

The in-house SNAP[®] Lepto Test and the *Leptospira* ELISA at IDEXX Reference Laboratories

Introducing a rapid ELISA for antibodies to canine leptospirosis

A timely diagnosis is important in cases of acute canine leptospirosis. IDEXX Laboratories is pleased to introduce a new ELISA for *Leptospira*-specific antibodies. The trusted ELISA technology is available as a point-of-care SNAP[®] test and as an IDEXX Reference Laboratories test. The SNAP[®] Lepto Test and the Canine *Leptospira* spp. Antibody by ELISA provide fast results at a lower cost to assist veterinarians in diagnosing this potentially life-threatening infection.

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, Grippityphosa 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 SNAP[®] Lepto Test and the 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 may produce detectable MAT titers.¹⁰

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 SNAP® Lepto Test and the Canine *Leptospira* spp. Antibody by ELISA provide additional information when performing this complex diagnostic workup. The rapid results at a lower cost permit more frequent testing and facilitate convalescent testing by ELISA when needed. Results should be interpreted in the context of clinical signs, physical examination findings, vaccination history, preliminary blood work and urinalysis. Follow the diagnostic algorithm detailed on the next page when interpreting test results. For the most complete diagnostic workup, it is important to consider both serology and PCR when a patient presents with clinical signs 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.

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.

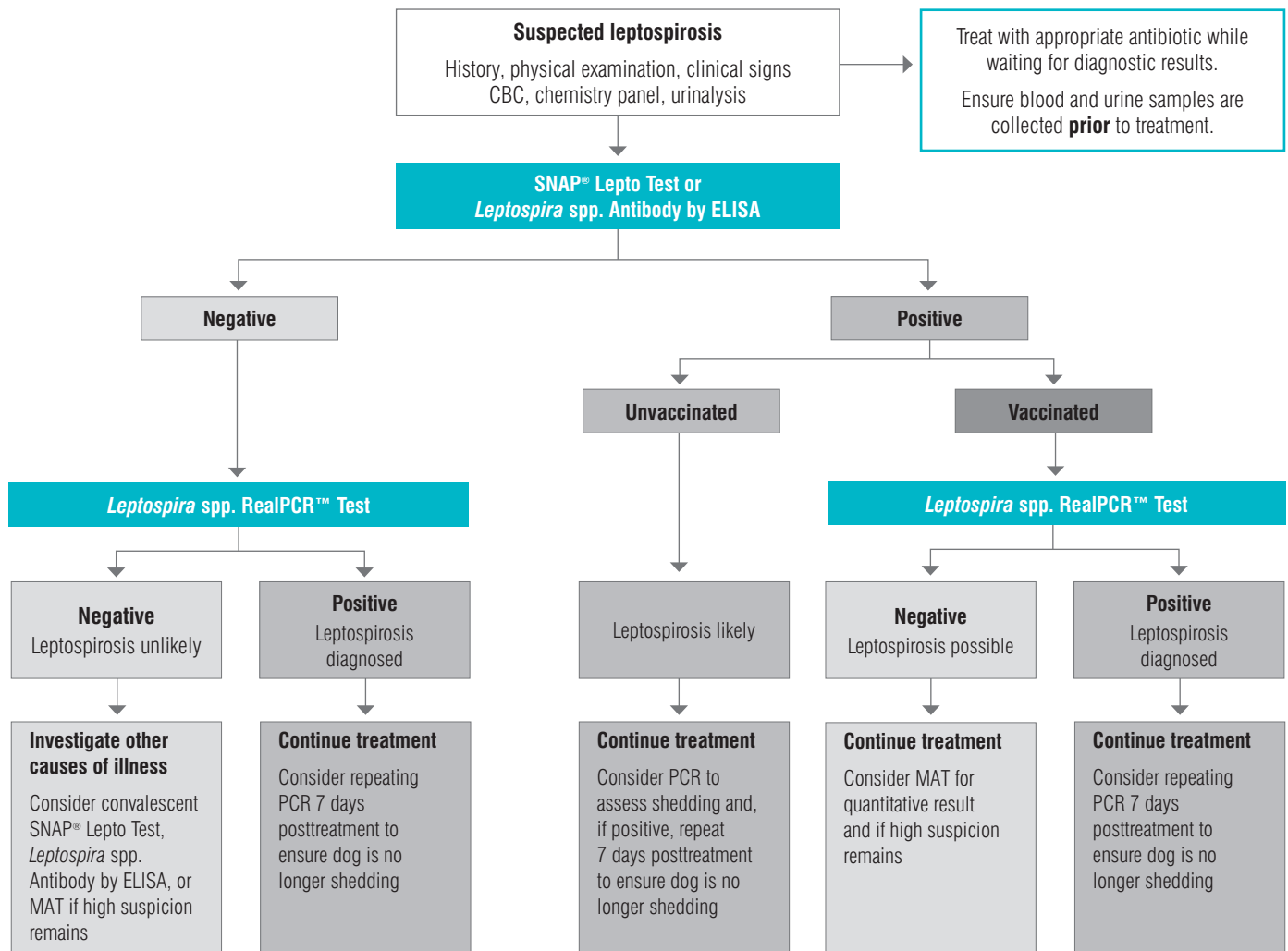
Expert feedback when you need it

If you have any questions on when to use the new SNAP® Lepto Test and the 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.

To order the SNAP Lepto Test

- Go to idexx.com/order.
- Call 1-888-79-IDEXX.
- Talk to your IDEXX Veterinary Diagnostic Consultant.

Diagnostic algorithm: ELISA and PCR testing



Recommended reading

Goldstein RE. Canine Leptospirosis. *Vet Clin Small Anim.* 2010;40:1091–1101.

References

- Alton GD, Berke O, Reid-Smith R, et al. Increase in seroprevalence of canine leptospirosis and its risk factors, Ontario 1998–2006. *Can J Vet Res.* 2009;73:167–175.
- Gautam R, Wu C-C, Guptill LF, Potter A, Moore GE. Detection of antibodies against *Leptospira* serovars via microscopic agglutination tests in dogs in the United States, 2000–2007. *JAVMA.* 2010;237(3):293–298.
- Stokes JE, Kaneene JB, Schall WD, et al. Prevalence of serum antibodies against six *Leptospira* serovars in healthy dogs. *JAVMA.* 2007;230(11):1657–1664.
- Harkin KR, Roshto YM, Sullivan JT, Purvis TJ, Chengappa MM. Comparison of polymerase chain reaction assay, bacteriologic culture, and serologic testing in assessment of prevalence of urinary shedding of leptospires in dogs. *JAVMA.* 2003;222(9):1230–1233.
- Harkin KR. Leptospirosis. In: Bonagura JD, Twedt DC, eds. *Kirk's Current Veterinary Therapy XIV.* 14th ed. St. Louis, MO: Saunders; 2009:1237–1240.
- Sykes JE, Hartmann K, Lunn KF, Moore GE, Stoddard RA, Goldstein RE. 2010 ACVIM small animal consensus statement on leptospirosis: diagnosis, epidemiology, treatment, and prevention. *J Vet Intern Med.* 2011;25:1–13.
- Tangeman LE, Littman MP. Clinicopathologic and atypical features of naturally occurring leptospirosis in dogs: 51 cases (2000–2010). *JAVMA.* 2013;243(9):1316–1322.
- Goldstein RE, Lin RC, Langston CE, Scrivani PV, Erb HN, Barr SC. Influence of infecting serogroup on clinical features of leptospirosis in dogs. *J Vet Intern Med.* 2006;20(3):489–494.
- Murray GL. The lipoprotein LipL32, an enigma of leptospiral biology. *Vet Microbiol.* 2013;162(2–4):305–314.
- Greene CE, Sykes JE, Moore GE, Goldstein RE, Shultz RD. Leptospirosis. In: Greene CE, ed. *Infectious Diseases of the Dog and Cat.* 4th ed. St. Louis, Mo: Saunders Elsevier; 2012:431–447.
- Adkin CA, Cowgill LD. Treatment and outcome of dogs with leptospirosis: 36 cases (1990–1998). *JAVMA.* 2000;216(3):371–375.

