



## Overview of Therapy Options and Pre-Treatment Evaluation for Hyperthyroid Cats

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Hyperthyroidism is one of the most common endocrine diseases in the cat. It is almost always caused by a hypersecreting, functional, benign thyroid adenoma. This disease causes a variety of metabolic disturbances that can have severe consequences on several organ systems, particularly the renal and cardiac. Without treatment, hyperthyroidism can induce progressive, debilitating changes in cats with consequent loss of quality of life, sickness, and organ failure possibly leading to death. Fortunately, several treatments exist for this disease and hyperthyroidism can often be easily controlled or eliminated entirely.

Of the available treatments, medical therapy with methimazole, surgical extirpation of thyroid nodules, and radioiodine therapy are the three most common. There are benefits and drawbacks associated with each treatment but of the three, radioiodine, where available, is considered the most effective with the fewest side effects.

Methimazole, while effective at controlling the symptoms of hyperthyroidism, does not address the underlying disease itself. The drug blocks the synthesis of thyroid hormone but it does not prevent growth of the thyroid adenoma. Increasing doses of methimazole are often necessary over time to keep pace with the output of the nodule and serial serum T<sub>4</sub> evaluations are necessary to ensure proper dosing. Advantages of methimazole therapy include low cost and ease of administration and disadvantages include intolerance by some cats (15-20% develop anorexia, vomiting, and/or lethargy), possible hepatotoxicity, and hematologic abnormalities (particularly leucopenia and thrombocytopenia).

Surgical removal of thyroid nodules is a straightforward procedure but it can be associated with certain local complications or incomplete removal of disease. As many as 60-75% of cats have bilateral disease and require a complete thyroidectomy to effect a cure. These cats are at risk for hypoparathyroidism due to inadvertent parathyroidectomy. Furthermore, they may need lifelong thyroid hormone supplementation if the thyroid is completely removed. Other complications (Horner's syndrome, damage to the recurrent laryngeal nerve, intraoperative death) are far less common but have been reported. Lastly, ectopic disease may go undetected, especially without previous scintigraphy, and surgery may not be able to address the entirety of the disease.

In contrast to the above-mentioned treatments, radioiodine is an effective means of treating hypersecreting thyroid tissue, regardless of where it may be in the body, with a high degree of safety. Radioiodine (I-131 or <sup>131</sup>I) has been demonstrated to be >90% effective in creating a euthyroid state with a single treatment. Fewer than 5% of treated cats require a second treatment to eliminate hyperthyroidism. A similar number of cats actually become permanently hypothyroid after a single treatment of I-131, and these patients must be managed with thyroid hormone supplementation. The disadvantages of radioiodine therapy are cost (compared to methimazole treatment) and the need to keep the patient in-hospital for several days (usually around 4-5 days) until the level of radioactivity has dropped to acceptable levels. Given the effectiveness of this treatment and low chance of complications, these problems are considered acceptable by most owners.

While radioiodine is a technically simple treatment to administer, the patient's overall health status must be evaluated first to make certain the therapy is appropriate. Because the hyperthyroid state alters the patient's metabolism so greatly, the sudden drop in thyroid hormone caused by radioiodine can lead to major and life-threatening complications if the patient is not properly prepared beforehand. In particular, the effects on the kidneys (increased GFR, hypertension) can mask underlying renal failure that suddenly appears as a clinical problem once the excess thyroid hormone is eliminated. Thyroid hormone also affects the heart (positive inotropic influence, direct action on the

myocardium inducing hypertrophy) and many cats can be teetering on the edge of cardiac failure. Given these potential problems (among others), certain screening tests should be performed prior to therapy.

There are many opinions as to which screening tests are necessary and the goals of these tests should be to determine the overall health status as it relates to thyroid disease and the potential benefits/risks of radioiodine. At VSH, we recommend the following work-up prior to radioiodine therapy:

- 1     **CBC/serum chemistry/UAT<sub>4</sub>:** The standard “minimum database” to evaluate for blood and metabolic derangements. Renal function, of course, can be easily evaluated with these simple lab tests.
- 2     **Thoracic radiographs:** If cardiomegaly is detected and the patient has a murmur, an echocardiogram is recommended. The films can also be useful in screening for other disease (e.g., metastases from a thyroid adenocarcinoma or other tumor)
- 3     **Blood pressure measurement**
- 4     **Thyroid pertechnetate scintigraphy:** This is useful to evaluate for ectopic disease, to locate the thyroid tumor if no nodule is palpable on physical exam, and to identify thyroid adenocarcinomas
- 5     **Methimazole trial:** Any patient who has not been given methimazole should be treated for approximately 14 days to see if any laboratory abnormalities appear once the thyroid hormone is suppressed. If the

patient's values are good while on methimazole, it is unlikely that radioiodine will unmask further problems.

Once these tests have been performed, the patient's health status and fitness for radioiodine are usually clear. In some instances, further investigation (i.e., thyroid panel or T3 suppression testing) is necessary. In some instances, the screening reveals a patient who has kidney or cardiac disease that will pose a problem if treatment is performed. This does not automatically exclude these patients from treatment – the effects of hyperthyroidism are often worse than the potential complications of therapy – but they must be carefully managed and cared for afterwards.

# **Clinical Study of Improved Management of Advanced Kidney Disease in Dogs Using an Intestinal-based Probiotic**

A study conducted under the auspices of the Department of Veterinary Clinical Sciences of the University of Minnesota College of Veterinary Medicine and the University Of California Davis, School of Veterinary Medicine

**Campus of the University of California Veterinary Medical Center-San Diego (UCVMC-SD) at the Veterinary Specialty Hospital of San Diego (VSH)**

You are invited to participate in a study evaluating the use of an intestinal-based probiotic for management of advanced chronic kidney disease in dogs. This is a double-blinded, randomized controlled clinical trial designed to last one year. To be eligible for the study, the patient should meet the following...

## **Inclusion Criteria:**

- Greater than one year of age
- Confirmed diagnosis of chronic kidney disease
- Serum creatinine concentrations between 4.0 and 8.0mg/dl
- Body condition score of 3/9 or greater
- Dog not in overt uremic crisis
- Owner willing to consider placement of esophagostomy tube (feeding tube)
- Dog does not concurrently have; diabetes mellitus, Cushing's disease, Neoplasia, and is not receiving chronic corticosteroid therapy.

**Purpose:** Chronic kidney disease (CKD) is an important cause of morbidity and mortality in middle-aged and older dogs. It is generally regarded as a progressive disease culminating in uremia and death. Oral sorbents and selected probiotics may provide a viable means of managing uremia in dogs with advanced CKD. Sorbents and selected probiotics trap uremic wastes in the intestines and allow them to be removed in the feces. **The purpose of this study is to determine if daily administration of an intestinal-based probiotic reduces signs of kidney disease and forestalls the onset of uremic signs.**

**Procedures:** Each dog enrolled will be randomly assigned to one of the two treatment groups. All dogs enrolled in this study will receive the most current recommended treatment plan for CKD. The only difference between the two groups will be that one group of dogs will get the sorbent, while the other group of dogs will get a placebo. This study will be double-blinded. All dogs must have a feeding tube placed to permit administration of food, water, and treatments during the study. Exceptions may be made if the patient is maintaining an adequate body weight and will readily accept medications. The study will continue for one year after enrollment. Physical examinations, blood

pressure and blood and urine collections will be performed at 1, 2, 4, and 8 weeks and 3, 5, 7, 9 and 12 months after starting the treatment. Three times during the study, at the beginning, 3 months and at the end of the study, a 24 hour hospital stay will be required for urine collection.

**Client Compensation:**

The study will cover the costs related to performing the study beginning at week one and excluding the costs associated with placement of a feeding tube. This includes routine examinations, blood pressure measurements, blood and urine samples as scheduled. In addition, we will provide the probiotic or placebo used during the study and supply a commercial renal failure diet. We will not cover the costs of any additional diagnostic tests or treatments that may be required. We will make treatment recommendations based on our opinion of the best treatments for the patient, however, the owner may decide to accept or reject any diagnostic or treatment recommendations. The study will not cover costs related to development of signs of uremia or kidney disease beyond the tests and treatment provided by the study protocol and specifically identified above. There are no cash incentives provided for participation in this study.

**Potential Benefits:** We hope that your patient's participation in this study will improve the quality of life of dogs affected with CKD and provide valuable new information. **WE DO NOT AND CANNOT GUARANTEE THAT YOUR PATIENT WILL RECEIVE ANY BENEFIT FROM THE INTESTINAL-BASED PROBIOTIC OR FROM HIS/HER PARTICIPATION IN THIS STUDY.**

If you have questions about the study, or have a patient that may be a potential candidate, please do not hesitate to contact us.

Sincerely,

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## **Renal transplantation: when nine lives just aren't enough**

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**Associate Clinical Professor of Nephrology**

Chronic kidney disease (CKD) can develop in dogs and cats for many different reasons, but often is diagnosed in the absence of any identifiable initiating factor. Once advanced to a certain point, CKD is relentlessly progressive, with eventual polysystemic consequences such as weight loss, anemia, hypertension, gastrointestinal bleeding, nausea/vomiting, and decreased energy.

Medical manipulations such as phosphorus restriction, dietary modification, control of hypertension, erythropoietic injections and fluid therapy all are supportive measures designed to mitigate uremic clinical signs/consequences, slow progression of CKD, or both. When medical strategies fail to adequately control the sequelae of CKD, renal replacement therapies (e.g., hemodialysis, renal allografting) may be required to maintain good quality of life for a pet.

Hemodialysis (HD) can be applied chronically in both dogs and cats, but long-term HD is usually financially prohibitive and often fraught with complications. Renal allografting (transplanting a kidney from one animal to another of the same species) is a viable and potentially life-prolonging renal replacement option. Transplants have been successfully performed in both dogs and cats, though the bulk of clinical expertise in veterinary kidney transplantation has been generated in cats.

There are few veterinary transplantation centers in the country, and only two with the current capability to also perform hemodialysis (UC Davis and the University of Pennsylvania). Over the last few years we have fielded significant client and veterinarian interest in developing the capacity to perform kidney transplants in southern California. Hemodialysis and renal transplantation are sister specialties in a way – the services are mutually supportive and the presence of each expands the utility of the other. Because of these factors, we are pleased to announce the first steps towards creation of a renal transplantation program as a joint venture of the UCVMC-SD and VSH.

Success of renal transplantation is dependent on many different factors, including patient (and client) selection, thorough pre-transplant evaluation and preparation, a skilled and specifically trained surgical team, rigorous perioperative and operative medical management, and meticulous ongoing follow-up. Deficiency in any of these areas may spell failure of the entire process - we are committed to designing and implementing this program carefully and well.

Full development of a renal transplantation program will likely require several months at least to get underway; we are just laying the foundations to amass funding for startup and to begin building the program from the ground up, utilizing the full range of veterinary transplantation experience available to us.

Stay tuned!

These are just preliminary donor/recipient qualifications. We may amend these guidelines as the program evolves.

### **Donor selection criteria**

- 1) Age ideally  $\geq 1$  and  $\leq 6$  years
- 2) Normal organ system function as determined by CBC, chemistry panel, urinalysis, UPC, and urine culture
- 3) Negative testing for: FeLV/FIV, toxoplasmosis, mycoplasma haemofelis
- 4) Normal and symmetrical renal function as assessed by nuclear scintigraphy
- 5) Absence of radiographic evidence of urinary stone disease
- 6) Initial compatible crossmatch with recipient
- 7) Second compatible crossmatch with recipient performed the day of surgery

### **Recipient selection criteria**

- 1) Chronic kidney disease, usually IRIS Stage III-IV
- 2) No documented urinary tract infection, or negative cultures + a cyclosporine challenge
- 3) No significant cardiac disease (a heart murmur is not necessarily disqualifying)
- 4) Normotension (or controlled hypertension)
- 5) Screening for infectious diseases (FeLV/FIV, toxoplasmosis, mycoplasma hemofelis)
- 6) Blood Type A (or owner location of a Type B kidney  $\pm$  blood donor)
- 7) Thorough owner education regarding financial commitment, general transplant statistics, pet-specific risk factors, expectations for procedure, client responsibilities for follow-up.

### **Contraindications to transplantation (will likely not transplant)**

- 1) Active infection (including ocular herpesviral infection), especially urinary tract infection
- 2) Diabetes mellitus
- 3) Significant liver disease
- 4) Most cancers
- 5) Fractious temperament of pet precludes reliable, lifelong, twice-daily medication
- 6) Owner schedule precludes reliable, lifelong, twice-daily medication
- 7) Pet temperament or owner scheduling precludes regular cyclosporine level monitoring

### **Relative contraindications (may still transplant with owner acceptance of increased risks)**

- 1) Inflammatory bowel disease
- 2) Severe protein-losing nephropathy (especially amyloidosis)
- 3) Oxalate stone disease
- 4) Significant disease of other organ system
- 5) Blood type B
- 6) Immunocompromised human in recipient's household



# Septic Peritonitis

By

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## Introduction

Peritonitis is inflammation of the peritoneum. Peritonitis can be categorized as primary or secondary; acute or chronic; localized or generalized; and aseptic or septic. These groupings are not mutually exclusive. However, for the purposes of this lecture we will be considering the general category of septic peritonitis.

The term septic peritonitis implies polymicrobial bacterial peritonitis with an underlying cause.

Potential sources for septic peritonitis include:

- Gastrointestinal Tract
  - Penetrating foreign bodies
  - Ulceration
  - Trauma
  - Neoplasia
  - Gastric Dilatation-Volvulus
  - Endoscopy
  - Gastrostomy or jejunostomy leakage
  
- Pancreas – ruptured abscess
  
- Urogenital tract
  - Pyometra with rupture
  - Uroabdomen with concurrent urinary tract infection

- Renal abscess
- Uterine Rupture secondary to dystocia
- Prostatic abscess
- Hepatobiliary system
  - Gall bladder rupture with concurrent cholecystitis
  - Hepatic abscess or torsion

The most common type of peritonitis observed clinically is generalized septic peritonitis secondary to disruption of the gastrointestinal tract, often after gastrointestinal surgery. In one study, this accounted for 60% of dogs with generalized peritonitis.

### Clinical presentation

The presentation of a patient with septic peritonitis is highly variable ranging from an alert patient that isn't quite acting normally at home, to a patient who is in septic shock with multiple organ failure. Accordingly, presenting signs can include:

- Lethargy
- Dehydration
- Vomiting
- Inappetence
- Abdominal pain – often present, but not always
  - Prayer position
- Abdominal effusion
- Ileus – lack of GI sounds
- SIRS/Septic Shock (hyperdynamic or hypovolemic)
  - Fever – not consistent. Temperature may actually be increased, decreased, or normal.
  - Tachycardic or bradycardic
  - Tachypnea
  - Brick red vs pale mucous membranes and prolonged CRT

Variability in clinical presentation can be related to:

- Source of infection
- Chronicity
- Quantity and type of pathogens involved

- Virulence of pathogens
- Immunocompetence of the host
- Other underlying disease processes

## Diagnosis

- CBC: Elevated WBC count with bands – best individual criterion for diagnosis of sepsis (sensitivity 87%, Specificity 69%) according to one study.
- Chemistry: hypoalbuminemia, hypoglycemia, mild hyperbilirubinemia may be present in septic patients.
- Radiographs – decreased serosal detail, free peritoneal gas, ileus.
- Contrast studies – Do not use barium. Use only water soluble contrast agents.
- Ultrasound – Can detect a small amount of abdominal fluid. Can be useful to obtain abdominal fluid sample.
- CT scan – less commonly utilized imaging modality in veterinary medicine.
- Abdominocentesis – most useful diagnostic test.
  - Abdominocentesis is easy to perform and requires no special equipment.
  - Needle vs. catheter
  - Four quadrant taps – increased diagnostic yield
  - Diagnostic peritoneal lavage – infusion of warmed sterile saline, 20 mls/kg
  - It can be difficult to evaluate abdominal fluid from a post-operative patient. Expected cytology after surgery consists of non-degenerate neutrophils. Identification of toxic neutrophils with bacteria or plant material is indication for surgical exploration.
  - Blood glucose-to-peritoneal glucose difference  $>20$  mg/dl = 100% sensitive and 100% specific for septic peritoneal effusion in dogs
  - Culture of peritoneal fluid – Definitive diagnosis. Unfortunately not much help in the acute clinical setting.

## Treatment

Septic peritonitis cases can require very intensive management.

- Fluid therapy/supportive care– Careful monitoring of “in’s and outs” – multiple weights, blood pressure, urine output, urine specific gravity, CVP’s.

- These patients can have very high fluid requirements – 10-12 mls/kg/h
  - Colloids often required
- Culture – obtain a sample before antibiotic therapy to determine bacteria present and appropriate antibiotic therapy
  - Intrapertitoneal antibiotics have NOT been demonstrated to be beneficial, and can potentially cause chemical peritonitis.
  - No consensus on initial antibiotic treatment: Until culture results are available, antibiotic regimen should be effective against aerobic (Gram positive and negative) and anaerobic intestinal flora. Aminoglycosides are often recommended, but concern of nephrotoxicity. Baytril, amoxicillin, metronidazole combo is often recommended. 3<sup>rd</sup> gen. cephalosporins + metronidazole or meropenem/imipenem is effective, although use should be limited in veterinary medicine to decrease emergence of resistant bacteria.
- Address the underlying cause – most often involves abdominal exploration
  - Primary repair or correction of source of sepsis
  - Abdominal lavage to decrease bacterial contamination – additives such as chlorhexidine, iodine, etc. are controversial.
  - Nutritional support – esophagostomy, gastrostomy, jejunostomy
  - Suture selection – avoid non-absorbable, braided suture.
  - Risk factors for leakage following intestinal anastomosis
    - Pre-existing peritonitis, GI foreign body, albumin < 2.5 g/dl
  - Serosal patching, omentalization
  - Primary closure vs. open abdomen vs. Closed suction drains
    - Retrospective study of 42 cases comparing open peritoneal drainage with primary closure: Overall survival rate of 71%, no significant difference between groups.
    - Closed suction drain – no decrease in total solids during initial 48 hours, and all drains remained patent
    - No study comparing closed suction drains to other treatment strategies
- Aggressive pain management is essential
  - These patients are extremely painful and require aggressive pain management
    - Epidural catheter
- Consider physiologic steroids
  - Relative hypoadrenocorticism

- Prognosis – Huge variation in the literature – there is a general trend toward a decrease in morbidity in recent studies, most likely due to aggressive monitoring/treatment of critically ill patients.
- Potential future therapy
  - Fluconazole – development of organ failure and mortality in septic shock decreased with IV fluconazole.
  - PI<sub>3</sub> kinase activators
    - Insulin in animal models of endotoxemia (very preliminary).

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## What's New with Total Joint Arthroplasty

Joshua Jackson, DVM, DACVS

### **Hips:**

#### **Micro system:**

Total hip replacement has been used clinically in dogs for more than 30 years, resulting in pain free hip joint function for our patients. To date, available implants have limited total hip replacement to medium, large and giant breed dogs. Recently, a micro total hip implant has become commercially available, allowing total hip replacement in virtually any size dog or cat. Within the new system modular components are similar to that which is available for larger dogs and both the femoral and acetabular components are cemented in place.

Indications for total hip replacement include aseptic necrosis of the femoral head, chronic arthritis and hip luxations that failed traditional repair techniques. Prior to the availability of the micro total hip implants, the only treatment available for these indications has been femoral head and neck excision. The goal of total hip replacement is to return the joint to biomechanically normal, pain free function. Benefits of total hip replacement over femoral head and neck excision include a shorter recovery and faster return to full function. In our experience dogs given the opportunity to undergo a total hip replacement experience a better overall quality of life, an observation that is the basis for our advocacy of total hip replacement as the recommended route of therapy. If financial considerations play a role in the treatment decision, femoral head and neck excisions will continue to be an alternative procedure, however owners should be aware that function and recovery is inferior. Total hip replacement in small dogs is still in its infancy but we are very encouraged by the initial results. To confirm our strong belief in total hip replacement in small dogs we will be enrolling the next 25 dogs into a clinical study to compare micro total hip replacement with femoral head and neck excision, the results of which we will be happy to share with you. If you know of a small dog that may benefit from this procedure please contact one of the surgeons at Veterinary Specialty Hospital with any questions.

#### **Cementless progress:**

The cementless total hip replacement has changed the way we think about hip surgery in the dog. Concerns of infection and loosening have almost completely disappeared with the advent of the porous coated implant. Surgical times have been dramatically decreased with the use of cementless implants as the long curing times for the cement are not needed. The implant relies on boney ingrowth into the porous coating and results in increased stability with time. 3 year follow up of cementless cases has shown excellent results. We are anxious to see how

these implants perform over the course of a dog's lifetime. Modifications in the technique have resulted in success rates in the high 90% range. Complications of dislocations and femoral fractures have not been eliminated altogether, but both can be successfully revised.

### **Elbow**

Total elbow arthroplasty (TEA) has now been in clinical use for the last 5 years. A commercially available cemented product is now available from Biomedtrix. Preliminary evaluation of the elbow seems promising. In a study by Conzemius et. Al, twenty large breed dogs with naturally occurring osteoarthritis had TEA performed. Follow up examination was performed at 3, 6 and 12 months after surgery. Satisfactory outcomes were reported in 16 dogs. Complications included infection (2), luxation (1) and humeral fracture (1). Best candidates for TEA are large breed dogs (<30kg) with end stage elbow osteoarthritis (< 90 degrees of range of motion in flexion) that have failed medical management. Modifications in technique, implants and instruments over the last several years will hopefully lead to an improved outcome. The elbow remains one of the most challenging joints to replace.

### **Stifle**

Although the stifle is one of the most common joints to replace in humans, it has only recently received attention from the veterinary community. A commercially available total stifle system from Biomedtrix is also just around the corner. Preliminary data from Dr. Bill Liska at Gulf Coast Veterinary Specialty Hospital in Houston is very promising. The implants are cemented in place. Candidates for total stifle replacement are dogs greater than 30kg with end stage osteoarthritis of the stifle with no prior history of joint infections. Long term evaluation of a large case series of dogs with total stifle replacement has not been reported. A prospective study evaluating the efficacy of the total stifle is also underway. Please call if you have a case that you think you may have an appropriate case.