

# Understanding Lyme Disease

## Signs, Symptoms and Prevention

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9th Grade Workbook



**GLOBAL LYME ALLIANCE**  
Conquering Tick-borne Disease through Research & Education

[www.GloballymeAlliance.org](http://www.GloballymeAlliance.org)



## INTRODUCTION

**Lyme disease** is a very serious illness that is **transmitted through the bite of the Blacklegged tick**, also known as the deer tick. Lyme disease was first discovered in Lyme, Connecticut. This guide will offer some information about the Blacklegged tick, how people contract Lyme disease, what the signs and symptoms are, and important outdoor safety tips that can help you stay healthy.

Ticks are fascinating and resilient creatures – they have been crawling the earth for **millions of years**. There are about **900 species of ticks in the world, and over 90 of those live in the continental U.S.\*** But not all ticks carry Lyme disease.

**Note the difference in appearance of the Blacklegged (deer) tick compared to these other common ticks.**



**LONE STAR TICK**  
(*Amblyomma americanum*)



**BROWN DOG TICK**  
(*Rhipicephalus sanguineus*)



**AMERICAN DOG TICK**  
(*Dermacentor variabilis*)



**WESTERN BLACKLEGGED TICK**  
(*Ixodes pacificus*)



**EASTERN BLACKLEGGED (DEER) TICK**  
(*Ixodes scapularis*)

Not actual size (these are enlarged photos). Nymphal ticks are actually very tiny and can be the size of a poppy seed; adult ticks can be the size of a sesame seed.

\*Purdue University program in Vector Biology and Vector-Borne Diseases website.  
<http://extension.entm.purdue.edu/publichealth/insects/tick.html>. Accessed 7/20/15.

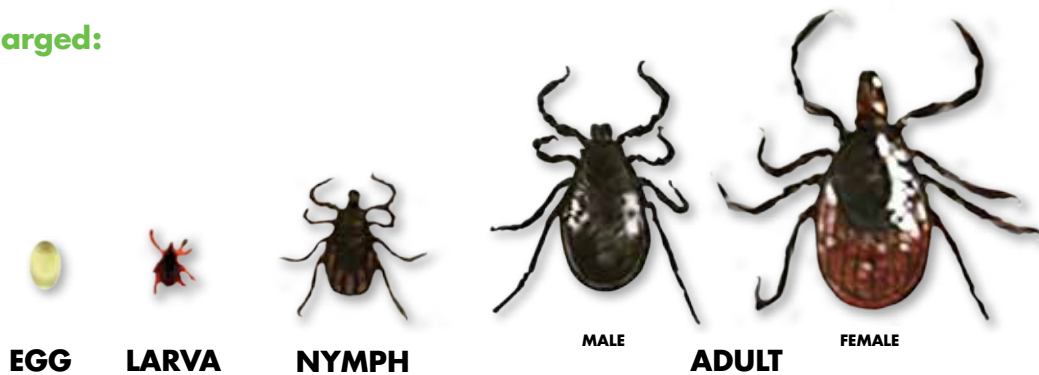


## LIFE STAGES OF THE BLACKLEGGED TICK



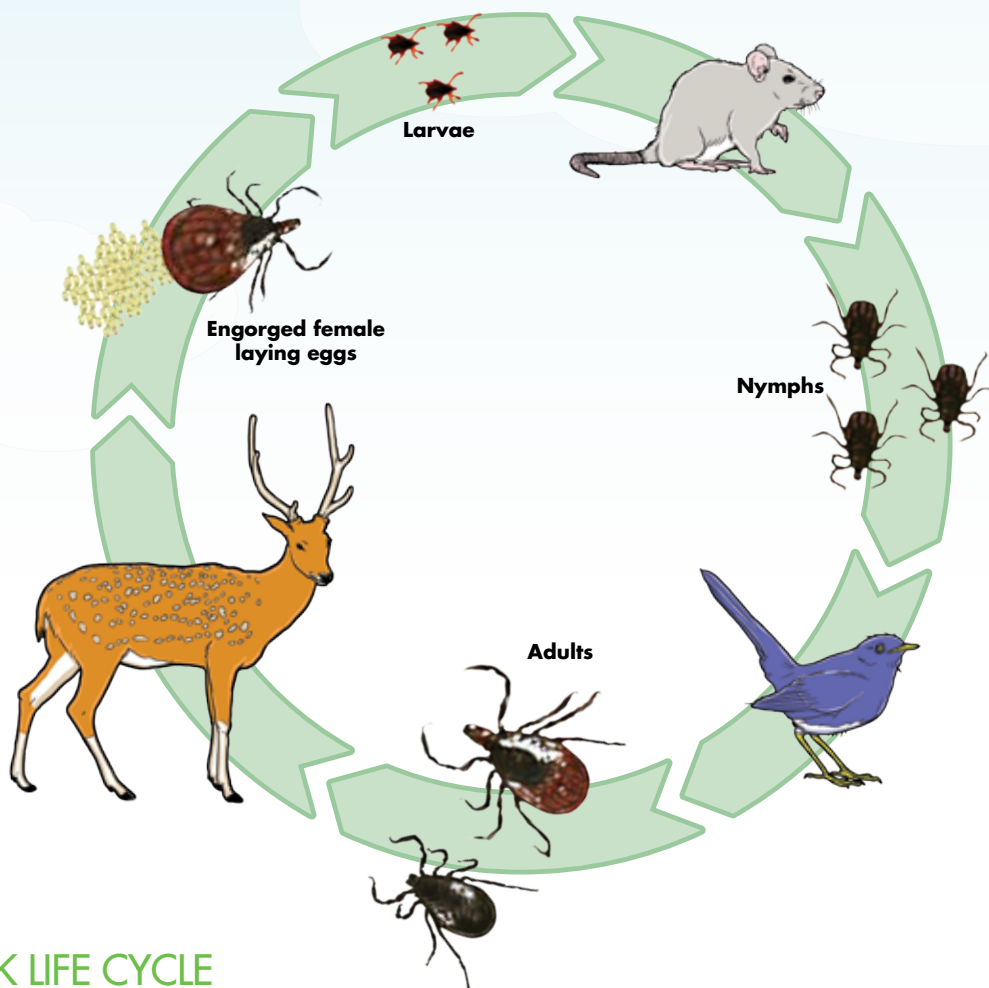
Like other ticks, Blacklegged ticks have **FOUR** stages of life. Ticks feed on their hosts in the larval, nymphal and adult stages. That means that **even the tiniest of Blacklegged ticks can transmit Lyme disease.**

**Enlarged:**



**Actual size:**





## TICK LIFE CYCLE

The tick has a **two-year life cycle**. The cycle begins in late July and early August with the hatching of larval ticks from **up to 3,000 eggs laid** by an engorged female tick. The larvae will disperse roughly 1 meter (3 feet) from the egg mass. Through August and September, the larvae **feed on whatever animal or human passes by**, usually a white-footed mouse, chipmunk, or bird, but also deer and humans. They drop off from the host after engorging with blood, molt, develop into nymphs with four (rather than three) pairs of legs and reappear the following summer, mainly **May through July, which is the peak period of risk for Lyme disease**. After feeding, nymphs molt to adult ticks during the summer. The adult stage, which seeks larger hosts (such as deer and humans), appears in the fall and is also active in warm days of winter and the following spring.

**BE AWARE: Humans are at risk for being host to a tick at the larval, nymphal or adult stage of its life cycle.**

From September through December, the tick mates while on their host. The adult male tick dies following mating and the female drops from the host, overwinters in leaf litter, under snow cover or underbrush, and later dies in the spring or early summer after laying eggs.

## THE ERYTHEMA MIGRANS RASH

There are many signs and symptoms of Lyme disease, but an erythema migrans (the classic **"bull's-eye"** red rash) is a definitive symptom of Lyme disease. This rash can vary in appearance and it is not always a classic bull's-eye rash (round, red circular rash with a clear center) and is often mistaken for a spider bite. Consider the season and the region — if it's June or July in the northeast, it is very likely Lyme disease.



Photos of rashes 1, 3, 4 and 5 courtesy of Dr. John Aucott of Johns Hopkins University.  
Photo of rash 2 courtesy of James Gathany Content Providers(s): CDC/James Gathany.



## SIGNS & SYMPTOMS OF LYME DISEASE

There are many signs of Lyme disease, and a hallmark of the disease is the fluctuation of symptoms.

### Head, Face and Neck:

- Headache
- Facial paralysis (Bell's palsy)
- Tingling of nose, cheek, or face
- Twitching of facial/other muscles

### Respiratory/Circulatory Systems:

- Heart palpitations
- Heart block, murmur

### Psychiatric Symptoms:

- Mood swings, irritability, agitation
- Anxiety
- Personality changes
- Feeling as though you are losing your mind

### Cognitive Symptoms:

- Poor school or work performance
- Attention deficit problems, distractibility
- Difficulty with concentration, reading, spelling
- Difficulty in multitasking

### Skin Problems:

- Erythema migrans (rash)

### Ocular:

- Double or blurry vision, vision changes
- Light sensitivity

### Auditory:

- Sound sensitivity/pain in ears

### Musculoskeletal System:

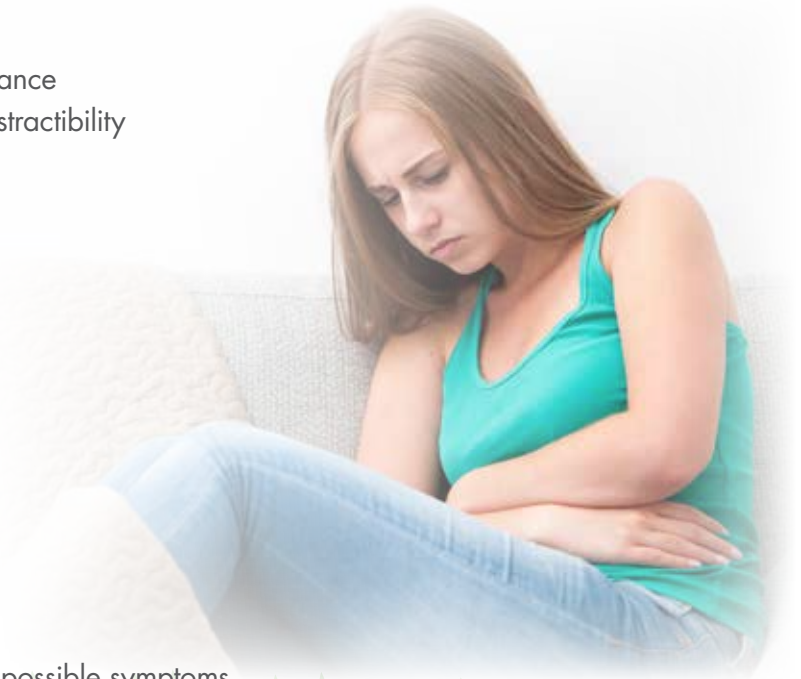
- Joint pain, swelling, or stiffness
- Migratory joint pains
- Muscle pain or cramps

### Neurologic System:

- Numbness in body, tingling, pinpricks
- Burning/stabbing sensations in the body
- Burning in feet

### General Well-being:

- Extreme fatigue, exhaustion



This is a partial list – there are many possible symptoms.

## TICK CHECKLIST

### Proper Tick Removal

- ☐ Take the time to remove the tick properly because improper removal can increase your risk of infection
- ☐ Use fine-point tweezers to grasp the tick close to the skin
- ☐ Pull the tick straight out
- ☐ Disinfect the tick bite site
- ☐ Disinfect the tweezers
- ☐ Wash hands thoroughly
- ☐ Do not panic and remove the tick with your fingers (if you must use your fingers, cover them with a tissue or plastic bag)
- ☐ Do not burn or smother a tick
- ☐ Do not grasp, squeeze or twist the tick body
- ☐ Contact physician for information on testing and treatment

### Tick Testing

- ☐ Keep the tick alive, if possible (not necessary for testing)
- ☐ Place tick in an airtight container or zip lock bag
- ☐ Place a moist cotton ball or a few blades of grass in the container
- ☐ Have the tick identified and tested by a lab, health department, or veterinarian if that service is available in your area
- ☐ Visit [www.GloballymeAlliance.org](http://www.GloballymeAlliance.org) to find tick testing locations

### Prevention

- ☐ Perform frequent and thorough tick checks; the longer the tick is attached, the greater the risk of infection
- ☐ Wear light-colored clothes
- ☐ Tuck pants into socks
- ☐ Spray insect and tick repellent on skin and/or clothing, following directions carefully
- ☐ Put clothes in the dryer on high for thirty minutes to kill ticks

### Get the Facts

- ☐ You can test negative and still have Lyme disease
- ☐ You can contract many tick-borne diseases simultaneously from the same tick bite
- ☐ If you have an erythema migrans (EM) rash, then you have Lyme disease; NOT EVERYONE infected with Lyme disease gets a rash
- ☐ Lyme disease is a clinical diagnosis, based on a patient's symptoms and history
- ☐ Lyme symptoms can develop within days, months or years of a tick bite
- ☐ Once you're bitten and already diagnosed with Lyme disease, you can still be re-infected at any time. This can make you sicker, even if you're still on medication.

## ASSESSMENT

1. The bacteria that causes Lyme disease enters the body through the bite of an infected Blacklegged tick and then \_\_\_\_\_ to many parts of the body and can cause many different symptoms.
2. The corkscrew shaped bacterium that causes Lyme disease is known as a \_\_\_\_\_ (*Borrelia burgdorferi*).
3. A large, red, expanding rash is a definitive symptom of Lyme disease and means that immediate \_\_\_\_\_ care is needed.
4. Many people do not display the telltale \_\_\_\_\_ rash. This rash may be the most classic but it is not the most common.
5. Early \_\_\_\_\_ and appropriate \_\_\_\_\_ prevent later stage complications that may be costly and debilitating.
6. Common early symptoms may include \_\_\_\_\_ symptoms such as fever, stiff neck, stomachaches, headaches, swollen lymph nodes, migratory pains in joints and muscles, and fatigue.
7. The ELISA and Western Blot are the most widely used \_\_\_\_\_ but are not always reliable to make a definitive diagnosis of Lyme disease. Currently no tests can rule out Lyme disease.
8. The diagnosis of Lyme disease should be a \_\_\_\_\_ one based on signs and symptoms, tick exposure, and evaluation of tests.
9. Mild to severe \_\_\_\_\_ are a sign that Lyme disease has spread to the nervous system.
10. The main treatment for Lyme disease is the use of \_\_\_\_\_, both oral and intravenous.
11. \_\_\_\_\_ in symptoms and the severity of these symptoms from day to day are the hallmark of Lyme disease, due to both the illness itself and the response of the treatment.
12. Psychiatric problems associated with Lyme disease may include \_\_\_\_\_.
13. Sound and light \_\_\_\_\_ can make it difficult for a student with Lyme disease to tolerate the lighting and noise in most school settings.
14. Some students with Lyme disease may experience problems with school performance, especially in the areas of \_\_\_\_\_ and \_\_\_\_\_.
15. Lyme disease is a major public health threat that is grossly \_\_\_\_\_.

### Word key

Antibiotics	Anxiety	Clinical
Concentration	Diagnosis	Diagnostic tests
Distractibility	Erythema migrans	Fluctuations
Flu-like	Headaches	Medical
Sensitivity	Spirochete	Spreads
Treatment	Under-reported	



## WHAT WOULD YOU DO?

You are hiking, playing sports, or enjoying another outdoor activity, and **you see there is a tick on your friend**. You're having a great time, but you know that the longer the tick is attached to your friend, the greater the chance that your friend might develop Lyme disease. **What would you do?**

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You are at lunch and **you see a rash on your friend's arm**. You ask about the rash and your friend tells you that it is from a bug bite. **What would you do?**

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**You are feeling like you have the flu and some joint pain**. It seems like everyone is sick with a cold lately, so you figure it will work its way out. However, as you think about it, you realize that you were **out in the woods** about ten days ago. **What would you do?**

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You and your friends are planning **an overnight trip into the woods**. What do you need to do to **prepare for your camping trip?**

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Check out our website for more fun activities!  
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## OPTIONAL WORD SEARCH

### SYMPTOMS OF LYME DISEASE

K O S Y M E L L P K J E T C C S E D D O S H C Y F  
G J O G T Y G V I S O W G B W D W I Z M W S D F I  
B A U F L I M S V G X O M Q F Q S F E U F A B I I  
E F N N Q L L T B Z H J O A C T G L O J C R H J J  
Y H D U W M C I K B Q T S R R X B I U O N U T C W  
X U S M I T H C B O B E S A J O I N T P A I N E K  
Q K E B D T I L W A H A C E R J D X V F X R N P Y  
X N N N W H U G P C T T N P N V Z B I D D P V J Q  
A C S E K M W Q A P I I N M H S N A H U H A S N S  
M B I S C J F D U B F O R B M C I D R O W M H I U  
K K T S D N A K I V I V U R A O B T H E S S N A K  
R H I R M E D L C T R E C I I Z O S I E E P U P R  
R F V R H C I L A Y R T R X Y P O D J V I J W E Y  
O B I R B T F R W N O V L H X A P W I T I J I L V  
Y W T V Y A T L D P W Z X H X L Q X B N S T K C A  
J G Y J T N S S N O I S I V Y R R U L B E I Y S H  
Q H H I E R B I P B L S U O Y M Z R R N O S L U E  
S U G C P N K U H X Q Z W V R X B O C G N X S M X  
E U N U D D A Z W L D Z E A C B X Y D W E N P G B  
E O A Y U R P A H L Q D Q P Y A U Z R N F Y G W M  
C S L W Y Z Y V Z L A F F B N V C E A J X A F V M  
O V O Y M I I Z M H U U S U Z F P D K X U T A C Q  
H E A R T P A L P I T A T I O N S L Q G J X R H C  
G Y V X D U S T X Q C K A J C Y T K P W E V K I J  
T J R W W I E J L M D Q O X B S F L D M E V D G Y

Blurry vision  
Concentration problems  
Distractibility  
Fatigue

Headache  
Heart palpitations  
Irritability

Joint pain  
Light sensitivity  
Moodiness

Muscle pain  
Numbness  
Rash  
Sound sensitivity



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