

## Wolbachia and Heartworm Disease

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Heartworm, *Dirofilaria immitis*, is a life-threatening parasite infecting dogs and cats bitten by infected mosquitos. The presence of the worms causes a severe inflammatory reaction in the pulmonary vasculature of the dog leading to endothelial damage, arterial muscular thickening and villus hypertrophy. The result is narrowing of the pulmonary artery lumen. Complete vascular occlusion, pulmonary thrombi and pulmonary hypertension often occurs after natural death of the worms or after adulticide treatment.

Wolbachia belong to a family of “bacterial endosymbionts” which have been identified in *Difilaria immitis* and other heartworm species. Wolbachia are found in the reproductive tract of adult female heartworm, all larval stages and microfilaria. They appear to be necessary for heartworm reproduction and development.

Dogs and cats infected with heartworm have been shown to produce circulating antibodies against Wolbachia bacteria at all stages of heartworm infection. One study reported that over 65 % of heartworm infected dogs have Wolbachia DNA present in their blood.<sup>1</sup> It is believed that the lipopolysaccharide released by the bacteria initiate an inflammatory response.

Melarsomine is the only registered drug for heartworm adulticide treatment in dogs. It is not recommended in cats. Tetracyclines are known to inhibit development of difilarial infection and reduce inflammatory reaction in the dog through death of Wolbachia in female worms. Doxycycline, tetracyclines, rifampin and azithromycin will effectively kill Wolbachia however they are not affected by ciprofloxacin, erythromycin or chloramphenicol. A three to four week course of Doxycycline therapy (10mg/kg/day) therapy before heartworm adulticide treatment is started may help to reduce the inflammatory reaction associated with the infection and the subsequent side effects of treatment.

1. Frank K, Heald et al. The emerging role of Wolbachia Species in Heartworm Disease. Compendium April 2010.
2. Atkins C. Canine Heartworm disease. In: Ettinger SJ et al. Textbook of Veterinary Internal Medicine. 6<sup>th</sup> ed. St. Louis: Elsevier Saunders; 2005:1118-1136.