Feline Heartworm Infection

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Profile

Definition
- Disease of the pulmonary vasculature and pulmonary parenchyma of cats caused by Dirofilaria immitis (Figure 1)

Geographic Distribution
- Infection in cats is found in all 50 states, with greater prevalence in warmer climates.

Prevalence
- Because cats are not the natural host of D immitis and clearance of third-stage through fifth-stage infective larvae (ie, L3-L5, immature) can occur, prevalence of feline heartworm infection in endemic areas is ~10% that of infection in dogs1,2 (Table, next page).
- Approximately 25% of feline heartworm cases occur in purely indoor cats.3

Transmission
- Mosquitoes extract the L1 microfilarial stage of D immitis from an infected dog, cat (unlikely), or other host.
  - L1-L3 molting occurs within the mosquito.
- Once D immitis reaches L3, the host mosquito can transfer it into a cat’s bloodstream via a bite.
  - L3-L5 (adult) molting may occur, although larvae often fail to mature.

Risk Factors
- Any cat not receiving prevention is at risk for heartworm infection.
- Risk for infection is higher in endemic areas.

Pathophysiology

Stage 1
- Inflammation caused by presence of immature worms
  - Occlusive hypertrophy of small pulmonary arterioles occurs within 3–4 months of infection.
- Pulmonary inflammatory response is called heartworm-associated respiratory disease (HARD); signs appear similar to asthma.

Occlusive hypertrophy of small pulmonary arterioles occurs within 3–4 months of infection.
If artery blunting is present, the right caudal lobar artery will be affected first.
- Right ventricular and mainstem pulmonary artery enlargement are uncommon.
- The most common abnormality is diffuse bronchial or broncho-interstitial pattern consistent with feline allergic airway disease.

**Echocardiography**
- May confirm if serologic testing is suggestive of heartworm disease
- Helps rule out primary or concomitant heart disease
- Although fewer worms are present in feline hearts (as compared with dogs), worm size relative to the small heart can make worms easier to detect.
- Worms may be visualized, but quantification is difficult.

Other Diagnostics
- Antibody testing detects antibodies to larvae and adult worms.
- Sensitive but not specific for presence of adult worms
- Negative result indicates that heartworm infection is unlikely.
- Significant incidence of false-positive results (eg, 76.1%–77.2% specificity)\(^4\)
  - False-positive results may reflect previously resolved infection, larvae that did not/will not develop to adults, and aberrant adult infection.
- Antigen testing detects mature female worms.
  - More specific (98.1%–99.4%)\(^5\) than antibody testing but not as sensitive
- Positive result indicates heartworm infection, but false-negative result can occur with immature or male-only infections.
  - These infections are common (small number of worms).

### Heartworm Infection: Cats vs Dogs

<table>
<thead>
<tr>
<th>Cats</th>
<th>Dogs</th>
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<tbody>
<tr>
<td>• 1%–10% of L3 survive</td>
<td>• 75% of L3 survive</td>
</tr>
<tr>
<td>• Low maturation rate</td>
<td>• High maturation rate</td>
</tr>
<tr>
<td>• Microfilariae uncommon</td>
<td>• Microfilariae common</td>
</tr>
<tr>
<td>• Worms survive 2–4 years</td>
<td>• Worms survive 5 years</td>
</tr>
<tr>
<td>• 1–5 worms present</td>
<td>• Many worms present</td>
</tr>
<tr>
<td>• Smaller adult worms</td>
<td>• Larger adult worms</td>
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#### Substantial lesions are noted in arterioles, arteries, alveoli, and bronchioles.
- Heartworm infection can be arrested at this stage, but histologic changes (Figure 2) and clinical signs may persist.
- Live heartworms can suppress immune function, allowing cats to better tolerate infection.

#### Stage 2
- Mature worms die and degenerate.
  - The process incites more pulmonary inflammation.
  - Thromboembolism, fatal acute lung injury, and anaphylaxis can occur.
  - Adult infection is usually limited to <5 worms.

#### Signs & Examination
- Cats are often subclinical
- Coughing and/or dyspnea are the most common signs.

#### Imagining

**Radiography**
- Cardiac changes consistent with heartworm disease are seen in ~50% of cats with positive result for heartworm infection.
- Pulmonary artery blunting and tortuosity is less common in cats than in dogs.

#### Laboratory Findings
- Serum biochemistry profile results are often within reference ranges.
- CBC may show eosinophilia.

#### Histopathology of the pulmonary artery of a cat infected with *D. immitis*. Courtesy of Dr. Julia A. Conway
Cats are often subclinical, but when signs are present, the most common are coughing and/or dyspnea.

In General

Relative Cost

- Treatment cost is relatively low ($–$$), as no adulticide therapy is available and care is supportive only.
- Respiratory distress secondary to heartworm infection can be an emergency and increase cost.

Prognosis

- Prognosis is guarded.
  - Infection can be fatal, as no acceptable treatment is available; however, infection can be cleared naturally.

Prevention

- Heartworm disease is preventable with administration of macrocyclic lactones (see Heartworm Preventive Options for Cats).
- Prevention should be started at 8 weeks of age and continue for life.
  - Medications should also include efficacy against some internal and external parasites.

Cost Key

- $ = up to $100
- $$ = $101–$250
- $$$ = $251–$500
- $$ = $501–$1000
- $$ = more than $1000

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Adjunct Therapies

- Antiemetics
- Doxycycline to eliminate Wolbachia pipiens (symbiotic bacteria harbored by D immitis)\(^5,6\)

Find More

Look for the companion article, Canine Heartworm Infection, in an upcoming issue.