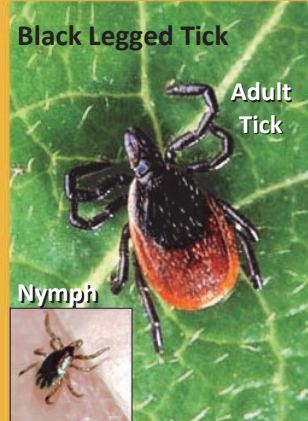
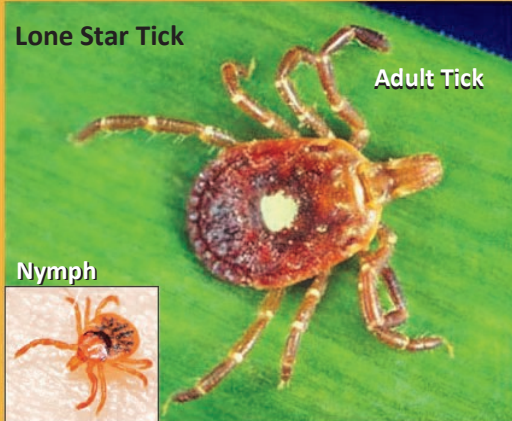


PREVENTING TICK-BORNE DISEASES IN VIRGINIA



Spring and summer temperatures are just right for walking in the woods or other outdoor activities. Ticks also become more active at this time, increasing the risk of a tick bite and exposure to tick-borne diseases. The tick-borne diseases that are seen most often in Virginia are Lyme disease and ehrlichiosis.

Lyme Disease

Lyme disease is caused by infection with a bacterium called *Borrelia burgdorferi*. The number of Lyme disease cases reported in Virginia has increased substantially in recent years.

The Tick

The blacklegged tick (*Ixodes scapularis*), formerly known as the “deer tick”, is the only carrier of Lyme disease in the Eastern U.S. The blacklegged tick’s name comes from it being the only tick in the Eastern U.S. that bites people and has legs that are black (or dark chocolate brown) in color. Blacklegged ticks are found primarily on forest leaf litter and vegetative ground cover in shady forest environments.

Lyme disease transmission to humans usually occurs during the late spring and early summer when nymph stage ticks are active and feeding. The nymphs are more likely to bite people than adult ticks. Nymphs typically become infected with the Lyme disease agent by feeding as larvae on certain rodent species. Adult blacklegged ticks are active on warm days of the fall, winter and early spring months. Adult ticks prefer to feed on deer, but will occasionally bite people, and if infected, can transmit Lyme disease.

Transmission of Lyme disease by the nymph or adult ticks generally does not occur until the tick has been attached and feeding on a human or animal host for at least 36 hours.

The Symptoms

Lyme disease symptoms commence from 3 to 30 days after an infectious tick bite. From 70-90% of people develop a circular or oval rash, called erythema migrans (or EM), at the site of the bite. To qualify as an EM, the rash must be at least two inches in diameter. That is because bites by some tick species can cause local inflammation and redness around the bite that could be mistaken for an EM. Unlike localized inflammation, an EM rash will increase in size and may become more than 12 inches across. As it enlarges, the rash may remain a solid color or the area around the center of the rash may clear, giving it a “bull’s eye” appearance. Generally, the EM rash does not itch or hurt so if it is not seen, it may not be noticed. In addition to an EM rash, Lyme disease may cause a headache, fever, muscle and joint aches, swollen glands and a feeling of tiredness. If left untreated, Lyme disease may progress to affect the joints, nervous system, or heart, several weeks to months after the initial illness. A small percentage of people with late stage symptoms may suffer long-term nervous system



EM Rash

problems or periodic bouts of arthritis in large joints like the knees.

Unfortunately, blacklegged tick nymphs are very small (as small as a poppy seed), difficult to see, and generally cause no itch or irritation at the site of the bite, so many people are not aware they have been bitten. If you have been in an area that might contain blacklegged ticks and you experience any symptoms of Lyme disease, contact your doctor.

The Treatment

When Lyme disease is detected early, its effects can be mild and the illness is easily treated with antibiotics. In the late stages, Lyme disease can be treated successfully with antibiotics, but complete recovery from the after-effects of illness may take months to years.

Ehrlichiosis and Anaplasmosis

Although ehrlichiosis can be caused by several bacteria species including *Ehrlichia chaffeensis* and *E. ewingii*, most ehrlichiosis cases in Virginia are caused by *E. chaffeensis*. Anaplasmosis is caused by a bacterium called *Anaplasma phagocytophilum* that is closely related to, and serologically cross-reactive with *Ehrlichia* Species.

The Ticks

Ehrlichia pathogens are transmitted only by the lone star tick (*Amblyomma americanum*), which is by far, the most common cause of human tick-bites in Virginia. Both the adult and the tiny nymph-stage lone star ticks can carry and transmit ehrlichiosis. Anaplasmosis is transmitted only by the blacklegged tick, and most commonly by bites from nymph stage ticks. Tick transmission of ehrlichiosis and anaplasmosis occurs only after the infected ticks have been attached and feeding for at least 24 hours.

The Symptoms

Ehrlichiosis and anaplasmosis are both characterized by a sudden onset of fever and symptoms that may include headache, muscle pain, nausea, vomiting, and mental confusion. Patient blood tests often show leucopenia (low white-blood cell count), thrombocytopenia (low platelet count) and abnormal liver function tests. A rash may occur on up to 30% of adults and 60% of children infected with ehrlichiosis. Rashes are uncommon in anaplasmosis patients. Ehrlichiosis and anaplasmosis can both cause a severe or fatal illness and up to 2% of patients may die if not treated. Severe illness may also result in difficulty breathing, or bleeding disorders. Persons who are asplenic or immune-compromised are more likely to suffer a severe illness or fatal infection.

The Treatment

Ehrlichiosis and anaplasmosis both respond rapidly to treatment with antibiotics. Treatment should be based on symptoms and suspicion of tick exposure. Treatment should not be delayed while waiting for serology results.

Rocky Mountain Spotted Fever

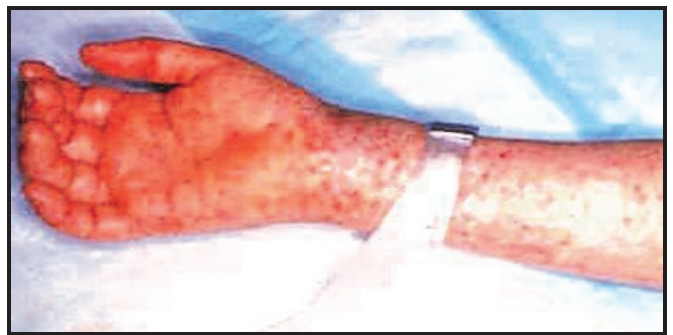
Rocky Mountain spotted fever (RMSF) is caused by infection with a bacterium called *Rickettsia rickettsii*. The initial illness symptoms are similar to those of ehrlichiosis or anaplasmosis. Up to 25% of untreated RMSF cases may be fatal.

The Tick

The American dog tick (*Dermacentor variabilis*) is the species thought to carry the agent of RMSF. The tick needs to feed on a host/person for about 10 to 20 hours to transmit the bacteria. Fortunately, fewer than one in a thousand American dog ticks carries the agent of RMSF.

The Symptoms

Symptoms of Rocky Mountain spotted fever begin 2-14 days after the tick bite, with a sudden onset of fever and symptoms that may include: headache, muscle pain, nausea, vomiting, abdominal pain as well as thrombocytopenia and abnormal liver function tests. A red, spotted rash may appear two to five days after illness onset. The rash begins on the wrists and ankles and spreads quickly to the palms of the hands and soles of the feet and to the rest of the body. Typically about 90% of RMSF patients develop a rash.

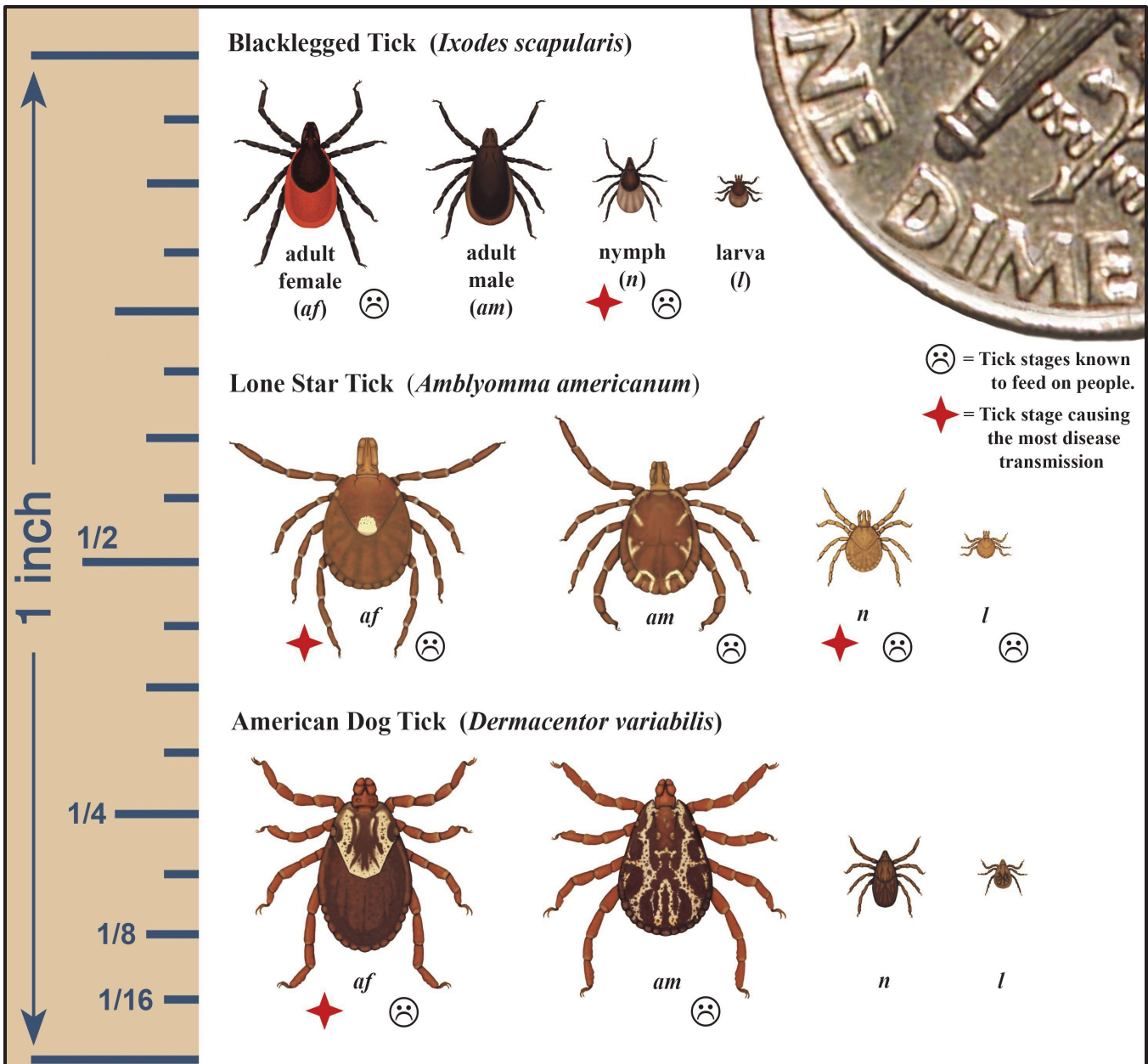


Spotted rash on arm and hand of RMSF patient

The Treatment

Antibiotic treatment for RMSF is effective, and suspected RMSF should be treated as soon as possible based on symptoms and suspicion of tick exposure. If untreated, the risk of death from RMSF greatly increases by the fifth day of illness - but the rash often does not occur until that time. Therefore, do not wait for RMSF blood test results, or the appearance of a rash, before starting treatment.

Tick Identification Chart



Original image by Litwak for CDC; modified by D.N. Gaines for VDH.

Tick-borne Disease Chart

Disease	Vector Species	Stage that can Transmit Diseases to People	Minimum Feeding Time for Disease Transmission
Anaplasmosis	Blacklegged Tick	Nymph and Adult	24 hours
Babesiosis	Blacklegged Tick	Nymph and Adult	36 hours
Ehrlichiosis	Lone Star Tick	Nymph and Adult	24 hours
Lyme Disease	Blacklegged Tick	Nymph and Adult	36 hours
Rocky Mountain Spotted Fever	American Dog Tick	Adult Only	10-20 hours
Tularemia	Lone Star Tick American Dog Tick	Nymph and Adult Adult Only	Unknown

For more information visit www.vdh.virginia.gov/TickBrochure

Other Diseases

Ticks can transmit other diseases, such as tularemia (rabbit fever) and babesiosis. Neither of these illnesses is common in Virginia.

Tularemia is a bacterial disease that has a sudden onset of fever and chills. Typically, an ulcer develops at the site of the tick bite and surrounding lymph nodes become enlarged. Tularemia is a serious illness and untreated cases may be fatal. Tularemia is most commonly associated with the lone star tick, but may also be transmitted by the American dog tick.

Babesiosis is caused by a parasite that infects red blood cells. The babesiosis agent is transmitted only by infected black-legged ticks. Symptoms include fever, chills, muscle aches, fatigue, and jaundice. Fatalities may occur in immunocompromised or splenectomized patients.

Prevention

Ticks do not jump or fly; they wait on the forest floor, leaf litter, or low vegetation and attach to the feet or shoes of people or legs of animals as they pass by. The ticks then crawl upward. The following steps can reduce your risk of tick-borne diseases:

- Avoid potential tick habitats such as forest leaf litter and low vegetation in shaded areas, forests, and forest edges.
- Walk in the center of trails to avoid brushing against vegetation.
- Keep grass cut and underbrush thinned in yards. If pesticides are used for tick control, follow directions carefully or hire a professional to apply the pesticide.
- Eliminate wood piles and objects that provide cover and nesting sites for small rodents around your property.
- Wear light-colored clothing so that ticks are easier to see and remove.
- Tuck pant legs into socks and boots, tuck shirts into pants, and wear long-sleeved shirts buttoned at the wrist.
- Apply tick repellent to areas of the body and clothing that may come in contact with tick habitat. Repellents for use on skin include those containing up to 50% DEET for adults or less than 30% for children. Repellents containing

other active ingredients such as picaridin, bioUD, oil of lemon-eucalyptus or IR3535 may also be effective on skin. A repellent/insecticide containing permethrin may be applied to shoes, socks, pants and other clothing, but should not be used on skin. Follow directions carefully and do not overuse.

- Conduct tick checks on yourself and your children every four to six hours while in tick habitat.
- Ask your veterinarian to recommend tick control methods for your pets. Animals can get Lyme disease, ehrlichiosis, and RMSF, but they do not transmit these diseases to people.

Tick Removal

Because ticks do not transmit disease until they have been attached to the host for several hours or several days, it is very important to remove ticks as soon as they are found. The following is the best way to remove a tick:



- Grasp the tick with tweezers as close to the skin as possible and gently, but firmly, pull it straight out. Avoid any twisting or jerking motion that may break off the mouth parts in the skin. Mouth parts left in the wound may cause irritation or infection similar to a reaction from a splinter.
- If tweezers are not available, be careful not to squeeze or rupture the tick's swollen abdomen while removing it. This may cause an infectious agent to infect the bite site.
- After the tick has been removed, wash hands with soap and water. Apply a topical antiseptic to the bite site.
- You can dispose of the tick by drowning it in alcohol or flushing it down a drain or toilet. However, it may be useful to save the tick in alcohol for several weeks and have it identified by an expert in case you become ill. Knowing what kind of tick bit you might help your doctor diagnose the illness.
- Tick removal using nail polish, petroleum jelly, alcohol or a hot match is not safe. These methods might cause the tick to regurgitate an infectious agent into the site of the bite.

If you get sick, and you have been exposed to ticks, be sure to tell your doctor about your tick exposure.

For more information, visit our website at:

www.vdh.virginia.gov/epidemiology/DEE/Vectorborne/index.htm

For printable copies of this brochure visit:

www.vdh.virginia.gov/tickbrochure