

What are feline lungworms?

- Lungworms are emerging parasites of the lower respiratory tract of cats in Europe.
- *Aelurostrongylus abstrusus* is the best-known feline lungworm and the most prevalent worldwide.
- Other lungworms, occurring in the cat populations, include *Oslerus rostratus*, *Troglostrongylus brevior*, *Capillaria aerophila* (syn. *Eucoleus aerophilus*) and mixed lungworm-infestations are increasingly reported.
- Lungworms are the most prevalent parasites detected in European cats after ascarids.
- Prevalence rates are very variable and linked to the cat's lifestyle and ecological factors.
- *Capillaria aerophila* has zoonotic potential.

Life cycle and transmission

- *Aelurostrongylus abstrusus*, *O. rostratus* and *T. brevior* all have an indirect life cycle involving terrestrial molluscs (slugs or snails) penetrated by larvae (L1 stage) hatched from eggs laid in the cat respiratory tract, swallowed and eliminated with their faeces.
- Infective larvae of *A. abstrusus* and *T. brevior* (L3 stage) are found in the molluscs and shed in the mucus of snails.
- *Aelurostrongylus abstrusus* L3 larvae are also found in a wide range of paratenic hosts commonly predated by cats (cockroaches, rat, mouse, lizard, frog, birds), however the role of paratenic hosts is not known in the epidemiology of *O. rostratus* and *T. brevior*.
- Vertical transmission through the placenta or via milk cannot be excluded (e.g. *T. brevior*).
- *Capillaria aerophila* has a direct cycle and eggs laid in the cat respiratory tract are swallowed and reach the environment in the faeces. Earthworms are facultative paratenic hosts.

Clinical signs

- The severity of lesions depends on the worm species and burden, but also on the host immune response.
- Kittens and cats with mixed infestations generally develop a more severe disease.
- *Aelurostrongylus abstrusus* eggs, larvae and adults accumulate in the alveoli and bronchioles, inducing an inflammatory reaction in the lung.
- Adult *T. brevior* worms cause a catarrhal bronchitis and can occlude bronchial lumens.
- Bacterial complications are frequent (mucopurulent bronchopneumonia, pyothorax).
- Pulmonary hypertension and right-sided heart disease can be caused by *A. abstrusus* or *T. brevior* infestations. Pulmonary hypertension persists after parasite death, mimicking lesions found in feline asthma.
- Lungworm infections can be asymptomatic or cause mild to severe respiratory signs (productive cough, tachypnoea, dyspnoea with laboured abdominal breathing).
- In the more severe cases (diffuse bronchopneumonia, pyothorax, pneumothorax) respiratory failure causes cyanosis and acidosis.
- *Oslerus rostratus* does not seem to be associated with severe pathologic changes in domestic cats.
- *Capillaria aerophila* usually induces dry cough (chronic bronchitis), but asymptomatic carriage is common.

Diagnosis

- The Baermann migration method is the enrichment technique of choice for copromicroscopy (detection of live larvae of *A. abstrusus*, *O. rostratus* and *T. brevior*) and it can provide quantitative information on the parasite burden.
- Morphometric identification of larval species requires specific training.

Diagnosis (cont.)

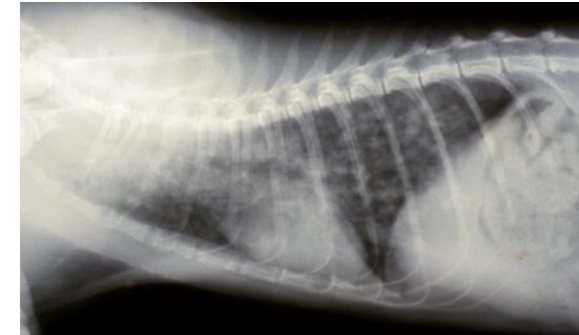
- Early diagnosis of infestation in the pre-patent period is obtained (1-2 months before faecal shedding of larvae) by PCR assays (*A. abstrusus*, *T. brevior*).
- Radiographic examination of the thorax provides information on the severity of disease.

Disease management

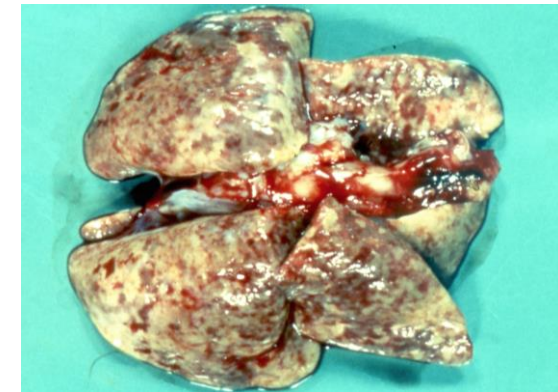
- In cases of *A. abstrusus* or *T. brevior* infestations, a delay in the diagnosis and treatment may lead to lethal cardiopulmonary lesions.
- Treatment against lungworm parasites is obtained by oral or spot on formulations licenced for treating *A. abstrusus* (fenbendazole oral paste; emodepside 2.1%/praziquantel 8.6% spot on; fipronil 8.3%/(S)-methoprene 10%/eprinomectin 0.4%/praziquantel 8.3% spot on), *T. brevior* (fipronil 8.3%/(S)-methoprene 10%/eprinomectin 0.4%/praziquantel 8.3% spot on), or *C. aerophila* (imidacloprid 10%/moxidectin 1% spot on).
- There is evidence of efficacy of moxidectin spot on formulations against *A. abstrusus* or *T. brevior* worms, emodepside spot on against *T. brevior* and *C. aerophila*, eprinomectin spot on against *C. aerophila* and *O. rostratus* infestations.
- Antimicrobials and corticosteroids should be provided in case of severe respiratory signs.
- Intensive care (oxygen administration, thoracocentesis if pyothorax) is needed in severe cases.

Prevention

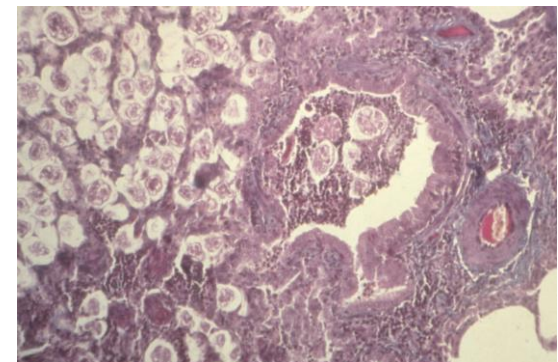
- The spot on formulation containing eprinomectin is licenced also against L3 and L4 forms of *A. abstrusus* and L4 of *T. brevior* and respectively prevents or early controls the disease.
- There is no vaccine to protect cats from lungworms.
- Avoiding outdoor access reduces hunting behaviour and the risk for predation of paratenic hosts.



- Right lateral thoracic radiograph of a kitten affected by severe aelurostrongylosis showing a diffuse focal alveolar pattern



- Multifocal subpleural nodules and haemorrhages in a severe case of aelurostrongylosis



- Alveolitis with larval accumulation, bronchiolitis and bronchiectasis in the lung of a cat affected by aelurostrongylosis (HE stain)