

Canine ehrlichiosis in Australia

Fact sheet

Introductory statement

Australia was previously believed to be free of *Ehrlichia canis*. During 2020, the organism was detected in Australian dogs for the first time. Infection with *E. canis* (ehrlichiosis) is a notifiable disease in Australia. If you suspect ehrlichiosis in Australia, call the Emergency Animal Disease hotline on **1800 675 888**.

The disease is also known as canine monocytic ehrlichiosis and can cause serious illness and death in dogs.

Aetiology

The organism *Ehrlichia canis*, is an obligate gram negative intracellular rickettsial bacterium belonging to the family Anaplasmataceae. It is transmitted through tick bites, in particular the bite of the brown dog tick (*Rhipicephalus sanguineus*).

Natural hosts

Dogs (*Canis lupus familiaris*) are considered the natural hosts of the organism. Other canids such as foxes and wolves are known to become infected with the bacterium (Santoro et al. 2016). It is assumed that dingos, a uniquely Australian ancient dog breed which some people consider a different species to domestic and wild dogs, may also become infected, and may be susceptible to disease from *E. canis*. On rare occasions, humans or cats can become infected from a tick bite (Stich et al. 2008; Day 2011).

World distribution

E. canis occurs worldwide, particularly in tropical and subtropical regions. It was, until recently, considered to be absent from Australia.

Occurrences in Australia

In 2020, *E. canis* was detected in Western Australia and the Northern Territory. It was first detected in a small number of domesticated dogs in the Kimberly region of WA in May 2020. This was the first detection of ehrlichiosis in dogs in Australia outside of dogs that had been imported from overseas. This was followed by detections in a small number of dogs in the NT, in Katherine and in a remote settlement west of Alice Springs in June 2020 (DPIR 2020). Previous surveys of dogs in northern Australia had found no evidence of *E. canis* infection (Mason et al. 2001; Barker et al. 2012; Hii et al. 2012).

Epidemiology

Canine ehrlichiosis is a multisystemic disorder that has high mortality rates in dogs during the chronic phase of infection. Dogs do not transmit the disease to each other. The disease is maintained by a cycle of transmission between ticks and dogs.

E. canis is transmitted primarily by the brown dog tick, which is widely distributed worldwide and is present in Australia, predominantly in the north (Greay et al. 2016; Chandra et al. 2020). Dogs acquire infection after being bitten by an infected tick, and the bacteria passes into the dog's bloodstream.

The brown dog tick is a three-host tick. Immature stage ticks become infected after feeding on infected dogs and are able to maintain the infection trans-stadially. Ticks can infect hosts in both nymphal and adult stages. The minimum amount of time that the tick needs to be attached to the host prior to passing on infection is not confirmed, but may be as short as a few hours (Fourie et al. 2013). The highest risk period for *E. canis* transmission is thought to be 24–72 hours after tick attachment, during the rapid 'soaking' phase of feeding (Davoust et al. 2003). Ticks can remain infectious for up to 5 months. The organism can also be transmitted through blood transfusions.

Transmission of *E. canis* occurs mainly during warmer months, when the tick vector is active. Canine ehrlichiosis has an incubation period of 8–20 days following exposure of a dog to an infective tick. Infection may be acute (non-myelosuppressive), subclinical or chronic (myelosuppressive) and may progress through each phase (Harrus and Waner 2011).

Although brown dog ticks are generally associated with tropical and subtropical environments, this tick species can complete its entire life cycle indoors, thereby potentially allowing it to survive in colder climates.

Some breeds of dog, for example German Shepherds, are reportedly particularly susceptible to the chronic phase of the disease with the development of a severe and often fatal haemorrhagic condition known as tropical canine pancytopenia.

Clinical signs

Signs of ehrlichiosis in dogs can be divided into three stages: acute, sub-clinical, and chronic.

The severity of the disease varies considerably among dogs. The chronic form of ehrlichiosis may not manifest until months or years following infection.

Signs in the **acute** phase are non-specific and can include fever, lethargy, enlarged lymph nodes and spleen, loss of appetite, discharge from eyes and nose, weight loss and bleeding disorders. This phase typically lasts

for 2–4 weeks. Untreated animals may progress to a long term subclinical phase or the chronic form of disease.

In the **subclinical** phase, dogs appear in normal health but the organism remains in the host's spleen. This phase can persist for months to years. Not all dogs pass from the subclinical to the chronic stage of infection. Dogs in this phase may clear the organism, remain asymptotically infected or progress to the chronic form of ehrlichiosis.

Clinical signs in the **chronic** phase are similar to those seen in the acute phase but are more severe with a worse prognosis. Signs can include fever, weakness, weight loss, bleeding disorders, pallor, dyspnoea, splenomegaly, hepatomegaly, ocular and neurological abnormalities and increased susceptibility to secondary infections. Haematological abnormalities include severe thrombocytopenia and nonregenerative anaemia. Pancytopenia can occur as a result of bone marrow hypoplasia.

Diagnosis

Diagnosis of ehrlichiosis is achieved through serological and/or molecular testing. The diagnosis is supported by clinical signs, haematological and serum biochemistry abnormalities and response to treatment.

The immunofluorescent antibody test (IFAT) detects IgG antibodies against *E. canis* and is generally used as the first screening test. Antibodies may not be detectable early in disease, and titres can persist for months to years after the infection is resolved.

PCR tests detect organism-specific DNA in the blood. PCR can be positive before seroconversion occurs and can detect an active infection.

Clinical pathology

Thrombocytopenia and mild anaemia.

Differential diagnoses

Differential diagnoses may include anaplasmosis, babesiosis, lymphoma, multiple myeloma and other immune-mediated diseases.

Laboratory diagnostic specimens and procedures

Veterinarians in Australia investigating possible cases of *E. canis* in animals should contact the EAD Hotline on 1800 675 888 or their state/ territory department of agriculture/ primary industry.

Treatment

Early treatment of infected dogs is important for full clinical resolution. If treated early, antibiotics and supportive care may assist in curing the disease. Antibiotic treatment is required daily for at least four weeks. Tick control is the main preventative measure against the disease.

Prevention and control

There is no vaccine against *E. canis*. Prevention of canine ehrlichiosis in endemic areas requires dogs to be on an effective tick control program. This depends on regular treatment of dogs with an effective acaricide (in accordance with the manufacturer's recommendations) to prevent tick attachment.

Owners should avoid taking dogs into tick infested areas such as bushland. Houses, kennels and yards should be frequently treated and tick infestations in these areas should be managed by a pest controller as *R. sanguineus* can survive off the host for prolonged periods. For dogs visiting tick endemic regions, tick preventative measures should be practised.

Dogs should be inspected regularly for ticks, with special focus on areas of the body where ticks tend to hide. Owners should observe dogs closely for signs of disease and take them to the vet for investigation if they are unwell or showing signs of ehrlichiosis.

Once ehrlichiosis is in the tick population, it is very difficult to control, particularly in tropical and subtropical regions.

Surveillance and management

The origin of the *E. canis* in northern Australia is not known and investigations are being undertaken into the situation. Surveillance is being undertaken in areas where the brown dog tick is known to occur to determine the distribution of ehrlichiosis, and local community awareness activities are underway.

Statistics

Wildlife disease surveillance in Australia is coordinated by Wildlife Health Australia. The National Wildlife Health Information System (eWHIS) captures information from a variety of sources including Australian government agencies, zoo and wildlife parks, wildlife carers, universities and members of the public. Coordinators in each of Australia's States and Territories report monthly on significant wildlife cases identified in their jurisdictions. NOTE: access to information contained within the National Wildlife Health Information System dataset is by application. See the WHA website for more information: www.wildlifehealthaustralia.com.au/ProgramsProjects/eWHISWildlifeHealthInformationSystem.aspx#requests.

Research

Further work is underway to better understand the origin and extent of *E. canis* in Australia.

Human health implications

Ehrlichiosis is zoonotic, but occurs rarely in humans. Ticks may transmit the disease to humans. Humans cannot become infected from contact with a dog with the disease. See www.health.nsw.gov.au/environment/pests/parasites/Pages/ticks.aspx for more information on preventing tick bite in humans.

Very rare cases of human infection with *E. canis* have been reported but the disease agent is not considered to have significant zoonotic potential (Day 2011).

Conclusions

Canine ehrlichiosis has been recently detected in northern Australia and is a concern for the health of dogs and related species. If you suspect canine ehrlichiosis in Australia, call the Emergency Animal Disease hotline on 1800 675 888.

Acknowledgements

We are extremely grateful to the many people who had input into this fact sheet.

Created: July 2020

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We are interested in hearing from anyone with information on this condition in Australia, including laboratory reports, historical datasets or survey results that could be added to the National Wildlife Health Information System. If you can help, please contact us at admin@wildlifehealthaustralia.com.au.

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