Healthy Cats and Bartonella:
Bartonella are More Important than FeLV and FIV©

Winter 2007

Vol. 6, Number 1

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In This Issue:
In the winter 2007 issue of the NVL Newsletter we will cover the importance of determining if healthy cats are infected with Bartonella. Healthy infected cats are prone to develop any of the Bartonella inflammatory diseases and can transmit the bacteria to people. There has been a long standing controversy as to whether or not Bartonella cause any disease in cats, even though there are ample publications that show Bartonella are disease-inducing bacteria.1,2

We strongly recommend that all healthy cats be tested for Bartonella as a part of their normal health exams which include FeLV and FIV tests, examination of the stool for intestinal parasites, and routine vaccinations.

Healthy Versus Disease:
Stedman’s Medical Dictionary, 25th Edition defines:
Healthy: “Well; in a state of normal functioning; free from disease.”
Morbis or Morbid: “Disease and diseased or pathologic.”
Disease: “1. Morbus; illness; sickness; an interruption, cessation, or disorder of body functions, systems, or organs. 2. A morbid entity characterized usually by at least two of these criteria: recognized etiologic agent(s), identifiable group of signs and symptoms, or consistent anatomical alterations.”
Syndrome: “The aggregate of signs and symptoms associated with any morbid process, and constituting together the picture of the disease.”

Pathogenic and Non-Pathogenic Microorganism:
All microorganisms must infect susceptible healthy hosts in order to propagate. They can be classified into 3 general groups: 1) Non-pathogenic microorganisms: these are non-disease-inducing and live commensally with their hosts, many of which are actually beneficial. 2) Chronic pathogenic microorganisms: these are minimally non-pathogenic for a time and live harmlessly for long periods within their host (chronic persistent infection) and induce disease after a long “latent period” or induce disease when the host is under stress (Herpes viruses) or is immunosuppressed (Mycobacterium avium).2 Bartonella, FeLV and FIV are examples of this type of microorganism. 3) Acute pathogenic microorganisms: these infect their hosts and quickly induce disease, some resulting in chronic non-life threatening diseases and others inducing death rapidly in their infected hosts (Plague, Parvovirus, Ebola virus).

Healthy Animals:
A healthy animal, by definition, is one that does not exhibit any signs of a recognizable disease syndrome, even though they may be infected with a known pathogenic microorganism. For example, cats can be healthy carriers of FeLV, FIV, FIPV, Toxoplasma or Bartonella. Cats are known to mask clinical signs of disease far more effectively than dogs or humans. During our FeLV clinical studies we often examined cats with large lymphosarcoma mediastinal masses or severe anemias where the owner had not noticed any signs of illness, such as increased respiration, until the day before coming to the clinic.

Many practitioners consider cats to be healthy even though they have gingivitis, skin papules or mild conjunctivitis. However, these may be signs of acute or chronic disease processes and may lead to more severe general pathology. A 3 month-old kitten with gingivitis most likely has an infectious cause for the gingivitis since it has not lived long enough to develop significant tartar to cause the gingivitis. Even though the gingivitis may be the only clinical abnormality noted, the practitioner should not discount this early sign of a systemic disease. The cause may be FeLV, FIV or Bartonella or a combination of these microorganisms.

Bartonella-Infected Healthy Cats:
The major risk factor for Bartonella infection of cats is not their contact with other infected cats, but rather, factors that increase the exposure to arthropod flea and tick vectors which are responsible for almost all of the transmission of Bartonella between cats. These risk factors are: stray or shelter origin, outdoor cat, living in multi cat households, a history of fleas or present flea infestation. In our initial study of healthy cats with no reported risk factors, performed in the metropolitan New York/New Jersey area from the Oradell Animal Hospital, the prevalence was 20%.3 This is the baseline or denominator for all of our studies of the prevalence in other areas of the United States and for cats with Bartonella inflammatory diseases.

As of January 1, 2007, after testing 129,922 cats, we have derived a Bartonella prevalence map based on the climate of the United States as differentiated by the first number of the postal zip codes. Nationwide, the prevalence in healthy cats with no reported risk factors is 30%.

Bartonella Prevalence in Healthy Cats Based on the First Number of Zip Code

*RFs= No reported risk factors
The prevalence increases in hot and humid climates as shown in the map above and is highest in the southern states of Florida, Texas, Louisiana, the Gulf states, and the Pacific coast states and is lowest in the northern states. The high prevalence parallels the year-round flea and tick incidence in the warmer more humid climates and people living in these areas are at increased risk of zoonotic infection. As of January 1, 2007 we have found that 11,973 of 31,924 (37%) healthy cats (with known or no reported risk factors), were infected with Bartonella (See Table below).

Bartonella Prevalence in Cats:

<table>
<thead>
<tr>
<th>Status</th>
<th>Number Tested</th>
<th>Number Positive</th>
<th>% Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>31,924</td>
<td>11,973</td>
<td>37%</td>
</tr>
<tr>
<td>1) No RFs*</td>
<td>6,912</td>
<td>2,054</td>
<td>30%</td>
</tr>
<tr>
<td>2) With RFs</td>
<td>25,012</td>
<td>9,919</td>
<td>40%</td>
</tr>
<tr>
<td>Diseased Cats</td>
<td>94,911</td>
<td>43,367</td>
<td>46%</td>
</tr>
<tr>
<td>Not Specified**</td>
<td>3,087</td>
<td>1,384</td>
<td>45%</td>
</tr>
<tr>
<td>Totals</td>
<td>129,922</td>
<td>56,724</td>
<td>44%</td>
</tr>
</tbody>
</table>

* RFs= risk factors  ** Diagnosis not given

Thus, veterinarians should realize that 1 of every 3 healthy cats that they examine are carrying Bartonella which are capable of infecting them, their hospital personnel, and the cat owner’s family members. Practitioners should re-examine their policy regarding Bartonella testing.
Comparison of the Prevalence of FeLV, FIV and Bartonella in Healthy Cats
Most practitioners include FeLV and FIV testing as part of their routine health examination of new cats but few include Bartonella testing. The prevalence of FeLV and FIV infection in healthy cats is quite low, whereas the Bartonella prevalence is 20 times higher. We have tested 4,360 healthy cats for FeLV, FIV and Bartonella and the data are given in the Table below. FeLV and FIV are not known to be transmissible to humans, whereas Bartonella are transmissible and can even cause death under rare conditions. Thus, Bartonella is more important for the health of cats and their owners than FeLV and FIV.

Prevalence of FeLV, FIV and Bartonella in Healthy Cats

<table>
<thead>
<tr>
<th>Test*</th>
<th>Number Tested</th>
<th>Number Positive</th>
<th>% Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>FeLV</td>
<td>4,360</td>
<td>60</td>
<td>1.4%</td>
</tr>
<tr>
<td>FIV</td>
<td>4,360</td>
<td>75</td>
<td>1.7%</td>
</tr>
<tr>
<td>Bartonella</td>
<td>4,360</td>
<td>1,530</td>
<td>35%</td>
</tr>
</tbody>
</table>

* 5 cats (0.1%) were infected with all 3 organisms.

Healthy Cats, Especially Kittens, Transmit Bartonella to People:
Bartonella are found in the blood plasma, inside erythrocytes and endothelial cells and in tissues of infected cats. In order to be transmitted to people, the organism must be present on the claws (scratch), in the mouth (bites) or on the fur (contact- no abrasion) of infected cats. Infected kittens are rapidly growing and have changing dentition leading to the probability that Bartonella can leak into the oral cavity. The loss of kitten teeth or oral trauma due to rough play, chewing and playful fighting, can lead to Bartonella in the mouth. Cats groom themselves frequently thereby depositing Bartonella organisms from the oral cavity onto their fur or claws. The fact that kittens and children are playful toward each other presents the conditions needed for the zoonotic transmission from kittens to children. Boys tend to play more roughly with kittens than do girls, which is reflected in the higher incidence of cat scratch disease in boys.

![Bartonella testing of healthy cats should be part of the routine feline health protocol, especially before their first birthday.](image)

Bartonella antibody negative kittens, 6 months or younger, present a problem for the practitioner. Kittens under 6 months of age with Bartonella-like inflammatory diseases (gingivitis, URI, conjunctivitis, rhinitis, uveitis, gastroenteritis, etc.) may be infected but have not yet had enough time to develop antibody. Bartonella appear to be able to infect young kittens and induce an inflammatory disease before the development of detectable antibody. Thus, test negative kittens with inflammatory diseases should be retested 8 weeks after the first test to see if they were “incubating the infection.” An example of one such Texas kitten’s tests is presented below.

![Antibody Negative Period in Early Infection: Kitten < 6 Months Old with URI](image)

Although we make this recommendation, only 270 (4%) of the 6,534 FeBarr® Test negative kittens, with an inflammatory disease, were retested 8 weeks later. 45 of the 270 retested kittens (17%) were found to be infected. Thus, many practitioners allow these kitten’s infections to go undetected and the kittens are prone to develop Bartonella inflammatory diseases. These kittens can transmit the bacteria to a person in the household. In this regard, we have observed Bartonella transmission to a person from an initially test-negative kitten with an inflammatory disease who was not retested as recommended. Not adhering to our recommendation may make the practitioner legally responsible for the zoonotic consequences, should they occur.

Transmission of Bartonella from Healthy Cats to People:
We presented our human Bartonella disease findings at The 5th International Conference on Bartonella as Emerging Pathogens, in conjunction with the 20th Meeting of the American Society for Rickettsiology, at the Asilomar Conference Grounds, Pacific Grove, California, September 2-7 2006. We investigated 84 human patients with serologically or biopsy confirmed Bartonella diseases and identified 70 cats that transmitted the bacteria. 40 of the 70 cats (57%) were healthy while 30 had Bartonella induced inflammatory diseases. 29 of the 70 (41%) cats were kittens under 1 year of age. Thus, more than half of cats that transmit Bartonella are healthy and almost half are kittens less than 1 year of age.

We recommend that all healthy cats, especially kittens younger than 1 year of age, be tested for Bartonella as a part of their normal health examinations.

Treatment of Bartonella Infection:
As has been reviewed in previous Newsletters, therapy of Bartonella infected cats is effective.5 It is very important to stress rigorous flea and tick prevention for Bartonella test-negative cats and infected cats that have been treated.

AFTER TREATMENT WE ARE UNABLE TO RETEST PREVIOUSLY POSITIVE CATS TO DETERMINE BARTONELLA RE-INFECTION. However, we can retest Bartonella test negative cats should they subsequently be infested with fleas or ticks.

Risk Factors for Bartonella Infection in Healthy Cats (Fleas & Ticks)

<table>
<thead>
<tr>
<th>Risk Factor*</th>
<th>Number Tested</th>
<th>% Infected</th>
</tr>
</thead>
<tbody>
<tr>
<td>None Reported</td>
<td>840</td>
<td>20%</td>
</tr>
<tr>
<td>Stray origin</td>
<td>8,380</td>
<td>40%</td>
</tr>
<tr>
<td>Shelter cat</td>
<td>5,124</td>
<td>32%</td>
</tr>
<tr>
<td>Multi cat household</td>
<td>14,121</td>
<td>41%</td>
</tr>
<tr>
<td>Exposed to Infected cat</td>
<td>3,646</td>
<td>53%</td>
</tr>
<tr>
<td>History of fleas</td>
<td>4,709</td>
<td>47%</td>
</tr>
<tr>
<td>Present flea infestation</td>
<td>1,307</td>
<td>42%</td>
</tr>
<tr>
<td>Lives in CSD household</td>
<td>628</td>
<td>58%</td>
</tr>
<tr>
<td>Totals:</td>
<td>37,915</td>
<td>42%</td>
</tr>
</tbody>
</table>

1/1/07 *Many cats had multiple risk factors.

Reasons to Screen Healthy Cats for Bartonella Infection:
1. To reduce the number of infected cats, the bacteria’s natural reservoir host, in order to reduce the number of Bartonella infected flea and tick vectors.
2. To prevent infected healthy cats from developing any of the many chronic debilitating inflammatory diseases caused by Bartonella.
3. To prevent zoonotic transmission from healthy kittens and adult cats to children, adults, and especially to immunosuppressed people.
4. To reduce the incidence of feline Bartonella-induced diseases of humans and keep the family of your clients safe.

It is more cost effective to prevent Bartonella diseases than to diagnose and treat them once they occur. Bartonella testing of healthy cats should be part of your routine feline health protocol.

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References:
4. Hardy, WD, Jr., and Zuckerman, EE. Human bartonellosis: diseases caused by feline Bartonella-84 cases. The 5th International Conference on Bartonella as Emerging Pathogens. Pacific Grove, California, September 2-7 2006.