Learning Objectives

After completing this module, your basic understanding should include:

• What the kidneys do and how disease can affect their function.
• The importance of proper pet nutrition to minimize kidney disease.
• The value of screening senior pets for kidney disease.
• How early intervention with Hill’s® Prescription Diet® k/d Canine® pet foods may help lead to a longer, better quality of life for dogs with chronic renal failure.
• The benefits of Hill’s Prescription Diet® k/d Canine® and k/d Feline® pet foods.
Introduction

Having completed all of Level I, and Modules 1, 2, 3 and 4 in Level II, you should have a good understanding of the importance of proper pet nutrition the pet’s entire life. Just because a client may have not seemed interested one or more times to nutritional recommendations, it is still important to discuss proper pet nutrition on every pet owner visit (and ideally recorded in the pet’s medical record). Many of us often need reminders, so as an advocate for the pet’s best interest and as requested by the veterinarian, you may have many opportunities to revisit critical wellness issues with pet owners. This approach to reinforcing the veterinarian’s recommendations is part of the veterinary team concept.

There are times though, when a pet owner might not heed advice, was never even told about proper nutrition, was told only once, or the pet, for any number of reasons, develops medical problems regardless of the plane of nutrition or care. These are prime areas where therapeutic nutrition should be considered a vital part of treatment and long-term management. Depending on certain circumstances, such as the cause, severity and progression of the disease, many pets can substantially benefit from nutritional intervention as part of the treatment regime. Therapeutic nutrition should ALWAYS be considered in patient care!
Introduction

Hill’s Pet Nutrition, Inc. has 34+ Prescription Diet® pet food formulas, and more than 100 packaging configurations for the veterinary profession to rely upon. In this Veterinary Nutritional AdvocateSM educational experience, it would be difficult to cover each product and the conditions the food helps manage, in any kind of detail. Therefore, in the next four modules, we’ll concentrate on four main areas: Kidney Disease, Weight Management, Gastrointestinal Problems and Lower Urinary Tract Diseases. These issues often constitute a substantial percentage of veterinary practice medical caseloads. You’ll be able to use the nutritional therapy concepts discussed in these modules, and apply them to a myriad of other situations needing nutritional intervention and support with Hill’s Prescription Diets products.

Proper nutrition is a critical element for managing cats and dogs with kidney (renal) disease, often helping to enhance the pet’s quality and length of life. Because the requirements for protein, minerals, and some other nutrients change markedly during progressive kidney disease, the role of nutrition is paramount. After the veterinarian makes a SPECIFIC product recommendation to the client, the veterinary health care team needs to effectively communicate the critical importance, (and adherence) to nutritional therapy. This is usually a traumatic time for the pet owner, so your ability to reassuringly reinforce the veterinarian’s protocol will be vital. This module of VNA is designed to provide you with a variety of communication points, to help you convey the importance of proper pet nutrition to clients whose pets have kidney disease. Specifically, we’ll focus on Hill’s® Prescription Diet® k/d Canine® and k/d Feline® products.
What Are The Kidneys And What Do They Do?

The kidneys are part of a pet’s urinary tract. The urinary tract consists of two kidneys, two ureters that connect the kidneys to the urinary bladder, and the urethra, the tube through which urine leaves the body, (see Figure 1). Normal dog and cat kidneys are bean-shaped, smooth, and are found under the backbone just beneath the last ribs and first few lumbar vertebrae.

Figure 1. Parts of the canine and feline urinary tract.
What Are The Kidneys And What Do They Do?

In resting pets, one-fourth of the blood pumped by the heart goes to the kidneys. In the kidneys, blood is pumped through a complex network of blood vessels that serve to decrease blood pressure and allow for controlled filtering of the blood and formation of urine.

The functional unit of the kidney is called a nephron. Each nephron consists of a cup-like structure called the glomerulus and a long thin tube lined by cells that have various functions. These tubes are called tubules. A thin delicate membrane called the glomerular membrane can be found at the end of the blood vessels in glomerulus. This membrane acts as a sieve, retaining cells and large protein molecules, but letting through water and other plasma components. The cells lining the tubules recover 99% of the water, salt, and vital nutrients filtered by the glomerular membrane, leaving behind metabolic waste products in the urine. This process also allows the kidneys to make small changes in body fluid composition by altering the amount of salt, acid, or alkali excreted or retained, depending on the body’s need. The tubules combine to form the ureters mentioned above.
The kidneys are vital organs that perform numerous metabolic tasks. The main functions include filtering and excreting the waste products of metabolism, regulating the body’s concentration of water and salt, maintaining a slightly alkaline body environment, reabsorbing molecules needed by the body (for example, glucose, amino acids, and vitamins), and secreting various hormones. The kidneys eliminate urea and other waste products that result from the breakdown of dietary protein; the higher the protein content in the diet, the more waste products that must be eliminated.

A brief summary of kidney functions:

- Maintenance of body composition. Recall that the body of dogs and cats is composed mostly of water (See Level I, Module 1: Nutrients). The kidneys function to regulate how much water and minerals are excreted as urine or retained by the body. These minerals include sodium, potassium, chloride, calcium, magnesium, and phosphorus. By regulating water and mineral levels, the kidneys control body fluid levels and their composition. The kidneys also help maintain body acid levels within a narrow range.
What Are The Kidneys And What Do They Do?

- Excretion of body wastes and foreign substances. The kidneys excrete many drugs in the urine, ensuring that harmful levels do not accumulate in the body. Also, the kidneys rid the body of many by-products of normal body metabolism. As one example, the kidneys excrete urea, a by-product of protein metabolism.

- Production and secretion of proteins called hormones. These proteins help control salt balance and blood pressure, red blood cell production, and calcium and phosphorus balance.

Optimal function of every organ in the body depends on control of fluid composition and levels within appropriate ranges. The kidneys correct fluctuations in body fluid composition and levels that result from food intake, metabolism, environmental factors, and medical therapy.
Detecting Kidney Failure

Kidney failure occurs when the kidneys can’t perform their functions. As a result, waste products and excess water accumulate in the body, causing clinical signs and abnormal laboratory results (see below). Clinical signs of chronic kidney disease don’t appear until at least three-fourths of kidney function has been lost.

There are two types of kidney failure seen in veterinary practice: acute (short term) and chronic (long term). Heart failure, extreme dehydration, some drugs and toxins (i.e., antifreeze containing ethylene glycol), or obstruction of the urinary tract (for example, a urinary bladder stone that lodges in the urethra preventing urination) are some of the more common causes of acute kidney failure. Acute kidney failure may or may not be reversed by medical therapy or surgical intervention, and may or may not progress to chronic kidney failure (CRF, where the “R” refers to renal, [kidney]). The rest of this module focuses on CRF.

CRF is characterized by an inability of the kidneys to perform normal functions due to progressive loss of nephrons over months to years. Although many diseases and conditions can initiate CRF including diabetes mellitus, infection, injury, exposure to toxins, and conditions such as high blood pressure, in some cases, it isn’t possible to determine the underlying cause. CRF is life-threatening and always progresses, ultimately causing death.
Detecting Kidney Failure

Regardless of the cause, in CRF the kidneys are unable to properly filter blood and perform their many functions. Metabolic waste products and extra fluids accumulate, and the chemical composition of the body becomes unbalanced. As a result, pets with CRF may develop weakened bones (impaired calcium and phosphorus metabolism), have difficulty controlling blood pressure (which further damages kidney function), and develop anemia (due to a lack of the kidney hormone that stimulates red blood cell production).

Figure 4. Natural progression of kidney disease.

Make sure pet owners with older dogs and cats, periodically monitor the pet’s water intake and urinations.
Detecting Kidney Failure

Pet owners may first note their pet drinks more water, (polydipsia) and needs to urinate more often, (polyuria) possibly having urinary accidents in the house, especially at night. Other clinical signs of CRF often include appetite loss, weight loss, weakness, vomiting, diarrhea, foul mouth odor, decreased water intake and urine output, (later stages), seizures, and a tendency to bleed easily. These symptoms can also mimic other disease signs. Blindness may be present if high blood pressure has been present for a prolonged period. Physical examination may reveal dehydration, malnutrition, oral ulcers, joint pain, facial swellings, abnormal retinas (an internal eye structure), and kidneys of abnormal size (usually smaller).
Detecting Kidney Failure

If the veterinarian suspects kidney disease, he or she may request that the veterinary technician collect blood and urine samples for testing. Blood levels of urea nitrogen (BUN) and creatinine may be elevated, indicating the kidneys are unable to adequately filter wastes from the blood. Likewise, potassium, calcium, phosphorus, glucose, and protein levels may be abnormal. Evaluation of a blood sample may indicate inflammation, anemia, or both. Blood pressure measurements may be abnormally high. Radiographs and ultrasound may show changes in the size, shape, or position of the kidneys.

It is now recommended that veterinarians begin conducting kidney screenings on cats, and small, medium and large size dogs, beginning at seven years of age, and beginning at five years of age for giant breed dogs. Kidney screening should always be conducted earlier if the veterinarian suspects a problem. Recommended tests include a complete urinalysis, complete biochemistry profile, and microalbuminuria. Testing for microalbuminuria is particularly important; a blood protein called albumin may leak through the glomerulus of the kidney and appear in the urine where it can be detected. This finding may be present before results of other lab tests become abnormal, and thus be an indicator of early kidney damage. Early detection—even before clinical signs occur—and proper nutrition, may improve the length and quality of life for pets with kidney disease.

Senior dogs and cats should be screened for kidney disease at least annually.
Risk Factors For Kidney Failure

In client surveys, kidney disease was the second most common cause of death in cats, (after cancer) and the third most common cause in dogs, after cancer and heart disease (Morris Animal Foundation Animal Health Survey, 1998). In yet another survey, approximately 20% of 1,600 pet dogs over 5 years of age had abnormally elevated kidney function tests (Leibetseder J, Neufeld K. Dogs with chronic renal failure. Proc. WSAVA, 1991; 271-274).

Other risk factors for CRF include:

- **Breed.** Some canine and feline breeds are more likely to develop familial forms of kidney disease. Dog breeds include Lhasa apsos, Shih Tzus, Doberman pinschers, and golden retrievers. Cat breeds include Maine coon, Abyssinian, Siamese, Russian blue and Burmese.
- **Urinary tract infections.**
- **Drug therapy.** Some antimicrobial and analgesic agents (among other drugs) may predispose to kidney disease.
- **Poor blood flow.** Shock, heart disease, and blood loss can cause kidney damage.
- **Diabetes mellitus.**
- **High blood pressure.**
Treating Kidney Failure

Although CRF can’t be cured, it is possible to control the clinical signs, reduce complications, and slow the disease’s progression. These measures may improve the quality and length of an affected pet’s life. The underlying disease and its complications should be controlled if possible.

For more than 50 years, a cornerstone of managing pets with CRF has been dietary modification. Unlike carbohydrates and fats, excess protein is not stored in the body, but rather, it is degraded to form urea and other nitrogen-containing substances that must be eliminated by the kidneys. Also, foods containing high levels of protein contain more phosphorus, hydrogen ions (which contribute to body acidity), and inorganic ions than low-protein foods. Consequently, CRF patients consuming excessive dietary protein will accumulate nitrogen-containing wastes, resulting in a life-threatening syndrome called uremia.

Many years ago, investigators in human and veterinary medicine discovered that limiting dietary protein and phosphorus intake would help correct many clinical signs and metabolic complications of uremia in people and pets. This finding helped formulate the goals of nutritional therapy for CRF:

- Ensure sufficient caloric intake to prevent malnutrition
- Limit accumulation of nitrogen-containing wastes and metabolic disturbances associated with uremia
- Slow progression of CRF, if possible.
Other therapy often prescribed for pets with CRF include:

- Fluid therapy to treat dehydration and correct electrolyte imbalances
- Drugs to control nausea and vomiting
- Drugs called intestinal phosphate binders to help correct high blood phosphorus levels
- A hormone called erythropoietin to treat anemia
- Drugs to treat high blood pressure
- Antibacterial drugs to treat infections
- Surgery to correct anatomic defects
- Drugs to decrease blood levels of a protein called parathyroid hormone.

Hemodialysis, a blood-filtering procedure, and even kidney transplants are performed at some veterinary referral centers.
Features And Benefits Of Prescription Diet® k/d Canine® And k/d Feline®

Dr. Mark Morris, Sr. began working on the first veterinary therapeutic dog food in the late 1930s. This food was of great benefit to one of the first Seeing Eye Dogs in America, “Buddy,” and of course her owner, Morris Frank! Buddy was suffering from CRF. This food was called Raritan Ration B and contained ingredients to lessen the workload on Buddy’s kidneys. Raritan Ration B evolved into Prescription Diet® k/d Canine®, which was first introduced to veterinarians in 1948. Prescription Diet® k/d Feline® was subsequently added as a nutritional aid for cats with CRF. Tables 1 and 2 show selected product features and benefits of Prescription Diet® k/d Canine® and k/d Feline® to help you better communicate with pet owners. Remember, “benefits” answer a potential “so what?” and are considered the advantages the “features” deliver.
### Table 1. Features and Benefits of Prescription Diet® k/d Canine®.*

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
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<tbody>
<tr>
<td>Very low phosphorus</td>
<td>Helps maintain healthy renal function</td>
</tr>
<tr>
<td>Low protein</td>
<td>Limits accumulation of waste products</td>
</tr>
<tr>
<td>Low sodium</td>
<td>Helps maintain normal blood pressure</td>
</tr>
<tr>
<td>Increased dietary buffering capacity</td>
<td>Helps maintain normal acid-base balance</td>
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<tr>
<td></td>
<td>Helps prevent muscle wasting</td>
</tr>
<tr>
<td>Target urine pH: 6.8-7.2</td>
<td>Helps maintain normal acid-base balance</td>
</tr>
<tr>
<td>Added potassium citrate</td>
<td>Helps maintain normal acid-base balance and limit accumulation of waste products</td>
</tr>
<tr>
<td>High soluble dietary fiber</td>
<td>Helps reduce urinary nitrogen excretion</td>
</tr>
<tr>
<td>High omega-3 fatty acids</td>
<td>Helps improve renal blood flow</td>
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<tr>
<td>High non-protein calories</td>
<td>Helps prevent malnutrition</td>
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*Source: Hill's Key to Clinical Nutrition.*
### Table 2. Features and Benefits of Prescription Diet® k/d Feline®.*

<table>
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<td></td>
<td>Helps prevent muscle wasting</td>
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<tr>
<td>Target urine pH: 6.6-6.9</td>
<td>Helps maintain normal acid-base balance</td>
</tr>
<tr>
<td>High B vitamins</td>
<td>Helps avoid losses caused by excess urine production</td>
</tr>
<tr>
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<td>Helps reduce urinary nitrogen excretion</td>
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<td>High omega-3 fatty acids</td>
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*Source: Hill’s Key to Clinical Nutrition.*
Some general benefits also include:

- Cost effective on a daily feeding basis.
- Balanced nutrition and great taste, to optimize the feeding experience.
- Canned and dry formulations.
- Dogs may be able to have Prescription Diet® Canine Treats, which are low in calories and minerals. The pet owner is less likely to feed other snacks.
- 100% Guarantee on all Hill’s® Prescription Diet® products: Hill’s guarantees Prescription Diet brand pet food for quality, consistency and taste. If you are not completely satisfied with any purchase of Prescription Diet brand pet food for these reasons, simply return the unused portion to your veterinarian for a full refund or replacement. (Hill’s will reimburse the practice).

Keep in mind also, that there are a number of benefits to your practice regarding the sale of Prescription Diet® brand pet foods. Examples include: More frequent client visits (bonding), the comfort of knowing you are providing an important part of disease therapy, ability to interact with the pet owner and answer questions, further educating the client on issues not adequately covered during exams, reinforce previous recommendations, the opportunity to promote other appropriate products and services, the profitability of Prescription Diet brand pet foods to the practice…
Over the years, Prescription Diet® kidney foods have been reformulated to incorporate the latest veterinary research. In a clinical study published in 2002, investigators found that feeding Prescription Diet® k/d Canine® dry was beneficial in reducing clinical signs and improving survival time in dogs with mild to moderate spontaneous renal failure compared to feeding a typical adult dog food.
Features And Benefits Of Prescription Diet® k/d Canine® And k/d Feline®

Dogs with CRF fed k/d Canine® lived twice as long and exhibited 50% fewer clinical signs than dogs fed the typical adult dog food. The authors concluded that initiation of treatment with k/d Canine® would benefit dogs with serum creatinine concentrations equal to or greater than 2.0 mg/dl (Jacob F, et al. Clinical evaluation of dietary modification for treatment of spontaneous chronic renal failure in dogs. JAVMA 2002; 220: 1163-1170.). Many dogs with creatinine values this low do not yet suffer from clinical signs of kidney disease, underscoring the need for early detection. Prescription Diet® k/d Canine® is the only pet food demonstrated to help improve the life expectancy of dogs with kidney disease. It is prudent that proper nutrition begin early in the course of the disease, ideally long before the onset of clinical signs, and that no other foods be fed.

Remind clients to always ensure that fresh clean water be available for pets with CRF.
Monitoring CRF Patients

Because CRF is a progressive, incurable disorder, dogs and cats with CRF should be monitored at regular intervals, depending on the severity of their disease and the therapy prescribed. Initially, pets may need to be checked every week, especially if drugs are given to increase red blood cell production or control parathyroid gland activity. Even pets with well-controlled CRF may need to be evaluated every one to three months. Blood and urine tests will likely be a part of most evaluations.

Owners of CRF pets may, unfortunately, feed inappropriate foods and treats. The result may be an increased number of clinical signs (reduced quality of life) and/or premature death of the pet. Communicate the importance of strict adherence to the veterinarian’s therapeutic plan, including the food. You can support the client’s efforts by ensuring that they keep their appointments and purchase Prescription Diet® k/d Canine® or k/d Feline® as recommended, on an ongoing basis.

It is usually necessary to limit the kidney disease patient’s access to other people and animal food (for example, a dog having access to cat food). Feeding location and presentation are important. Timid pets should be fed in a quiet place. Cats should not be fed in a loud environment. Placing small quantities of the food in a patient’s mouth or on its paws to stimulate licking or swallowing (hand feeding) may facilitate eating.
Monitoring CRF Patients

Food aversion (avoiding a food) is possible if a nauseated animal is force-fed or if a painful or unpleasant experience is associated with feeding. Disagreeable medications (for example, intestinal phosphate binders) should not be mixed with Prescription Diet® k/d Canine® or k/d Feline®. Managing underlying abnormalities in fluid, electrolyte, and acid-base balance will help minimize nausea and vomiting. Consider using Prescription Diet® k/d Canine® and k/d Feline®, foods intended for long-term management of CRF, should not be offered during periods of nausea and vomiting to prevent possible food aversions.
Chronic Kidney Disease is an irreversible, progressive disorder that affects many dogs and cats for a variety of reasons. Although kidney disease is especially common in older pets, earlier stages of it can often be diagnosed when pets are about 7 years of age. Therefore, screening protocols are especially important for early diagnosis, when dietary intervention may help CRF patients live longer, healthier lives. Helping place the pet on the proper food, and having the owner adhere to your instructions, will allow you to experience the Family-Pet-Veterinary Team Bond in a special way. No doubt, the pet and the pet owner will be very appreciative of your efforts!

Are You Ready?

To continue, you will need to complete the quiz for this module. When you are ready, click on the forward arrow below to take you to the quiz.