

# Central Connection

Your Connection to Valley Central - WINTER 2011/12



## Leaders in Specialty Care

Greetings to you all:

As we enter the New Year, we would like to thank each of you for your continued support of VCVRC. A few highlights in 2011 included Dr. Meg Sleeper joining our Cardiology Department, the inception of our Pet Loss Support Group and the launch of our new website.

In this first quarterly issue of CENTRAL CONNECTION, we have included articles written by Dr. Meg Sleeper, Susan Bulanda, and Veterinary Nurse Brandy Spadaccia. Our newsletter will keep you updated on medical topics, as well as new services being offered at VCVRC. The goal of our newsletter is to discuss current topics of interest in veterinary medicine as well as highlighted services at VCVRC. We understand that our success as a referral hospital is directly correlated to your confidence in our veterinary service. Please do not hesitate to contact any doctor or staff member with questions or concerns regarding any aspect of our veterinary hospital services.

I hope everyone has a very happy, healthy, and prosperous year in 2012.

Allyson Tolliver, Hospital Administrator

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### Updates From VCVRC:

WE DID IT! We are very proud to announce that we are AAHA accredited. This is an important accomplishment that we chose to pursue to further assure you that we are committed to providing the best veterinary care possible. Our next goal is to attain specialty accreditation in Internal Medicine and Surgery. Achieving accreditation in specialty medicine underscores our dedication to adhering to the principles that allow us to offer the highest standard of veterinary care to our clients and patients.

Less than 100 hospitals are AAHA accredited in specialty fields and we are extremely proud to be undertaking this venture.

Again, our inspiration to strive for AAHA accreditation is you, the referring practices, that have supported us over the years. We are very excited to start the New Year as an AAHA accredited hospital and look forward to serving your needs as the leading referral hospital in the Lehigh Valley.

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Meg M Sleeper VMD, DACVIM (Cardiology)

# Feline Heartworm Disease Update

### Etiology and life cycle

Although dogs are the usual definitive host of *Dirofilaria immitis*, the life cycle of the parasite can be completed in cats and feline infection rates in endemic regions are usually 10% to 20% of that of dogs within the same enzootic region. It is likely that the morbidity in cats associated with heartworm disease is underestimated. Cats are not the definitive host for the parasite and typically have low and transient microfilarial counts and a longer average pre-patent period (usually 1-2 months longer) than in dogs. Aberrant migration of the fourth-stage larvae (L4) occurs more frequently in cats than in dogs. Third-stage larvae (L3) infect the cat via the bite wound created when an infected mosquito feeds. Larvae migrate through the subcutaneous tissues and vascular adventitial tissues. During this time, 2 molts occur. Once the larvae enter the blood stream, they are swept with the circulation to the pulmonary arteries. There is very high mortality of the young adults (L5) as they reach the feline lungs approximately 3 to 4 months post infection and only a subset of the larvae ever mature to the adult stage. Adult heartworms are typically sexually mature and able to reproduce by 7-8 months post-infection (which is 1-2 months longer than is seen in the dog).

### Prevalence and Pathogenesis

Several studies have shown the heartworm infection rate in cats is greater than that for FIV or FeLV. Acute lung injury is the major contributing factor to the initiation of clinical signs. It is hypothesized that the arrival of fifth stage larvae in the lungs and the death of adult worms are the most likely stages of the life-cycle to be associated with clinical signs in the cat. After an initial host response, the signs may disappear or become subclinical. *D immitis* has evolved various strategies to evade host immune attack and these capabilities could account for the reduction of clinical signs after the initial, often marked inflammatory response following arrival of the L5 stage in the lungs, as well as the acute signs which follow death of the heartworm(s) in the cat. Although cats may clear the infection so that no adult worms develop, pulmonary pathology can still be severe. Thus, the disease process can be divided into 3 main stages of disease in cats.

The first being associated with the arrival of juvenile worms in the pulmonary arteries and an

acute parenchymal inflammatory reaction. This stage is followed by a relatively symptom free period after the worms mature to adults and the host immune response is suppressed. However, when the worm(s) die, the immune system is no longer suppressed and an intense inflammatory response follows (stage 2) with sudden death reported in 10-20% of affected cats. Finally, if the cat survives, it enters the final stage of disease with permanent lung injury due to type II alveolar cell hyperplasia and chronic respiratory disease.

### History and clinical signs

The owner of an affected cat may report a wide range of clinical signs such as chronic coughing, sudden or episodic dyspnea, and/or vomiting. Vomiting and coughing are common clinical signs in heartworm infected cats, and the combination of these signs in a feline patient warrants a high level of suspicion for heartworm infection. Lethargy, decreased appetite and/or weight loss may also be reported. Occasionally central nervous system signs such as seizures or blindness may be present, particularly when aberrant migration has occurred. Asthmatic signs are common manifestations and often occur about 3 to 4 months post-infection. In a subset of cats, severe respiratory distress +/- collapse or sudden death may be the first clinical sign recognized by the owner. It is a much more common presentation in feline heartworm disease than in canine heartworm disease. Acute death in affected cats has been attributed to pulmonary arterial infarction following spontaneous death of adult heartworms; however filariae are not always present embolizing the main pulmonary arteries and the lung lobes are rarely ischemic (based on radioisotope studies). It has also been theorized that damage to the heartworm cuticle causes release of large amounts of heartworm antigen (Ag) results in acute systemic anaphylaxis and death. On the other hand, approximately a third of affected cats will be asymptomatic.

### Diagnosis

Diagnostic confirmation often requires a combination of tests. Affected cats usually lack circulating microfilaria (tests for microfilaremia are positive in less than 20% of infected cats) and the low worm burdens in this species results in light or absent antigen loads. Positive antigen test results are the result of the presence of adult female worms.

In cats, antigen tests have excellent specificity but false-negative results are common. False-negative test results are explained by low worm burdens with male-only infections, and infection with young (< 7 month old) female worms that have immature reproductive tracts. The sensitivity of commercial Ag tests has improved dramatically in recent years and most are effective at detecting a single adult female worm. Heartworm-associated antibody (Ab) tests are useful to rule out infections in cats when there is an index of suspicion for the disease; however these tests also have significant limitations. Because these tests detect exposure to migrating heartworm larvae, they may be positive in cats with previous heartworm exposure or infection, so a positive antibody test indicates exposure but not necessarily active infection. Previously false negative results were thought to be rare, but recent studies suggest approximately 14-50% of infected cats are antibody negative. Since both L5 larvae and adult worms are capable of causing clinical disease in the cat, both antibody and antigen tests are useful tools, and the probability of making appropriate diagnostic decisions improves when they are used together.

Thoracic radiography and/or echocardiography are the two most useful diagnostic tests after serology in feline patients exhibiting evidence of heartworm disease. The caudal lobar arteries, especially the right, are the first to enlarge and typically are the most severely diseased. However, radiographic changes occur less frequently in feline heartworm disease than in canine heartworm disease and the absence of radiographic abnormalities does not exclude a diagnosis of feline heartworm disease. In fact, radiographic changes consistent with heartworm disease are noted in only half of the cats suspected to have disease on physical examination. Echocardiography is a particularly useful adjunctive test in cats in which there is a suspicion of heartworm disease despite negative Ag test results. However, the sensitivity of echocardiography in these patients is highly operator dependent and false positives are possible. The bottom line is that diagnosis of feline heartworm disease often requires multiple tests. The diagnosis is particularly difficult to confirm in the subset of cats which have stage 1 disease. In these cats, immature worms may result in severe pulmonary damage, yet be nearly impossible to diagnose because they are



Meg M Sleeper VMD, DACVIM (Cardiology)

## Feline Heartworm Disease Update (Cont.)

cleared prior to maturation. Since the antibody disappears quickly, the only remaining evidence of their presence may be pulmonary lesions which are virtually impossible to diagnose as caused by heartworm disease. The syndrome of vascular, airway and interstitial lung lesions caused by the death of immature worms has been coined "HARD" or heartworm-associated respiratory disease.

### Treatment

Retrospective studies suggest that 10-20% of cats with adult heartworm infections die secondary to death of the worm, but adulticide treatment itself is associated with significant risk in cats, as well. Infected cats are usually managed with supportive treatment. Life-long treatment for chronic bronchial disease may be necessary even after death of all heartworms in some cats due to residual, chronic pulmonary disease. Unfortunately, acute death syndrome may still occur without premonitory signs until all adult worms have died. It is possible that therapy with doxycycline will reduce pathology associated with eventual worm death (due to a reduction in Wolbachia antigens), but studies in cats are still lacking. Wolbachia are a vertically-transmitted, gram-negative, intracellular bacterium that is harbored by *D. immitis* larvae and adults. Cats have a strong IgG response against the surface protein of Wolbachia in heartworm-infected and it is hypothesized that the bacteria could play a large role in the feline inflammatory response to heartworm infection. Studies to determine the effects of suppressing Wolbachia populations with doxycycline in cats are in progress.

### General treatment recommendations for heartworm disease in cats:

- Treat asthma-like signs with prednisolone (2 mg/kg, daily for 10 days; gradually tapering to 0.5 mg/kg every other day by two weeks and discontinue in another 2 weeks). Repeat treatment as needed if recurrent clinical signs occur. Prednisolone is also warranted in cats without clinical signs if there is radiographic evidence of lung disease.
- Consider the addition of a bronchodilator if clinical signs persist despite anti-inflammatory treatment with corticosteroids (i.e. terbutaline, 0.625-1.25 mg/cat PO B-TID; aminophylline, 4-6 mg/kg PO B-TID; theophylline, 25 mg/kg PO SID; albuterol sulfate inhaler, 1 actuation BID).

- Canine data suggests doxycycline treatment reduces pathology associated with eventual worm death (due to a reduction in Wolbachia antigens). Although efficacy in cats remains unclear many clinicians recommend a course of doxycycline at the time of diagnosis.
- The monthly use of ivermectin at the prophylactic dose (24 mcg/kg) for 2 years has been reported to reduce worm burdens by 65% as compared to untreated cats. Therefore, in cats suspected to have heartworm infection, prophylactic ivermectin therapy is recommended to both prevent super-infection and to slowly kill the current infection. However, the inflammatory response to worm death is likely to occur with ivermectin treated worm death as well, and therefore owner education is important.

Acute crisis due to a dying worm(s) may require emergent therapy with supportive therapy for treating shock. Depending on the individual case, this may include:

- IV corticosteroids (dexamethasone sodium phosphate, up to 2.2 mg/kg IV or IM)
- fluid therapy
- bronchodilator therapy (terbutaline, 0.01 mg/kg IV; aminophylline, 4-6 mg/kg IV-inject slowly; albuterol sulfate inhaler, 1 actuation-Intravenous medications would be preferable in a dyspneic cat, however in a crisis the owner can administer albuterol with an inhaler while en route for emergency care)
- oxygen supplementation
- Diuretics and non-steroidal anti-inflammatory drugs such as aspirin are not recommended. Studies in cats with heartworm disease have shown only limited benefit to aspirin therapy at a dose that was approached the feline toxic range.<sup>18,19</sup>

Use of injectable arsenicals has been associated with fatal thromboembolism or acute lung injury in cats, and is not recommended. However, surgical removal of heartworms is feasible and effective in cats with echocardiographically visible filariae in the right heart and/or main pulmonary arteries.

### Monitoring and Prognosis

Periodic monitoring at 6 to 12 month intervals with repeat Ag and Ab testing and thoracic radiography is warranted. After clearance of adult heartworms (iatrogenic or spontaneous),

infected cats will usually become antigen negative within 4 or 5 months. However, it is important to review the results carefully for each individual case recognizing the inherent weaknesses of the available tests. At least regression of radiographic signs and seroconversion of a positive Ag test suggests the period of risk of an acute crisis following worm death and embolization is over. In one field study which followed 34 asymptomatic cats diagnosed with feline heartworm infection by antibody, antigen and echocardiographic examination every three months until self cure or death, over 80% of the cats self-cured and 21 of the 34 remained asymptomatic throughout the study. Six of the 34 cats (18%) died. Infections lasted over 3 years in most of the cats enrolled in the study. This study shows that a large proportion of heartworm infected cats can survive the infection with supportive care. Moreover, many cats remain asymptomatic through the course of disease.

### Prevention

Cat owners should be advised regarding the potential risk of heartworm infection in their community and the comparative ease of preventing the disease vs. the difficulty of treatment. When monthly heartworm chemoprophylaxis is elected, it should be initiated at least 30 days following the estimated seasonal onset of transmission and continued for 30 days after that period has ended. Year round administration has been recommended by some because: 1) depending on the product chosen, the cat may also be protected from intestinal or external parasites, 2) studies suggest owner compliance is better, and 3) there is retroactive efficacy ("reach back") if doses are missed inadvertently. Currently four macrocyclic lactone products are registered for feline heartworm chemoprophylaxis: ivermectin, moxidectin, milbemycin and selamectin. All of these products are safe and effective options for cats living in areas where canine heartworm disease is considered endemic and each is administered monthly. Ivermectin and milbemycin oxime are administered orally while moxidectin and selamectin are topical. All of these drugs can be safely administered in seropositive cats.



## BEHAVIOR

Susan Bulanda, M.A., C.A.B.C.

### Aggression in Dogs

As the year 2011 ends, it is a good time to reflect on the types of behavior problems that have been referred to Valley Central. For the most part, the problems involved some level of canine aggression. However, aggression isn't just aggression. There are a number of reasons why a dog will bite. The first step in understanding dog aggression is to realize that 1) dogs are animals and think like a dog; 2) all dogs will bite given the correct circumstances.

When dealing with dog bites it is important to keep in mind that there are different types of bites. The first type of bite is the play bite. In young puppies or dogs that have not been taught to inhibit their bite, play bites can hurt.

Second is the manipulative bite. This type of bite is used by dogs when they want to move, position or control an object. For example, some dogs will grab their owners hand to lead them where the dog wants to go.

Third is the affectionate bite that is often called "mouthing." Dogs will do this to show affection or gain reassurance. One of the highest forms of affection is when a dog will nibble a person with their small front teeth, almost as if they were eating a tiny ear of corn.

Fourth is the corrective bite. This usually follows verbal or body language warnings that have been ignored. Picture a young dog who wants a toy that an older dog has. The older dog will first give a "don't think about it" look to the younger dog. If the younger dog ignores the "look," a growl will follow. If the younger dog ignores the growl, then he will get an open mouth correction. This is similar to an adult human giving a child a swat on the behind. The dog will "hit" the puppy/young dog with an open mouth, not clamping down. And lastly, if the open mouth correction is ignored, the adult dog will give the offending dog a sharp nip. Unfortunately, dogs will treat children and even adults the same way. Humans often ignore the early warning signs and are upset when they receive a corrective nip from a dog. Puppies will react to pain with the nip instead of going through the warning process.

Fifth is the defensive bite. This often occurs when a dog feels the need to defend himself. A defensive bite can be directed at either another animal or a human and often occurs when the dog is threatened or in pain. This type of bite is usually a strike and run bite. But if the offending party does not retreat, the bite can become the sixth level. Dogs that exhibit this type of bite on rare occasions and have sound temperaments are typically not a threat. Unfortunately there are significant numbers of dogs that behave this way because their perception is skewed by faulty genetic

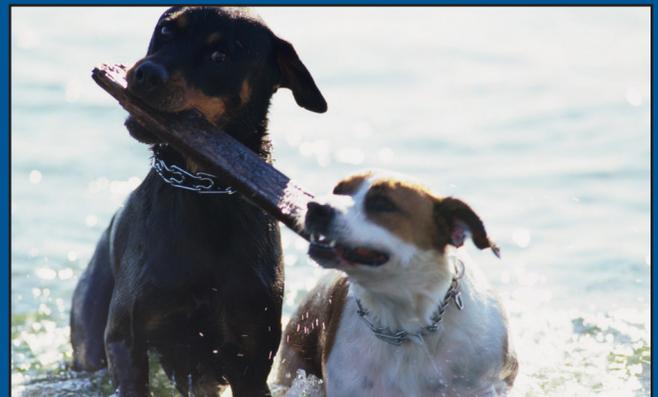
makeup (bad temperament) or traumatic life experiences. These dogs usually do not enjoy a quality of life and live in constant fear. They are often called "fear biters."

Sixth is the aggressive bite. This type of bite can be premeditated, such as the dog who is trained to do guard work, schutzhund or ring sport, or who has anger toward an object or who is driven by a high prey drive. An example of a high prey drive is the terrier that is bred to kill varmin.

Dogs that bite are not always bad dogs that need to be euthanized. However, determining how safe a dog is or if the dog can be rehabilitated is not always an easy task. A complete history of the dog is required as well as a detailed examination of the circumstances surrounding the bite. An important factor in determining if a dog is safe or can be rehabilitated is the genetic makeup of the dog which includes the dog's breed and general temperament. The last and very important aspect of evaluating a dog bite situation is to determine if there are any medical reasons why a dog did bite. Medical issues usually involve pain due to past injuries, orthopedic issues, chemical imbalances or diseases. Medical issues must be addressed before the medically induced behaviors can be changed.

In cases where the client cannot work with the dog properly or where the aggression has become so ingrained in the dog (often because it has been allowed for too long or encouraged) euthanasia may be the only alternative for the safety of the general public, the owner, and the dog.

However, when aggressive tendencies or early aggression in any form is treated promptly, the dog can often be cured and enjoy a long life that is not a threat to the physical and financial safety of the owner as well as provide a high quality of life for the dog.





## NURSES TIP

Brandy Spadaccia, CVT

### Are your clients aware of Leptospirosis?

Many owners are unaware of the potentially deadly disease although it is a number one cause of acute renal failure in dogs today. Leptospirosis should be considered if the dog is vomiting, has diarrhea, lethargy, loss of appetite, jaundice, and increased kidney values.

Asking important questions when taking a pet's history may be a key tool in helping to determine if a pet may have been exposed to leptospirosis. You should find out if their pet drinks or wades in standing water, is their pet exposed to wildlife, do they live near farmland or woods, and has anybody in the area, pet or human, been diagnosed with leptospirosis.

Leptospirosis has been seen in a variety of neighborhoods. It is a disease that affects any dog no matter what breed or size. Many people know that deer can carry lepto but there other carriers. If you have raccoons, skunks, opossums, squirrels or rats in your area, you may also have leptospirosis in your area. It can survive for long periods of time in water in the environment. Hunting dogs can be at a higher risk because lepto can live in the moist soil where they run.

Veterinary technicians need to be careful when working with a lepto suspect. Gloves and a long sleeved gown should be worn when handling dogs or cleaning cages that are contaminated with urine. Items should be washed and disinfected immediately after use or if urine is on them. Hands should be washed thoroughly after handling the pet or bedding and bowls. Lepto suspects should

be isolated from other animals and walked in a designated area that is not accessible to other pets or children. If possible urinary catheters should be placed and a closed system should be used. Technicians should see a doctor if they develop flu-like symptoms after handling a lepto positive pet.

If you suspect a pet may have leptospirosis, the clients should be educated about the potential for zoonoses. It is highly transmittable from pets to humans. Clients should consider testing other dogs in the household if one dog is positive. Early detection and treatment is important for their pet's full recovery.





# VALLEY CENTRAL

VETERINARY REFERRAL CENTER

210 Fullerton Avenue  
Whitehall, PA 18052



VCVRC has been serving the Lehigh Valley and surrounding areas since 1996. We are dedicated to providing state-of-the-art veterinary care for your patients.

## Specialists at Valley Central Veterinary Referral Center

### **SURGERY**

Carlos Hodges, D.V.M., M.S., P.C.

*Practice Limited to Surgery*

Salvador Galindo, D.V.M.

*Practice Limited to Surgery*

Ezra Steinberg, V.M.D., D.A.C.V.S.

### **INTERNAL MEDICINE**

Ronald Hodges, D.V.M., P.C., D.A.C.V.I.M.

Candace Carter, D.V.M., Ph.D., D.A.C.V.I.M.

### **OPHTHALMOLOGY**

Robert Peiffer, D.V.M., Ph.D., D.A.C.V.O.

Mary Landis, V.M.D., M.A.

*Practice limited to Ophthalmology*

### **CARDIOLOGY**

Dennis Burkett, V.M.D., Ph.D., D.A.C.V.E.C.C., D.A.C.V.I.M.

Ellen Davison, V.M.D., D.A.C.V.I.M.

Meg Sleeper, V.M.D., D.A.C.V.I.M.

Jonathan Goodwin, D.V.M., M.S., D.A.C.V.I.M.

### **NUCLEAR MEDICINE**

Ronald Hodges, D.V.M., P.C., D.A.C.V.I.M.

### **BEHAVIOR**

Susan Bulanda, M.A.

Certified Animal Behavior Consultant

### **ACUPUNCTURE**

LEE SIMPSON, D.V.M., C.V.A., C.V.C.

### **Continuing Education Schedule**

#### **Monthly Case Conferences:**

The last Thursday of the Month from 12 PM-1 PM. For your convenience we are continuing to offer monthly case meetings thru web conferencing. For more details please call the office.

Discussions about clinical cases with medicine and surgical implications.

Lunch will be provided, courtesy of Hills, by Dr. Heather Berst.

Until our new web-site is launched, please refer to our Facebook page for updates to our CE schedule. You may also email Dr. Carlos at [Carlos@vcvrh.com](mailto:Carlos@vcvrh.com) with any questions about upcoming lectures.

