

## Reassessing the definition of heartworm infection in cats

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Recent studies by Browne et al<sup>1</sup> and Dillon et al<sup>a</sup> have corroborated earlier findings of Selcer et al,<sup>2</sup> who reported radiographic evidence of pulmonary disease in cats experimentally exposed to heartworm infective larvae, but which did not develop mature heartworm infection (dirofilariasis). Importantly, the two more recent aforementioned studies identified histologic lesions in the pulmonary arteries<sup>1</sup> or in airways and pulmonary parenchyma, as well as pulmonary arteries<sup>a</sup> in cats with natural<sup>1</sup> or experimental<sup>a</sup> infections, respectfully. While it remains to be proven that naturally infected cats (with presumably lesser L<sub>3</sub> exposure) develop pulmonary parenchymal and airway lesions, it seems clear that naturally exposed cats that resist mature infection develop, at the very least, pulmonary vascular disease. These three landmark works broaden our understanding of the pathophysiology of the respiratory tract signs associated with exposure to various stages of *Dirofilaria immitis*. Their findings also raise questions as to appropriately descriptive terminology, particularly regarding the use of the word exposure.

In 2005, I was an investigator on a study<sup>3</sup> of heartworm risk in nondomestic cats in the southeastern United States. In that article, we defined antibody-positive cats as those exposed to, but negative for, heartworm infection if they were heartworm antigen negative and if no heartworms were found on necropsy. During the peer review process, one reviewer challenged this definition conceptually, arguing that antibody-positive cats indeed were infected. While acknowledging that exposed cats might well have pulmonary lesions,<sup>1</sup> we argued that a cat without mature (L<sub>5</sub>) heartworms did not meet the requirements for a diagnosis of heartworm infection. Our arguments were convincing enough that the manuscript was published with this distinction intact. Perhaps, in light of recent work, this point should be reconsidered.

Conceptually, this represents a thorny problem. In an ideal world, cats would either have heartworm infection or not, but there is now a recognized gray zone in which cats that have successfully rejected an infection (probably at the young L<sub>5</sub> stage) may develop lesions (ie, disease) induced by *D immitis*. New terminology is

required to allay the confusion associated with our current limited linguistic alternatives. I propose the term pulmonary larval dirofilariasis to describe the condition in cats that have been exposed to the L<sub>3</sub> of *D immitis* (most of which would be antibody positive) and have aborted the infection, but have pulmonary lesions.

Possible classifications for cats related to heartworm exposure or infection would then include the following:

- Nonexposed cats (antibody negative).
- Exposed cats being treated with heartworm preventive (antibody positive, but heartworm and disease free)—heartworm exposed.
- Exposed, subclinical cats in which the parasite developed into immature L<sub>5</sub> in small numbers and the infection was subsequently aborted (antibody positive; no radiographic lesions identifiable)—heartworm exposed.
- Exposed, possibly clinically affected cats in which the parasite developed into immature L<sub>5</sub> with resultant pulmonary lesions and the infection was subsequently aborted (antibody positive; pulmonary vascular and possibly airway and parenchymal disease)—pulmonary larval dirofilariasis.
- Exposed cats in which the parasite completed development to the mature L<sub>5</sub> stage (antibody positive; heartworm disease involving potentially many organs, but primarily the lungs)—dirofilariasis (heartworm disease).

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a. Dillon AR, Blagburn BL, Tillson WR, et al. Immature heartworm infection produces pulmonary parenchymal, airway, and vascular disease in cats (abstr). *J Vet Intern Med* 2007;21:608.

### References

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2. Selcer BA, Newell SM, McCall JW, et al. Radiographic and 2-D echocardiographic findings in eighteen cats experimentally exposed to *D. immitis* via mosquito bites. *Vet Radiol Ultrasound* 1996;37:37–44.
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