

Leptospirosis

The Pet Health Care Library

When a Dog Becomes Infected

Dogs become infected by leptospire when abraded skin comes into contact with infected urine or with water contaminated with infected urine. Bite wounds, reproductive secretions, and even consumption of infected tissues can transmit this infection. The organisms quickly spread through the bloodstream leading to fever, joint pain, and general malaise that can last up to a week. The organism settles in the kidneys and begins to reproduce, leading to further inflammation and then kidney failure. Depending on the type of leptospire involved, other organ failure (especially liver) can be expected as well. Make no mistake, leptospirosis is a life-threatening disease with worldwide significance. People can be infected, too.

Typical symptoms and clinical picture: *Fever, depression, loss of appetite, joint pain, nausea, excessive drinking, jaundice, excess bleeding brought on by low platelet count. Recovered animals can shed leptospire for months after recovery. Younger animals tend to be more severely affected than older animals. Most cases are diagnosed between July and December and involve large breed dogs in rural or suburban environments. There may be a genetic predisposition for infection in German Shepherd dogs.*

Kidney failure is a relatively common malady in pets and can be either chronic or acute. Chronic kidney failure is a different situation from acute kidney failure, where the ability to produce urine is endangered and the condition comes on more quickly. It is acute kidney failure that affects 90% of dogs with leptospirosis, with 10-20% also suffering liver failure. In most infected dogs the main feature is excessive water consumption a week or two after an episode of unexplained fever (rather than sudden inability to make urine as is usually seen in an acute kidney failure situation.)

The Infection in Humans

As the Centers for Disease Control and Prevention (CDC) monitor leptospirosis cases in people, it seems that one third come from contact with infected dogs and one third come from contact with rats, usually through field work. The same disease symptoms occur in humans as would be seen in a canine infection.

See the [CDC's page on human leptospirosis](#).

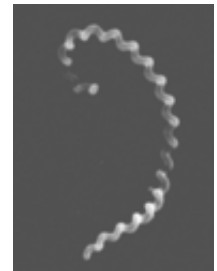
The species *Leptospira interrogans* has been classified into subtypes called **serovars**. Over 200 serovars have been named.

Testing

Blood testing to detect antibodies against *Leptospira interrogans* (microscopic agglutination testing, or MAT) can be performed. While a value of 1:800 or higher supports a positive diagnosis, confirmation is not made until a second antibody level **called a titer** is run between 2 and 4 weeks and shows a *four-fold increase*. Vaccination may interfere with testing since - obviously - the entire point of vaccination is to generate antibodies. **If the dog has been vaccinated in the last 3 months, testing will be difficult to interpret; however, a single titer of 1:800 or higher against a serovar for which there is no vaccine is considered a positive result.** The **PCR test**, which detects even small amounts of Leptospire DNA, would be an excellent test if vaccination has been recent but PCR testing is not available in most reference laboratories.

Urine may be submitted for what is called **darkfield microscopy**. In this test, a dark background may offset the paler leptospire organisms, rendering them visible. This sounds like a good way to make the diagnosis but the problems are:

1. The urine sample must be fresh and most animal hospitals do not have the capability to do dark



Leptospira interrogans is shaped like a question mark and is a type of bacterium called a spirochete.

field microscopy.

2. Leptospire are only shed in urine intermittently.

The kidney may be biopsied and specific tissue stains may be used to detect leptospire organisms. Obviously, this is an invasive procedure.

Treatment

Fortunately, *Leptospira interrogans* is sensitive to **penicillin**, a readily available antibiotic. After penicillin has been used to stop leptospire reproduction and limit bloodstream infection, **tetracycline derivatives (such as doxycycline)** are used to clear leptospire from the kidneys.

Intravenous fluids are crucial to support blood flow through the damaged kidneys so that recovery is possible. Any areas at home that have been contaminated with urine should be disinfected with an iodine-based product and gloves should be worn when cleaning any urine. Prognosis is guarded depending on the extent of organ damage.

Hemodialysis?



photo courtesy of the Animal Medical Center in New York City

In a recent study from the University of California at Davis (JAVMA, Vol 216, No3, p271-5), dogs judged as having mild to moderate increases in renal parameters received traditional fluid therapy and 82% survived. Dogs having moderate to severe elevations tended to receive **hemodialysis**. Prognosis was worse for the severely affected that did not receive hemodialysis, while 86% of those receiving hemodialysis survived. In short, dogs with the most severe renal toxin build up probably need referral to a critical care facility that supports hemodialysis.

So what Constitutes a Moderate to Severe Toxin Build up?

The parameters measured in the assessment of kidney function are called BUN (blood urea nitrogen - with normal levels around 25 mg/dl) and creatinine (normal levels less than 2.0 mg/dl). In the above study, the group termed mild to moderate had an initial BUN level ranging from 24 to 225 mg/dl and initial creatinine levels between 1.7 and 11.5 mg/dl. Again, 82% of these dogs survived with only traditional fluid therapy as can be performed in most veterinary practices. The moderate to severe group had initial BUN levels ranging from 97 to 365 mg/dl and initial creatinine levels ranging from 6.5-21.9 mg/dl.

Prevention

Vaccination Options

Vaccination against *Leptospira interrogans* is only available for the serovars called canicola, grippityphosa, pomona and icterohaemorrhagiae. (Some vaccines cover all four serovars while others cover only two out of four.) As a result of long-standing use of this vaccine, it is hard to assess how important it is to vaccinate against leptospirosis. As you might imagine, most recent outbreaks involve serovars for which vaccination does not exist.

Vaccination against at least two of the four serovars mentioned is commonly included in the basic distemper shot (DHLPP - the "L" stands for leptospirosis). The vaccine can be made up to omit the leptospirosis portion. Of all the sera in this basic vaccine, it seems to be the leptospirosis portion that has been associated with hives, facial swelling, and even life-threatening vaccination reactions much more than any of the other fractions. If there is any question of an animal having a vaccine reaction, leptospirosis vaccine is often left out of the mix. As technology has improved, however, vaccines made from leptospire grown in protein-free media have made vaccination reaction far less likely.

Vaccination will reduce the severity of disease but will not prevent infected dogs from becoming carriers.

Other important aspects of prevention include control of rodents in the pet's environment and removal of standing water.

For additional informational links on this condition, see www.vet.uga.edu/vpp/clerk/noel/index.php.

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