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NEWSLETTER

Bartonella and Your Immunocompromised Clients[©]

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In This Issue:

The fall 2013 issue of the NVL Newsletter will discuss *Bartonella*, your feline patients, your immunocompromised clients, and your public health and legal responsibilities. The emphasis will be on YOU and YOUR patients and clients. Are you protecting your clients and discussing the *Bartonella* public health aspects with them?

Bartonella:

Bartonella spp. are ubiquitous bacteria found in many animals from reptiles to humans. They were first identified in 1990 using DNA technology in an immunocompromised AIDS patient.¹ Cats are the reservoir host for most *Bartonella* species (6) and the bacteria are spread among cats by flea and tick arthropod vectors. Feline *Bartonella* cause numerous inflammatory diseases in cats and 38% of healthy cats are chronically infected.² Infected cats can transmit the infection to people via scratches, bites, and contact. People infected zoonotically with feline *Bartonella* may develop at least 22 diseases, some severe and a few life-threatening.³ Infected cats and people can be successfully treated with antibiotics.⁴ Dogs also carry *Bartonella* but they do not appear to represent much of a zoonotic danger. Immunocompromised people are at the greatest risk for severe *Bartonella* diseases.⁵ Our recent study found that 94% of veterinarians did not discuss the zoonotic dangers of feline *Bartonella* with their clients before their clients developed a *Bartonella* disease.⁶

Immunosuppression:

Immunosuppressed, immunocompromised or immunodeficient animals are those whose immune systems are disordered or suppressed making them more susceptible to infections and to cancer. Veterinarians most often do not know if any of their clients, or members of their client's families, are immunocompromised and may be hesitant to inquire as to immunocompromised individuals in their client's families. Thus, veterinarians should discuss the *Bartonella* risks with all their cat-owner clients.

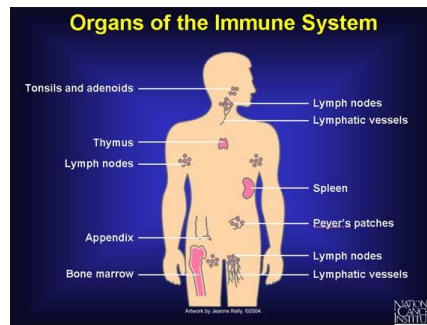
The 3 Immune System Components:

1) Lymphoid: B and T cells are found in various tissues: bone marrow, lymph nodes, spleen, gastrointestinal tract, thymus, and tonsils

2) Neutrophil granulocytes

3) Complement system of proteins

All three immune components can be affected causing immunodeficiencies in humans:



1) Lymphocytes:

A. B cells and plasma cells- humoral immunodeficiency is caused by primary B-cell disorders, multiple myeloma, chronic lymphoid leukemia, and HIV-AIDS.

B. T cell immunodeficiencies are caused by bone marrow and solid organ transplantation, lymphoma, cancer chemotherapy, glucocorticoid therapy and HIV-AIDS. T cell deficiency leads to susceptibility to intracellular microorganisms such as *Bartonella*, *Herpes simplex virus*, *Mycobacterium*, *Listeria*, and intracellular fungi.

C. Asplenia immunodeficiency can be caused by trauma, splenectomy, and sickle-cell anemia. People who have had their spleen removed are at higher risk for infection by certain bacteria.

2) Neutrophil granulocytes: neutrophil immunodeficiencies can be caused by chronic granulomatous disorders, chemotherapy and organ transplantation.

3) Complement immunodeficiencies can be caused by congenital complement deficiency diseases and complement consumption.

Types of Immunosuppression:

There are two major types of human immunodeficiencies: primary (inherited) and acquired.

Primary Immunodeficiency:

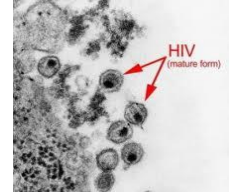
Primary immunodeficiency disorders affecting B cells include hypogammaglobulinemia which usually leads to respiratory and gastrointestinal infections and agammaglobulinemia which results in severe infections early in life, and is often fatal.

Acquired Immunodeficiency:

Causes of acquired immunodeficiency are:

1. HIV-AIDS: Worldwide, the largest group of immunocompromised patients, caused by infections, are those with AIDS, a disease which was first recognized in 1981 and has been

responsible for the death of over 25 million people since the beginning of the epidemic. There are currently about 35 million people



worldwide who are living with HIV.

2. Cancer: Many cancers, especially cancers of the lymphoid cells, cause immunodeficiency.

3. Splenectomy: People who have had their spleens removed have an acquired immunodeficiency and are at increased risk for infection by certain bacteria.

4. Chronic Diseases: Patients with chronic diseases such as end stage renal disease and dialysis, diabetes, and cirrhosis are also at higher risk for certain infections.

5. Medications: Medications such as steroids, chemotherapy, radiation, immunosuppressive post-transplant medications, and antirheumatic drugs can markedly weaken the immune system.

6. Pregnancy: The physical state of pregnancy can weaken the immune system.

7. Age: As we get older, the immune system becomes less effective, immune tissues atrophy, and the number and activity of lymphocytes and neutrophil granulocytes decrease. The aging of the immune system is called immunosenescence and leads to increased risk for infection.^{7,8}

It is important to realize that not all immunodeficiencies result in the same risk for infection.

Immunocompromised Cat Owners:

The exact number of cat owners who are immunocompromised, and at risk of *Bartonella* zoonosis in the USA, is not known but we can give an estimate based on the cat owning population and the number of elderly people and people with the 3 major classes of immunodeficiency diseases: cancer, HIV infection and transplants.

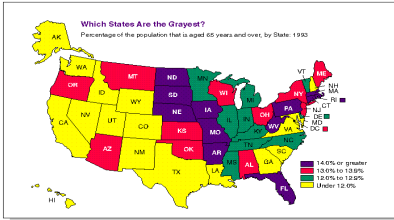
Human and Cat Population Numbers:

According to the 2010 census, there were 308.7 million people in the USA.⁹ Of the total population; 300.8 million lived in 116.7 million households for an average of 2.58 people per household. In 2009 the AVMA estimated that there were 81 million cats residing in 32% of the households. Our data as of November 4, 2013, from the past 14 years of *Bartonella* testing, indicates that 35% of healthy cats and 46% of cats with inflammatory diseases in this country are infected with *Bartonella*. This represents a

large cat reservoir population as a source of infection for the cat flea vector and a source of direct zoonotic spread to their owners.

Immunocompromised Human Prevalence:

1) Age- Elderly (Aging) Prevalence: There were more than 40 million people 65 years of age or older, 13% (7.4% females and 5.6% males) of the population, in the 2010 census.⁹ According to petfoodindustry.com, 36% of people over 65 years of age own a dog or cat. The number of elderly people is growing rapidly which increases the population with weakened immune systems (immunosenescence).^{7, 10, 11}



Greatest numbers of over 65 year olds are shown in purple and red states

2) Cancer Prevalence: Cancer prevalence is defined as the number of living people who have ever been diagnosed with cancer. The American Cancer Society estimates, as of January 1, 2010, the cancer prevalence for all invasive sites in the USA to be 13,028,000 with females accounting for 6,949,000 and males accounting for 6,079,000.¹² Cancers of the immune cells such as lymphoma, acute and chronic leukemias, myeloma, and myelogenous leukemia are most immunosuppressive.¹²

3) HIV Prevalence: The CDC estimates that more than one million people are living with HIV in the USA. One in five (20%) of those people are unaware of their infection.¹³ However, new infections continue at far too high a level, with approximately 50,000 Americans becoming infected with HIV each year. HIV-infected individuals are at much higher risks for developing severe *Bartonella* diseases.¹⁴

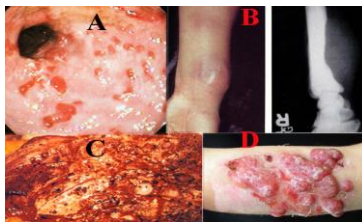
4) Organ and Bone Marrow Transplant Prevalence: 264,406 people were living with transplants in the USA at the end of 2010.¹⁵ In 2012, 28,051 people received organ transplants and are at increased risk from infections such as feline *Bartonella*.¹⁶

Immunocompromised Cat Owners:

Analyses of all these parameters indicate the at-risk immunocompromised population is about 30 million people or about 10% of the total US population. Thus, approximately 1 of 10 cat owner families has an immunocompromised individual at home who might need protection from *Bartonella* infected cats. In this regard, we tested 1,737 cats owned by immunocompromised people and 44% were infected with *Bartonella* (Table1).

Clinical Syndromes of Feline *Bartonella* in Immunocompromised People:

These infections are characterized by fever of unknown origin, bacillary angiomatosis (BA) angioproliferative lesions that can involve any organ system including the skin, spleen, liver and culture-negative endocarditis and osteomyelitis. Involvement of major organs is often life threatening.^{2, 14, 15}



A. Colonic BA, B. Bone BA, C. Liver- peliosis hepatis (fatal), and D. Skin BA

Table 1 *Bartonella* Prevalence in Cats Owned by Immunocompromised People:

Immuno-compromised	# Tested	# Positive	%
Unspecified	2,619	1,141	44%
Chemotherapy	934	376	40%
Transplants	277	128	46%
HIV-AIDS	84	45	54%
Elderly	117	60	52%
Nursing Home	325	147	45%
Totals;	4,356	1,897	44%

Recommended Approach to Your Clients:

At the first exam of a kitten, or the yearly healthy cat checkup, it would be advisable to mention the *Bartonella* risk to all family members, especially those who may be immunocompromised due to present or past cancer therapy, corticosteroid use for allergy, chronic diseases and elderly (>65yrs). You do not have to inquire as to any family member who might be immunocompromised but mentioning the danger in general terms should be sufficient to alert your clients to their possible zoonotic *Bartonella* danger.

Our Recommendations for Cat-Owning Immunocompromised Clients:

1. Avoid contact with all cats, and especially kittens, whose *Bartonella* status is unknown.
2. Be cautious about handling, and do not adopt, stray, feral, rescue or shelter cats.
3. *Bartonella* test and treat all infected cats living with the immunocompromised client.
4. Recommend that someone other than the immunocompromised owner treat *Bartonella* infected cats.
5. Maintain rigorous flea and tick control for all household cats and dogs.
6. Keep household cats indoors at all times.

CDC Recommendations for Cat Owners who are Immunocompromised:

1. Avoid "rough play" with cats, especially kittens. This includes any activity that may lead to cat scratches and bites.
2. Wash cat bites and scratches immediately and thoroughly with running water and soap.
3. Do not allow cats to lick open wounds.
4. Control fleas.
5. If you develop an infection (with pus and pronounced swelling) where you were scratched or bitten by a cat or develop symptoms, including fever, headache, swollen lymph nodes, and fatigue, contact your physician.

Editorial Comment: We feel the CDC recommendations are outdated and inadequate. In support of these recommendations CDC gave 3 references that date to 1994, 1995 and 2000, 13 years or more out of date.

Immunocompromised Veterinarians and Their Employees:

Veterinarians and their employees are among the highest at risk people for *Bartonella* zoonosis. Those who are immunocompromised are at even greater risk and should take stringent precautions.

Summary:

Feline derived *Bartonella* can infect both immunocompetent and immunocompromised people and people of all ages. *Bartonella* can be transmitted to people from their cats by scratches, bites or mere contact even without a known break in the skin. It is imperative that the veterinary profession take this zoonotic risk seriously in order to protect their patients, clients, employees and themselves.

Bartonella free cats are safe, healthy & happy.



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