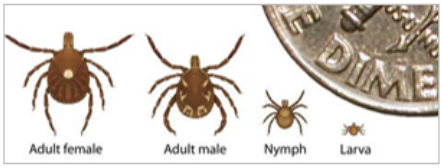
Tickborne Disease in Missouri

An Educational Series for Stream Teams to Learn and Collect

By Christie Darby, Missouri Department of Health and Senior Services

Missouri's diverse landscapes range from dense forests to open grasslands, providing ideal habitats for ticks, making tickborne disease a significant public health concern in Missouri. The Zoonotic Disease Program within the Missouri Department of Health and Senior Services (MDHSS) monitors tickborne dis- and provides prevention tips to help avoid tick bites.



Size comparison of Lone Star tick life stages compared to a dime. From smallest to largest: larva, nymph, male adult, female adult. Adult females have the distinct white spot on their back. Image courtesy of Centers for Disease Control and Prevention.

The number of human tickborne disease cases is generally on an upward annual trend in Missouri and the United States. This is thought to be partly due to better recognition and reporting of disease and changes in the environment that foster increased exposure to ticks. Following simple tick prevention guidelines can greatly reduce your chances of getting a tickborne disease.

Life Cycle of Ticks

You may encounter ticks of different sizes depending on which stage of the life cycle they are in. In Missouri, most of the ticks that pose a public health risk feed and ingest a blood-meal from three hosts in their lifetime. After a blood-meal, ticks molt and mature to the next stage in their life cycle. Ticks can pick up diseases while feeding on one host, then transmit it to another host, including to humans and domestic pets.

Common Ticks and Tickborne Diseases in Missouri

Ticks found in Missouri	Lone Star Tick *Amblyomma americanum*	American Dog Tick *Dermacentor variabilis*	Gulf Coast Tick *Amblyomma maculatum*	Blacklegged or deer tick *Ixodes scapularis*
				
Pathogens and diseases they can spread	• Ehrlichiosis • Tularemia • Heartland virus • Bourbon virus • Alpha-gal syndrome	• Tularemia • Rocky Mountain spotted fever	• ***Rickettsia parkeri*** (a type of spotted fever)	• Lyme disease • Anaplasmosis • Powassan virus

Signs and Symptoms of Tickborne Disease
Common symptoms of tickborne disease include fever, headache, muscle or joint aches, nausea, vomiting or diarrhea. These symptoms can vary according to the individual and pathogen. If any of these symptoms occur following a tick bite, or even after exposure to tick habitat, talk with your health provider as soon as possible to determine if testing and/or treatment may be necessary.

Tickborne Diseases in Missouri
Most of the disease burden in Missouri is caused by ehrlichiosis and Rocky Mountain spotted fever (RMSF); in 2023 there were 648 total tickborne disease cases reported, 492 of which were ehrlichiosis and 105 were RMSF. Ehrlichiosis and RMSF are both bacterial diseases spread by different ticks. Ehrlichiosis is transmitted by the lone star tick, and can cause fever, headache, fatigue, muscle aches, vomiting, and diarrhea. RMSF is spread by the bite of an American Dog tick, with symptoms including fever, headache, and a rash. Ehrlichiosis and RMSF can be treated with antibiotics, but early intervention is best for successful treatment.
Lyme Disease is a well-known bacterial tickborne disease; however Missouri is considered a low-incidence state compared to other Northeast and Upper Midwest states, with 16 cases occurring in 2023. Transmitted by the Blacklegged tick, typical Lyme Disease symptoms include a fever, headache, fatigue, and characteristic 'bullseye' skin rash known as an erythema migrans, or EM, rash. If left untreated, infection can spread to joints, the heart and nervous system. Lyme disease can be treated with antibiotics.
Other low-incidence bacterial diseases include Anaplasmosis, spread by the Blacklegged tick, and tularemia, spread by the American Dog tick. Both diseases cause common tickborne disease symptoms and are treatable by antibiotics. The Lone Star tick is thought to be the vector of Heartland virus and Bourbon virus in Missouri. Illness from these tickborne viruses can result in hospitalization, however most people recover with supportive care.

Alpha-gal Syndrome
Alpha-gal syndrome (AGS) is a serious, potentially life-threatening allergic condition that can occur after a tick bite. Symptoms can occur after people eat red meat or are exposed to other products made from mammals, which have the galactose-α-1,3-galactose (alpha-gal) sugar molecule in them. Reactions to AGS can appear 2-6 hours after eating foods or having exposures to other products containing alpha-gal but reactions may not happen after every exposure. AGS can cause a range of symptoms including hives/rash, nausea, vomiting, stomach pain,

Common Tick Species in Missouri

Missouri is home to many species of ticks, but more common species including those that transmit disease are;

Lone Star Tick (Amblyomma americanum)
- Females are easily identifiable by a distinctive white dot on the back. This species is associated with transmission of ehrlichiosis, tularemia, Heartland and Bourbon virus and alpha-gal syndrome (red meat allergy).

American Dog Tick (Dermacentor variabilis)
- This species can transmit Rocky Mountain spotted fever (also known as Spotted Fever Rickettsiosis) and tularemia.

Blacklegged Tick (Ixodes scapularis)
- Also known as the deer tick, it is a known vector for Lyme disease and Anaplasmosis.

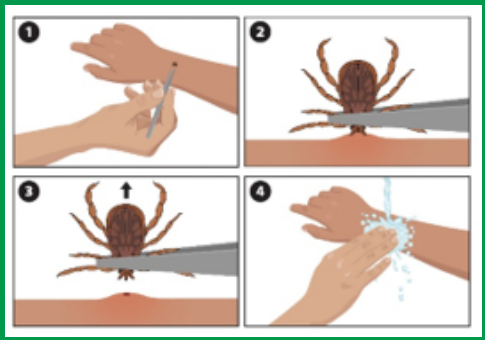
Gulf Coast tick (Ambylomma maculatum)
- This species can transmit Rickettsia parkeri (a type of spotted fever).

may not happen after every exposure. AGS can cause a range of symptoms including hives/rash, nausea, vomiting, stomach pain, cough, shortness of breath, and swelling of lips, tongue, throat or eyelids. Anaphylaxis can occur, which is a life-threatening reaction that requires urgent medical care.
AGS is suspected to be transmitted by the bite of a lone star tick, but other species have not been ruled out. AGS should be managed under the care of an allergist or other healthcare provider. Although AGS is not currently a reportable condition, MDHSS recognizes it is a concern that is impacting Missourians and we continue to monitor developments in AGS research and promote tick bite prevention messaging.

The Best Defense is Prevention
Preventing tick-bites is the best defense against all tickborne diseases. Ticks can bite year-round but are most active during warmer months (April-September). Know how to protect yourself, your family, and pets from tick bites.

- Avoid Tick-Infested Areas: Stay in the center of trails when hiking and avoid tall grasses, brush, and wooded areas whenever possible since these are likely tick habitats.
- Treat Clothes with Permethrin: If you can't avoid tick-infested areas, treat boots, clothing and camping gear with permethrin that kills ticks on contact. (Read label and plan ahead of time as permethrin products require clothes to dry before wearing.)
- Use Insect Repellent: Apply EPA-registered repellents containing active ingredients such as DEET, picardin, or IR3535 to all exposed skin. DEET concentrations between 20-50% are the most effective at repelling ticks. Be sure to read the product label carefully and apply according to the product instructions.
- Wear Protective Clothing: Opt for long-sleeved shirts and long pants (weather-permitting). Tuck pants into socks to prevent ticks from reaching the skin. Consider wearing light-colored clothing to make it easier to see ticks that may be crawling on your clothing.
- Perform Regular Tick Checks: After spending time outdoors, thoroughly check your body, especially underarms, behind ears, around the waist, and behind knees. Remember to check your pets, too.

Resources and Further Information
For more detailed information and resources on tick prevention and tickborne diseases in Missouri, visit the Missouri Tickborne Disease Storymap or contact the Zoonotic Disease Program at (573-751-6113).



Best Practices for Tick Removal. Image courtesy of Centers for Disease Control and Prevention.

Tick Removal and Post-Bite Care

If you find a tick attached to your skin, follow these best practices for safe removal.
•Use Fine-Tipped Tweezers: Grasp the tick as close to the skin's surface as possible.
•Pull Upward with Steady Pressure: Avoid twisting or jerking to prevent mouthparts from breaking off and remaining in the skin.
•Clean the Area: After removal, clean the bite area and your hands with rubbing alcohol or soap and water.
•Save the Tick: Submerge it in alcohol and place it in a sealed bag – it can be useful to know which type of tick bit you if you develop symptoms of tickborne disease.
•Monitor for Symptoms: Watch for signs of illness such as rash, fever, or fatigue for about two weeks following the bite. If any symptoms develop, contact your medical provider right away to discuss testing and/or treatment.