Leptospirosis
Vetspeak - December 1998, Linda Aronson, DVM

Leptospirosis is a disease whose incidence is definitely and rapidly on the rise, especially here in the northeast. It is of particular concern because the spirochete which causes the illness can be passed from dogs to humans (and vice versa) and to other mammals. There are seven species of Leptospira which carry more than 200 pathogenic serological varieties or serovars. The prevalence of pathogenic serovars, maintenance hosts and reservoirs of infection varies throughout the world. Each serovar has a different clinical, epidemiological, diagnostic and prognostic significance.

The agent implicated in the current epizootic is *Leptospira kirschneri serovar grippotyphosa*, although many cases manifest differently than those described in the literature. Historically, *L. interrogans serovars canicola* and *icterohaemorrhagiae* were associated with canine leptospirosis, but the incidence of infection with these diseases has declined, almost to the point of insignificance, probably because these are the serovars in the current canine leptospirosis vaccine. In the meantime, canine disease caused by *L. interrogans serovars pomona* (maintenance hosts pigs, cattle, skunks, opossums) and *bratislava* (pigs, horses), as well as *grippotyphosa* (raccoons, skunks, opossums and small rodents), has been increasing.

This means that the current vaccines do not protect dogs against the serovars which are now causing the disease, however, owners and their veterinarians may assume that their dogs are covered against all serovars and not consider this as a cause of disease signs. In addition, because the presentations now being seen are not text book for leptospirosis, again diagnoses may be missed.

Maintenance hosts are reservoirs for disease. They are usually chronically infected with and shedding the organism, but are without symptoms. Transmission is primarily through urine, although organisms can survive in animal tissues or free in the environment in surface waters, drains, mud or moist, alkaline soil. The pathogen enters through mucous membranes or abrasions of the skin, and then reproduces in epithelial cells particularly those lining the kidney tubules and blood vessels. There it causes cell death, inflammation and serious tissue injury. The specific manifestation of disease depends on the serovar and the host species. Most infections result in varying degrees of kidney failure, liver toxicity and/or inflammation,

inflammation of the blood vessels (vasculitis) and possibly muscle inflammation (myositis). In addition, uveitis (inflammation of the uvea of the eye), glossitis (inflammation of the tongue), meningitis, abortion and autoimmune diseases often develop. Some cases are chronic and may be subclinical but produce chronic interstitial nephritis (kidney) or chronic hepatitis (liver).

Due to cross reactivity it is sometimes not possible to identify the particular serovar causing disease. In the early, acute stage of the illness there may be little or no detectable antibody to the organism, and as this is what is measured, diagnosis may be missed at this stage. Some serovars may not be detected. It is usually possible to visualize the organism in urine or liver or kidney biopsy specimens. It is better to treat for leptospirosis if the clinical signs are consistent even if the initial antibody titer is negative, and then retest in the convalescent stage to confirm illness.

Classically, *L. kirschneri serovar grippotyphosa* causes severe acute kidney failure and sometimes moderate to highly elevated liver enzymes and bilirubin. The current leptospirosis cases are seen regardless of age and sex of the dog. Several days of lethargy, anorexia, vomiting and depression, and occasionally diarrhea are reported. The dogs show varying levels of fever, dehydration, icterus (yellowing of the mucous membranes) and abdominal pain. Blood work shows signs of acute kidney failure (as does urinalysis), elevation of liver enzymes and bilirubin, high blood phosphorous, with an increase in white blood cells and lack of platelets.

In the most severe cases, seizures, inability to urinate, disseminated intravascular coagulation (DIC - known to students as death is coming) and death can occur. In most cases liver involvement has been mild, but a smaller subgroup, possibly infected with a closely related serovar with different toxic properties, have also had severe liver disease. If diagnosed and treated early, prognosis is quite good. Provided precautions are taken when handling the dog, the risk of transmitting the disease to humans is quite low. Blood and urine testing, and saving frozen serum for titer comparison with samples taken 14-21 days after treatment has been initiated, should be done as soon as the disease is suspected. Ruling out Rocky Mountain spotted fever and ehrlichiosis by serology may be advisable. Other rule outs include: viral or toxic gastroenteritis; pancreatitis; hepatitis; obstructive liver disorders; and cancer. Acute kidney failure is also seen in Addison's disease, severe kidney (pyelonephritis) infections; ethylene glycol

(antifreeze) toxicity; or if there are obstructions (stones) in the urinary tract. Many vets recommend hospitalizing and isolating suspected cases. Intravenous fluids need to be administered at high doses, and the electrolyte and renal chemistries must be monitored along with urine output. Antibiotics not only reduce kidney and liver damage, but shorten the length of the illness and the period over which the dog sheds the organism in its urine. Procaine penicillin intramuscularly or subcutaneously is the drug of first choice. The dog can be switched to a form of oral penicillin once the elevated blood urea nitrogen has returned to normal. After a total of two weeks of penicillin the dog should be switched to doxycycline for another 6 to 8 weeks to eliminate the carrier state.

Blood and urine should only be handled if wearing rubber gloves. Dogs should be kept away from children and their play areas, and walked in confined areas which can be washed and disinfected with a bleach or iodine based solution. They should be kept away from ponds and other wet areas. Dogs can shed organisms in their urine for up to 3 months after infection. Symptoms in humans are flu-like and include fever, headache, chills, vomiting, jaundice and anemia. They may be mild or so severe that the person has to be hospitalized.

Once a dog has had leptospirosis he is usually immune to that serovar, but can be infected with any related or different serovar. The present vaccine has been associated with vaccinosis reactions, and appears to provide effective resistance to the serovars it combats for a limited period (less than one year). I do not recommend its use for Beardies. Be very careful about letting your Beardie play in puddles, ponds or other standing water, and try and keep him away from areas frequented by the wildlife maintenance hosts. As you will have noted, some farm animals can serve as asymptomatic hosts too, and there are other serovars associated with these species which dogs may get if they frequent farms.