Dirofilaria immitis and D. repens in dog and cat and human infections

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Dirofilaria (Nochtiella) repens infection in dogs and cats

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*Dirofilaria (Nochtiella) repens*, is the causative agent of canine and feline subcutaneous dirofilariosis, a mosquito borne disease that has become increasingly recognized in several countries in southern and central Europe, Africa and Asia.

*D. repens* life cycle, like that of *Dirofilaria immitis*, consists of 5 larval stages which develop both in a vertebrate host and an arthropod (mosquito), intermediate host and vector. Adult female worms produce thousands of embryos (microfilariae) that are ingested by a blood-feeding insect.

Microfilariae have a unique circadian periodicity in the peripheral circulation over a 24-hour period. The arthropod vectors also have a circadian rhythm in which they obtain blood meals. The highest concentration of microfilariae usually occurs when the local vector is most actively feeding. Microfilariae then undergo 2 developmental moults in the insect. During feeding, the infected mosquito deposits third-stage larvae throughout a drop of haemolymph in the proximity of bite wound from where larvae actively migrate to subcutis. Larvae develop to the adult stage through moults in the vertebrate hosts. Prepatency lasts 6 1/2 to 9 months (Webber and Hawking, 1955; Cancrini et al., 1989). The adults reside in the subcutaneous tissues of dogs and cats and may cause mild clinical signs such as pruritus, dermal swelling, subcutaneous nodules or no symptoms at all (Baneth et al., 2002; Živičnjak et al., 2006).

Despite the usual hosts of *D. repens* are domestic and wild carnivores, human beings may act as accidental and dead-end hosts and a big concern about zoonotic human cases is arising. Human infection manifests with either subcutaneous nodules, ocular or lung parenchymal nodules mostly asymptomatic. The significance of infection in humans is that pulmonary and some subcutaneous lesions are commonly labelled as malignant tumours requiring invasive investigation and surgery before a correct diagnosis is made. The pathology of the condition is associated with aberrant localization of immature worms that do not reach adulthood; therefore, microfilariae are almost always absent (Pampiglione et al., 1995).

**Diagnosis**

**Blood test for microfilariae**

Detection of circulating microfilariae using the method developed by Knott is the best way for doing an *in vivo* diagnosis but collection of histopathological cutaneous specimens.

Larvae species determination is made on the basis of morphological or histochemical method or by using PCR.

**Blood test for adult antigens**

Tests detecting adult heartworm (*D. immitis*) do not detect *D. repens* antigens and no cross reactivity is described.

**Therapy**

No adulticide treatment for *D. repens* is registered and a off-label use of melarsomine has only recently been described on the basis of a case report
where combined therapy with the arsenic adulticide melarsomine and the avermectin microfilaricidal doramectin was effective in clearing infection with *D. repens* in a dog (Baneth et al., 2002), although the death of the patients does not allow conclusive evidences.

Symptomatic therapy of canine dirofilariosis due to *D. repens* is indicated for dogs suffering from clinical signs of this disease, such as dermal swelling, sub-cutaneous nodules and pruritus. Steroids and/or antibiotics administration and nodules surgical removal may be suggested in these cases for relieving symptoms.

Some macrocyclic lactones (ivermectin, moxidectin, selamectin) are claimed to be effective for the prevention of *D. repens* infection in dogs (Genchi et al., 2002; Rossi et al., 2002) and labelled for this use in some country (Italy) on the basis of field study.

While there is no doubt that they are able to prevent microfilaraemia in dogs (and this is important for zoonotic implications), as most of the performed studies were not based on necropsy confirmation some concerns about the ability of completely preventing infection in dogs still remain (Cancrini et al., 1989).

**References**


