



Facts about Wildlife Diseases: Ehrlichiosis¹

Yasmin Tavares and Samantha Wisely²

What is ehrlichiosis?

Human ehrlichiosis is the term used to describe the disease caused by the bacteria Ehrlichia chaffeensis, E. ewingii, E. muris eauclairensis, or Panola Mountain Ehrlichia sp. Human monolytic ehrlichiosis (HME) is a rapidly increasing tick-borne disease in the eastern United States (Biggs et al. 2016). The primary route of transmission to people is through the bite of an infected tick, which can be the lone star tick (Amblyomma americanum) or the blacklegged tick (Ixodes scapularis). Ehrlichiosis can be misdiagnosed in early stages because symptoms are usually mild to moderate and include fever, severe headache, muscle aches, nausea, vomiting, diarrhea, dry cough, or a rash (more common in children). However, if antibiotic treatment is delayed, ehrlichiosis can cause severe acute illness—symptoms of which may include respiratory failure, uncontrolled bleeding, nervous system damage, and death in extreme cases (CDC 2019) (Figure 1). Ehrlichiosis cases present with similar symptoms regardless of species causing infection and are indistinguishable by serologic testing.

What causes ehrlichiosis?

Ehrlichiosis occurs when *Ehrlichia spp.* bacteria are transmitted via the bite of the lone star tick (*Amblyomma americanum*) (Figure 2) or the blacklegged tick (*Ixodes scapularis*) (Figure 3). These tick species are the most commonly encountered ticks in the southeastern United States. (Figure 4). For both the lone star tick and the blacklegged tick, the greatest risk of being bitten is in early spring through late fall (CDC 2019).



Figure 1. Erythematous maculopapular rash without distinct margins caused by Ehrlichiosis.

Credits: IJCP

The known agents that cause ehrlichiosis infection are the obligate intracellular Gram-negative bacteria *Ehrlichia chaffeensis*, *E. ewingii*, and Panola Mountain *Ehrlichia* sp. found in lone star ticks; and *E. muris eauclairensis* found in blacklegged ticks in the United States. The bacteria live inside white blood cells of mammals. The principal wildlife reservoir for *E. chaffeensis* and *E. ewingii* are white-tailed deer. These bacteria are the two most common species infecting humans and are seen primarily in the southern United States, especially Arkansas, Missouri, and Oklahoma, but also in New York. In contrast, most cases of Panola Mountain *Ehrlichia* sp. and *Ehrlichia muris eauclairensis* are reported in the Midwest and Southeast United States (Papadakis 2020).

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- 2. Yasmin Tavares, laboratory technician, Department of Wildlife Ecology and Conservation; and Samantha Wisely, professor, Department of Wildlife Ecology and Conservation, UF/IFAS Extension, Gainesville, FL 32611.

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Figure 2. Lone star tick *Amblyomma americanum*. Credits: CDC



Figure 3. Blacklegged tick *Ixodes scapularis*. Credits: CDC

What are the chances of you getting infected with ehrlichiosis?

Before *Ehrlichia* can be transmitted, a tick must be attached to human skin and feeding for several hours; therefore, removing ticks as soon as possible may prevent infection. If the bacteria is successfully transmitted, symptoms develop after an incubation period of 5–14 days. In addition, *Ehrlichia* may be transmitted through blood transfusions (Bakken and Dumler 2008), from mother to fetus (Horowitz et al. 1998), and through direct contact with an infected, slaughtered animal especially white-tailed deer (Bakken et al. 1996).



Figure 4. Estimated geographic distribution of lone star ticks (left) and blacklegged ticks (right).

Credits: CDC

The number of people infected with *Ehrlichia* has steadily increased in the last decade (Figure 5). During the months of May to September, the increased number of reported ehrlichiosis cases reflects the seasonality of the two vector species with a peak in cases typically occurring in June and July (Figure 6). This period, therefore, correlates to the increased numbers of adult and nymph ticks, adults and nymphs being the life stages of lone star ticks and blacklegged ticks that can spread *Ehrlichia* to humans (CDC 2019).

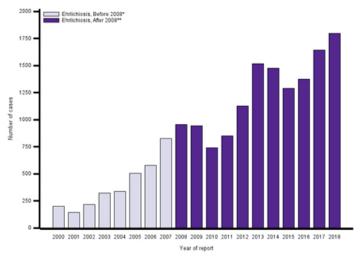


Figure 5. Number of US ehrlichiosis cases caused by *Ehrlichia chaffeensis* and reported to CDC, 2000–2018 (CDC 2019).

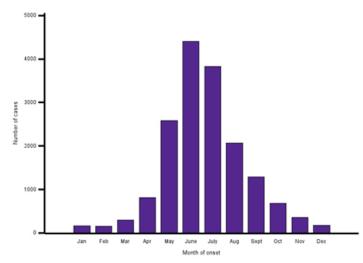


Figure 6. Number of reported ehrlichiosis cases caused by *Ehrlichia chaffeensis* by month of onset, 2000–2018 (CDC 2019).

From a review of the national surveillance data, cases of ehrlichiosis are more frequently reported in men than women. People between 60 to 69 years of age account for the highest numbers of cases. People with compromised immune systems (e.g., resulting from cancer treatments, advanced HIV infection, prior organ transplants, or some medications) might be at increased risk for severe disease (CDC 2019).



Figure 7. The number of ehrlichiosis cases that occurred in residents of 11 Florida counties from 2008–2017.

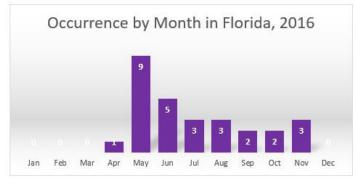


Figure 8. The number of ehrlichiosis cases that occurred in Florida each month of 2016.

How common is ehrlichiosis in Florida?

Ehrlichiosis is the most commonly acquired tick-borne disease in Florida. In 2017, four cases were reported in people less than 50 years old, including two cases who were hospitalized. Across years, the overall hospitalization rate has been high (81%), which may indicate that only the most severe illnesses are being reported. The number of ehrlichiosis cases reported in Florida has increased in the last 10 years (Figure 7). Weather patterns, tick and deer population dynamics, and increased health-care-provider awareness contribute to this change in reported cases (De Jesus 2019). Occurrence of ehrlichiosis in Florida starts a

bit earlier and lasts longer than in the rest of the country and may be influenced by the tick life cycle, weather patterns, and human activities (Figure 8).

The Panhandle and north-central Florida are hotspots for ehrlichiosis. Five cases were identified in Alachua County, Florida, and three cases were from Marion County, Florida, in 2014, an average year in Florida (Figure 9).

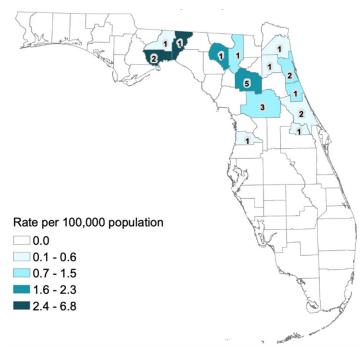


Figure 9. Reported ehrlichiosis cases and incidence rates per 100,000 population (restricted to infections acquired in Florida) by county of residence, Florida, 2014 (N=23) (CDC 2014).

How can you prevent ehrlichiosis and tick bites?

There is no vaccine to prevent ehrlichiosis, and, consequently, the best way to prevent infection is to avoid tick bites. Ticks live in grassy, brushy, or wooded areas, and on animals (wildlife and pets). When spending time outside camping, gardening, or hunting, be aware that you can be bitten by ticks.

Treating clothing and gear with products containing 0.5% permethrin or DEET can be an effective way to repel ticks. It is important to note that permethrin is for use on clothing exclusively, while DEET is safe for human skin. Be sure to follow the directions on the product label, and allow these items to dry completely before use. Long sleeved shirts, long pants and closed-toed shoes are recommended because ticks live in grassy areas or fields and can attach themselves to your feet and legs when you brush by.

Another way to prevent infection is to check your pets and your own body after being outdoors. Remember, a tick must be attached to human skin and feeding for several hours before will be able to transmit the bacteria. Therefore, a thorough body check is recommended after outdoor activity.

Can other species get ehrlichiosis?

Yes, some of the same bacteria that infect and cause illness in humans also can cause clinical symptoms in animals. In addition, other species of *Ehrlichia* that do not appear to cause illness in humans cause disease in animals. Dogs, cattle, non-human primates, cats, and rodents can carry the bacteria and may become ill. Dogs and white-tailed deer have been implicated as reservoir hosts for some species of *Ehrlichia* (Spickler et al. 2013). A reservoir host typically shows no signs of illness when infected but helps to spread the pathogen when ticks bite an infected animal and then bite an uninfected one.

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