

Ettinger & Feldman – Textbook of Veterinary Internal Medicine

Client Information Sheet

Nutritional Management of Chronic Renal Disease

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What is kidney failure and why is nutritional management important?

Chronic renal (kidney) failure is an irreversible loss of kidney function. Although commonly considered an illness of older dogs and cats, it can occur in animals of any age. Chronic renal failure is not reversible and may have been present in your pet for months to years before the time of diagnosis. Although no cure exists for this disease, it can be successfully managed. Nutritional therapy is an important part of that management plan. Recent studies in dogs and cats have shown both a reduction in the complications associated with renal failure and an increase in life expectancy by feeding diets designed to compensate for renal disease.

The goals of nutritional management are to do the following:

1. Meet the patient's nutrient and energy requirements
2. Alleviate the symptoms
3. Slow the disease progression

Specific recommendations regarding dietary therapy vary from pet to pet. Recommendations need to be based on clinical and laboratory findings. Chronic renal disease is progressive and therefore repeated assessment and subsequent changes in your pet's care and diet may be necessary to successfully manage this process.

Is protein content of diet important?

In a majority of cases, your veterinarian will recommend a dietary change once your pet has been diagnosed with renal disease. Recommending a diet with moderate to severe protein restriction is one of the most common approaches to managing kidney failure. Restriction of dietary protein has been demonstrated to slow the rate of progression of renal disease in rats and people. However, the effect of protein restriction on the progression of renal disease in dogs and cats remains controversial and no definitive study exists on this matter.

Many of the symptoms that you see in your pet can be partially or completely alleviated by reducing the protein concentration in your pet's diet. These symptoms may include the following:

- Vomiting
- Lethargy
- Anorexia
- Diarrhea

- Oral ulcerations
- Foul odor to the breath

These symptoms, often referred to as *uremia*, can be caused by an accumulation of the breakdown products of protein metabolism (sometimes referred to as *nitrogenous waste products*). This protein comes from both the protein in your pet's diet, as well as mobilization and degradation of its own body's protein stores. Consumption of protein in amounts greater than what your animal needs to maintain normal bodily functions can exacerbate these problems. However, not enough protein in the diet can be equally detrimental and protein malnutrition in pets with renal failure can facilitate the occurrence of other complications or lead to an early death.

The consumption of diets containing reduced protein levels decreases the amount of nitrogenous waste delivered to the kidneys for excretion in the urine. This may help reduce the excessive drinking (polydipsia) and urination (polyuria) in your pet. A reduction in dietary protein may also help reduce the degree of anemia. Anemia enhances the weakness and reluctance to eat in animals with renal failure. Anemia can occur for several reasons with renal disease, but one factor that is believed to make it worse is excessive dietary protein. Nitrogenous waste products are believed to contribute to anemia by reducing the life span of red blood cells. The waste products may also enhance blood loss by leading to the formation of gastrointestinal ulcers and a reduction in blood clotting ability.

Is mineral content of diet important?

Close attention must be paid to the mineral balance in pets with chronic renal disease. Phosphorous, calcium, sodium, and potassium are of particular concern. The latter two are often referred to as *electrolytes*. All of these can be easily measured using blood tests and are part of "routine" testing in pets with chronic renal disease.

Most diets designed to manage renal disease also contain alterations in these minerals to meet these special needs. One of the first alterations in mineral status that occurs with renal disease is phosphorous retention by the kidneys; this is manifested as increased phosphorous concentrations in the blood (referred to as *hyperphosphatemia*). This increase in body phosphorous concentration can lead to numerous deleterious consequences, such as vitamin D deficiency, in addition to alterations in the actions of other hormones that regulate calcium metabolism. In dogs, dietary phosphorous restriction has been shown to slow the progression of renal failure.

One goal in the management of renal disease is to normalize blood phosphorous concentrations. By reducing hyperphosphatemia, these changes can be minimized or prevented. This can be achieved by reducing the amount of phosphorous contained in the diet or by reducing the intestinal absorption of dietary phosphorous. Dietary protein sources contain high levels of phosphorous. This is another reason that foods designed for the management and treatment of renal failure contain reduced amounts of dietary protein.

Unfortunately, as renal disease progresses, restriction alone is not sufficient to control blood phosphorous levels. Further control of phosphorous can be achieved by the addition of intestinal phosphate binders. These binders help to reduce the absorption of phosphorous through the gastrointestinal tract. The point when one begins to institute the use of phosphate binders in the management of chronic renal failure will vary from animal to animal and is something your veterinarian can determine.

Secondary to alterations in phosphorous concentrations, calcium may also be altered in pets with chronic renal failure. Although phosphorous most commonly increases, calcium concentrations may increase, decrease, or remain normal. Your veterinarian will monitor calcium concentrations using blood analysis and manage changes accordingly.

Restriction of dietary sodium is a common feature in diets designed to help manage chronic renal disease. Sodium restriction is instituted to help control high blood pressure (hypertension) that is associated with the diseased kidney's inability to excrete sodium normally. Hypertension is also theorized to contribute to the progression of renal disease. However, *severe* sodium restriction is not prudent. Severe restriction can result in blood volume decrease and dehydration, exacerbating symptoms and worsening the kidney disease. Gradual sodium restriction is therefore recommended because the kidney's ability to adjust to different sodium loads diminishes with this disease.

Potassium is another mineral that can either increase or decrease in dogs or cats with chronic renal failure. The most common scenario is potassium depletion. Potassium depletion occurs with chronic renal disease because of a reduction in dietary potassium intake in animals that are not eating well. Potassium can also be lost through the urine. However, a population of dogs and cats may have increased potassium concentrations. Your veterinarian will monitor potassium concentrations in the blood and will adjust intake accordingly. Some animals require the addition of extra potassium to their diets to maintain normal blood concentrations.

Is vitamin supplementation needed?

Animals with renal failure have an increase in their urine volume and therefore may have exaggerated loss of water-soluble vitamins (B vitamins and vitamin C). Loss of these vitamins may contribute to the decrease in appetite associated with renal disease. Diets designed for the management of renal disease are supplemented with increased amounts of water-soluble vitamins, and further vitamin supplementation is rarely necessary. Humans with renal failure have a reduced capacity to excrete vitamin A, although no similar information exists in dogs and cats. Feeding supplements containing vitamin A is not recommended.

Is my pet likely to have acidosis?

Acid-base abnormalities are commonly seen in dogs and cats with renal failure because it is the kidney's job to excrete hydrogen ions and retain bicarbonate ions to maintain blood pH within the normal range. When the kidneys begin to fail, hydrogen ions are retained and bicarbonate ions are not reabsorbed, leading to a state called *metabolic acidosis*. Metabolic acidosis affects the entire body and can worsen the symptoms associated with renal disease, making your pet feel

ill. In an effort to counter this disturbance, the body will mobilize its own resources from muscle and bone. This mobilization initially does fix the problem, but over the long term it can lead to a further decline in your pet's health. Dietary protein restriction reduces the production of protein-derived acid precursors, which helps to some extent. In addition, renal failure diets have increased amounts of alkalinizing agents such as potassium citrate, sodium bicarbonate or calcium carbonate to further combat this problem.

How do we provide enough calories if protein in diets is restricted?

As previously mentioned, diets designed for renal disease have reduced amounts of protein compared with normal maintenance diets. To compensate for this protein reduction, the concentration of fat is usually increased.

An increase in dietary fat can be beneficial in several ways:

- On a weight basis, fat has almost twice as many calories as protein or carbohydrates. This increases the energy density (number of calories per cup or can) of the diet and therefore allows your pet to consume less food to meet its energy needs.
- Fat also enhances the palatability of the diet and makes it more appealing to a dog or cat that might be reluctant to eat it.

However, in some animals extra dietary fat can cause problems. Signs that your animal may not tolerate the higher fat concentrations in these diets may include the following:

- Reluctance to eat or reduction in food intake
- Lethargy
- Vomiting
- Diarrhea
- Abdominal pain

Should any of these signs occur, you should contact your veterinarian. Some of these clinical signs can also be caused by the kidney disease itself and your veterinarian may have to do so diagnostic tests to determine the cause of the problem.

Summary

Your pet needs to consume sufficient calories to supply essential nutrients, as well as to prevent the breakdown of their body's protein stores that will cause malnutrition and exacerbate the symptoms of uremia. If you notice that your animal is not eating well or has stopped eating entirely, contact your veterinarian immediately. Do not attempt to force-feed the reduced protein diet to your pet. Force-feeding may cause your dog or cat to associate feeling ill with the consumption of the therapeutic diet (also known as *learned aversion*). Once they feel better, they will not want to resume eating that kind of diet. It can then be difficult to get them to consume any diet designed to address their special needs. In some cases, dogs and cats that are reluctant to eat will require the placement of an enteral feeding tube (a tube that allows the delivery of food directly into the gastrointestinal tract) to provide some, or all, of their daily energy needs.

Contacts for Further Information



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