antibodies. Positive Bb antibody test results were found in 215/919 (23%) of healthy blood donor dogs compared with 962/3941 (24%) of hospital clinic cases during the period of May 2001–Dec 2007.

Medical records from the hospital population of Bb-seropositive dogs were studied. Within our referral population, 102/962 (10%) of Lyme-positive dogs showed evidence of protein-losing nephropathy (hypoalbuminemia, proteinuria). A preliminary review of 55 of these cases was undertaken. Breeds most frequently represented included Labrador Retrievers (16/55, 29%), Golden Retrievers (6/55, 10%), and mixed breed (15/55, 27%), with males comprising 47% (26/55). Average patient weight was 26.1 kg and average age at presentation was 6.3 years.

Common presenting complaints in 55 dogs included inappetance (89%), lethargy (89%), vomiting (72%), weight loss (69%), peripheral lymphadenopathy (33%), and polyuria/polydipsia (31%); only 9% had a history of lameness and 11% had previous Lyme vaccination. Common blood test abnormalities on admission included anemia (49/53, 92%), thrombocytopenia (42/53, 79%), azotemia (50/52, 96%), hypoalbuminemia (47/52, 90%), and hypercholesterolemia (15/52, 29%). Urinalysis and UPC in all 55 dogs confirmed proteinuria (100%) with USG <1.022 in 72%, glucosuria (27%), and bilirubinuria (27%). Hypertension during hospitalization was found in 69% (37/54). A small group of patients showed antibodies to *Ehrlichia canis* (3/55, 5%) or *Rickettsia rickettsii* (2/38, 5%). Anti-Ap antibodies were found in 14% (2/14) of Lyme+PLN dogs tested.

Patients were treated with doxycyline (42/55, 76%), ACE inhibitors (43/55, 78%), amlodipine (14/55, 25%), low-dose aspirin (18/55, 33%), and famotidine (33/55, 60%). A small group (6/55, 11%) received immunosuppressive doses of prednisone. Follow-up of 30 dogs found 60% (18/30) were euthanized or died with mean survival of 24 days post-admission.

In this preliminary study, dogs seropositive for Bb antibodies and exhibiting signs of protein-losing nephropathy had a high mortality rate in the initial period following diagnosis. Further study is warranted to investigate whether other therapeutic modalities, including immune suppression, may be of benefit to these patients.

ABSTRACT #276

DYNAMICS OF EXPOSURE TO VECTOR-BORNE ORGANISMS IN DOGS IN NORTH AMERICA: 2004–2006. PPVP Diniz[1], M Morgado[1], BC Hegarty[1], N Cherry[1], M Sullivan[2], EB Breitschwerdt[1]. [1]Intracellular Pathogens Research Laboratory, College of Veterinary Medicine, North Carolina State University, Raleigh, NC. [2]IDEXX Laboratories, Westbrook, ME.

Vector-borne infections in dogs occur throughout the US; however, temporal trends in prevalence for most infections have been poorly described. The objective of this study was to evaluate the seroprevalence of *Anaplasma* spp., *Babesia canis, Bartonella henselae, Bartonella vinsonii* subsp. *berkhoffii, Borrelia burgdorferi, Dirofilaria immitis, Ehrlichia canis*, and *Rickettsia rickettsii* in dog blood samples submitted to the Vector-Borne Diseases Diagnostic Laboratory at NCSU from January 2004 to December 2006. From the laboratory database, 7049 accessions (2208 dogs in 2004, 2400 dogs in 2005 and 2441 dogs in 2006), for which serological results were available for at least three test organisms, were selected for analyses. An indirect immunofluorescence assay (IFA) with a cut-off of 1:64 was used to detect exposure to *B. canis B. henselae, B. v. berkhoffii, E. canis* and *R. rickettsii*. The Snap® 4Dx® was used to detect exposure to *Anaplasma* spp., *B. burgdorferi, D. immitis* and *E. canis*. Gender information was available only for 2006, with 1218 males and 1179 females. 6775 samples (96.1%) were submitted from 47 states of the US, with South and Midwest regions overrepresented (68.1% and 20.1% of US samples, respectively). 274 samples (3.9%) were submitted from Canada. Seroprevalences in 2004, 2005 and 2006 are presented below:

	Organism seroreactivity (% of total per year of tested samples)								
Year	*Anaplasma* spp.	*Babesia canis*	*Bartonella henselae*	*Bartonella v. berkhoffii*	*Borrelia burgdorferi*	*Dirofilaria immitis*	*E. canis* (by IFA)	*E. canis* (by Snap® 4Dx®)	*Rickettsia rickettsii*
2004	1.7	1.3	10.6	1.0	6.2	1.0	4.7	5.8	6.1
2005	1.8	2.7	4.4	1.9	5.4	0.5	3.9	4.9	16.0
2006	1.9	2.0	3.8	2.9	6.0	0.8	3.3	5.2	15.2
N	6452	7045	5395	7049	7018	6452	7049	6452	7049

A significant decrease in *B. henselae* seroprevalence occurred from 2004 to 2006 in northeastern states (12%, 2.7% and 4.7%, $p = 0.02$), in southern states (11.5%, 4.6% and 3.8%, $p<0.0001$), especially in the south Atlantic states (DC, DE, FL, GA, MD, NC, SC, GA, and WV) and in Canada (16.3%, 4.7% and 0%, $p = 0.0004$). A significant increase in *B. v. berkhoffii* seroprevalence occurred from 2004 to 2006 in Midwestern states (0.8%, 2.2% and 3.1%, $p = 0.027$), especially in IL, IN, MI, OH, and WI, and in southern states (1.2%, 1.9% and 2.8%, $p = 0.002$), especially in south Atlantic states. There was a significant increase in *R. rickettsii* seroprevalence from 2004 to 2006 in midwestern states (2.2%, 6.9%, and 9.2%, $p<0.0001$) and in southern states (6.7%, 19.7%, and 19.2%, $p<0.0001$), especially in south Atlantic states. *Ehrlichia canis* exposure defined by IFA and Snap® 4Dx® test results were similar in 96.7% of the samples (Kappa: 0.641, CI: 0.596–0.686). Monitoring vector-borne exposures in pets over years is critical for establishing trends and future actions, not only in veterinary but also in human medicine.

ABSTRACT #277

MOLECULAR AND SEROLOGICAL PREVALENCES OF VECTOR-BORNE DISEASES IN CATS FROM MADRID, SPAIN. T Ayllón[1], PPVP Diniz[2], A Sainz[1], A Villaescusa[1], EB Breitschwerdt[2]. [1]Complutense University of Madrid, Spain. [2]College of Veterinary Medicine, Intracellular Pathogens Research Laboratory, North Carolina State University, Raleigh, NC.

Anaplasma phagocytophilum (*Aph*), *Bartonella henselae* (*Bh*) and *Ehrlichia canis* (*Ec*) are considered emerging or re-emerging diseases in human and veterinary medicine worldwide. In Spain, human bartonellosis, ehrlichiosis and, recently, anaplasmosis have been reported. Classically, non-specific clinical and laboratory abnormalities are induced by infection with these organisms in animals and human patients, which leads to misdiagnosis and artificially low estimates of disease prevalence. Furthermore, limited epidemiological data is available for these organisms in cats from Spain.

The aim of this study was to determine the molecular and serological prevalences of *Aph*, *Bh* and *Ec* in 155 cats examined at the Veterinary Teaching Hospital in Madrid, Spain. Between September, 2005 and May, 2006, blood samples obtained from cats for any diagnostic purpose were entered into the study. Epidemiological data recorded for each cat included: breed, gender, age, access to outdoor environment, contact with other animals, arthropod-exposure history, endoparasite treatments, previous anti-rickettsial treatments and travel history. Antibody reactivity against *Aph*, *Bh* and *Ec* antigens, was determined using an indirect immunofluorescence antibody (IFA) test with cut-off titers of 1:40 for *Aph* and *Ec*, and 1:64 for *Bh*. Using PCR, *Aph* and *Ec* DNA was amplified targeting the 16S rRNA and groESL genes. *Bh* DNA was amplified targeting the intergenic transcribed spacer (ITS) region.

Seroprevalences were *Aph*: 13.5% (21 cats), and *Bh*: 5.2% (8 cats) and *Ec*: 11% (17 cats). Two cats were *Aph* and *Ec* seroreactive, two cats were *Aph* and *Bh* seroreactive and one cat was *Bh* and *Ec* seroreactive. Neither *Anaplasma* spp. nor *Ehrlichia* spp. DNA was amplified from any sample. *Bartonella* spp. DNA was amplified, cloned and sequenced from one sample. When consensual sequences were compared with other GenBank sequences (Nov/2007), the Spanish cat ITS sequence was 100% homologous to *B. henselae* Houston-1 (BX897699). With the exception of an association between the *Aph* seroreactivity and pure breed cats ($p = 0.024$), there were no statistical associations between *Aph*, *Bh*, or *Ec* seroreactivity and epidemiological parameters. These results indicate that a portion of the cat population examined at a Veterinary Teaching Hospital in Madrid, Spain, has been exposed to the vector-borne organisms evaluated in this study. Although seroreactivity to *Anaplasma* spp. and *Ehrlichia* spp. was detected in some cats, there was no molecular evidence of active infection with either genus. Surprisingly, the *B. henselae* serological and molecular prevalence was comparatively low in this cat population. Demographics of the study population, including the majority of subjects being client-owned cats, and changes in vector distribution may justify disagreement with prevalences encountered in other locations in Spain. Since this hospital population does not represent the regional or national feline population, these data cannot be extrapolated to other cat populations or other regions of Spain.

Molecular and Serological Prevalences of Vector-Borne Diseases in Cats from Madrid, Spain

ACVIM 2008

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Speaker Information

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