



# A Pet Owner Has Been Scratched by Their Cat. Should They Be Worried?

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Numerous infectious agents can be transmitted via cat scratch; however, the primary concern is transmission of *Bartonella* spp. The genus *Bartonella* comprises at least 35 species and subspecies of vector-transmitted, fastidious, gram-negative, zoonotic bacteria that are highly adapted to one or more mammalian reservoir hosts (eg, domestic and wild cats).<sup>1</sup>

Epidemiologic evidence and experimental transmission studies have demonstrated that cat fleas (ie, *Ctenocephalides felis*) play an important role in the global transmission of several *Bartonella* spp among cats, dogs, and other small mammals. *Ctenocephalides felis* transmits *B henselae*, *B clarridgeiae*, and *B koehlerae*, and, potentially, *B bovis*, *B vinsonii* subsp *berkhoffii* genotype II, and *B quintana* to cats and, potentially, directly to humans. As such, *C felis* should be considered a major source of zoonotic *Bartonella* spp transmission. Currently, in the context of

a global health threat, flea infestations in pets and feral and wild animals as a source of *Bartonella* spp transmission and as a cause of animal and human disease are medically underappreciated. Cats can be chronically bacteremic with at least 4 zoonotic *Bartonella* spp for months to years after flea transmission, which makes flea-exposed cats a major reservoir for human infection.

The bacterium can remain viable in flea feces deposited in the environment (ie, the cat's hair coat) for periods of at least 15 days. While grooming, flea-infested cats contaminate the nails and/or saliva with *B henselae*-infected flea feces. If a pet cat is not flea-infested, the risk for *B henselae* transmission, as well as other flea-associated *Bartonella* species, is considered minimal. However, if the cat is flea-infested, *B henselae* can cause persistent bloodstream infections in immunocompromised and immunocompetent humans.

*Bartonella henselae* causes cat scratch disease (CSD) in humans, which is characterized by fever, enlarged lymph nodes, and a history of a cat scratch. Atypical manifestations of CSD in humans have included tonsillitis, encephalitis, cerebral causes of arthritis, transverse myelitis, granulomatous hepatitis and/or splenitis, osteolysis, pneumonia, pleural effusion, and thrombocytopenic purpura. With the advent of specific diagnostic techniques (ie, culture, serology, PCR), there has been a dramatic increase in reports describing human patients with atypical manifestations of CSD, which should be referred to as bartonellosis—a more encompassing term for diseases caused by members of this genus. For example, osteomyelitis, granulomatous hepatitis, and granulomatous splenitis have been recognized in children infected with *B henselae*, who frequently lack the classical CSD lymphadenopathy. Although CSD occurs within days to weeks after a

scratch and presents with an appropriate humoral immune response, more chronic presentations can develop weeks to months after *B henselae* transmission, and patients often lack serologic evidence despite chronic, relapsing bacteremia.

Previously, bartonellosis would not have been considered a likely differential diagnosis in patients lacking a history of lymphadenopathy or animal contact. As evidenced by reports in the past 5 years, the spectrum of human disease—most importantly, various rheumatologic, neurologic, and neurocognitive disease manifestations—associated with *Bartonella* spp continues to expand and requires frequent reassessment as new information becomes available.<sup>2</sup>

On a comparative medical (ie, One Health) basis, many atypical CSD mani-

festations—including encephalitis, transverse myelitis, granulomatous hepatitis, osteolysis, pleural effusion, and thrombocytopenia—also occur in cats or dogs. Thus, similar diseases have been temporally reported in dogs and owners—and, in a few instances, multiple family members—in the same household.

Persistent intravascular infections with one or more *Bartonella* spp have recently been reported in veterinarians, veterinary nurses, wildlife biologists, and other humans with extensive arthropod exposure and animal contact.<sup>3</sup> Thus, veterinary workers and others with extensive animal contact or arthropod exposure are at occupational risk for acquiring *Bartonella* spp infections. It is important for physicians to ask patients about occupational and lifestyle exposure to fleas and cats and to consider the

potential role of zoonotic infections in chronic symptoms affecting the joints and neurologic and vascular systems. In the context of public health, veterinarians have an obligation to recommend routine year-round use of flea-control products, to educate owners that cat fleas transmit several zoonotic pathogens, and to inform physicians of the body of knowledge in the veterinary literature relative to health risks associated with flea infestations in pets or humans. ■

## References

1. Breitschwerdt EB. Bartonellosis: One Health perspectives for an emerging infectious disease. *ILAR J*. 2014;55(1):46-58.
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3. Lantos PM, Maggi RG, Ferguson B, et al. Detection of *Bartonella* species in the blood of veterinarians and veterinary technicians: a newly recognized occupational hazard? *Vector Borne Zoonotic Dis*. 2014;14(8):563-570.

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