

Tick-Borne Illnesses: A Growing Concern

What are tick-borne illnesses? Within the continental U.S., there are several illnesses which may be transmitted to humans from the sustained bite of a tick. Although these illnesses are transmitted by the same vector, there are differences in the symptoms and differing treatment recommendations. Although the following information addresses 5 of the most widely known tick-borne illnesses, there are others, including Ehrlichiosis, anaplasmosis, Colorado tick fever, Powassan encephalitis and others noted in the table below which may be relevant depending upon your personal circumstances and exposures.

Tick-Borne Disease	Common US Regions
Lyme disease	Northeast, North Central, Pacific Coast
Babesiosis	Northeast, Midwest, Northwest
Ehrlichiosis	East, Southeast, Central
Rocky Mountain Spotted Fever	Southeast, Atlantic Coast
Southern Tick-Associated Rash Illness	Southeast, Atlantic Coast
Tick-Borne Relapsing Fever	Rocky Mountains, Pacific Coast
Tularemia	All States except Hawaii
Anaplasmosis	Northeast, North Central, Pacific Coast
Colorado Tick Fever	Northwest, Rocky Mountains
Powassan Encephalitis	Northeast
Q fever	Throughout the United States



An adult female *Ixodes scapularis* tick (about the size of a sesame seed) is shown here.

Which tick-borne illnesses pose the greatest concern?

- 1. Borreliosis or Lyme Disease:** Lyme disease is caused by the bacterium *Borrelia burgdorferi* and is transmitted to humans by the bite of infected blacklegged ticks. Typical symptoms include fever, headache, fatigue, and a characteristic skin rash called erythema migrans. If left untreated, infection can spread to joints, the heart, and the nervous system. Lyme disease is diagnosed based on symptoms, physical findings (e.g., rash), and the possibility of exposure to infected ticks; laboratory testing is helpful in the later stages of disease. Most cases of Lyme disease can be treated successfully with a few weeks of antibiotics. Steps to prevent Lyme disease include using insect repellent, removing ticks promptly, landscaping, and integrated pest management. The ticks that transmit Lyme disease can occasionally transmit other tick-borne diseases as well.
- 2. Babesiosis:** Babesiosis is caused by the parasite *Babesia microti* and is also transmitted to humans by the bite of infected black-legged ticks. Many people who are infected with *Babesia microti* feel fine and do not have any symptoms. Some people develop nonspecific flu-like symptoms, such as fever, chills, sweats, headache, body aches, and

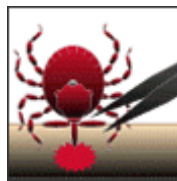
loss of appetite, nausea, or fatigue. Because *Babesia* parasites infect and destroy red blood cells, babesiosis can cause a special type of anemia called hemolytic anemia. This type of anemia can lead to jaundice and dark urine. In the United States, tickborne transmission is most common in particular regions and seasons: it mainly occurs in parts of the Northeast and upper Midwest; and it usually peaks during the warm months. Although many people who are infected with *Babesia* do not have symptoms, for those who do, effective treatment is available. Babesiosis is preventable, if simple steps are taken to reduce exposure to ticks.

3. **Southern Tick-Associated Rash Illness (STARI):** A rash similar to the rash of [Lyme disease](#) has been described in humans following bites of the lone star tick, [Amblyomma americanum](#). The rash may be accompanied by fatigue, fever, headache, muscle and joint pains. The rash usually appears within 7 days of tick bite and expands to a diameter of 8 centimeters (3 inches) or more. The rash should not be confused with much smaller areas of redness and discomfort that can occur commonly at tick bite sites. Unlike Lyme disease, STARI has not been linked to any arthritic, neurological, or chronic symptoms. The specific microbiological cause of STARI is unknown. In the cases of STARI studied to date, the rash and accompanying symptoms have resolved promptly following treatment with oral antibiotics.
4. **Tick-borne Relapsing Fever (TBRF):** Relapsing Fever is a disease characterized by relapsing or recurring episodes of fever, often accompanied by headache, muscle and joint aches and nausea. There are two forms of relapsing fever, but the primary concern within the U.S. is for Tick-borne relapsing fever (TBRF) which is caused by several species of spiral-shaped bacteria that are transmitted to humans through the bite of infected soft ticks. Most cases occur in the summer months and are associated in particular with sleeping in rustic cabins in mountainous areas of the Western United States. There are approximately 25 cases of TBRF in the United States each year.
5. **Rocky Mountain Spotted Fever (RMSF):** Rocky Mountain spotted fever is caused by infection with the bacterial organism *Rickettsia rickettsii* transmitted by the bite of an infected tick. Initial symptoms may include fever, nausea, vomiting, muscle pain, lack of appetite and severe headache. Later signs and symptoms include rash, abdominal pain, joint pain, and diarrhea. RMSF is a seasonal disease and occurs throughout the United States during the months of April through September. Over half of the cases occur in the south-Atlantic region

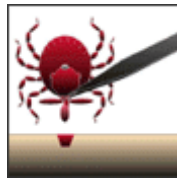
of the United States (Delaware, Maryland, Washington D.C., Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida).

What should I do if I find a tick on my person? Take the following steps:

1. Use fine-tipped tweezers or notched tick extractor, and protect your fingers with a tissue, paper towel, or latex gloves (see figure). Persons should avoid removing ticks with bare hands.
2. Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. *(If this happens, remove mouthparts with tweezers. Consult your health care provider if illness occurs.)*



Grasp as close to skin surface as possible



Pull upward with steady, even pressure

3. After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.
4. Do not squeeze, crush, or puncture the body of the tick because its fluids may contain infectious organisms. Skin accidentally exposed to tick fluids can be disinfected with iodine scrub, rubbing alcohol, or water containing detergents.
5. Save the tick for identification in case you become ill. This may help your doctor make an accurate diagnosis. Place the tick in a sealable plastic bag and put it in your freezer. Write the date of the bite on a piece of paper with a pencil and place it in the bag.
6. Photograph the area of a tickbite if you cannot see a physician right away and illness is suspect. Also, photograph any subsequent swelling/redness at the site. If further symptoms develop, the photos might be useful for a clinician or medical investigator to see.

How can tick-borne illnesses be effectively prevented? In general, tick-borne illness may be prevented by avoiding tick habitat (dense woods and brushy areas), using insect repellents containing DEET or permethrin, wearing long pants and socks, and performing tick checks and promptly removing ticks after outdoor activity. To prevent infection:

- Avoid sleeping in rodent infested buildings.
- Limit tick bites by using insect repellent containing DEET (on skin or clothing) or permethrin (applied to clothing or equipment).
- Rodent-proof buildings in areas where the disease is known to occur.
- Identify and remove any rodent nesting material from walls, ceilings and floors.
- In combination with removing the rodent material, fumigate the building with preparations containing pyrethrins and permethrins. More than one treatment is often needed to effectively rid the building of the vectors, the soft-ticks. **Always follow product instructions, and consider consulting a licensed pest control specialist.**

Persons should monitor their health closely after any tick bite, and should consult a physician if they experience a rash, fever, headache, joint or muscle pains, or swollen lymph nodes within 30 days of a tick bite. In most circumstances, treating persons who only have a tick bite is not recommended.

Where can I obtain additional information regarding tick-borne illnesses? The following websites may assist you in your pursuit of additional information:

- **CDC:**
 - ✚ Tick-borne Rickettsial Diseases (<http://www.cdc.gov/ticks/diseases/>)
 - ✚ Tick Removal (http://www.cdc.gov/ticks/tick_removal.html)
 - ✚ Lyme Disease Resources (http://www.cdc.gov/ncidod/dvbid/lyme/ld_resources.htm)
 - ✚ Babesiosis Fact Sheet (<http://www.cdc.gov/babesiosis/factsheet.html>)
 - ✚ STARI (<http://www.cdc.gov/ncidod/dvbid/stari/>)
 - ✚ TBRF (<http://www.cdc.gov/ncidod/dvbid/RelapsingFever/>)
 - ✚ Prevention and Control (<http://www.cdc.gov/ticks/prevention.html>)
- **NIOSH:**
 - ✚ Tick-borne Diseases (<http://www.cdc.gov/niosh/topics/tick-borne/>)

- **EPA:**
 - ✚ Insect Repellants: Use and Effectiveness
(<http://cfpub.epa.gov/oppref/insect/index.cfm>)