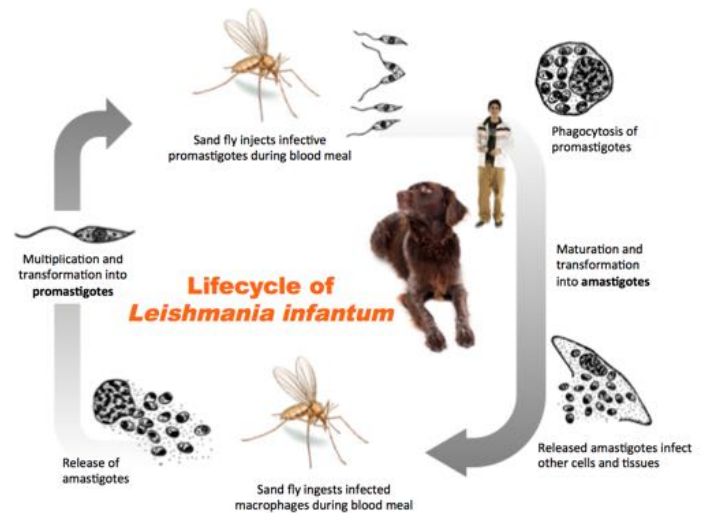


Leishmania infantum

- Leishmaniosis is a zoonosis caused by *Leishmania infantum*, an intracellular protozoan parasite.
- Vectors of the disease in Europe are sand flies of the genus *Phlebotomus*. The parasites are transmitted through the haematophagous activities of female phlebotome sand flies.
- During a blood meal, amastigotes from the host cells are ingested by sand flies and develop into the flagellate form called promastigotes that are inoculated in the next host.
- Depending on the host's immune response, canine leishmaniosis can have a very variable clinical manifestation ranging from subclinical to severe and even fatal disease.
- Renal failure is the main cause of death.



When to suspect infection?

■ Clinical signs

- Clinical signs of canine leishmaniosis are very variable. The most common signs are:
 - Lymphadenopathy (up to 88% of sick dogs)
 - Cutaneous lesions: exfoliative dermatitis, ulcerations, abnormal claws, focal hypotrichosis (up to 81%)
 - Pale mucous membranes (up to 58%)
 - Splenomegaly (up to 50%)
 - Weight loss (up to 32%)
 - Eyes: conjunctivitis/keratoconjunctivitis, anterior uveitis, blepharitis, periocular alopecia (up to 24%)
 - Epistaxis (up to 10%)
 - Vomiting, diarrhoea (up to 4%)
 - Lameness (up to 3.3%)
- The incubation period may be long (months-years)

■ Clinical pathology

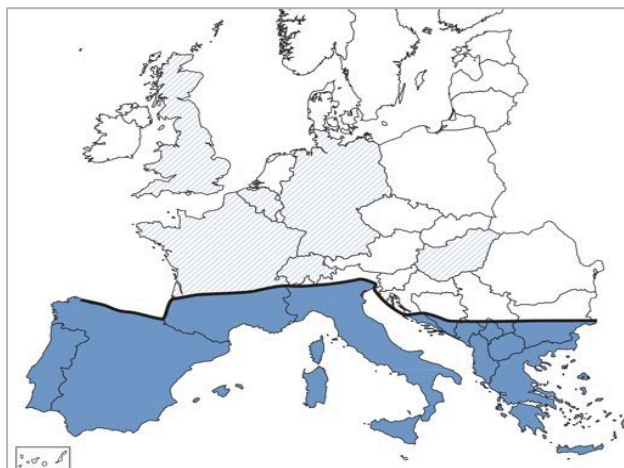
- Hyperproteinaemia: oligoclonal gammopathy
- Hypoalbuminaemia
- Increased liver enzyme activity
- Non-regenerative anaemia
- Leukocytosis/leukopenia
- Thrombocytopenia
- Proteinuria, renal azotaemia

■ Origin / travelling history

- Dogs that live in, originate from or have travelled to countries where the parasite is endemic (Spain, Portugal, Southern France, Italy, Croatia, Montenegro, Greece, Cyprus, Bulgaria, Turkey) are at risk.
- Dogs in countries not currently considered endemic should not be considered free of risk.
- In view of the potentially long incubation period (several months or years), clinically healthy animals may be infected.

How can it be confirmed?

- **Quantitative serology** (IFAT or ELISA): very high sensitivity in the case of a progressive infection (93-100%). May be false negative in early infection.
- **PCR**: bone marrow, lymph node and skin lesion biopsy samples are ideal (sensitivity up to 100%). Lower sensitivity on peripheral blood samples. Mandatory test for blood donors. Positive result confirms infection but not the disease. Real-time PCR allows parasite load quantification.
- **Qualitative serology**: rapid in-house test kits (immunochromatography); sensitivity ranges from 36 to 76%. Not recommended.
- **Cytology/Histopathology** of samples from lymph nodes, liver, bone marrow, spleen and skin in order to identify intracellular or extracellular amastigotes. Poor sensitivity.



Approximate distribution of canine leishmaniosis in Europe

Dogs without clinical signs or clinic-pathological abnormalities but that live in or have travelled to an endemic region:

- Wait with testing at least 3 months from the moment of potential exposure.
- Then perform quantitative serology: if the test is positive with low antibody levels, perform PCR.

Dogs with clinical signs and/or clinic-pathological abnormalities compatible with canine leishmaniosis:

- Perform quantitative serology
 - High antibody level: confirmed disease.
 - Low antibody level: cytology/histopathology and PCR required to confirm disease.

Staging clinical disease

- **Stage A:** Mild clinical disease with low positive antibody titer and no clinic-pathologic abnormalities
- **Stage B:** Moderate clinical disease with low to high positive antibody titre and some clinical pathologic abnormalities but normal renal profile. Mild proteinuria.
- **Stage C:** Severe clinical disease with medium to high positive antibody levels, clinical signs related to immune complex precipitation and IRIS (International Renal Interest Society) stage 1 or 2 of chronic kidney disease (CKD).
- **Stage D:** Very severe disease with medium to high positive antibody titre, end stage renal disease and severe proteinuria.

Disease management

- The choice of drugs depends on the stage of the clinical disease.
- Stage A: allopurinol, meglumine antimoniate or miltefosine as monotherapy, or combination of meglumine antimoniate with allopurinol or miltefosine with allopurinol.
- Stage B: combination of allopurinol with miltefosine or with meglumine antimoniate
- Stage C: As stage B and CKD treatment
- Stage D: allopurinol alone and CKD treatment

Drug	Dosage	Comment
Miltefosine	2 mg/kg PO q24h for 4 weeks	Gastrointestinal upsets are the main side effects
Meglumine antimoniate	75-100 mg/kg SC q24h for 4 weeks	Potential nephrotoxicity and cutaneous abscesses/cellulitis
Allopurinol	10 mg/kg PO q12h for 6-12 months	Xanthine urolithiasis is common (low purine diets are advised)

Follow-up

- Asymptomatic dogs that are:
 - *Seropositive:* Clinical examination & routine lab tests including serology every 3-6 months
 - *PCR-positive:* Clinical examination & routine lab tests including serology every 6-12 months
- Dogs that required treatment:
 - Clinical examination and routine laboratory work one month after the start of treatment and then every 4 months.
 - Serology 6 months after the start of treatment and then every 6-12 months.
 - Real time PCR: optional (at the same time as serology).

Prevention

- Approved collars or spot-on formulations containing synthetic pyrethroids as sand fly repellents
- Licensed vaccines to reduce the risk of developing clinical disease.
- Domperidone to reduce the risk of developing clinical disease.
- Keep dogs indoors from sunset till dawn during the sand fly season (April to November) and use physical barriers (mosquito nets) on windows to keep sand flies away.

Travel advice

- When travelling from a disease-free to an endemic area, use a product that helps preventing clinical disease or a product that repels the vector.
- Dogs that have travelled to an endemic area for at least 3 months should be screened for potential exposure by quantitative serology.

Clinical manifestations

Clinical signs may vary but lymphadenopathy, cutaneous and ocular lesions are common.



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Ocular signs associated with cutaneous signs of canine leishmaniosis. Keratitis marked by an important corneal neovascularisation, alopecia of the eyelids and ears and hyperkeratosis of the margin of the pinnae.



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View of the head of a dog severely affected by canine leishmaniosis: alopecia, scaling and bleeding ulcers of the ear pinnae are observed.



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Generalised alopecia, scaling and weight loss in a dog with chronic leishmaniosis (the cropped ears are not associated with the disease)