I tell my veterinary students that, unless another infectious disease comes along that we don’t yet know about, such as covid-19 did in humans, Bartonella will cause them more problems in their careers than anything else.”

That quote is from Edward Breitschwerdt, DVM, DACVIM, Melanie S. Steele Professor of Medicine and Infectious Disease at North Carolina State University (NCSU) College of Veterinary Medicine. He’s been studying the bacteria for 30 years.

“Wait, what?” you ask. “What the heck is Bartonella?”

It’s an emerging threat that research is showing can be associated with potentially fatal conditions in your dog—and you.

Dr. Breitschwerdt should know: the bacteria infected his father 12 years ago. “If it didn’t directly cause his death,” he explains, “it certainly helped cause it.” (See, “It’s Personal,” at page 314.)

THE ABC’S OF BARTONELLA

What it is: A Gram-negative bacteria that causes a disease called Bartonellosis. An ancient pathogen, it has existed for thousands of years. Yet prior to 1990, there was only one named Bartonella species. Thanks to research by Dr. Breitschwerdt and others, there are now 40 named species, of which 17 have been associated with an expanding spectrum of disease in dogs and humans, as well as other mammals.

The bacteria lives inside blood cells and is transmitted by carriers, known as vectors, which include fleas, lice, and sand flies; Bartonella DNA has also been found in ticks. These vectors are found on and around such animals as dogs, cats, coyotes, raccoons, cows, foxes, horses, rodents, and bats. Bartonellosis is a zoonotic disease, meaning it can be transmitted from your pets or other mammals, to humans.

Cats are a key Bartonella reservoir. “On an evolutionary basis, Bartonella has figured out how to readily infect cats, and how to maintain an extremely high bacteria level in them, most often without inducing disease,” explains Dr. Breitschwerdt. “Those high levels enable the bacteria to be easily picked up by such vectors as fleas and ticks, and passed to other mammals, including dogs and humans.”

Why it’s a threat: Bartonella is a stealth pathogen, meaning it hides inside red blood cells and the cells of blood-vessel walls. There, it eludes the body’s immune system—and, often,
detection by standard diagnostic blood tests. (More about that, below.) It can infect multiple areas in your dog’s body, such as his cardiovascular, neurological, and skeletal systems, plus, potentially his digestive system. That means your dog may develop a heart issue (such as endocarditis, an inflammation of the heart’s valves and inner lining), neurological issues (such as seizures, weakness, or paralysis), or vomiting, diarrhea, and pancreatitis-like signs.

In Dr. Breitschwerdt’s AKC Canine Health Foundation-funded research (CHF; akcchf.org), Bartonella has also potentially been linked to hemangiosarcoma, a deadly canine cancer. (See, “The ‘Hemangio’ Connection,” at page 318.)

“The varied presentation of symptoms reported in dogs with Bartonellosis is problematic for your veterinarian,” he says. (His research team discovered the world’s first identification of Bartonella in a dog in 1993). “Your dog may display a variety of signs from limping, to unexplained weight loss, to cancer. Or, you may say, ‘My dog just isn’t acting right.’ Diagnostically, these problems can be caused by lots of diseases. They also can be caused by Bartonella.”

In humans, Bartonella is the bacteria that causes Cat Scratch Disease (CSD, also known as Cat Scratch Fever), which is characterized by fever, swollen lymph nodes, fatigue, headache, and general malaise. Recent research has shown that Bartonella can also cause chronic infections in humans which, over time, can damage multiple organ systems, just as the bacteria does in dogs.

“If you were to pull out current medical textbooks, they’d state that Bartonella is essentially two things: an infection in immunocompromised individuals, such as AIDS patients or transplant recipients,” says Dr. Breitschwerdt. “Or, an infection that’s transmitted by cats, which is Cat Scratch Disease. If our research holds up, which it’s been doing world-wide, when combined, immunocompromise-linked disease and CSD will be just the tip of the iceberg.”

“That’s because there’s good evidence Bartonella affects the human nervous system, the cardiovascular system, and the
skeletal system, particularly joints, causing rheumatologic symptoms,” he continues. “Immunologically, as with covid-19—the disease caused by the novel coronavirus—Bartonella can affect different people in very different ways.”

Adds Dr. Breitschwerdt, “Not only are dogs our best friends, but naturally infected dogs continue to provide important comparative medical insights that have enhanced our understanding of human Bartonellosis.”

UNDER THE RADAR

“If you were going to design the perfect pathogen to hide under the radar, Bartonella would be a good model,” he says. Compare it, for example, to covid-19, which he describes as a “frontal pathogen,” meaning the virus immediately attacks and tries to overwhelm its victim’s immune system. That way, it can cause rapid spread through respiratory secretions.

“Say you get exposed to someone who’s infected with covid-19,” explains Dr. Breitschwerdt. “Within days, you’re a highly contagious, non-symptomatic carrier at the least, or you become ill. The disease progression may make you mildly ill, or if it’s severe, you could end up on a ventilator, and perhaps even die.”

“With Bartonella,” he says, “you can literally be infected when you’re 15 years old by being bitten by a tick or scratched by a flea-infested cat. But you may not develop disease until five or 10 years down the road—if ever. As a stealth pathogen, Bartonella doesn’t severely suppress you or your dog’s immune system. But if the immune system does get stressed, that may allow the bacteria to proliferate, resulting in disease.”

Ironically, whereas cats carry high loads of the bacteria while rarely getting sick, dogs and humans, even those showing signs of infection, don’t. In fact, infected dogs and humans have a Bartonella blood-bacteria level between 100 and 1,000 times lower than what is typically found in feline carriers.

That makes diagnostic detection difficult, especially with standard blood cultures. Bacterial growth from cultures can take 20 to 40 days rather than the typical two to three days. And, despite infecting red blood cells, Bartonella isn’t visible on blood smears. Serology antibody testing in dogs and humans is also problematic, since these stealth bacteria can persist without causing a measurable antibody response. As a result, diagnostic

IT’S PERSONAL

“My father’s death still motivates me to better understand Bartonella,” says Dr. Breitschwerdt. He thinks his father, who was found to harbor three species of the bacteria in his blood, was infected over a matter of years.

“I think Dad got one species from his barn cat, another likely came from a groundhog he’d relocated, and the third may have come from a blood transfusion. Those findings are based on DNA of three different Bartonella species we found in his blood,” he says.

Looking back, he suspects Bartonellosis caused his father to have neurological signs, which led him to fall and break his hip. “Following hip surgery,” he recalls, “he had one odd complication after another. When he got a form of esophagitis that typically only happens in people with AIDS or cancer, I wondered about an underlying cause—I was pretty sure my 86-year-old dad didn’t have AIDS. And he’d been screened for cancer.”

Dr. Breitschwerdt didn’t immediately suspect Bartonella. He’d just begun studying that bacteria in humans, so his first thought was a recurrence of the tick-borne disease caused by Ehrlichia; his father had been sickened by it in the past. That bacteria, like Bartonella, can present in a variety of ways. His father’s neurologist agreed to provide him a blood sample for testing.

Back at his NCSU lab, Dr. Breitschwerdt’s research team tested the blood. The findings startled him: It was PCR-negative for Ehrlichia, but positive for Bartonella. He immediately called his father’s doctors.

“They started Dad on a rigorous regimen of intravenous antibiotics. He improved to the point that he could go home,” he says. “Unfortunately, what I know now, that I didn’t know then, is that eliminating Bartonella is hard to do. Dad relapsed several weeks after he got home.” Despite further antibiotic treatment, he died.

“We share our world with vectors and mammals that can transmit or harbor Bartonella. Based on evolving research, many people may not get through life without being exposed to one or more of Bartonella species,” he says. “That’s what keeps me up at night. And that’s why I believe we need a vaccine to protect our pets—and potentially, their owners.”

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test results are often negative, even when infection is present. (Improved testing for *Bartonella* infection is a research area currently funded by CHF.)

Polymerase chain reaction (PCR) is a more accurate diagnostic method for *Bartonella* than standard blood tests. PCR is a molecular technique used to detect specific genetic material of a pathogen (virus, bacteria, or other) in the blood. Analysis of tissue and bodily fluids using PCR can help detect *Bartonella*, plus identify distinct genotypes among *Bartonella* species.

As with detection, treatment can be a challenge: Once inside a victim’s bloodstream, the bacteria can invade a variety of cells. “So far,” says Dr. Breitschwerdt, “*Bartonella* has been able to invade and live within nearly every cell in your body that an investigator has looked at. That makes it unique, because it can invade so many cells without causing substantial damage, or alerting the immune system.”

In fact, a cell infected with the bacteria actually lives longer than an uninfected cell, because the organism protects that cell, its “cellular house,” from dying. That way, it doesn’t have to find another cellular house. “On an evolutionary basis,” he explains, “*Bartonella* found a way to decrease programmed cell death.”

In other words, this pathogen can be tough to kill. “*Bartonella* is like a bad guy in a movie—a really smart bad guy. This is not a dumb bacteria,” says Dr. Breitschwerdt.

*Bartonellosis* in dogs, cats, and humans is generally treated with such antibiotics as doxycycline, amoxicillin, enrofloxacin, or rifampin, given for a long duration (such as four to six weeks) to reduce the bacteria load. According to the Centers For Disease Control and Prevention (CDC; cdc.gov), the ability of any antibiotic or antibiotic combination to completely clear the bacteria from the bloodstream hasn’t been established.

The treatment challenge, plus the fact that *Bartonella* may be linked to cancer, caused Dr. Breitschwerdt to refocus his research. “I’ve gone from asking how some dogs and people get infected, and why only some get sick from it, to how to prevent people and dogs from getting infected in the first place,” he says. “If we can learn how to prevent the infection, such as with a vaccine, the ‘why’ questions become less important.”

**PREVENTION: YOUR BEST BET**

Use these suggestions from Dr. Breitschwerdt to help keep your pets, and your family, safe.

• “Practice flea and tick control year-round,” he says. “Do it, literally, 365 days a year. Don’t let up. These vectors can transmit pathogens such as *Bartonella* to your pets, and to you. Fleas also cause allergies in your dog, which can make him itch. And, they can transmit tapeworms and other parasites.”

• Consult your veterinarian for the best vector-control program for your pets. Don’t forget yourself: If you live in an area that has ticks and other biting insects, use topical insect repellants when you go outside.

• Talk to your veterinarian about *Bartonella*. “Our dogs are the best sentinels for understanding human *Bartonellosis*,” says Dr. Breitschwerdt. “Veterinary workers are the best sentinels for understanding what *Bartonella* is doing in dogs.”

• Donate to the AKC Canine Health Foundation (akchf.org), to help fund more research on *Bartonella*, including for a vac-

Says CHF’s Dr. Mary O. Smith, “Dr. Breitschwerdt’s groundbreaking studies are just one example of the close link between canine and human health. His work to understand the mechanisms by which *Bartonella* causes disease in multiple organ systems in dogs is also providing key insights into the cause of human diseases.”

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protected—and can’t serve as a source of transmission to you or your family.”

“The recent advent of SARS CoV-2 (covid-19) has been a reminder that while we await a vaccine, there are other strategies we can use to reduce infectious disease risks,” says Mary O. Smith, BVM&S, PhD, DACVIM (Neurology), Vice Chairman of CHF’s Board of Directors and Chairman of its Scientific Review Committee. “For covid-19, those strategies include social distancing and wearing a facial mask. For Bartonella and other vector-borne diseases, strategies are aimed at avoiding vectors. Talk to your veterinarian about effective flea, tick, and other external parasite control that works in your area. Remember to use products and physical barriers (such as screens) that protect both your dogs and you.”

The bottom line: “Bartonella has been documented in cats that were buried with the Egyptian Pharaohs,” says Dr. Breitschwerdt. “So we know the organism was around at least 3,000 to 4,000 years ago—and cohabitating with people and their pets. It’s not a new bacteria. But it’s one that’s so good at flying under the radar, both human and veterinary medicine missed its existence for a long time. It will continue to complicate the lives of veterinarians and physicians—and their patients—until we find a way to prevent it.”