

Canine Filariasis– A Silent and Neglected Parasitic Problem

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Canine filariasis is an important vector-borne parasitic disease caused by several species of filarid nematodes. Among them, *Dirofilaria immitis* (Heartworm) is the most pathogenic and life-threatening parasite affecting dogs. Other important canine filarial worms include *Dirofilaria repens*, *Acanthocheilonema (Dipetalonema) reconditum*, and *Brugia malayi*. These parasites are transmitted through the bites of infected mosquitoes, which serve as the major vectors. In the Indian subcontinent, filarial infections in dogs are often neglected and underdiagnosed due to limited awareness and inadequate routine screening. Rapid urbanization, environmental changes, and favorable climatic conditions have contributed to a significant increase in mosquito populations, thereby enhancing the transmission of filarial parasites among dogs. As canine filariasis can lead to severe cardiopulmonary, subcutaneous, and systemic complications, it is essential for pet parents to possess a comprehensive understanding of the disease. Knowledge regarding the parasite biology, vector dynamics, clinical manifestations, diagnostic methods, treatment protocols, and preventive strategies is crucial for effective management and control of this emerging parasitic threat.

Biology of filarid nematodes

Dirofilaria immitis (Heartworm of dog)

This species most commonly occurs in the right ventricle and pulmonary artery of dogs, the worms are slender and white in colour. The males are 12-16 cm and females are 25-30 cm long.



A bunch of *Dirofilaria immitis* worms occluding the heart chambers of a dog

Dirofilaria repens

This species occurs in the subcutaneous tissue of dogs.

Acanthocheilonema (Dipetalonema) reconditum

This species occurs in the subcutaneous tissue and perirenal connective tissues of dogs.

Brugia malayi

The main animal hosts of *Brugia malayi* infection are cats and dogs, which act as reservoir hosts. In some regions, wild animals such as monkeys may also harbor the parasite. Humans are the primary definitive host in endemic areas. Male worms measure 2.2 cm and females 4.8 cm.

Life cycle of Canine filarid nematodes is indirect. The intermediate hosts for filarid nematodes are Culicine mosquitoes (*Culex*, *Aedes* and *Anopheles*). The microfilariae (first stage larva) are found in the peripheral blood of the infected animals which are ingested by the mosquito intermediate hosts during blood meal. The ingested microfilariae are first found in the stomach of mosquito, after that they, migrate to

the malpighian tubule, where further development occurs. In about 4 days of ingestion, they develop into a sausage form (second larval stage). The sausage forms then grow into elongate sausage form in 9 days, which feeds on the cells of malpighian tubules and enter into the haemocoel cavity of mosquitoes. From there, it migrates to the mouthparts, where they attain infective stage.

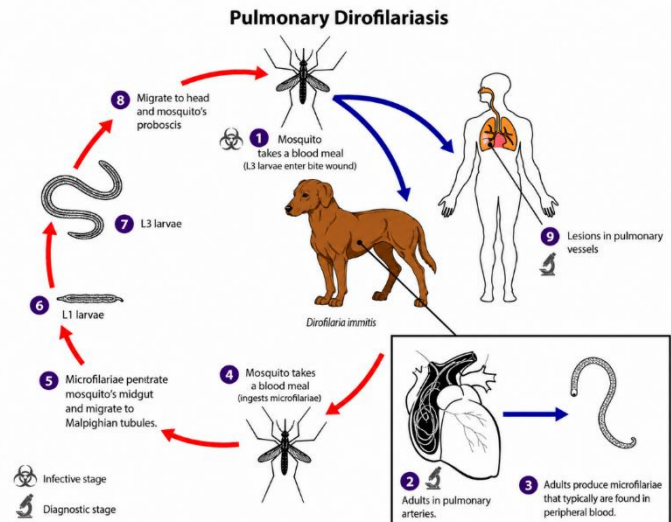
The dogs get infected when the infected mosquitoes feed on them. Initially the inoculated larvae would migrate to the site of inoculation. In *Dirofilaria immitis*, at about 85-125 days of infection, the developmental stages are found in the heart or pulmonary artery. The worm attains maturity in 6 months of infection and microfilariae are shed into the blood. Transplacental transmission occurs in puppies. In case of *Dirofilaria repens*, *Acanthocheilonema (Dipetalonema) reconditum*, it reaches the subcutaneous tissue and *Brugia malayi* in the lymphatic vessels.

Pathogenesis

Dogs affected with dirofilariasis usually shows no clinical signs during mild infection. Heavy infections cause circulatory distress due to mechanical interference. The heart worm primarily causes pulmonary circulatory disturbances, which leads to pulmonary hypertension due to narrowing of pulmonary peripheral artery. The compensatory hypertrophy of right ventricle results in congestive heart failure, liver failure syndrome and peripheral oedema.

The larvae of *Dirofilaria repens* and *Acanthocheilonema (Dipetalonema) reconditum* migrate through the subcutaneous tissues and mature into adult worms beneath the skin. Adult worms cause mild irritation, inflammation, and localized tissue reaction.

The larvae of *Brugia malayi* migrate to the lymphatic vessels and lymph nodes, where they mature into adult worms. Adult worms cause inflammation and obstruction of lymphatic vessels, leading to impaired lymph



drainage. This results in lymphedema and swelling of affected tissues.

Clinical Signs

The dogs affected with *Dirofilaria immitis* infection may present with the symptoms of deep cough, hemoptysis, dark brown coloured faeces containing blood, exercise intolerance, weight loss, and in severe cases, congestive heart failure.

Dogs affected with *Dirofilaria repens* exhibit moist dermatitis in the lumbar region, multiple papules, erythema, and severe itching.

Unlike heartworms, *Acanthocheilonema (Dipetalonema) reconditum* worms live harmlessly in subcutaneous tissues and body cavities. Cases are usually subclinical, with clinical relevance stemming almost entirely from the need to differentiate its microfilariae from the dangerous *Dirofilaria immitis* (heartworm).

In *Brugia malayi* infection, most infected animals remain asymptomatic carriers and continue to circulate microfilariae in the bloodstream without showing obvious clinical signs. Some animals may develop mild, painless lymphedema, especially in the hind limbs or scrotal region. Occasionally, early signs such as fever, lethargy, and conjunctivitis may also be observed.

Diagnosis

Canine filarid infections especially with heartworms are easily detected by wet blood film

examination. Examination of stained blood smear, Knott's test, X ray, ECG and PCR apart from clinical signs. Filarids dwelling subcutaneously can be detected only occasionally. Morphological features of microfilaria of different canine filarid nematodes vary and this helps in diagnosis



Microfilaria of filarid nematode found in the blood smear of a dog

Treatment

Infected dogs are treated with drugs targeting adult worms and microfilariae. Prophylactic medications are also available. Canines showing clinical signs should be taken to a veterinarian, diagnosis to be made followed by proper treatment as needed.

Control

- Vector Control
- Chemoprophylaxis
- Treatment of Infected Animals
- Diagnosis and Screening
- Public Awareness

Advise to Pet Parents about the Zoonotic Risk of Filarial Nematodes

- Some filarial worms of dogs can occasionally infect humans through mosquito bites.
- *Dirofilaria repens* may cause skin nodules or eye infections in people.
- *Dirofilaria immitis* can produce lung lesions in humans, though humans are accidental hosts.
- *Brugia malayi* is an important cause of human lymphatic filariasis in endemic areas.
- Regular treatment of pets, mosquito control, maintaining hygiene, and

routine blood examination and veterinary checkups are essential to reduce zoonotic transmission risk due to canine filarid nematodes.



 **SAY NO TO
MOSQUITOES**
 **TREAT THE**

