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DIAGNOSTIC UPDATE

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Diagnosing and Managing Canine Leptospirosis

IDEXX Reference Laboratories introduces a rapid ELISA for canine leptospirosis

The new Canine *Leptospira* spp. Antibody by ELISA from IDEXX Reference Laboratories provides fast results at a lower cost to assist veterinarians in diagnosing this potentially life-threatening infection. Until now, testing options for diagnosing canine leptospirosis have had prolonged turnaround times and high costs, resulting in delayed diagnosis or antibiotic trial therapy.

Background

Leptospirosis, a zoonotic disease of worldwide significance, is caused by spirochetes of the genus *Leptospira*. Leptospirosis has been thought to most commonly affect young-adult, large breed, outdoor dogs; however, small dogs in urban areas can also contract the disease. Pathogenic serovars infecting dogs include Icterohaemorrhagiae, Canicola, Pomona, Bratislava, Grippotyphosa and Autumnalis. Although serovar identification is of interest from an epidemiologic standpoint, clinical disease is similar for all serovars and treatment is the same.

Prevalence

The prevalence of canine leptospirosis varies by region and season, and is considered an emerging infectious disease in humans as well as dogs.[1,2] Results of one study in Michigan indicated that more than 20% of healthy, client-owned dogs had been exposed to *Leptospira* serovars.[3] In another study, 8.2% of dogs were shedding pathogenic leptospires irrespective of health status.[4] It is unknown what proportion of dogs with acute kidney injury have leptospirosis; however, given the high rate of exposure, leptospirosis should be considered in every dog presenting with acute renal abnormalities regardless of the dog's signalment, environment or geography.

Transmission

Infected animals shed spirochetes in their urine that subsequently contaminate the environment. Susceptible animals and humans are most often infected through contact with contaminated water. Bacteria enter through damaged skin or mucous membranes.

Clinical signs

Acute kidney injury (AKI) is the most commonly recognized disease in dogs, accounting for more than 90% of reported cases of leptospirosis. Hepatic disease occurs concurrently in 10%–20% of dogs with AKI but can also occur independently. Anorexia, lethargy, vomiting, polyuria and polydipsia are common signs. Icterus, fever, abdominal pain, muscle pain and stiffness, uveitis, dyspnea and coagulopathies occur as well but with less frequency.[5] Infected dogs have also presented with only polyuria and polydipsia and normal chemistry findings with or without glucosuria.[6,7]

Clinicopathologic findings

Anemia, leukocytosis characterized by neutrophilia, and thrombocytopenia are the most common findings on the complete blood count (CBC). Azotemia, increased liver enzymes, hyperbilirubinemia and electrolyte disturbances are the most common biochemical changes. Coagulation abnormalities, including prolongation of prothrombin time (PT) and partial thromboplastin time (PTT), are not uncommon. Decreased specific gravity and markers of tubular injury—including glucosuria, granular casts and low-grade proteinuria—are often present on urinalysis.[8]

Leptospira spp. ELISA technology

The lipoprotein LipL32 is the most abundant outer membrane protein found in pathogenic species of *Leptospira*.[9] An enzyme-linked immunosorbent assay (ELISA) for the detection of LipL32 antibodies in the dogs is now available from IDEXX Reference Laboratories. The lower cost and rapid results afforded by this ELISA will allow for increased testing to ensure adequate precautions are taken when handling dogs with a zoonotic disease, and administration of therapy in a timely manner.

Overview of testing options

Serology—Serologic tests detect antibodies to *Leptospira* spp.

- ELISA: The new Canine *Leptospira* spp. Antibody by ELISA from IDEXX Reference Laboratories will provide a qualitative positive or negative antibody result. Similar to microscopic agglutination testing, some currently vaccinated dogs may have detectable antibodies on the assay. Duration of vaccinal antibody reactivity may vary depending upon the dog and frequency of vaccination.
- MAT: Detection of antibodies using the microscopic agglutination test (MAT) has been the most common diagnostic method used for the diagnosis of canine leptospirosis.[10] Vaccination with commercially available leptospirosis vaccines will produce detectable MAT titers.[10] See algorithm 2 for more information on MAT results.

PCR—Polymerase chain reaction (PCR) tests detect *Leptospira* spp. DNA. Whole blood and urine are tested simultaneously to allow for diagnosis of sick animals in the early stages of infection and for the detection of urinary shedding in sick animals. PCR on blood will be positive early in infection, usually prior to seroconversion. Urine will become positive 7–14 days after infection, at which time DNA evidence of leptospires may or may not be detected in the blood.

Diagnosis

The diagnosis of canine leptospirosis can be complicated and challenging. The new Canine *Leptospira* spp. Antibody by ELISA provides additional information when performing this complex diagnostic workup. Results should be interpreted in the context of clinical signs, physical examination findings, vaccination history and preliminary blood work and urinalysis. Follow algorithms 1 and 2 when interpreting test results. For the most complete diagnostic workup, it is important to consider both serology and PCR when a patient presents with symptoms consistent with leptospirosis.

Treatment

For dogs presenting with acute kidney injury, supportive therapy with intravenous fluids is indicated. The dog should be rehydrated and fluids given to support diuresis and replace ongoing losses. Electrolyte disturbances and acid-base abnormalities should be corrected. Most dogs with leptospirosis are polyuric; however, urinary output should be monitored closely. In severe cases, especially if oliguria or anuria develops, referral for hemodialysis should be considered.

Antibiotic therapy is key to specifically treating leptospirosis. When leptospirosis is suspected, antibiotics should be initiated as soon as possible after diagnostic samples have been collected, even prior to confirmation of the diagnosis. Doxycycline (administered orally) or penicillin and its derivatives (i.e., ampicillin [intravenously] or amoxicillin [orally]) are the antibiotics of choice for initial treatment. These drugs terminate leptospiremia within 24 hours, which in turn prevents urinary shedding and transmission of the organism and significantly decreases the risk of zoonotic transfer. To clear renal infections and eliminate the carrier state and chronic shedding, doxycycline should be administered for 3 weeks once oral medication is possible, or if doxycycline is not tolerated, a fluoroquinolone can be administered in conjunction with a penicillin derivative.

Prognosis

Establishing a definitive diagnosis of leptospirosis is critical. Without specific therapy, permanent renal damage is more common, and the disease is more likely to be fatal. With early recognition and appropriate treatment, the survival rate for dogs with acute kidney disease is approximately 80%.[8,11]

Public health considerations

Urinary shedding of leptospires poses a zoonotic risk to dog owners and veterinary hospital staff. Urine from infected dogs can infect humans if it comes in contact with mucosal surfaces or a break in the epidermal barrier. One study evaluating 500 dogs used PCR on urine to detect shed leptospires. The results revealed that, irrespective of health status, 8.2% of dogs were shedding pathogenic leptospires.[4] Identifying dogs shedding leptospires allows veterinarians, their staff and the pet owner to take appropriate precautions (e.g., latex gloves, face mask, goggles) when handling the dog's urine and entering urine-contaminated areas.

Ordering information

test code	test name and contents
3568	***Leptospira* spp. Antibody by ELISA—Canine** Results reported as positive or negative for *Leptospira* spp. only. **Specimen Requirements:** 1 mL serum **Turnaround time:** Daily
3569	***Leptospira* spp. Panel—Canine** *Leptospira* spp. RealPCR™ Test, *Leptospira* spp. antibody by ELISA **Specimen Requirements:** 2 mL EDTA whole blood (LTT) and 2 mL urine in a sterile container for RealPCR tests (keep refrigerated) and 1 mL serum for serology. Collect specimens prior to antibiotic administration. **Turnaround time:** 1–3 working days
3567	**Leptospirosis Profile—Canine** Chem 25, comprehensive CBC, *Leptospira* spp. antibody by ELISA, urinalysis **Specimen Requirements:** 2 mL serum, 1 mL LTT, two blood smears (preferred), 5 mL urine in a sterile container **Turnaround time:** Daily

Contacting IDEXX

Laboratory Customer Support

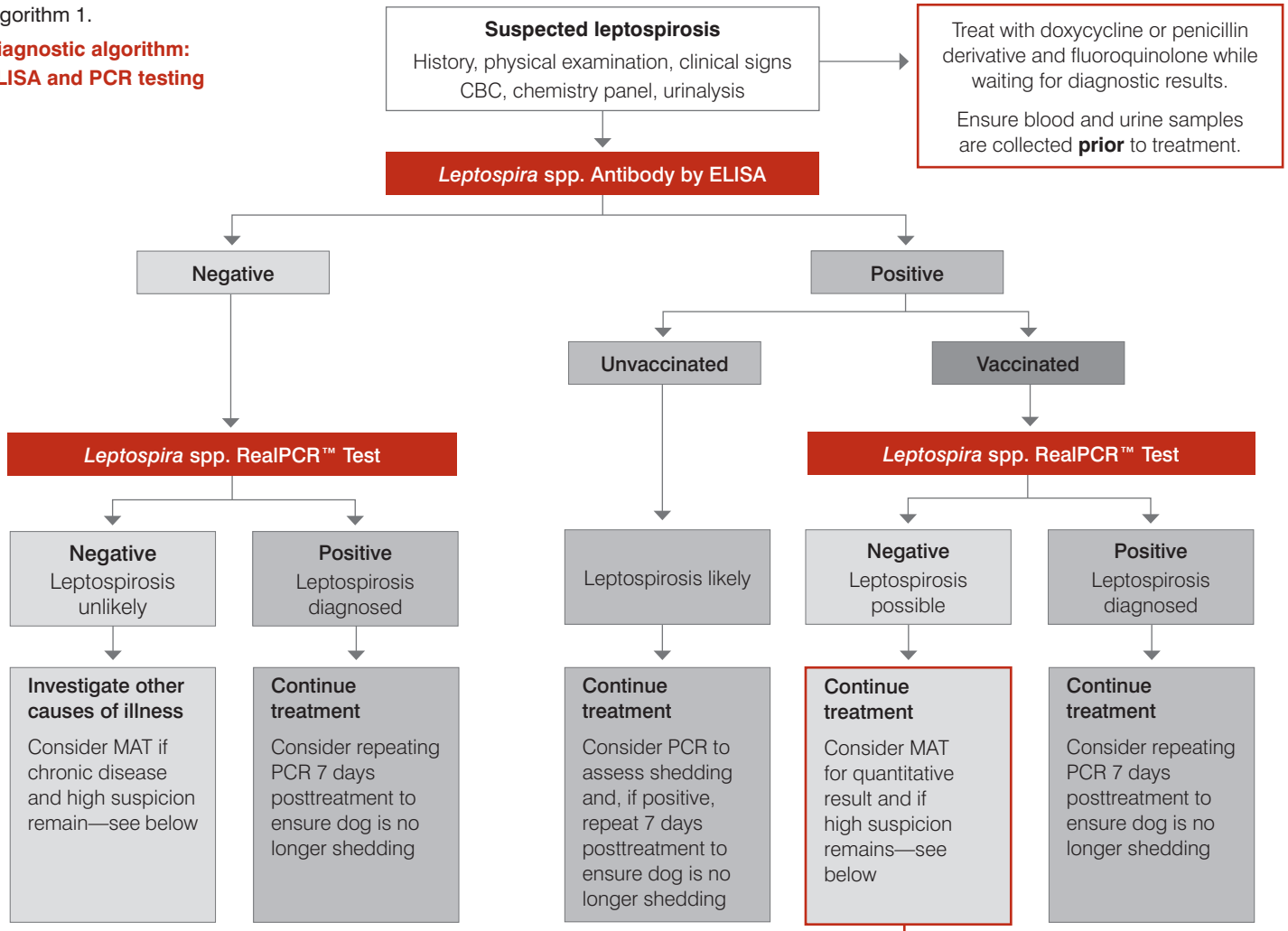
If you have any questions regarding test codes, turnaround time or pricing, please contact our Laboratory Customer Support Team at 1-888-433-9987.

Expert feedback when you need it

If you have any questions on when to use the new Canine *Leptospira* spp. Antibody by ELISA or on how to interpret test results, or if you would like treatment advice, please call for a consultation at 1-888-433-9987.

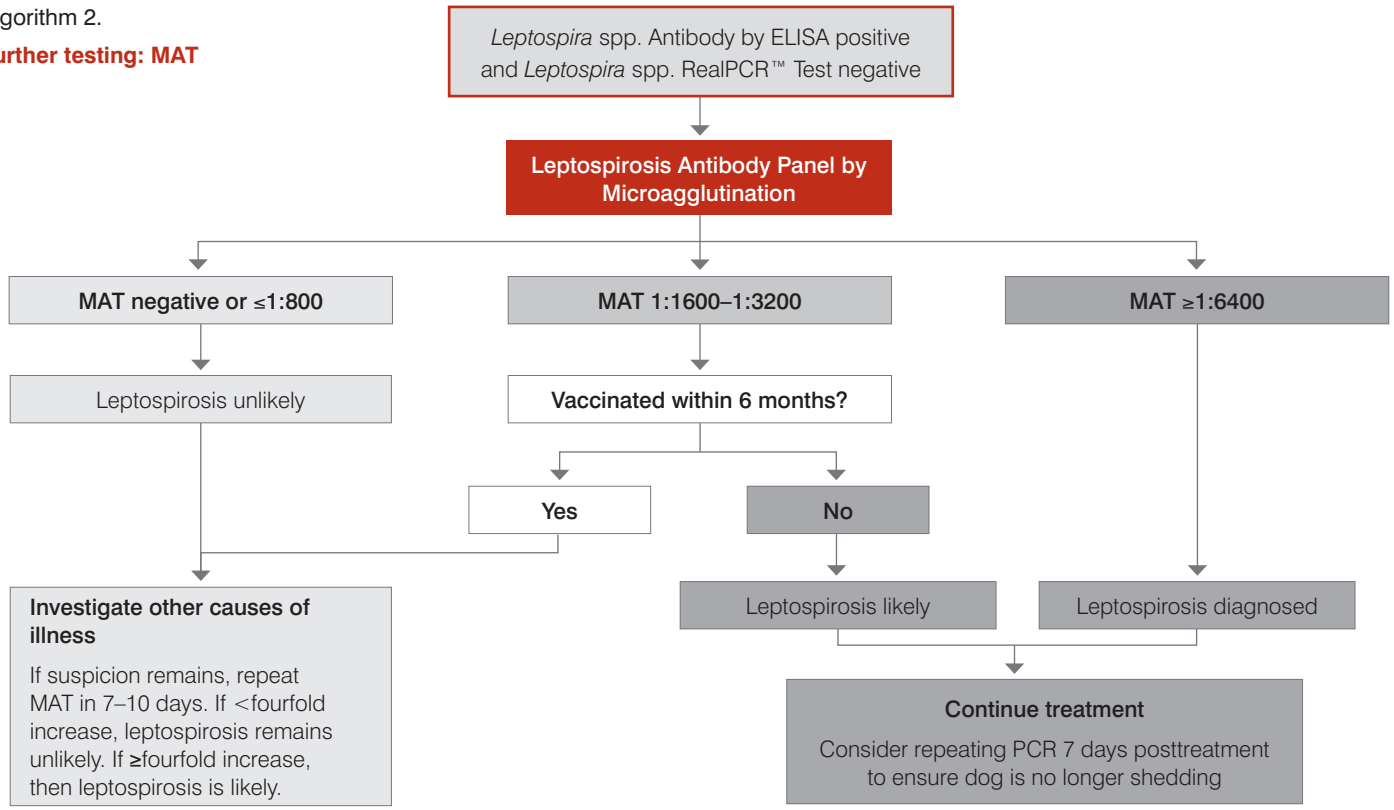
Algorithm 1.

Diagnostic algorithm: ELISA and PCR testing



Algorithm 2.

Further testing: MAT



Recommended Reading

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