

Just the Facts...

Tick-Borne Relapsing Fever (TBRF)

Q. What is tick-borne relapsing fever (TBRF)?

A. Relapsing fever is an illness that is caused by certain bacteria in the genus *Borrelia*. In tick-borne relapsing fever (TBRF), as the name suggests, the *Borrelia* are transmitted to people via the bite of ticks. In epidemic louse-borne relapsing fever (LBRF), also known as typhus fever, the disease is spread by lice. LBRF is not found in the United States, and will not be discussed in this fact sheet. TBRF occurs in limited areas of several western states (USA), western Canada, and a number of other countries throughout the world. TBRF is not spread from person-to-person.

Q. Do all ticks transmit TBRF?

A. No. The ticks that transmit TBRF *Borrelia* are argasid (soft) ticks of the genus *Ornithodoros*. Soft ticks are different from the ixodid (hard) ticks that transmit more common diseases such as Lyme disease, Rocky Mountain spotted fever, and human ehrlichiosis. Each species of *Ornithodoros* tick is the vector for (carries and transmits) a different species of TBRF *Borrelia*, and in each case the species of *Borrelia* is named after the tick. For example, most cases of TBRF in the United States are caused by *Borrelia hermsii*, which is transmitted by the bite of *Ornithodoros hermsii*. In Texas, *O. turicata* transmits *B. turicatae*. Likewise, several other *Ornithodoros* tick species transmit associated TBRF *Borrelia* bacteria in other parts of the world.

Q. How does a person get TBRF?

A. Most people become infected while vacationing during the summer months. *Ornithodoros hermsii* ticks are found in rural areas that are usually mountainous and forested. They live in dark, cool places where rodents nest, such as woodpiles outside buildings, in house crawl spaces, or between walls or beneath floorboards inside rustic cabins. In Texas, *O. turicatae* ticks are found in caves. If rodents are scarce, *Ornithodoros* ticks may bite humans that are nearby. The ticks usually feed at night, typically while people are asleep, and they remain attached for only a short time (15 - 30 minutes). If the ticks are infected, they pass on infection during the brief tick bite. The bites are painless and most people never realize they have been bitten.

Q. How do ticks acquire TBRF *Borrelia*?

A. *Ornithodoros* ticks can become infected with *Borrelia* in two ways. The first way is by feeding on an infected animal known as a reservoir host. A reservoir host can carry *Borrelia* in its bloodstream for a prolonged period of time, thus causing ticks that feed on it to become infected. Then, when the infected tick feeds on its next victim (host), the bacteria are passed on to that individual or animal. Rodents, including deer mice, squirrels, and chipmunks are the primary reservoir hosts for *B. hermsii*. The second way a tick can become infected is by a process called transovarial transmission. In transovarial transmission, an infected adult female *Ornithodoros* tick passes on the *Borrelia* directly through her eggs to the next generation of ticks. *Ornithodoros* ticks can live for up to 10 years or more, and they remain infective for the duration of their lifespan.

Q. How prevalent is TBRF?

A. TBRF has been documented in limited areas of 11 western states (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Texas, Utah, Washington, and Wyoming), although the majority of cases have been reported from California and Washington. TBRF frequently occurs in small clusters or multi-case outbreaks, often among groups of people who share a rustic facility that is infested with rodents. Two such outbreaks occurred in 2002: Montana (5 cases – 1st demonstration of TBRF and the tick in this state) and New Mexico (11 cases). During 1990-2000, a total of 247 cases were reported from western U.S. states, but the number of cases is undoubtedly underreported. One reason for lack of reporting may be misdiagnosis, since travelers who are infected may return home to areas where physicians are not familiar with the disease. In addition, the disease is not nationally notifiable to the Centers for Disease Control and Prevention (CDC), although many western state and local health departments do require reporting within their jurisdictions.

Q. What are the symptoms of TBRF?

A. Most people who are infected get sick about a week after they are bitten by the tick. The symptoms include repeating bouts of fever, chills, headache, muscle or joint aches, and nausea that last from 2 - 7 days, punctuated by periods of apparent wellness that last for about a week. The initial symptoms are the most severe, with sudden onset of high fever and severe headache. A spotted and/or itchy rash may sometimes occur during this first episode of illness. The number of episodes or “relapses” ranges from 2 - 10, and each is less severe than the previous one. Serious complications or death (fatality rate of 0 - 10%) can occur if the illness is not treated, especially in the very young, elderly, pregnant, or debilitated.

Does NOT transmit TBRF



Transmits TBRF



Right: *Ornithodoros hermsii* (family Argasidae, a soft tick), vector for *Borrelia hermsii*, the agent responsible for causing most cases of tick-borne relapsing fever in the United States. Left: *Ixodes scapularis* (blacklegged tick, family Ixodidae, a hard tick), vector for the agents of Lyme disease, human granulocytic ehrlichiosis, and babesiosis.

Q. How is TBRF diagnosed?







A. Recurring fever is suggestive of TBRF. TBRF is confirmed by blood culture or observation of *Borrelia* bacteria in a blood smear obtained from the patient during an episode of fever. If these tests are unavailable or inconclusive, serological testing of paired acute and convalescent samples for antibody titers can be performed by the CDC.


Q. What is the treatment for TBRF?

A. Infection is usually cleared up easily with a 7 - 14 day regimen of antibiotic therapy. The tetracyclines or penicillins, or alternatively erythromycin, are the drugs of choice for treatment of TBRF. Within 1 - 4 hours of initiation of treatment, a temporary Jarisch-Herxheimer reaction (a worsening of symptoms) is common. This condition should be monitored closely, as it can become serious if not managed properly.

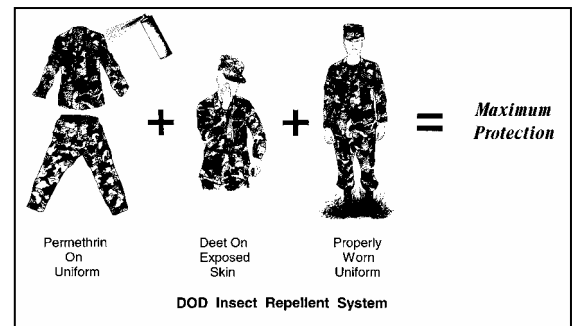
Q. What can I do to reduce my risk of becoming infected with TBRF?

A. There is no vaccine against TBRF. Therefore, help prevent TBRF by protecting yourself from exposure to soft ticks and rodents.

-  Inspect your cabin or other dwelling on a regular basis for signs of rodent activity; eliminate all rodent nesting material.
-  Rodent-proof buildings in areas where TBRF is known or suspected to be present. Do this as follows:
 - Seal all holes in the foundation and walls.
 - Place heavy gauge metal screen on window, vents, and other openings to prevent entry of rodents.
 - Place an 18-inch perimeter border of gravel around the foundation to help prevent the movement of rodents and ticks into the dwelling.
 - If ticks have already infested the building and are present within the crawl space, floor boards, wall voids or attic, contact a licensed professional exterminator for assistance.
-  Avoid sleeping in rodent-infested buildings. Don't sleep on the floor or on a bed that touches the wall.
-  Wear protective clothing in areas where soft ticks or rodent nests may be present (rustic cabins, caves, etc.), especially at night when the ticks are more likely to be active – long pants tucked into tightly-woven socks; long sleeve shirt; shirt tucked into pants.
-  Check your skin and clothing periodically for ticks.
-  Use both skin and clothing repellents that have been approved by the Environmental Protection Agency (EPA). They are safe and effective.
 - For your skin, use a product that contains 20-50% **DEET** (N,N-diethyl-meta-toluamide). **DEET** in higher concentrations is no more effective.
 - Use **DEET** sparingly on children, and don't apply to their hands, which they often place in their eyes and mouths.
 - Apply **DEET** lightly and evenly to exposed skin; do not use underneath clothing. Avoid contact with eyes, lips, and broken or irritated skin.
 - To apply to your face, first dispense a small amount of **DEET** onto your hands and then carefully spread a thin layer.
 - Wash **DEET** off when your exposure to ticks, mosquitoes, and other arthropods ceases.
 - For your clothing, use a product that contains **permethrin**. **Permethrin** is available commercially as 0.5% spray formulations.
 - **Permethrin** should only be used on clothing, never on skin.
 - When using any insect repellent, always FOLLOW LABEL DIRECTIONS.
 - Do not inhale aerosol formulations.

 For optimum protection, soldiers should utilize the **DOD INSECT REPELLENT SYSTEM**. In addition to proper wear of the battle dress uniform (BDUs) (pants tucked into boots, or tightly-woven socks when sleeping, sleeves down, undershirt tucked into pants), this system includes the concurrent use of both skin and clothing repellents:

- Standard military skin repellent: 33% **DEET** lotion, long-acting formulation, one application lasts up to 12 hours, NSN 6840-01-284-3982.
- Standard military clothing repellents: either aerosol spray, 0.5% **permethrin**, one application lasts through 5-6 washes, NSN 6840-01-278-1336; or impregnation kit, 40% **permethrin**, one application lasts the life of the uniform (at least 50 washes), NSN 6840-01-345-0237.



Q. What should I do if I find a tick attached to my skin?

A. Remove attached ticks promptly. Use fine-pointed tweezers to firmly grasp the tick's mouthparts up against the skin, and pull back firmly and steadily. Never squeeze the body of the tick or use such things as petroleum jelly, fingernail polish remover, or a lighted match: these methods could force more infective fluid into the skin. After removal, wash the wound site, and apply an antiseptic. Preserve the tick by placing it in a sturdy, dry, sealed container, and keeping it in your freezer. Should you develop disease symptoms, take the tick with you to the physician's office; identification of the tick species may assist in diagnosis and treatment.