

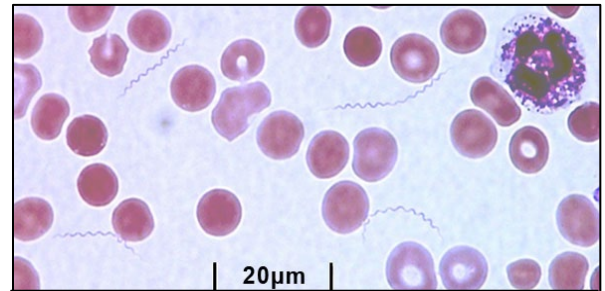


FS No. 001-0223

## Tick-Borne Relapsing Fever

### What is Tick-Borne Relapsing Fever?

Tick-borne relapsing fever (TBRF) is a condition caused by several species of *Borrelia* bacteria. These bacteria are transmitted by the bite of an infected tick. In the U.S., these can be transmitted by soft or hard ticks. Soft ticks are the most common culprit in the western U.S., transmitting several TBRF *Borrelia* species. In the eastern U.S., the blacklegged *Ixodes scapularis* is capable of transmitting *Borrelia miyamotoi*, a common agent of TBRF. Although the bacteria are closely related to *Borrelia burgdorferi*, which causes Lyme disease, relapsing fever is less common and differs in several important ways. Like its cousin, though, the tick must be attached for 24-48 hours to transmit the bacteria. Therefore, it is important to promptly remove the tick to decrease the chance of being infected.



*Borrelia* spirochetes (bacteria) may be visible in the blood under a microscope during episodes of relapsing fever. They resemble thin spirals. Photo courtesy of the CDC.

### What are Some Risk Factors for Tick-Borne Relapsing Fever?

**Geography:** TBRF transmits differently in different parts of the country. In the Western U.S., it is transmitted by soft ticks. In the Eastern U.S., the range of *B. miyamotoi* corresponds with the range of the blacklegged tick. This is most common in the Northeast and Upper Midwest but can be found as far south as Florida and as far west as Texas. **Seasonality:** Blacklegged ticks are active whenever the temperature is above freezing, but they are most active in the spring, fall, and summer. Soft ticks can be active at any time of the year so long as animals are present. **Environment:** Blacklegged ticks live on the ground of wooded areas, clinging to the underbrush to grasp passing people or animals. Soft ticks are usually found in association with animals and are usually encountered in disused or seasonally occupied buildings such as cabins. **People at risk:** Those who live in areas where blacklegged ticks live are most at risk of exposure to *B. miyamotoi*, especially if they spend time outside in woodland environments. Individuals who utilize cabins for hunting or vacation may be at higher risk of exposure to soft ticks, especially if rodent infestation is a problem in the building.

### What are the Symptoms of TBRF?

Relapsing fever begins with flu-like symptoms such as headaches, muscle aches, chills, and possibly vomiting and a fever that can be high. These symptoms may subside on their own, only to come back 1 or 2 weeks later. If not treated, this cycle may continue over a long period of time. Although the early symptoms of relapsing fever can be similar to those of Lyme disease, TBRF is not known to cause arthritic complications as Lyme disease does. Unlike Lyme disease, a bull's-eye rash (erythema migrans) is not usually present for TBRF. It is possible to have both Lyme and TBRF, as both are transmitted by the bite of a blacklegged tick. Illness in immunocompromised individuals may be especially severe.

### How is TBRF Diagnosed and Treated?

Diagnosis can be made by a healthcare provider based on the detection of the bacteria or antibodies to the bacteria in blood. However, since the disease is uncommon, it may be difficult to accurately diagnose. Exact identification of the bacteria may not be required to start treatment if a bacterial tick-borne disease is suspected. Antibiotics are an effective treatment for TBRF. Early treatment can lead to better outcomes. If you experience any of the symptoms described above, especially if you have recently been bitten by a tick or have been outdoors in a place where ticks live, seek medical attention and relay these facts to the physician.

### Can TBRF be Prevented?

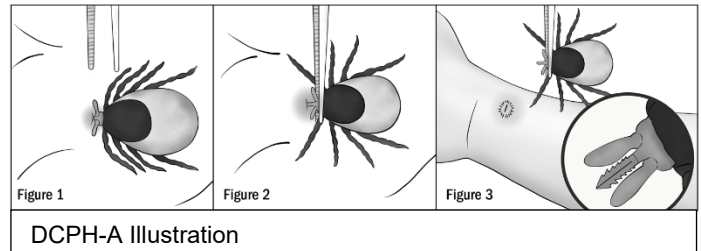
The best way to prevent TBRF is to avoid tick bites. Use the DoD Insect Repellent System when in tick habitat (tall grass, weeds, scrubby areas, woods, and leaf litter). The system includes using permethrin repellent on the uniform; applying DEET, picaridin, or IR3535 repellent to exposed skin; wearing uniforms properly; and sleeping inside a permethrin-treated bed net in tick habitat. It is also important to routinely check your skin and clothing for ticks while in tick habitat, and to carefully check your whole body once indoors. A friend or a mirror can help you check areas you cannot see. Attached

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ticks should be removed as soon as they are found by using sharp tweezers to grasp the tick as close to the skin as possible and applying steady upward pressure. Clothes can be put in a dryer on high heat to kill ticks. Additionally, avoid rodent-infested areas such as burrows, crevices, and caves. Ensure rodents do not infest buildings and avoid handling rodent-infested materials (nests, warrens, or waste) without proper personal protective equipment. Keep up-to-date on pest control procedures for all permanent and semi-

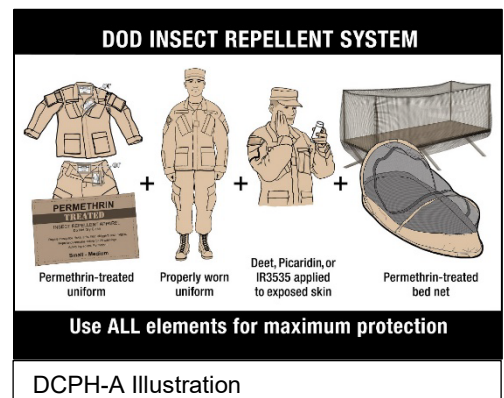


permanent buildings. Ticks that are removed can be folded in a piece of sticky tape and discarded or saved for identification and testing. Ticks removed from military personnel, their dependents, or other DoD beneficiaries can be submitted for identification and disease testing through the Defense Centers for Public Health-Aberdeen's Military Tick Identification/Infection Confirmation Kit Program (MilTICK):

<http://phc.amedd.army.mil/topics/envirohealth/epm/Pages/HumanTickTestKitProgram.aspx>

### What Can I Use to Treat my Clothing with Permethrin?

Permethrin-treated Army Combat Uniforms (ACU) and Operational Camouflage Pattern (OCP) uniforms are available to all Soldiers. The ACU and OCP will have a sewn-in label on both the trouser and the blouse indicating the uniform has been factory-treated with permethrin. If not factory-treated, apply permethrin to uniforms in the field before wearing by using either the IDA Kit (NSN 6840-01-345-0237), which can last up to 50 washings, or aerosol can (NSN 6840-01-278-1336), which can be reapplied after 6 weeks and the sixth washing. Other aerosol products containing 0.5% permethrin and permethrin-impregnated garments are also commercially available for civilian use. **Do not apply permethrin directly onto your body or the bodies of animals.**



### What are the Standard Military Insect Repellent Products Available for Use on Exposed Skin?

Approved military insect repellents for use on exposed skin come in a variety of formulations. Always refer to the label to determine frequency of repellent application based on activity. **Do not apply repellent to eyes, lips, or to sensitive or damaged skin.** Available military insect repellents include:

- Cutter® pump spray (NSN 6840-01-584-8598) contains 25% DEET; one application protects for up to 10 hours.
- Ultra 30 Insect Repellent Lotion (NSN 6840-01-584-8393) contains 30% Lipo DEET; one application protects for up to 12 hours.
- Bullseye™ Bug Repellent pump spray (NSN 6840-01-656-7707) contains 20% IR3535®; one application protects for up to 8 hours.
- Natrapel® pump spray (NSN 6840-01-619-4795) contains 20% picaridin; one application protects for up to 8 hours.
- Ultrathon™ (NSN 6840-01-284-3982) contains 34% controlled-release DEET lotion; one application protects for up to 12 hours.

### What Standard Bed Nets are Available to Help Protect Soldiers from Tick Bites While Sleeping?

Lightweight, self-supporting, pop-up bed nets factory-treated with permethrin are available in coyote brown (NSN 3740-01-518-7310) and OD Green (NSN 8415-01-516-4415), and a larger Egret bed net (NSN 3740-01-644-4953) is now available that fits a full-sized cot inside. Untreated mosquito bed nets (NSN 7210-00-266-9736) should be treated with 0.5% permethrin aerosol spray and assembled properly on a cot. Check for holes in the netting and keep loose edges off the ground by tucking them under the sleeping bag. Ticks may crawl under mesh bed nets that do not fully enclose the sleeper.

### References:

- "Relapsing Fever," Centers for Disease Control and Prevention, last modified September 10, 2015. <https://www.cdc.gov/relapsing-fever/index.html>
- U.S. Army Public Health Center. 2017. Fact Sheet No. 18-009-0317, *DoD Insect Repellent System*. [https://phc.amedd.army.mil/PHC%20Resource%20Library/DoD Insect Repellent System FS 18-009-0317.pdf](https://phc.amedd.army.mil/PHC%20Resource%20Library/DoD%20Insect%20Repellent%20System%20FS%2018-009-0317.pdf)