

# Facts about Wildlife Diseases: Ehrlichiosis<sup>1</sup>

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## 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 monocytic 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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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).

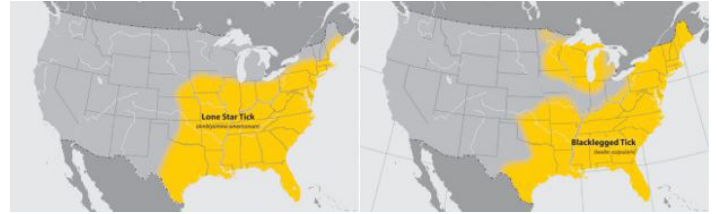


Figure 4. Estimated geographic distribution of lone star ticks (left) and blacklegged ticks (right).

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).

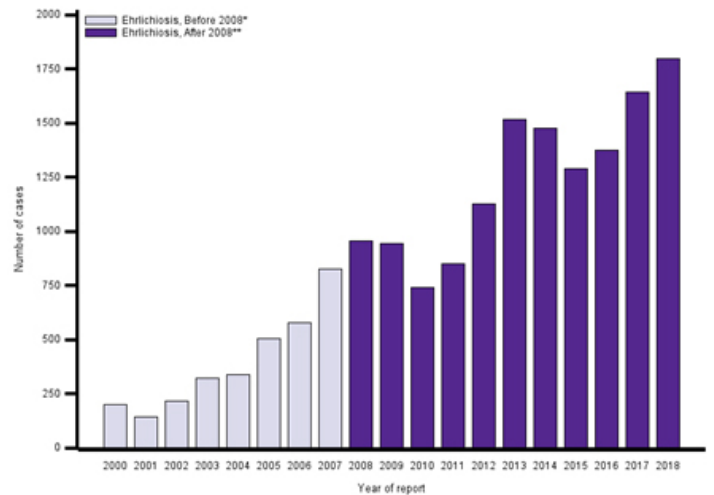


Figure 5. Number of US ehrlichiosis cases caused by *Ehrlichia chaffeensis* and reported to CDC, 2000–2018 (CDC 2019).

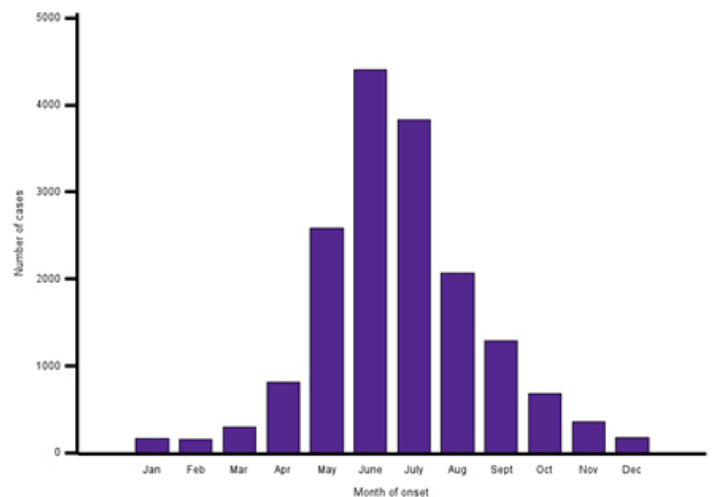


Figure 6. Number of reported ehrlichiosis cases caused by *Ehrlichia chaffeensis* by month of onset, 2000–2018 (CDC 2019).





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.

## References

- Bakken, J. S., and S. Dumler. 2008. Human granulocytic anaplasmosis. *Infect Dis Clin North Am* 22 (3): 433
- Bakken, J. S., J. K. Krueth, T. Lund, D. Malkovitch, K. Asanovich, and J. S. Dumler. 1996. "Exposure to deer blood may be a cause of human granulocytic ehrlichiosis." *Clin Infect Dis* 23 (1): 198
- Biggs, H. M., C. B. Behravesh, K. K. Bradley, et al. 2016. "Diagnosis and management of tickborne rickettsial diseases: Rocky Mountain Spotted Fever and other spotted fever group rickettsioses, ehrlichioses, and anaplasmosis — United States." *MMWR Recomm Rep*. 65 (No. RR-2): 1–44. DOI: <http://dx.doi.org/10.15585/mmwr.rr6502a1>
- Centers for Disease Control and Prevention (CDC). 2019. "Ehrlichiosis: epidemiology and statistics." <https://www.cdc.gov/ehrlichiosis/stats/index.html>
- Dahlgren, F. S. et al. 2016. "Undetermined human ehrlichiosis and anaplasmosis in the United States, 2008–2012: a catch-all for passive surveillance." *Am J Trop Med Hyg* 94 (2): 299–301. [PubMed: 26621564]
- De Jesus, C. E., C. Ganser, W. H. Kessler, Z. S. White, C. R. Bhosale, G. E. Glass, and S. M. Wisely. 2019. "A survey of tick-borne bacterial pathogens in Florida." *Insects* 10 (9): 297.
- Engel, J., K. Bradley, et al., 2007. Revision of the national surveillance case definition for ehrlichiosis. Council of State and Territorial Epidemiologists, Infectious Diseases Committee. Position Statement.
- Florida Department of Health. Annual morbidity statistics report, 2011–2017. Technical Report for Florida Department of Health. Florida Department of Health: Tallahassee, FL, USA.
- Gollamudi, K., and R. Shaikh. 2017. "Ehrlichiosis: A child with a maculopapular rash on his trunk." *International Journal Of Clinical Pediatrics* 6 (1–2): 33–35. doi: <https://doi.org/10.14740/ijcp276w>
- Horowitz, H. W., E. Kilchevsky, S. Haber, M. Agüero-Rosenfeld, R. Kranwinkel, E. K. James, S. J. Wong, F. Chu, D. Liveris, and I. N. Schwartz. 1998. Perinatal transmission of the agent of human granulocytic ehrlichiosis. *Engl J Med* 339 (6): 375.
- Loftis, A. D., T. R. Mixson, E. Y. Stromdahl, et al. 2008. "Geographic distribution and genetic diversity of the *Ehrlichia* sp. from Panola Mountain in *Amblyomma americanum*." *BMC Infect Dis* 8:54. <https://doi.org/10.1186/1471-2334-8-54>
- Mayo Clinic. Ehrlichiosis. Last reviewed 2019 Jul 13. <https://www.mayoclinic.org/diseases-conditions/ehrlichiosis/symptoms-causes/syc-20372142>
- Papadakis, M. A., et al., 2020. "Viral & rickettsial infections." In: *Current Medical Diagnosis & Treatment 2020*. New York, N.Y.: The McGraw-Hill Companies. Retrieved from <http://www.accessmedicine.com>
- Spickler, A. R., 2013. "Ehrlichiosis and anaplasmosis." <http://www.cfsph.iastate.edu/DiseaseInfo/factsheets.php>.