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NEWSLETTER

Dogs and *Bartonella*©

Summer 2007

Evelyn E. Zuckerman, Editor **Vol. 6, Number 3**

In This Issue:

The Summer 2007 issue of the NVL Newsletter is the first of several Newsletters that will give an overview of *Bartonella* infection in healthy and sick dogs. This is especially relevant as summer is the height of the tick and flea season in many parts of the country. Subsequent Newsletters will cover canine *Bartonella* testing and diseases in more detail.

Dogs

Background:

Dogs cannot relax when it comes to *Bartonella*.

Yes dogs, like cats, are susceptible to infection with *Bartonella* but they are less likely to transmit the bacteria to humans than are cats. However, dogs appear to be exposed less or are less susceptible to infection by *Bartonella*. Dogs are infected much less often (~4 times less) than cats living in the same geographical areas.

Bartonella Species Found in Dogs:

Early studies found that dogs were mainly infected with *Bartonella vinsonii* whereas cats were mainly infected with *Bartonella henselae*.[1-2] Subsequent studies have found that dogs are infected with 6 *Bartonella species* (*B. henselae, vinsonii, clarridgeiae, elizabethae, woshoensis,* and *quintana*) and like cats, they are more often infected with *Bartonella henselae*.[2-16]

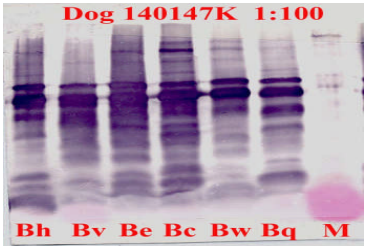
Both cat and dog fleas carry and transmit *Bartonella*, but ticks appear to transmit *Bartonella* among dogs more often than do fleas.[14]

Like cats, dogs have the same risk factors for *Bartonella* infection: flea or tick infestation or a history of infestation, stray or shelter origin, living in multi dog or cat households, living with a *Bartonella*-infected cat or dog, and living in hot and humid climates. In this regard, field dogs or dogs kept outdoors are more likely to be exposed to ticks than dogs kept indoors most of the time.

Western Blot *Bartonella* Test:

As with cats, we utilize the WB technique for serologic testing of dogs for *Bartonella* infection (Figure 1). The WB technique is more specific and more sensitive than IFA or ELISA tests and is used as the confirmatory serological method for many pathogen serologic assays.

Figure 1



Western Immunoblot of a seropositive dog showing cross-reactivity to 6 *Bartonella* species: *B. henselae*, B. *vinsonii, B. elizabethae, B. clarridgeiae, B. weissi (bovis),* and *B. quintana* (M= molecular weight markers).

Similar to cats, *Bartonella* infection in dogs is also correlated with hot and humid climates (Table 1) and we have mapped the prevalence of infected healthy dogs by the first number of their zip codes (Figure 2). The overall infection in healthy dogs, with no reported risk factors, is only 5% compared to 20% in cats with no reported risk factors (Table 2). Healthy dogs who have risk factors for exposure to fleas and ticks compared to dogs with no reported risk factors are 3 times (17% versus 5%) more likely to be infected.

Figure 2

NVL Geographic Prevalence* of *Bartonella* Infection in Healthy Dogs Based on First Number of Zip Code

Healthy dogs infected in: Zip 0: 6/63= 10%; Zip 1: 32/616= 5%; Zip 2: 2/9= 22%; Zip 3: 2/8= 25%; Zip 4: 0/27= 0%; Zip 5: 2/7= 29%; Zip 6: 0/2= 0%; Zip7: 7/22= 32%; Zip 8: 0/1= 0%; Zip 9: 7/42= 17%

***Based on *Bartonella* western blot antibody test.**

Table 1
Geographic Occurrence of *Bartonella* in Dogs

Geographic Area	Percent Infected
New Jersey- NVL	4%
North Carolina/Virginia	3.6%
Southeast- US Healthy	10%
Sick	27%
Southwest- US Army Dogs	9%
California	3%
Israel	10%

We have tested 3,665 dogs for *Bartonella* infection by western immunoblot (WB) (Figures 1 & 2, Tables 2 & 3).

Table 2
NVL Occurrence of *Bartonella* in Dogs

Status	Number Tested	Number Positive	% Positive
Healthy	**802**	**58**	**7%**
1) No RFs**	**641**	**31**	**5%**
2) With RFs*	**161**	**27**	**17%**
Diseased Dogs	**2,730**	**404**	**15%**
Not Specified***	**133**	**25**	**19%**
Totals	**3,665**	**487**	**13%**

* RFs= risk factors for *Bartonella* infection- flea & tick exposure.
** No risk factors reported by veterinarian.
*** No diagnosis given.

Dog *Bartonella* Diseases:

There have been numerous publications documenting the diseases caused by *Bartonella* in dogs.[1-16] The *Bartonella* inflammatory-granulomatous disease spectrum in dogs is quite different from those of cats. Canine *Bartonella* diseases include: heart disease- endocarditis, myocarditis, vegetative valvulitis, and arrhythmias, liver disease- peliosis hepatis, and granulomatous hepatitis, ocular disease- uveitis and chorioretinitis, lymphadenopathy (itis), granulomatous rhinitis, thrombocytopenia and anemia.[1-16]

In addition to the published canine *Bartonella* diseases, we have found *Bartonella spp.* associated with myositis, arthritis, polyarthritis (arthropathy), neurological disease and fever (Table 3). In collaboration with Dr. Charla Jones, Board Certified Veterinary Cardiologist at Veterinary Cardiology & Medicine Service, Austin, Texas, we have found *Bartonella* associated with heart diseases in both cats and dogs. Texas is a high *Bartonella* incidence state.

Table 3

***Bartonella* Infected Dogs with Inflammatory Diseases- NVL Data**

Disease	# +/ # Tested	% +	X
Healthy- No RFs	31/641	5%	X
Myositis/ Myopathy	29/104	28%	5X
Arthritis/Arthritis	72/297	24%	5X
Heart Disease	34/183	19%	4X
Anemia	19/115	17%	3X
Lymphadenopathy	40/265	16%	3X
Neurological Disease	26/167	16%	3X
Fever	57/374	15%	3X
Ocular Disease	82/606	14%	3X
Liver Disease	23/182	13%	2X
Thrombocytopenia	17/156	11%	2X
Respiratory Disease	21/207	10%	2X
Oral Disease	33/578	6%	X
Totals	417/2,963	14%	3X

Case Reports:

Morales SF, Breitschwerdt EB, Washabau RJ, et al. Detection of *Bartonella henselae* DNA in two dogs with pyogranulomatous lymphadenitis. J Am Vet Med Assoc 230:681-685, 2007.

This publication describes 2 cases of canine pyogranulomatous lymphadenitis seen at the Department of Clinical Sciences, College of Veterinary Medicine, University of Minnesota.

Case 1: A 6 year-old neutered male Golden Retriever from Massachusetts was seen for anorexia and lameness of the left hind leg. Cytology of multiple joint aspirates revealed neutrophilic arthritis consistent with an immune-mediated polyarthropathy. Bacterial cultures of the joint fluid were sterile for bacteria and a tick serology panel was also negative. IFA serology for *Bartonella henselae* and *vinsonii* was also negative at the Vector Borne Disease Diagnostic Laboratory at NC State University. However, quantitative PCR for *Bartonella* spp was positive from a lymph node biopsy. The dog was treated with doxycycline (5mg/kg PO BID for 6 weeks) and made a complete recovery. NVL did not test this dog for *Bartonella* by western blot.

Case 2: 6 year-old neutered male English Springer Spaniel was evaluated for fever (105°F), anorexia, and lymphadenopathy of 2 weeks duration. CBC showed a mild thrombocytopenia and there was pyogranulomatous lymphadenitis on histology of a lymph node excision. Serology was negative for antibodies against *Aspergillus* spp, *Blastomyces dermatitidis*, *Coccidioides immitis*, and *Histoplasma capsulatum*. However, we found the dog +3 (infected) by the WB test for *Bartonella* spp. Because of the WB result the dog was discharged on enrofloxacin 8 mg/kg, PO, q 24 h and carprofen 2 mg/kg, PO, q 12 h for 7 days. Clinical signs resolved within 7 days. However, 4 months later the dog's signs recurred with fever and generalized lymphadenopathy. Tick serology was negative at this time and the dog was now treated specifically for the *Bartonella* infection with doxycycline for 4 weeks duration. An IFA test for *Bartonella henselae* and *vinsonii* antibodies on serum collected on day 130 was negative. However, PCR for *Bartonella henselae* was positive from a lymph node biopsy. IFA serology and PCR were performed at NC State University. Antibiotic therapy did not resolve the clinical signs but the addition of an immunosuppressive dosage of prednisone resolved all signs. The authors concluded that "In dogs with pyogranulomatous lymphadenitis, serologic testing may not detect antibodies against *B henselae*."

Editor's Comment: This conclusion was made despite the fact that the dog in case #2, tested by WB for *Bartonella* antibodies at this lab at the initial presentation, was positive (+3 infected). Our studies show that the IFA test is less sensitive and less specific than the WB test for detection of antibodies against *Bartonella*. We find that WB serologic testing of dogs for *Bartonella* infection is a valid diagnostic procedure.

Conclusion:

Dogs, like cats, are susceptible to *Bartonella* infection and the subsequent development of chronic inflammatory diseases. Although dogs can be infected, they rarely transmit the bacteria to people and thus we do not recommend routine testing of healthy dogs due to the relatively low prevalence of infection.[19-20] However, healthy dogs that are exposed to frequent tick or flea infestations and dogs with chronic illnesses (Table 3) may benefit from *Bartonella* testing.

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More *Bartonella* references can be obtained at:
www.nlm.nih.gov/

Happy 99th Birthday Mrs. Adeline Shipp

Mrs. Shipp celebrates her 99th birthday on June 12, 2007

The staff of NVL celebrated Mrs. Shipp's 99th birthday at her home on June 12, 2007. Mrs. Shipp reported all of NVL's FeLV and FIV test results by telephone for 25 years before the widespread acceptance of the fax machine. Her pleasant nature and personality was a client builder for the laboratory for many years. Some hospitals would call just to chat with Addie even when no test results were pending. We were most fortunate to have had such an intelligent, industrious and pleasant person as a member of our staff for 25 years. Mrs. Shipp retired from NVL in 1998 at the age of 90!

The NVL staff has a combined 205 years of specialty veterinary testing experience (average 29 years per person). From left to right standing Valerie Sellen 33 years, Mari Bertero 22 years, Gloria Longo 22 years, Dr. Hardy 45 years, Gina Guerriero summer student, Evelyn Zuckerman 33 years. Front Row Mrs. Shipp 25 years (retired at 90 years of age) and Susan Hardy 25 years.