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Brown Dog Tick: Vector for Rocky Mountain Spotted Fever

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National Pest Alert

Brown Dog Tick

Vector for Rocky Mountain Spotted Fever

The brown dog tick, *Rhipicephalus sanguineus* (Acari: Ixodidae), feeds primarily on dogs and until recently was not known to vector Rocky Mountain spotted fever (RMSF). In 2003–2004, fourteen cases of RMSF in humans occurred in eastern Arizona in the absence of known vectors, the Rocky Mountain wood tick, *Dermacentor andersoni*, and American dog tick, *Dermacentor variabilis*. However, health officials found brown dog ticks to be very abundant in areas associated with human cases, and the Centers for Disease Control and Prevention (CDC) implicated that the brown dog tick was responsible for transmitting RMSF. Brown dog ticks occur throughout the United States and the world. These ticks are most common in warm temperate climates. The common brown dog tick cannot survive outdoors in northern temperate latitudes, but it is found wherever dogs are housed in heated buildings.

Transmission and Symptoms of RMSF

RMSF is a severe and often life threatening tick-transmitted disease caused by the bacterium *Rickettsia rickettsii*. Usually, ticks have to be attached and feeding for several hours (> 4–6 hours) before passing the infection to the host. Transmission also can occur if the crushed tissues of ticks are introduced into breaks in the skin



Ptential tick habitat

Chris Paddock, Center for Disease Control and Prevention



Engorged common brown dog ticks

Ted Pestorius, Center for Disease Control and Prevention

or mucous membranes, such as eyes, nose, and mouth. The infection is not passed from person to person. When physicians are diagnosing RMSF, the absence of an attached tick should not rule out the possibility of RMSF, because immature ticks may be tiny and easily overlooked. Up to 30% of untreated cases can be fatal. Female ticks can pass the bacteria directly to offspring through transovarial transmission, allowing the pathogen to amplify, and roaming dogs can move them around, acting as “tick buses.” The incubation period for the disease is 3–14 days after tick bite. In the case of “classic RMSF,” initial symptoms can include sudden onset of moderate-to-high fever, chills, severe headache, nausea, vomiting, deep muscle pain, anorexia, and bloodshot eyes. Later symptoms can include rash, abdominal pain, joint pain, and diarrhea. The RMSF rash usually appears 2–5 days after disease onset. It starts as discolored spots on the wrists, forearms, ankles, palms, and soles, which later spread to the trunk. If you suspect you have been exposed to RMSF, contact a physician immediately. Diagnosing RMSF is difficult because laboratory testing is not reliable early in the disease since it takes many days for antibodies to rise to detectable levels. In addition, not all *R. rickettsii* infections result in classic RMSF symptoms.

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James Gathany, Center for Disease Control and Prevention

Rhipicephalus sanguineus female and male images

Tick Life Cycle

The brown dog tick life cycle includes four stages: egg, larva or “seed tick”, nymph, and adult. Differences in size and color occur between each life stage, leading people to conclude there are several different species of ticks infesting their dogs and homes. Brown dog ticks prefer dogs as the primary host during all stages of development. Both males and females must consume a bloodmeal between each stage of the life cycle. A blood-feeding adult female can swell in size to 12 mm, and she turns from brown to gray or olive as she becomes engorged. The blood-engorged female will drop off the host and find a sheltered place (e.g., cracks and crevices around homes) to lay up to 5,000 eggs. Eggs usually hatch within 3 to 8 weeks, and the newly hatched larvae (seed ticks) are no bigger than a pinhead. The light-colored larvae have six legs during this life stage. After blood feeding, the seed ticks drop off the host, and they hide in cracks and crevices from one to several weeks while they molt into the nymph stage. Nymphs and adults are brown and they have eight legs. Immature brown dog ticks can survive for many months without feeding, and adults can survive more than a year. Usually, the brown dog tick's life cycle spans 2 years. However, if hosts are readily available, the tick's entire life cycle can take place within 3 to 4 months.

RMSF Prevention

Brown dog ticks rarely feed on humans, which is probably why they have never been implicated as human disease vectors in the United States before 2004. However, risk for human parasitism increases when tick numbers are excessive. The best strategy for controlling brown dog ticks and reducing risk for RMSF transmission in your community is an integrated approach, which includes 1) controlling ticks on dogs; 2) controlling ticks around homes and businesses; 3) reducing tick habitats around homes by eliminating lumber, junk piles, old furniture, mattresses, and trimming tall grass and weeds; 4) enforcing stray animal control; and 5) providing prevention education.

Controlling brown dog ticks on their primary host, dogs, is essential. Inspect pet dogs regularly, remove any ticks with pointed tweezers, and use topical tick control products, including products available as spot-ons, sprays, and tick collars. To help prevent human infection, it is best not to remove ticks with your fingers. Tick control treatments should be ongoing as product efficacy is often short term, usually weeks. Brown dog ticks have a tremendous reproductive potential, and lapses in control efforts can allow tick populations to increase rapidly.

For more information on Rocky Mountain Spotted Fever, please visit <http://ncipmc.org/alerts/rmsf.cfm>

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Craig Levy, Arizona Department of Health Services

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