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Ehrlichiosis: additional veterinary guidelines for managing CME in Australia

Canine monocytic ehrlichiosis (CME), commonly known simply as ehrlichiosis, is a tick-borne disease of dogs caused by infection with the bacterium *Ehrlichia canis*. In Australia, dogs can be infected with *E. canis* within hours after being bitten by an infected brown dog tick (*Rhipicephalus linnaei*; tropical lineage of *R. sanguineus*), a species that is habituated to human settlements and built environments. *E. canis* occurs worldwide, particularly in tropical and subtropical regions.

The first detection of ehrlichiosis in Australia was in May 2020. Since then, it has been diagnosed in dogs in the northern regions of Western Australia and South Australia, all of the Northern Territory, and northwestern Queensland. Ehrlichiosis is a notifiable disease, and must be reported to state or territory biosecurity authorities according to jurisdictional requirements. This may include reporting via the Emergency Animal Disease Watch hotline (1800 675 888).

E. canis is an obligate intracellular, rickettsia-like bacterium that infects monocytes and may sequester in haematopoietic tissues. It causes severe and potentially life-threatening disease, with a range of nonspecific clinical signs in both acute and chronic forms. No vaccine is available.

This fact sheet is provided in addition to the national veterinary guide to ehrlichiosis, and offers additional insights around the challenges and ethical considerations of managing infected dogs in Australia.

Acute ehrlichiosis

Some dogs are diagnosed in the acute stage, which has an incubation period of 1–3 weeks. Depending on access to veterinary services, dogs may be treated and appear to recover, but there is no straightforward test to monitor treatment success.

A positive PCR test post-treatment may indicate that the dog is still bacteraemic and treatment was unsuccessful. Given the ability of the organism to sequester in tissues, and be undetectable in circulation, a negative result does not indicate that the dog has successfully cleared the infection. Similarly, use of nonquantitative ELISA serology after treatment is of limited value. This is because antibody titres (that are nonprotective) may remain detectable for months to years after treatment. Aspirates of the spleen and bone marrow may detect the organism in subclinical cases, but this is a risky procedure, particularly in a thrombocytopenic dog. For these reasons, consider any dog diagnosed with *E. canis* infection as potentially subclinically infected for life. Educate owners about the clinical signs of chronic disease, the need to protect in-contact dogs from infection and the importance of limiting disease spread.

Subclinical ehrlichiosis

Some dogs may be infected but show no clinical signs. Post-infection, they may clear the organism from circulation, or may become subclinical carriers of the bacteria in the spleen and bone marrow for months or years. These dogs may not present to veterinarians unless the disease progresses to its chronic form. There are particular challenges around the long-term management of subclinically infected and post-acute patients:

- The proportion of subclinically infected dogs that go on to develop chronic, end-stage disease is currently unknown.
- Dogs that have lived or travelled in regions where *E. canis*-infected ticks exist may become subclinically infected without their owners' knowledge, and go on to develop chronic ehrlichiosis months or years later. Because of the time delay, the connection between travel and clinical signs may not be obvious.
- Interstate movement of infected dogs, associated with travel or rehoming, into areas where brown dog ticks exist but *E. canis* is not known to be active occurs regularly, and some of these dogs will develop chronic disease.
- Some jurisdictions place a biosecurity obligation on responsible parties to minimise the risk of spread, but there is no obligation for individuals or rehoming groups to disclose the health status of infected dogs to adopting new owners.
- The clinical and geographical/movement history of dogs adopted either privately or through rehoming and rescue organisations may not always be made clear to new owners or treating veterinarians. The situation is further complicated if interstate rehoming involves multiple changes in dog ownership.

Not knowing that a dog is subclinically infected can result in delayed diagnosis or misdiagnosis, particularly if veterinarians in areas where *E.canis* is not known to be active are not on the lookout for possible infections. Chronic ehrlichiosis mimics other diseases and can be difficult or impossible to treat. The absence of an accurate diagnosis can lead to expensive testing that does not result in a diagnosis, ineffective treatment interventions and development of animal welfare issues.

Stringent use of a repel-and-kill tick product for dogs that live in or travel through brown dog tick-infested areas of Australia affords the best protection against tick attachment. To prevent transmission, dogs with suspected or confirmed ehrlichiosis that live in an area where the brown dog tick is likely to exist need lifelong treatment with registered systemic tick control products, even where there is no visible tick burden. Dog owners should be informed of the future disease risk to other dogs in the household and local community if this protocol is not maintained. Consult the veterinary guide *Canine monocytic ehrlichiosis: a guide for veterinarians* for suitable product suggestions.

Chronic ehrlichiosis

Veterinarians across Australia need to be aware of the risks and signs of chronic ehrlichiosis. Consider the disease as a differential diagnosis when severe, nonresponsive illness or haematological abnormalities occur in any dog that has travelled to, or possibly originated from, a region with *E.canis*-infected brown dog ticks. History taking should include questions about movements, *E.canis* testing, treatment and tick control. Consult the map in the veterinary guide to see where brown dog ticks are likely to exist in Australia.

Preoperative complete blood counts (CBCs) for healthy but suspect dogs may assist in detection of chronic ehrlichiosis. Suspect dogs are any that:

- live in a brown dog tick-infested area, or a region where *E.canis* is known or likely to be active
- have an unknown movement history
- have an unknown or poor tick control history
- live or have lived with a confirmed case of ehrlichiosis
- have previously been diagnosed with ehrlichiosis, whether they were treated or not.

Routine CBCs sometimes aid in detection of subclinical cases, which can show marginal thrombocytopenia and/or other haematological abnormalities in clinically normal dogs, leading to submission of samples for *E. canis* exclusion.

Clinical signs of chronic ehrlichiosis are associated with laboratory abnormalities of increasing severity and tend to be terminal in their outcome. As the infection progresses, a range of immune complex pathologies, including vasculitis, uveitis and glomerulonephritis, develop because of excessive immunoglobulin production. However, these antibodies are nonprotective. Terminal bone marrow failure is associated with pancytopenia and, frequently, sepsis.

Clinical presentations include all of the signs seen in the acute phase. Dogs may present with fever, lethargy, and severe, rapid wasting, even with apparently adequate nutrition. Clinical signs are wide-ranging, and may include epistaxis, petechiae/ecchymoses, dyspnoea, harsh lung sounds, lymphadenopathy and splenomegaly. Uveitis, intraocular bleeding and corneal oedema are common. Many dogs present with shifting lameness, polyarthritis and vasculitis-associated dependent oedema. Infected dogs are more susceptible to secondary infections and may present with nonhealing wounds, persistent bleeding from injuries and surgical incisions, treatment-resistant infections or treatment failures. Blood tests often show severe thrombocytopenia, leukopenia and anaemia, progressing to nonregenerative pancytopenia. This form of the disease is usually fatal, and treatment efforts are likely to be futile. Images of some typical presentations are in the veterinary guide.

Treatment and prognostic indicators

Treat both acute and chronic infections with doxycycline 10 mg/kg daily for 28 days. Most other antibiotics are ineffective against *E. canis*. However, there is evidence that rifampicin used at 15 mg/kg PO every 12 hours for 7 days may be a suitable choice, but only if doxycycline fails to clear infection. Under current guidelines for antimicrobial stewardship,¹ rifampicin is not registered for use in animals, and should not be used off-label, except in exceptional circumstances for individual animals with laboratory-confirmed, persistent *E. canis* infection.

Immunocomplex pathology that causes significant morbidity can be palliated with a 7–10-day course of prednisolone at an anti-inflammatory dose (1 mg/kg PO every 24 hours). This appears to help reduce complications. However, treatment failure is common if the dog has progressed to complete pancytopenia. Make owners aware that chronic ehrlichiosis carries a grave prognosis, regardless of treatment intervention and effort.

¹ <https://www.ava.com.au/siteassets/resources/fighting-antimicrobial-resistance/veterinary-use-of-antibiotics-critical-to-human-health.pdf>

Serial haematology is useful to assess disease progression. Dogs with chronic ehrlichiosis will present with a variety of haematological abnormalities, including:

- thrombocytopenia (moderate to severe)
- leukocytosis (acute) to leukopenia (chronic)
- monocytosis
- lymphocytosis (acute) to lymphopenia (chronic)
- anaemia (mild to severe in late infection)
- pancytopenia
- hyperglobulinaemia
- hypoalbuminaemia
- elevations in liver enzymes
- mild to moderate azotaemia.

Disease progression is associated with increasing severity of abnormality in haematological parameters. Timely euthanasia can be recommended on humane grounds when pancytopenia becomes evident.

More information on diagnosis, sampling and prevention is provided in the veterinary guide, and at Ehrlichiosis in dogs²

² <https://www.agriculture.gov.au/ehrlichiosis>

