Tick-borne diseases: which ones do I actually need to know about?

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There are two major endemic tick-borne conditions in the UK; *Borrelia burgdoferi* (Lyme disease) and *Anaplasma phagocytophilum*. The principle vector is the tick *Ixodes ricinus*, which was confirmed as the most common species removed from dogs as part of a nationwide survey. Analysis of removed ticks found that 2% carried *Borrelia burgdoferi* and 0.74% *Anaplasma phagocytophilum*.

Borrelia sp. are extracellular spirochete bacteria with at least 50 hours of tick attachment required for transmission. Lyme disease most often manifests as a non-erosive inflammatory polyarthropathy. The diagnosis of the condition is complex but is centred around detection of exposure through serological testing or confirming the presence of the organism by culture, cytology or PCR.

Anaplasma phagocytophilum is a rickettsial intracellular bacteria that primarily invades neutrophils with at least 36 hours of attachment required for transmission. Infection is normally subclinical, however lethargy, polyarthritis, neck pain, pallor, lymphadenomegaly and splenomegaly can occur. The sensitivity of visualization of the organism within neutrophils is low in contrast to PCR which is both sensitive and specific. Serology can be useful, although cross-reactivity occurs.

The introduction of the Pet Travel Scheme coupled with change in vector distribution has resulted in tick-borne infections once considered exotic, principally ehrlichiosis and babesiosis, being diagnosed with increasing frequency.

Ehrlichia canis, an intracellular bacteria that invades monocytes and macrophages, is transmitted by *Rhipicephalus sanguineus*, with transmission occurring within a few hours of attachment. The condition has been reported in the UK (including reports in untravelling dogs). Infection can be subclinical, acute or chronic. The most common clinical signs include lethargy, anorexia, fever, weight loss and haemorrhage. *Ehrlichia canis* morulae may be visible in the monocytes, but this is a very insensitive test. PCR is sensitive and specific and can be performed on blood, lymph node, splenic and bone marrow aspirates. In chronic infections, blood PCR may be negative despite infection being present. Serology can be useful, both in acute and chronic forms of the condition, although cross-reactivity occurs.

The prognosis for *Borrelia burgdoferi*, *Anaplasma phagocytophilum* and *Ehrlichia canis* infections is good,

with the exception of chronic ehrlichiosis-associated pancytopenia. Doxycycline is the treatment of choice.

Babesiosis is caused by protozoan parasite species which invade erythrocytes including large (e.g. *Babesia canis*) and small (e.g. *Babesia gibsoni*) species. They are transmitted by several tick species, including *Dermacentor reticulatus*, around 24–48 hours after tick attachment. An outbreak of *Babesia canis* infection in untravelling dogs has been reported in Essex, with sporadic reports in other locations. Signs can include fever, lethargy, weakness, pallor, jaundice and pigmenturia and collapse. Large *Babesia* species may be identified within erythrocytes, although this is an insensitive test, in contrast to PCR. Large *Babesia* species (treated with imidocarb dipropionate), are generally easier to treat than small *Babesia* species (treated with atovaquone plus azithromycin).

KEY LEARNING OBJECTIVES

- Be aware that *Borrelia burgdoferi* is the most prevalent endemic tick-borne infection
- Be aware that *Babesia canis* and *Ehrlichia canis* have been reported in both travelled and untravelling dogs
- Understand that testing is complex and normally involves combinations of organism identification by direct visualization or polymerase chain reaction (PCR) and serology

MULTIPLE CHOICE QUESTIONS

1. Which one of the following is NOT a classic clinical sign of *Borrelia burgdoferi* infection?
 - (A) Bullseye skin rash
 - (B) Lameness
 - (C) Lymphadenomegaly
 - (D) Fever
2. Regarding the 2016–2017 outbreak of *Babesia canis* in Essex, which of the following is true?
 - (A) Dog-to-dog transmission was suspected to be involved
 - (B) An infected population of *Dermacentor reticulatus* ticks was confirmed in the area
 - (C) It was suspected that ticks attached to dogs which had entered the UK via the Pet Travel Scheme were involved
 - (D) All cases were treated with imidocarb and fully recovered
3. Which of the following is the most sensitive test for *Ehrlichia canis*?
 - (A) Visualization within monocytes
 - (B) PCR on blood
 - (C) PCR on splenic aspirates
 - (D) Serology