

## *Dirofilaria repens*

- Subcutaneous dirofilariosis is caused by the filarial nematode *Dirofilaria repens*.
- *D. repens* larvae migrate to the subcutaneous tissue and deep fascia where they grow into adult worms.
- Severe illness caused by the presence of *D. repens* in the host is uncommon – as a consequence, subcutaneous dirofilariosis is underdiagnosed in general practice.
- *D. repens* has an important zoonotic potential.

## When to suspect infection?

### ■ Clinical signs

- Subcutaneous nodular dermatitis.
- Pruritic pustules, ulcerative lesions (in cases of heavy infection in sensitized patients).
- Accidental findings of adult parasites (worms can be up to 20 cm long) in subcutaneous tissue, deep fascia or body cavities during surgery.

### ■ Clinical pathology

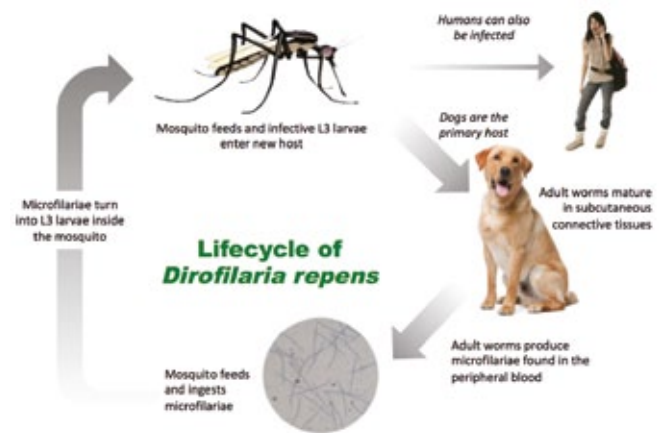
- No specific abnormalities.
- Cytology examination of the sample obtained by fine-needle aspiration from subcutaneous nodules caused by *D. repens*, reveals mixed inflammatory cell population.
- Accidental findings of microfilariae in blood smears or cytological samples contaminated with blood.

### ■ Diagnostic imaging

- Ultrasonographic examination of the nodules may show presence of adult *D. repens* worms (double hyperechoic parallel structure). Very specific but depends on the operator's skill and probe frequency. Colour flow Doppler of nodules shows blood flow only on the periphery of the nodule.

### ■ Origin / travelling history

- Dogs that live in, originate from or have travelled to countries where the parasite is endemic are at risk.
- Dogs in countries not currently considered endemic should not be considered free of risk.



## How can it be confirmed?

- **Knott test** (concentration and staining of microfilaria in EDTA blood): Acceptable sensitivity. Allows the differentiation of the other filarial species (*Dirofilaria immitis* and *Achantoelionema reconditum*). Inexpensive. False negative results can occur (occult infections), mainly in patients treated previously with macrocyclic lactones. Performing the Knott test:
  - Mix 1.0 ml of anti-coagulated blood with 9.0 ml of 2% formalin in a centrifuge tube
  - Plug the tube and invert it gently several times (in order to mix solution and enable haemolysis)
  - Centrifuge for 3 minutes at 1500 rpm
  - Discard the supernatant and add 1 drop of 1% methylene blue and mix with a clean pipette.
  - Place a drop of the sample on a glass slide and cover with a coverslip (0.02 ml for a 24x24 mm coverslip).
  - Examine the slide under the microscope at 10x to assess the presence of microfilariae and at 40x to observe the morphological features (see next page).
  - The whole sediment from the tube needs to be analysed in order to achieve maximal sensitivity.
- **PCR:** lower sensitivity than that of the Knott tests but accurate to differentiate microfilariae from the different filarial species. (*Achantoelionema reconditum*, *Dirofilaria immitis*). Not useful in occult infections (without circulating microfilariae). Expensive.



Distribution of *Dirofilaria repens* in Europe.

\* DNA of the parasite found in mosquitos; ● sporadic cases.



Ultrasound appearance of *D. repens* in a subcutaneous nodule

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## Disease management

- Monthly treatments with spot-on moxidectin+imidaclopride, for 12 months.
- Consider minimally invasive way of removing the worms by a 19 G needle connected to syringe, which creates a vacuum.

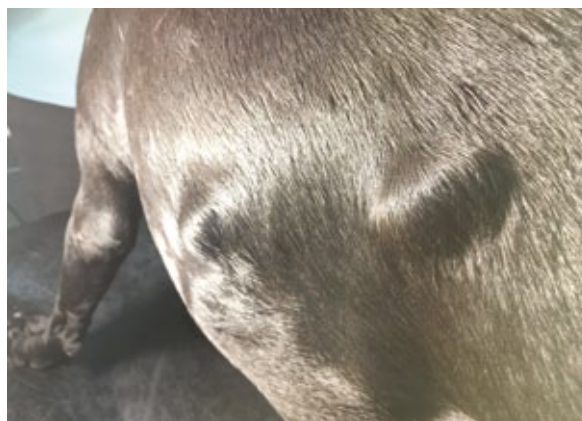
## Prevention

- Southern parts of Europe: year-round, monthly (or sustained-released) prevention is recommended.
- Northern Europe, endemic countries: ideally, preventive measures should start less than one month after the beginning of the mosquito season, to be discontinued one month after the end of mosquito season.
- Veterinary practitioners should familiarise themselves with the mosquito activity in their area.

Drug	Route	Dosage
Ivermectin	Oral	6-12 µg/kg, monthly
Moxidectin	Spot-on	2.5 – 6.25 mg/kg, monthly
Moxidectin SR	Subcutaneous	0.17 mg/kg, every six months

## Travel advice

- Dogs travelling from *Dirofilaria repens*-free countries to endemic areas for **less than one month** require the administration of the preventive drug in a single dose within one month after returning home.
- If the visit to the endemic area is **longer than one month**, prevention should start at the end of the first month of travelling and continue monthly, ending one month after returning home from an endemic area.



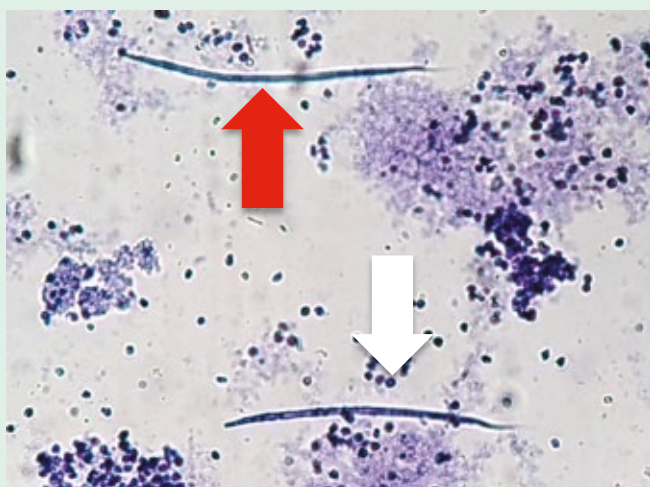
Dog with subcutaneous nodules caused by *D. repens*.

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## Public health considerations

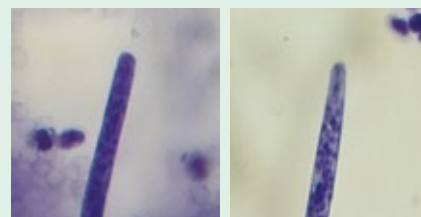
- Human dirofilariosis is an emerging zoonosis in all parts of Europe that are endemic for dirofilariosos, mainly in Eastern Europe.
- *Dirofilaria repens* predominates as a cause of human infections (a total of 4,230 cases have been reported in Europe so far) compared to *D. immitis* infections (32 cases).
- In humans, *D. repens* can be found in eyelids, subconjunctival tissue, scrotum, breasts (mimicking breast cancer) or anywhere in the subcutaneous tissue.
- Preventive measures in dogs can significantly reduce the risk for the human population.

## *D. repens* vs. *D. immitis* microfilariae\*: spot the differences

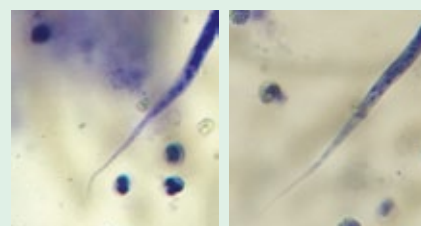


*D. repens* (red arrow) is longer (>330 µm) than *D. immitis* (white arrow) (< 330 µm). 10X

\* Knott test



Microfilariae: the head of *D. repens* (left) compared with *D. immitis* (right) 40 X



Microfilariae: curved tail of *D. repens* (left) and straight tail of *D. immitis* (right). 40x

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