

***Borrelia* spp.**

- Canine borreliosis or Lyme disease is a tick-borne disease caused by *Borrelia* spp, predominantly of the *B. burgdorferi* complex, an extracellular spirochete bacterium.
- The main vector in Europe is the *Ixodes* tick, mainly *I. ricinus*.
- Small rodents and birds act as reservoirs of infection, while ruminants and deer act as reproductive and transport hosts for infected ticks.
- Seroprevalence in humans and dogs is highly variable across Europe.
- The disease is frequently self-limiting or asymptomatic with 5-10 % of dogs going on to develop clinical signs. However, it is not proven that European Lyme borreliosis even causes clinical signs in dogs.
- Coinfections with other pathogens sharing the same vector can occur and may be associated with increased morbidity.

When to suspect infection?

- **Clinical signs**
 - Asymptomatic (most common)
 - Lameness
 - Joint swelling (acute or sub-acute arthritis)
 - Fever
 - Anorexia
 - Lethargy
 - Lymphadenopathy
 - Lyme nephritis (in < 1-2% of cases in US, rare in Europe):- acute progressive protein-losing nephropathy with membranoproliferative glomerulonephritis, tubular necrosis and interstitial nephritis.
 - Cardiac signs have been reported
- **Clinical pathology**
 - Non-specific CBC and biochemistry panel results
 - Extracellular spirochaetes on blood smears
 - Proteinuria



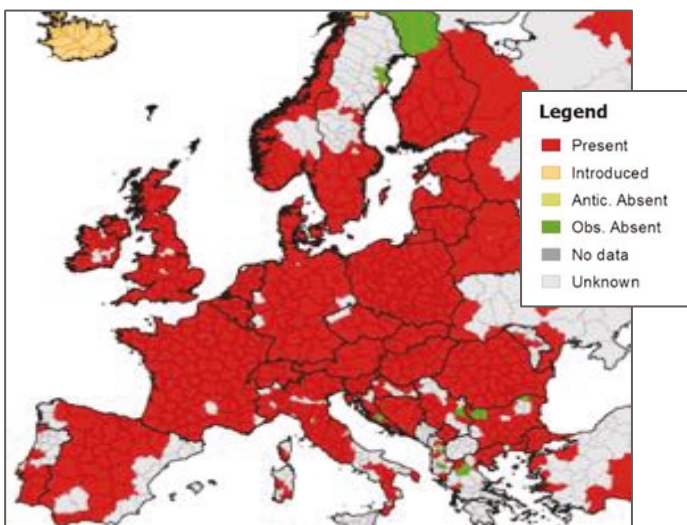
In Europe, the tick *Ixodes ricinus* (here, an engorged female) is the main vector of *Borrelia* spp., the pathogen causing Lyme disease

■ **Origin / travelling history**

- Dogs that live in, originate from or have travelled to countries where the parasite is endemic are at risk.

How can it be confirmed?

- **Serology:** the only recommended test to evaluate exposure. Highly sensitive. Antibodies take 3-4 weeks to develop after the infection. Quantitative serology is not useful: higher titres do not predict illness and are not associated with future illness in seropositive dogs. Quantitative C6 assays (and potentially OspF) pre- and 3-6 months post treatment useful to measure treatment success and set a baseline for future infections. Some in-house snap tests differentiate between vaccinal and natural exposure antibodies. (Whole cell ELISA, IFA or Western blot testing is not recommended because of possible cross-reactions with other spirochetal infections. IgM vs. IgG antibody testing is not recommended because dogs do not present with acute illness before seroconversion.)
- **PCR** Very specific but low sensitivity for *Borrelia* spp on blood. Skin from tick bite sites, connective tissue or joint capsule required. PCR cannot differentiate between viable and dead spirochaetes (prone to false negatives). Not recommended.



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Distribution of the tick *Ixodes ricinus* (January 2018), vector of *Borrelia burgdorferi*



Various stages of the tick *Ixodes ricinus*. From left to right and top to bottom: adult female, adult male, nymph, larva.

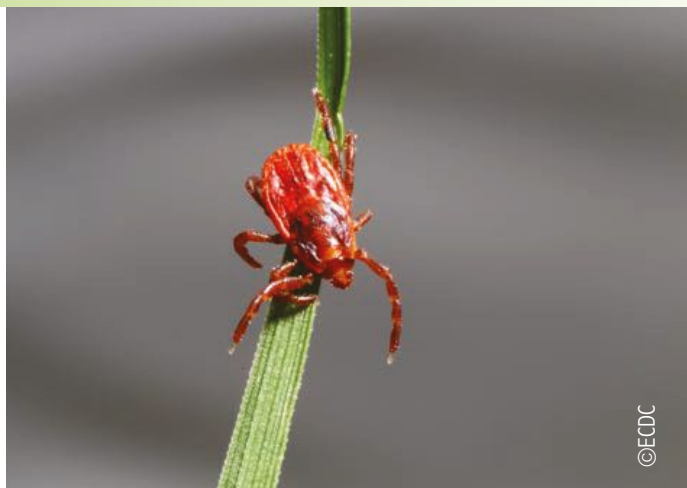
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Disease management

- Doxycycline 5 mg/kg PO q12h or 10 mg/kg q24h for 28 days is highly effective. It can also aid in the reduction of joint inflammation.
- Cefovecin (2 injections, 14 days apart) was shown to be as efficacious as 4 weeks of doxycycline or amoxicillin.
- Chronic Lyme arthritis is not well-documented in dogs and there is no evidence to support treatment beyond 1 month.
- Early treatment improves prognosis and efficacy.
- **Supportive care, analgesics –as needed.**

Prevention

- **Use of tick prevention products** - transmission is positively related to the duration of attachment, so prefer products which rapidly repels or kills ticks to reduce the risk of disease transmission. The more rapidly this is achieved, the greater the protective effect. Choice of the product should also be based on compliance, lifestyle factors, owner capabilities and other parasiticide needs for the pet. **Tick prevention will also reduce the risk of other tick-borne diseases, such as anaplasmosis and ehrlichiosis.**
- **Checking for ticks** - dogs should be checked for ticks at least every 24 hours in situations of high-risk exposure. Any ticks found should be removed immediately without stressing them as this increases the risk of disease transmission.



An adult female *Ixodes ricinus* tick on a blade of grass.

- **Vaccination** – there is no consensus between experts in the field of Lyme borreliosis in dogs about vaccination. Tick control remains the most important preventive measure.

Travel advice

- Use of a product that kills or repels ticks will reduce the risk of exposure to tick-borne pathogen transmission while travelling.
- No tick preventative product is 100% effective. Dogs should therefore also be checked at least every 24 hours for ticks and any found tick immediately removed.

Lyme disease and the Ixodes life cycle

