A.C.E. VETERINARY HOSPITAL LLC
1078 RTE 82
Hopewell Junction, New York 12533
845-592-4463

**Client:** John Tengstrom
Po Box 143
Hopewell Junction, NY 12533
(845) 418-2603

**Patient:** Susi
DOB: 10/16/2018
Weight: 16 lbs.
Species: Canine
Breed: Norwegian Elkhound
Sex: M

| Reminders | Date Due |
|---|---|
| Rabies Vaccination | |
| Canine Distemper Vaccination | 01/08/2019* |
| Bordetella Vaccination | 01/25/2019* |
| Parvovirus Vaccination | 01/08/2019* |
| Lyme Vaccination | |
| Heartworm Test | |

# Take Home Instructions

## Surgery/Anesthesia

The following information pertains to your pet's anesthetic, surgical and/or other procedure.

## Why spay/neuter my pet?

We have an obligation as pet owners to provide the best care possible for our pets. Spaying or neutering Susi falls into this realm. Most pets can be altered at four to six months of age. Pets normally have a very easy surgery and recovery time when younger.

Advantages for females: no heat cycles, eliminate or at least significantly reduce the risk of breast cancer (very common in unspayed females), no pyometra (life-threatening uterine infections), no cystic ovaries, no false pregnancies and the hormone roller coaster associated with one, no emergency expensive c-sections.

Advantages for males: no benign prostatic hypertrophy (enlargement), lessened marking behavior (spraying or other urinary marking), decreased aggression and fighting, decreased wanderlust.

Animal shelters across the country are continually faced with having to euthanize animals due to overpopulation. You can help decrease this burden by having Susi spayed or neutered.

## Boarding

Boarding your pet with us is the best alternative for pet care while you are away from home. House/pet sitters are another excellent alternative but not always affordable and not always available when you need them.

# Leptospirosis

# Basics

## OVERVIEW

- "Leptospirosis" is caused by disease-causing members of the bacterial genus *Leptospira*
- Sudden (acute) and long-term (chronic) diseases of dogs (mainly inflammation of the kidney [known as "nephritis"] and inflammation of the liver [known as "hepatitis"]) and other animals, including cats, although rarely
- Dogs-serovars causing disease vary by geographic region, recent serovars of concern in the United States include *Leptospira grippotyphosa*, *Leptospira autumnalis*, and *Leptospira pomona*; "serovars" are subdivisions of a species that are different from other strains
- Dogs-ideally vaccines should include representative serovars found in the geographic region where the dog lives

## SIGNALMENT/DESCRIPTION OF PET

**Species**

- Dogs
- Rarely cats

**Mean Age and Range**

- Young dogs-more likely to exhibit severe disease
- Old dogs with adequate protection from vaccinations-seldom exhibit clinical disease, unless exposed to a serovar not in the vaccine

**Predominant Sex**

- Traditionally, male dogs more commonly affected; disputed by recent reports

## SIGNS/OBSERVED CHANGES IN THE PET

- Vary with age and immune status of the pet, environmental factors that affect *Leptospira* survival, and disease-causing nature of the infecting serovar
- May have no clinical signs

**Very Sudden (Peracute) Disease to Disease with Signs over a Moderate Amount of Time (Known as "Subacute Disease")**

- Fever
- Sore muscles
- Stiffness
- Shivering
- Weakness
- Lack of appetite (known as "anorexia")
- Depression
- Vomiting
- Rapid dehydration
- Diarrhea-with or without blood

- Yellowish discoloration to the gums and other tissues of the body (known as "jaundice" or "icterus")
- Spontaneous cough
- Difficulty breathing (known as "dyspnea")
- Increased thirst (known as "polydipsia") and increased urination (known as "polyuria") progressing to production of no urine (known as "anuria")
- Bloody vaginal discharge
- Death-without clinical signs

**Very Sudden (Peracute) to Sudden (Acute) Disease**

- Rapid breathing (known as "tachypnea")
- Rapid, irregular pulse
- Poor blood flow in the capillaries (smallest blood vessels; condition known as "poor capillary perfusion")
- Vomiting blood (known as "hematemesis")
- Passage of blood in the bowel movement or stool (known as "hematochezia")
- Black tarry stools, due to the presence of digested blood (known as "melena")
- Bleeding in the nose and nasal passages (known as "epistaxis" or a "nosebleed")
- Widespread small, pinpoint areas of bleeding (known as "petechia"); bruises or purplish patches under the skin, due to bleeding (known as "ecchymoses")
- Reluctance to move, overly sensitive to pain or touch (known as "hyperesthesia") along the spine, stiff gait
- Inflammation of the moist tissues of the eyes (known as "conjunctivitis")
- Inflammation of the nose (known as "rhinitis")
- Blood in the urine (known as "hematuria")
- Mildly enlarged lymph nodes (known as "lymphadenopathy")

**Long-Term (Chronic) Disease**

- May have no apparent illness
- Fever of unknown origin
- Increased thirst (polydipsia) and increased urination (polyuria)-long-term (chronic) kidney failure

## CAUSES

- Dogs-*Leptospira canicola*, *Leptospira icterohaemorrhagiae*, *Leptospira pomona*, *Leptospira grippotyphosa*, *Leptospira copenhagenii*, *Leptospira australis*, *Leptospira autumnalis*, *Leptospira ballum*, and *Leptospira bataviae*
- Cats-*Leptospira canicola*, *Leptospira grippotyphosa*, *Leptospira pomona*, and *Leptospira bataviae*

## RISK FACTORS

**Transmission**

- Direct-host-to-host contact via infected urine, postabortion discharge, infected fetus/ discharge, and sexual contact (semen)
- Indirect-exposure (via urine) to a contaminated environment (such as vegetation, soil, food, water, bedding) under conditions in which *Leptospira* can survive
- Disease agent-*Leptospira* serovar, each with its own disease-causing factors, infectious dose, and route of exposure

- Leptospirosis in companion animals often is the result of spillover from disease occurring in wildlife (many different types of mammals) in the area; wildlife may act as "hosts" and maintain the different serovars

**Host Factors**

- Vaccine-protection is serovar-specific; prevents clinical disease as a result of specific serovar; may not prevent kidney colonization of *Leptospira* and subsequent shedding of the bacteria in the urine; serovars not included in the vaccine may infect and cause disease in vaccinated pet
- Outdoor pets or hunting dogs-exposure of moist tissues of the body (mucous membranes) to water; exposure of abraded or water-softened skin increases risk of infection

**Environmental Factors**

- Warm and moist environment; wet season (high rainfall areas) of temperate regions; low-lying areas (marshy, muddy, irrigated); warm humid climates of tropical and subtropical regions
- Environmental temperature range-7-10$dg$C (44.6-50$dg$F) to 34-36$dg$C (93-96$dg$F)
- Water-organism survives better in stagnant than in flowing water; neutral or slightly alkaline pH
- Organism survives 180 days in wet soil and longer in standing water
- Dense animal population-kennels and urban settings; increases chances of urine exposure
- Exposure to rodents and other wildlife

# Treatment

## HEALTH CARE

- Sudden (acute) severe disease-inpatient; extent of supportive therapy depends on severity of disease; kidney failure requires closely monitored, medically induced increased production of urine (known as "diuresis")
- Dehydration and shock-intravenous fluids (such as lactated Ringer's solution)
- Severe bleeding-blood transfusion may be needed in association with treatment for the blood-clotting disorder, known as "disseminated intravascular coagulopathy" or DIC
- Production of only small amounts of urine (known as "oliguria") or no urine (known as "anuria")-initially rehydrate; then give medications to increase production of urine (known as "diuretics"); peritoneal dialysis (a type of dialysis in which fluids are put into the abdomen and the lining of the abdomen [known as the "peritoneum"] acts as a filter to remove waste products from the blood; after a certain amount of time, the fluids and waste products are removed from the abdomen) may be necessary

## ACTIVITY

- Suddenly (acutely) ill pets and pets with the presence of bacteria in their blood (known as "bacteremia") or generalized disease caused by the spread of bacteria in the blood (known as "septicemia" or "blood poisoning")-restricted activity; cage rest; monitoring; and warmth

## DIET

- Severely ill pets-often have lack of appetite (anorexia); provide nutrition through intravenous feeding for prolonged anorexia

# Medications

Medications presented in this section are intended to provide general information about possible treatment. The

treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

- Procaine penicillin G-an antibiotic; administer until kidney function returns to normal
- Dihydrostreptomycin-an antibiotic; administer for 2 weeks to eliminate organism from kidney tissues; try streptomycin if no kidney failure (drug not available everywhere)
- Doxycycline-an antibiotic; administer for 2 weeks; use alone to clear *Leptospira* from the blood and urine
- Ampicillin or amoxicillin-antibiotics; may be used instead of penicillin; administer for 2 weeks
- Erythromycin-an antibiotic

# Follow-Up Care

## PATIENT MONITORING

- Monitor bloodwork and urinalysis for kidney function and monitor bloodwork for liver function and electrolytes
- Monitor bloodwork (blood urea nitrogen [BUN] and serum creatinine) and urine specific gravity in dogs with kidney failure for indication of prognosis

## PREVENTIONS AND AVOIDANCE

- Vaccine (dogs)-whole-cell bacterin vaccines contain the serovars *Leptospira canicola* and *Leptospira icterohaemorrhagiae* (some also now include *Leptospira pomona* and *Leptospira grippotyphosa*); promotes immunity to these serovars and protection from overt clinical disease; serovar specific; does not promote protection against other serovars present in nature; may not prevent colonization of the kidneys of *Leptospira*, resulting in a long-term (chronic) carrier state; a "carrier state" is one in which the animal has no signs of disease, but harbors *Leptospira* and can transmit it to other animals
- Newer subunit vaccine contains the serovars *Leptospira pomona*, *Leptospira icterohaemorrhagiae*, *Leptospira grippotyphosa*, and *Leptospira canicola*; claims are made that the vaccine provides protection from clinical disease and prevents kidney colonization of *Leptospira*
- Vaccines-vaccinate dogs per current label recommendations; bacteria-induced immunity lasts only 6-8 months and is serovar specific (no cross-protection outside of the serogroup); revaccination at least yearly; vaccinate dogs at risk (such as dogs that hunt, show dogs, and dogs with access to water/ponds) every 4-6 months, especially in areas where *Leptospira* is found (known as "endemic areas"); the veterinarian will assess the risk of exposure and will recommend a vaccination protocol for your pet
- Kennels-strict sanitation to avoid contact with infected urine; control rodents; monitor and remove carrier dogs until treated; isolate affected dogs during treatment; "carrier dogs" are infected, but have no signs of disease-they harbor *Leptospira* and can transmit it to other animals
- Activity-limit access to marshy/muddy areas, ponds, low-lying areas with stagnant surface water, heavily irrigated pastures, and access to wildlife

## POSSIBLE COMPLICATIONS

- Blood-clotting disorder (disseminated intravascular coagulopathy)
- Liver and/or kidney dysfunction may be permanent
- Inflammation of the iris and other areas in the front part of the eye (known as "uveitis")
- Abortion

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### EXPECTED COURSE AND PROGNOSIS

- Most infections are subclinical or long-term (chronic); a "subclinical infection" is one in which the animal is infected, but has no signs of disease
- Prognosis guarded for sudden (acute) severe disease

## Key Points

- Leptospirosis has zoonotic potential from contaminated urine of affected dogs and their environment; "zoonotic diseases" can be passed from animals to people

## Educational Information

The information provided below will hopefully help to explain the findings from your pet's visit. Please let us know if we can provide you more answers and/or information.

### Bordetella

Bordetella (kennel cough), or infectious tracheobronchitis, is an infection of the trachea and large ai passages of the lungs. The bordetella bacteria is the cause of the disease and it spreads easily an rapidly from one dog to another. Although Susi seems to be alert, you will notice the sudden onset a harsh, deep cough, followed by gagging. A true kennel cough infection is like a cold in people, being that it will run its course. Recovery can be faster through medication, which may be necessar for several weeks. Proper vaccination has reduced the incidence of this condition.

# Lyme Disease
# (Lyme Borreliosis)

## Basics

### OVERVIEW

- One of the most common tick-transmitted diseases in the world
- Caused by spirochete species of the *Borrelia burgdorferi* group (such as *B. burgdorferi, B. afzelii, B. garinii*)
- Dominant clinical feature (dogs)-recurrent lameness due to inflammation of the joints (known as "arthritis"); sometimes lack of appetite (known as "anorexia") and depression; may develop kidney and rarely heart or nervous system disease

- Reported in people, dogs, horses, and occasionally in cats
- Also known as "Lyme borreliosis" or "borreliosis"

## GENETICS

- Certain dog breeds (such as the Bernese mountain dog) are reported to develop severe kidney failure following infection with *Borrelia*

## SIGNALMENT/DESCRIPTION OF PET

**Species**

- Dogs and rarely cats

**Breed Predilections**

- Kidney disease: Bernese Mountain dogs in Europe

**Mean Age and Range**

- Experimentally, young dogs (puppies) appear to be more susceptible to disease than do adult dogs

## SIGNS/OBSERVED CHANGES IN THE PET

- Recurrent lameness due to inflammation of the joints (arthritis)
- In studies, sudden (acute) form lasts for only 3-4 days; recurs days to weeks later in the same or in other legs (known as "shifting-leg lameness," characterized by lameness in one leg, then that leg appears to be normal and another leg is involved); one or more joints may be swollen and warm; a pain response is elicited by feeling the joint; responds well to antibiotic treatment
- Affected dogs may refuse to walk or stand or may walk stiffly, with an arched back, and be sensitive to touch
- Long-term (chronic) inflammation of several joints, in which the bones around the joints are not destroyed (known as "non-erosive polyarthritis") is found in pets with prolonged infection without adequate treatment; may persist despite antibiotic therapy
- Fever, lack of appetite (anorexia) and depression may accompany inflammation of the joints (arthritis)
- Superficial lymph nodes close to the site of the infecting tick bite may be swollen
- Kidneys-reported glomerulonephritis with immune-complex deposition in the glomeruli leading to fatal kidney disease; "glomerulonephritis" is inflammation and accompanying dysfunction of glomeruli (plural of glomerulus) of the kidney; each kidney is composed of thousands of nephrons (the functional units of the kidney, each consisting of the glomerulus [a tuft of blood capillaries-the "blood filter"] and a series of tubes and ducts, through which the filtered fluid flows, as urine is produced); inflammation most commonly is due to the presence of immune complexes in the glomerulus
- Kidneys-loss of protein through the kidneys (condition known as "protein-losing nephropathy") with resulting low levels of albumin (the type of protein lost through the kidneys) in the blood (condition known as "hypoalbuminemia")
- Kidney failure (signs include vomiting; diarrhea; lack of appetite [anorexia]; weight loss; increased urination [known as "polyuria"] and increased thirst [known as "polydipsia"]; fluid buildup in the tissues, especially the legs and under the skin [known as "peripheral edema"] or fluid buildup in the abdomen [known as "ascites"])
- Heart abnormalities-reported, but rare; include complete heart block
- Nervous system complications-rare

### CAUSES

- *Borrelia burgdorferi*-transmitted by slow-feeding, hard-shelled tick species of the genus *Ixodes* (such as *Ixodes scapularis* [the deer tick], *Ixodes pacificus*, *Ixodes ricinus*, *Ixodes persulcatus*)
- Infection-only after a tick (nymph or adult female) carrying *Borrelia* has been attached to the host for at least 18 hours

### RISK FACTORS

- Roaming in tick-infested environment, where Lyme borreliosis is common (known as an "endemic area")

## Treatment

### HEALTH CARE

- Outpatient
- Keep pet warm and dry

### ACTIVITY

- Reduced activity advisable until clinical signs improve

### DIET

- No change needed

### SURGERY

- Tapping the joint and removing joint fluid (known as "aspiration of synovial fluid") may be considered for diagnostic purposes

## Medications

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

- Most commonly used antibiotics-doxycycline, amoxicillin, or azithromycin
- Doxycycline-preferred in pets that have both *Borrelia* and *Anaplasma phagocytophilum* infections at the same time (*Anaplasma* is another tick-borne agent that causes disease)
- Antibiotics do not eliminate the infection; consequently, persistent infection with a very low bacterial burden remains; treatment significantly improves clinical signs and disease
- Recommended treatment period-4 weeks
- Steroids-initially may cause signs to improve; may cover up or mask effects of antibiotics for diagnostic purposes; may increase clinical signs later by decreasing the ability of the pet to develop a normal immune response (known as "immunosuppression")
- Nonsteroidal pain medications-use judiciously to avoid covering up or masking signs; use only as directed by your pet's veterinarian

## Follow-Up Care

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## PATIENT MONITORING

- Improvement in sudden (acute) inflammation of the joints caused by *Borrelia* (known as "Lyme arthritis") should be seen within 2-5 days of antibiotic treatment
- If no improvement within 2-5 days or is signs worsen, consider a different diagnosis

## PREVENTIONS AND AVOIDANCE

- Mechanical removal of ticks-groom pets daily; discuss appropriate technique for removing ticks from your pet with the veterinarian
- Prevention of tick attachment-products to kill ticks (known as "acaricides") and tick repellents are available commercially as spot-on topical products, sprays or collars; any such product should be used only according to label directions (*do not use permethrin on cats*)
- Vaccines-are available commercially for dogs; talk to your pet's veterinarian about the vaccine and vaccination protocols
- Tick population control in the environment-restricted to small areas; limited success by reducing deer and/or rodent population

## POSSIBLE COMPLICATIONS

- Fatal kidney failure
- Heart block
- Central nervous system disorders

## EXPECTED COURSE AND PROGNOSIS

- Recovery from sudden (acute) lameness expected 2-5 days after initiation of antibiotic treatment
- Disease may be recurrent with intervals of weeks to months; responds again to antibiotic treatment

# Key Points

- Treatment of Lyme disease requires regular administration of antibiotics as prescribed by your pet's veterinarian
- Prevent tick attachment-products to kill ticks (acaricides) and tick repellents are available commercially; any such product should be used only according to label directions (*do not use permethrin on cats*)
- Diagnosis of Lyme disease (Lyme borreliosis) in a pet increases the risk to people living in the same area, as the people may be infected with *Borrelia* if they come into contact with ticks in the environment; they too should prevent tick attachment to themselves and should inform their personal physician of the pet's diagnosis if they become ill

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