Quick background

 LYME DISEASE: most common vector-borne disease in the US\textsuperscript{1}

 VECTOR: ticks
 Ixodes scapularis (AKA blacklegged or deer tick)

 PATHOGEN: Borrelia burgdorferi

1. (CDC MMWR, 2013; Steer et al. 2004)
How do ticks sense their environment?

Unlike insects, ticks have no antennae.

Ticks sense their environment with sensory organs on their legs and palps.

They can detect heat, CO₂, movement, and other ticks.
How do ticks feed?

Ticks will search the host for an appropriate attachment site

- Typically the hairline, behind the ears, armpits, groin, behind knees, waistline
How do ticks find their prey?

- Ticks of concern find their prey by “questing”
- Ticks climb onto vegetation to await a passing animal often along animal and man-made trails
- They may also crawl short distances in response to CO2
- Ticks DO NOT jump, fly, or drop onto people from trees
Two most common ticks in Michigan

**Dermacentor variabilis** (American dog tick or wood tick)
- Most common tick in Michigan
- Vector: Rocky Mountain spotted fever

**Ixodes scapularis** (blacklegged tick)
- Smaller size than *D. variabilis*
- Vector: Lyme disease, anaplasmosis, babesiosis, deer tick virus, *Ehrlichia muris*-like
What is the Blacklegged tick life cycle?

Spring: Egg

Early Summer: Larvae

Next Spring/Summer: Nymph

Fall/Next Spring: Adult

Immature ticks feed primarily on small mammals. These mammals are the primary reservoir of Lyme disease.

People become unwilling participants by recreating or working in tick infested habitats.

White-tailed deer do not cycle the disease.
Blacklegged tick nymphs

Nymphs are the stage most responsible for the majority of Lyme disease illness in the United States. This is due to:

- Small size
- First infectious stage
- Active during peak outdoor recreation periods in the NE and Upper Midwestern U.S.
Lyme Disease Cases by Region and Year
2012-2016
Lyme cases by region by year

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<th>Region</th>
<th>2012</th>
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<th>2014</th>
<th>2015</th>
<th>2016</th>
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<td>85</td>
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Blacklegged ticks and risk for Lyme disease are emerging in Michigan

Tick populations are affected by:
- Local temperature
- Precipitation
- Soil type
- Drainage
- Host species
- Land use/cover

70% of infected persons have Erythema migrans (EM) rash

- Begins at the site of a tick bite after a delay of 3 to 30 days
- Expands gradually
- "Bull’s-eye" appearance
### Erythema migrans/Bullseye Rash (physician diagnosed at least 5cm in diameter)?

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>Percent</th>
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<tr>
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<td>331</td>
<td>46.0%</td>
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<tr>
<td>Unknown</td>
<td>49</td>
<td>6.8%</td>
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### Does the patient recall a recent tick bite?

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>Percent</th>
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<tbody>
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<td>38.5%</td>
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<tr>
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<td>8.2%</td>
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Symptoms 3 to 30 days after tick bite include:

- Fever
- Chills
- Headache
- Fatigue
- Muscle and joint aches
- Swollen lymph nodes
Weeks to months after infection

- Pain and swelling in the large joints
- Facial or Bell's palsy
- Shooting pains that may interfere with sleep
- Severe headaches and neck stiffness due to meningitis
- Heart palpitations and dizziness
If not appropriately treated:

- intermittent bouts of arthritis, with severe joint pain and swelling
- chronic neurologic complaints:
  - shooting pains
  - numbness or tingling in the hands or feet
  - problems with short-term memory
Some symptoms may persist even after treatment

❖ muscle and joint pains
❖ cognitive defects
❖ sleep disturbance
❖ fatigue
Who does tick-borne disease affect?

Anyone **working or recreating in forested or forest-edge habitats**, including:

- Man-made trail systems
- Trails used by animals
- Campgrounds
- Brushy or grassy areas near buildings or yards
- Wooded river banks

MSPS member, Matthew Dontz, with son Tyler - a future member!
The most important factors in preventing Lyme disease are:

1. Knowing where ticks can be encountered
2. Preventing tick bites
3. Removing ticks promptly if they do bite
4. Seeking prompt medical care if illness occurs after exposure to ticks
Preventing tick bites

- Wear light-colored clothing with a tight weave so ticks can be spotted easily.
- Wear closed-toe shoes, long pants, and a long sleeved shirt. Tuck pant legs into socks or boots and shirt into pants.
- Check clothes and any exposed skin frequently for ticks.
- Avoid sitting directly on the ground, fallen logs, or stone walls.
Personal protective measures

EPA-approved skin repellents:
DEET (20-30%), Picardin, oil of lemon eucalyptus

EPA-approved clothing repellent:
Permethrin
Preventing tick bites

- Remove ticks from your clothes before going indoors.
- To kill ticks that you may have missed, wash your clothes with hot water and **dry them** using high heat for at least one hour.
- Perform daily tick checks after being outdoors, even in your own yard. Inspect all parts your body carefully, including your armpits, scalp, and groin.
Removing blacklegged ticks promptly can help prevent Lyme disease!

Probability of Lyme disease transmission by blacklegged tick nymphs over time

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des Vignes et al., 2001. Effect of tick removal on transmission of *Borrelia burgdorferi* and *Ehrlichia phagocytophila* by *Ixodes scapularis* nymphs. JID
What should I do if I’m bitten by a tick?

If a tick is attached to you, use fine-tipped tweezers or similar tool to grasp the tick at the surface of your skin.

Pull the tick straight up and out. Don’t twist or jerk the tick—this can cause the mouth parts to break off and stay in the skin. If this happens, remove the mouth parts with tweezers if you can. If not, leave them alone and let your skin heal.

Clean the bite and your hands with rubbing alcohol, an iodine scrub, or soap and water.

You may get a small bump or redness that goes away in 1-2 days, like a mosquito bite. This is not a sign that you have Lyme disease.
How to remove a tick?

Use tweezers and just pull out from closest point of attachment to body and try not to leave mouthparts in, which could lead to a secondary infection.

Then wash area with soap & water and apply antiseptic.
At the end of the day, also check your dog, cat, and horse companions!
Expert tick identification is available at a number of state agencies. Place the tick in a small vial containing a damp piece of tissue or piece of grass and submit it to the appropriate agency, following the guidelines for tick identification and testing found at: www.michigan.gov/lyme.

This service is free to the public for ticks removed from residents in Michigan.
Looking for a bull's-eye rash? Look again – erythema migrans can take many forms.

**Actual Size Comparison**
- Blacklegged (Deer) Tick
- American Dog (Wood) Tick
- Lone Star Tick

**Tick removal tips**
- Remove as quickly as possible
- Use tweezers to grasp the head close to the skin
- Pull gently
- Use soap and water, or antiseptic on the bite
- Preventing tick bites

**Ticks and Your Health**
Preventing tick-borne illness in Michigan

More resources available online

[www.michigan.gov/lyme](http://www.michigan.gov/lyme)  [www.cdc.gov/lyme](http://www.cdc.gov/lyme)