

Ticks

What are ticks?

Ticks are mites. They feed on the blood of mammals, birds, and reptiles. Deer ticks and dog ticks are found throughout Massachusetts and may spread different disease-causing germs when they bite you. Ticks are generally found in rough grassy, brushy, or wooded areas. Ticks do not fly or jump. They attach to animals or people that come into direct contact with them.

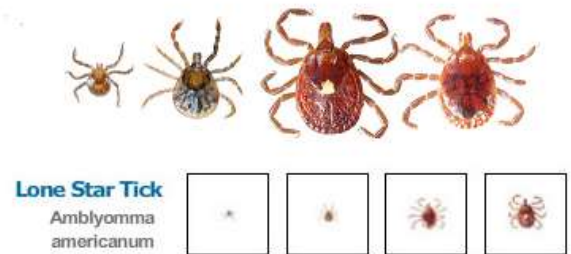
American dog ticks or wood ticks (*Dermacentor variabilis*): In general, only the adult dog tick will bite humans. Primary vector for Rocky Mountain spotted fever and capable of spreading tularemia. The highest risk of being bitten by a dog tick occurs during the spring and summer seasons. Adult dog ticks are about the size of a watermelon seed. Found throughout Massachusetts.

Deer ticks or black-legged ticks (*Ixodes scapularis*): Both nymph (young) and adult deer ticks will bite humans. Primary vector for Lyme disease, babesiosis, anaplasmosis, and deer tick virus. Most cases of Lyme disease are contracted when deer ticks are in the nymphal stage because they are difficult to detect due to their small size. The highest risk of being bitten by a deer tick is from May through July. However, adults can also be out searching for a host any time winter temperatures are above freezing. Deer tick nymphs are the size of a poppy seed and deer tick adults are the size of a sesame seed. Found throughout Massachusetts.

Lone star ticks (*Amblyomma americanum*): All stages can bite humans. Lone star ticks are known to transmit Rocky Mountain spotted fever, tularemia, and ehrlichiosis. Southern Tick Associated Rash Illness (STARI) is commonly transmitted by this species in the southern states and this illness has been found as far north as New

York state. Active when temperatures are over 50°F with peak activity from May to August. These ticks are a little smaller than American dog ticks. Found on Cape Cod and the Islands.

Woodchuck ticks or groundhog tick (*Ixodes cookei*): Mostly found on woodchucks and rarely bites humans. This is the primary vector for Powassan virus (POW). Can be found throughout the summer months with peak activity during July. Very similar in size and appearance to deer ticks. Found throughout Massachusetts.



East Middlesex Mosquito Control Project
Waltham, Massachusetts

The East Middlesex Mosquito Control Project (emmcp.ma@verizon.net) was established in 1945 as a Trust Agency of the Commonwealth of Massachusetts. The Project provides mosquito control services to 26 participating communities located west and northwest of Boston. The governing body of the Project is the East Middlesex Mosquito Control Commission which is comprised of one representative from each municipal government. The Commission selects 5 of its members to serve on an Executive Committee, which meets on a regular basis. Funding is comprised entirely of voluntary appropriations that originate from the municipal budgets of the participating communities.

Tick Diseases

Lyme disease is caused by bacteria (*Borrelia burgdorferi*). Deer ticks need to be attached from 24-48 hours to transmit this disease. Initial symptoms usually begin 3 to 30 days after a person is bitten by an infected deer tick and may include an expanding rash at the site of the bite and/or flu-like symptoms. If left untreated, the bacteria can spread to almost any site in the body and can cause arthritis, neurologic difficulties, and/or heart problems. Cases of Lyme disease occur throughout Massachusetts. This is the most common tick transmitted disease in Massachusetts.

Anaplasmosis is caused by bacteria (*Anaplasma phagocytophilum*) that affect certain white blood cells called granulocytes. Deer ticks need to be attached from 12-24 hours to transmit this disease. Symptoms typically appear suddenly 7 to 14 days after being bitten by an infected deer tick and can include fever, headache, muscle aches, chills, sweating, nausea, and vomiting. Because symptoms may become life-threatening, immediate treatment is necessary. The elderly, people with diabetes or collagen vascular disease, and people without a healthy immune system are more likely to develop serious symptoms. In Massachusetts, cases occur most frequently on Cape Cod, Martha's Vineyard, Nantucket, and in Berkshire County. The state has tracked this disease since 2008 when there were 41 confirmed cases. The number of human infections in Massachusetts has steadily risen to 677 in 2015.

Babesiosis is caused by a parasite that affects red blood cells. The two most common parasites in humans are *Babesia microti* and *Babesia divergens*. Most people who are infected will show no or only very mild signs of illness. Symptoms, when they do occur, begin gradually 1-6 weeks after being bitten by an infected deer tick and can include fever, chills, headache, achy joints and muscles, fatigue, nausea, vomiting, abdominal pain, and dark urine. The elderly and people without a healthy spleen or immune system are more likely to develop serious symptoms. In Massachusetts, cases occur most frequently on Cape Cod, Martha's Vineyard, and Nantucket. The state has tracked this disease since 2008 when there were 51 confirmed cases. The number of human infections steadily rose to 535 in 2014 and 414 in 2015.

Ehrlichiosis is a bacterial disease (*Ehrlichia chaffeensis*), transmitted by the Lone Star tick, that causes fever, headache, muscle aches and pain, anorexia, diarrhea, abdominal pain, and confusion. Symptoms occur 1-2 weeks after being bitten. Illness may be severe with rare fatalities. Recently reported in southeastern Massachusetts. There were 20 cases in 2014 and 7 in 2015.

Powassan virus and **deer tick virus** are two closely related viruses spread by two different ticks. Powassan virus is spread by woodchuck ticks and deer tick virus is spread by deer ticks. Some evidence shows that ticks only need to be attached for 15 minutes to transmit these viruses. Symptoms of these diseases can include but are not limited to fever, headache, vomiting, weakness, confusion, loss of coordination, speech difficulties, and memory loss. About 10% of infections result in death. People that initially recover from these viruses may experience long term neurological problems. Although rare, these viruses are likely found throughout Massachusetts because their vectors are widespread. From 2013-2015 there have been 5 confirmed and 2 probable cases in the state.

Borrelia miyamotoi is a bacterial disease. Onset of disease and symptoms are similar to Lyme disease with which it is closely related. However, unlike Lyme disease, no rash is associated with *Borrelia miyamotoi*. Deer ticks, which are common throughout Massachusetts, spread this disease. First reported in New England in 2001, there is evidence to suggest that at least 5% of Lyme disease cases are actually *Borrelia miyamotoi*.

Rocky Mountain spotted fever (RMSF) is a rare bacterial disease (*Rickettsia rickettsii*) that usually presents as a high fever with severe headache and fatigue 3 to 14 days after being bitten by an infected dog tick. A rash that spreads to the palms of the hands and soles of the feet often appears 3 to 5 days after the fever begins. In Massachusetts, cases occur most frequently in the southeastern part of the state, on Cape Cod, and on Martha's Vineyard.

Tularemia is caused by bacteria (*Francisella tularensis*) that can be spread to people in a number of ways, including through the bite of an infected dog tick. Symptoms vary depending on the way the germs are transmitted and usually begin between 3 to 5 days after an exposure, although it can take as long as 21 days. People infected by a tick bite typically have a slow healing skin sore (ulcer) and swollen glands (lymph nodes). In Massachusetts, cases occur most frequently on Cape Cod, Martha's Vineyard, and Nantucket.

How can I protect my family, my pets, and myself from tick bites?

There is currently no human vaccine available to protect against Lyme disease or any other tick-borne disease found in Massachusetts. **Prevention** is the best protection! Go to: <http://www.tickencounter.org/> for good tips such as these:

1. The single most important thing you can do is **check yourself for ticks once a day**. Ticks like to go between the toes, back of the knees, groin, armpits, and neck, along the hairline, and behind the ears. Remember to check children and pets. Remove any attached tick as soon as possible.
2. **Use repellents that contain DEET on your exposed skin**. DEET can damage some synthetic fabrics such as acetate, rayon or spandex. In general, the higher the percentage of DEET, the longer the duration of activity. DEET products should not be used on infants under 2 months of age. Children older than two months should use concentrations of 30% or less. Read the product label to determine the percentage of DEET included and how often it should be reapplied.
Permethrin products are intended for use on items such as clothing, shoes, bed nets and camping gear and should not be applied to skin. Apply the permethrin to your clothes before you put them on and follow the product's instructions.
Some "natural" plant-derived repellents, such as picaridin or oil of lemon eucalyptus, have been found to provide protection against mosquitoes but do not work as well or as long as products containing DEET or permethrin against ticks.
3. **Stick to main pathways** and the center of trails when hiking to avoid ticks.
4. **Wear long-sleeved, light colored shirts and long pants tucked into your socks**. This may be difficult to do when the weather is hot, but it will help keep ticks away from your skin and make it easier to spot a tick on your clothing.
5. Talk to your veterinarian about the best ways to **protect your pets** from ticks.
6. If you choose to use a pesticide to reduce the number of ticks on your property, hire a licensed applicator experienced with tick control. Your local landscaper or arborist may be a licensed applicator. In general, good tick control can be achieved with no more than two pesticide applications in any year. When selecting an applicator, ask if they will provide:
 - A written pest control plan that includes information on the pesticide to be used.
 - Information about non-chemical pest control alternatives.
 - Signs to be posted around the property after any application of chemical pest control.

What should I do if I find a tick on myself?

Tick Removal

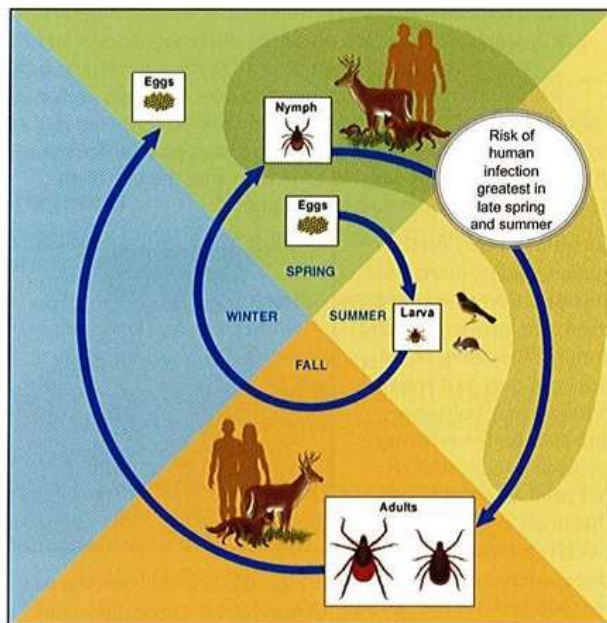
The tick should be carefully removed as soon as possible. The longer an infected tick remains attached to a person or animal, the higher the likelihood of disease transmission. Use fine point tweezers to grip the mouthparts of the tick as close to the skin as possible. The tick should not be squeezed or twisted, but pulled straight outward with steady, gentle pressure. Do not apply kerosene, petroleum jelly, nail polish, or a hot match tip to remove the tick. These measures are not effective and may result in injury. Circle the calendar date and note where on the body the tick was removed. You may want to save the tick for identification. Your physician may choose to treat you following a deer tick bite. Notify your physician if you have been bitten by a deer tick or if you develop a rash or other signs of illness following a tick bite.

Tick Identification and Testing

Mass. Department of Public Health does not offer tick identification or tick testing. If you choose to have a tick tested, it is important to keep in mind the following:

- Tests performed on the ticks are not perfect and they do not test for all infections ticks may be carrying. Therefore, even with a negative result, people should still monitor themselves for the appearance of rash, fever or other unusual symptoms and immediately seek the advice of a health care provider should any symptoms occur.
- If someone has been infected by a tick bite, symptoms may begin to occur even before the results of tick testing are available. People should not to wait for tick testing results before seeking medical advice should any symptoms develop.
- A positive test on a tick is not an automatic indication that treatment is needed. A positive test indicates that the tick was infected but not that the tick was successful in spreading the infection to the person bitten. The longer a tick is attached to you, the greater the chance that it will spread infection. Discuss any positive test results with your health care provider.

Life Cycle of Ticks



Year 1

- **Spring:** Tick eggs are laid on the ground.
- **Summer:** Tick larvae hatch and feed on mice, other mammals, birds; larvae may become infected.
- **Fall/Winter:** Ticks are usually less active or inactive.

Year 2

- **Spring/Summer:** Larvae change into nymphs that feed a lot; if an infected tick bites a human, the tick can infect the human.
- **Fall:** Nymphs molt into adults who continue to feed and mate (e.g., on deer). They will lay their eggs the next spring.