed in early stage by distinctive clinical features and in later stages by accurate commercial laboratory tests.
- Effectively treated by short course of antibiotics (2-4 weeks).

International Lyme and Associated Diseases Society (ILADS) believes that:

- not rare due to its spread by rodents, deer and birds and found around the world.
- tick bites go unnoticed and available commercial lab testing is inaccurate.
- disease goes unrecognized and may persist in patients due to persistent infection with invasive Lyme spirochete.
- prolonged antibiotic treatment may be beneficial in eradicating a chronic infection.

In 2016, the National Guidelines Clearinghouse, a federal database that provides treatment guidelines for health practitioners, removed the IDSA treatment guidelines from its website. The CDC provides antibiotic guidelines for (early) localized Lyme disease and disseminated (late) Lyme disease. The National Institutes of Health continues to do research on “chronic” Lyme disease.

<https://www.cdc.gov/lyme/treatment/index.html>

<https://www.medscape.com> --Chronic Lyme Disease and the “Axis of Evil”. Raphael B. Stricker & Lorraine Johnson. *Future Microbiology*, 2008)

Treatments

Anaplasmosis

Adults and Children weighing < 100 lbs: Doxycycline x 10-14 days

Babesiosis:

Adults and Children: Atovaquonex 7-10 days + Azithromycin x 7-10 days

OR

Clindamycin x 7-10 days + Quinine x 7-10 days

Lyme Disease

Adults and Children: Doxycycline x 14-21 days

Cefuroxime axetil x 14-21 days

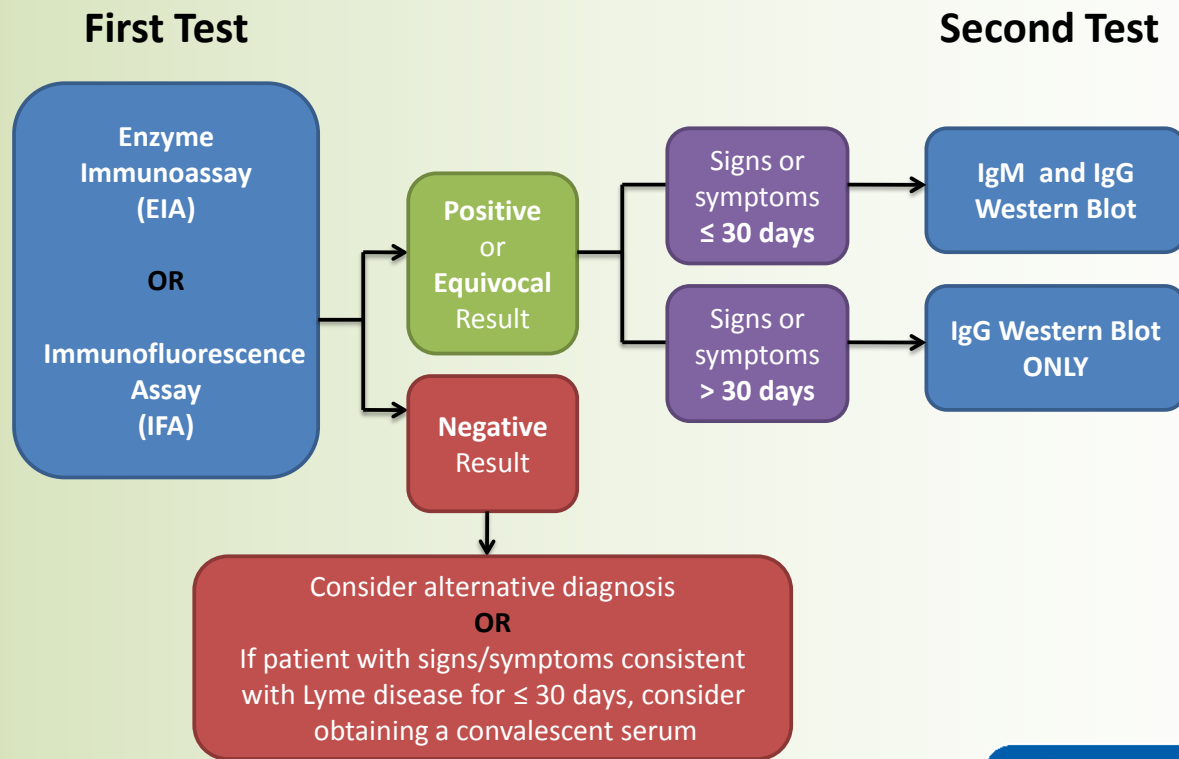
Amoxicillin x 14-21 days

Azithromycin (children who can't tolerate other antibiotics)

(CDC-Tickborne Diseases of the United States- A Reference Manual for Health Care Providers, Fourth Edition, 2017)

Laboratory Diagnosis – Lyme Disease

Two-Tiered Testing for Lyme Disease



Prophylaxis Treatment of Lyme Disease

The Infectious Disease Society does not generally recommend antimicrobial prophylaxis for prevention of Lyme disease after a recognized tick bite but approves offering a single dose **doxycycline 200 mg.** within **72 hours** for adults and children ≥ 8 yrs. of age (4 mg/kg up to 200 mg) when all of the following conditions exist:

- Attached tick can be reliably identified as an adult or nymph *I. scapularis* tick estimated to have been attached > 36 hours by degree of engorgement or certainty about time of exposure
- Prophylaxis can start within 72 hours of tick removal
- Rate of local infection with *B. burgdorferi* is > 20%
- Doxycycline is not contraindicated
- Lyme disease is common in the county or state where patient lives or has recently traveled, (i.e., CT, DE, MA, MD, ME, MN, NH, NJ, NY, PA, VA, VT, WI)

Prophylaxis not recommended as a means to prevent anaplasmosis or babesiosis.

(CDC – Tick Bite Prophylaxis; updated May 2017)

Personal Protection

- **Minimize exposure** to tick-infested areas
- **Wear protective clothing**
 - Light-colored; long-sleeved shirt, long pants
 - Tick repellent clothing
 - Tuck pants into socks
- **Use repellents** – best to do both
 - **Permethrin** on clothing
 - **DEET** (30-40% concentration) on skin; Might prevent tick attachment but not deter tick from walking to unexposed or untreated area; effective for one to several hours.
- **Shower** soon after outdoor activity
- **Clothes in hot dryer** x 15 minutes
- Perform **Tick Checks**
- Safely **remove ticks** (Use tweezers for embedded; duct tape for clothes/skin)
- Treat and **check pets**

Tick Checks

Check daily:

Inside and behind ears

Along hairline

Back of neck

Armpits

Belly button

Groin


Legs

Behind knees

Between toes

Ticks are tiny –look for new “freckles”.

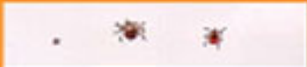
Is there a tick on you?
Do a tick check!



Here's where to look:

- Inside and behind the ears
- Along your hairline
- Back of your neck
- Armpits
- Groin
- Legs
- Behind the knees
- Between your toes

Ticks are tiny, so look for new "freckles."



Actual sizes of nymph (left), adult female dog tick (center) and adult deer tick (right)

Tick Check Shower Cards



URI Tick Resource Center- www.tickcounter.org

Tick Removal



How to remove a tick

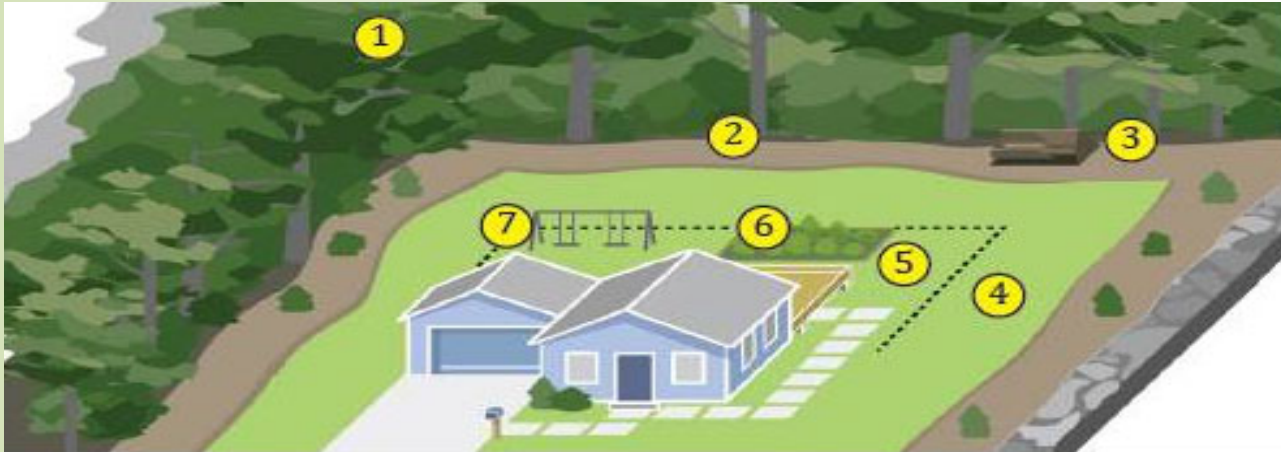
- Use fine-tipped tweezers to grasp the tick as close to the skin's surface as possible.
- Pull upward with steady, even pressure. ...
- After removing the tick, thoroughly clean the bite area and your hands with rubbing alcohol, an iodine scrub, or soap and water.

(https://www.cdc.gov/ticks/removing_a_tick.html)



Personal Property Protection

Landscaping a Tick Safe Zone



- | | | |
|----------|----------------------------|-----------------------------------------------------------------------------------------------------------|
| 1 | Tick zone | Avoid areas with forest and brush where deer, rodents, and ticks are common. |
| 2 | Wood chip barrier | Use a 3 ft. barrier of wood chips or rock to separate the "tick zone" and rock walls from the lawn. |
| 3 | Wood pile | Keep wood piles on the wood chip barrier, away from the home. |
| 4 | Tick migration zone | Maintain a 9 ft. barrier of lawn between the wood chips and areas such as patios, gardens, and play sets. |
| 5 | Tick safe zone | Enjoy daily living activities such as gardening and outdoor play inside this perimeter. |
| 6 | Gardens | Plant deer resistant crops. If desired, an 8-ft. fence can keep deer out of the yard. |
| 7 | Play sets | Keep play sets in the "tick safe zone" in sunny areas where ticks have difficulty surviving. |

Based on a diagram by K. Stafford, Connecticut Agricultural Experiment Station

Tickborne Diseases: School Focus

The *Massachusetts Lyme Disease report (2013)* cites schools as important sites for education of students and families in tickborne disease prevention:

- **Key role of School Nurses**
- Train new generation to protect themselves
- Parent/Caregiver education: newsletter articles, brochures, tick identification cards
- Prevention Posters around school – “Tick Check” reminders
- Classroom/assembly presentations
- Tick removal in school health office - send home tick and info with student
- Field trip notices about personal protective measures
- Also --Preschool, Day Care centers, After school programs
- Collaboration with local BOHs and Public Health Nurses

Identifying Lyme Disease in Schools

How a child or adolescent with undiagnosed Lyme Disease might present to the School Nurse:

- Frequent headache
- Rash: Bulls eye or other
- Bell palsy
- Joint pain, twitching, muscle aches
- Dizziness, disorientation
- Sleep disturbance
- Sensitivity to sound, light, other stimulation
- Gastrointestinal symptoms
- Vision problems
- Depression, anxiety, mood swings
- Severe PMS
- Profound fatigue

Reference 2005 Sandy Berenbaum, LCSW BCD, Family Connections Center for Children, www.lymefamilies.com

Community Education

- ***“Lyme Disease Awareness Month”*** activities (May)
- Public Forums
- Resource materials in public places:
 - libraries, stores, town halls, senior centers, town meetings, town day celebrations/parades, elections, summer camps, doctors’ offices and clinics
- Public Media:
 - town websites, local newspapers, town clubs’ newsletters, local cable TV, recreation department brochures
- Tick warning trail signs on trails and conservation lands
- Training for DPW and Conservation workers
- Local Town or Regional Tick Task Forces

Tickborne Diseases Resources

Centers for Disease Control and Prevention:

www.cdc.gov/ticks/tickbornediseases/index.html

Massachusetts Department of Public Health:

www.mass.gov/eohhs/gov/departments/dph/programs/id/epidemiology/ticks

University of Rhode Island- Tick Resource Center:

www.tickencounter.org

Massachusetts Health Promotion Clearinghouse (Tick identification cards, pamphlets, posters)

<http://massclearinghouse.ehs.state.ma.us/category/MNT.html>

Lyme Disease Association:

<https://www.lymedisease.org>

Infectious Diseases Society of America

www.idsociety.org

International Lyme and Associated Diseases Society

www.ILADS.org