



Hill's Kidney Health Reference Guide



Your trusted resource in the fight against kidney disease

If your canine or feline patient has kidney disease, choosing the right nutrition can make all the difference. Although kidney disease is one of the leading causes of death in dogs and cats, signs typically do not appear until significant damage has already been done. That is why Hill's brings you this valuable reference guide to help you and your health care team inform and educate clients about the appropriate nutrition, management and care for dogs and cats suffering from this condition. In addition, you will also find a list of Hill's materials for your clinic to order, free of charge, to help spread awareness and promote better care for pets living with kidney disease.

How to use this reference guide

This reference guide is your quick and easy resource for educating, diagnosing and informing pet owners about the proper management and care for pets living with kidney disease. The quick-tab sections allow you to navigate easily and efficiently to find the answers you and your clients need for managing signs associated with kidney disease.

Diagnosing chronic kidney disease

Chronic kidney disease is a progressive condition that starts with loss of kidney reserve and culminates with azotemia and uremia. Early kidney disease is difficult to detect so frequent screening is important. Diagnosis of chronic kidney disease is made when there is increased serum urea nitrogen and creatinine (azotemia) concurrently with inappropriately concentrated urine. However, in the absence of azotemia, the presence of decreased urine specific gravity or persistent proteinuria may indicate kidney disease. Serial monitoring of serum creatinine concentrations also may be useful;

gradually increasing serum creatinine concentrations over time suggest progressive chronic kidney disease, even if values remain within the normal range. Determining the severity and progression of chronic kidney disease can be aided by assessing serum creatinine, urine specific gravity and the presence and magnitude of proteinuria. The prevalence of kidney disease increases as dogs and cats get older. Therefore, it is recommended that pets at risk for chronic kidney disease, particularly those >7 years of age, be screened every 6-12 months for signs of kidney disease.



Prevalence of kidney disease by age of dogs and cats in the United States¹

Age	Canine %	Feline %
Less than 1 year	0.3	0.2
1 to 7 years	0.3	0.6
7 to 10 years	0.7	1.8
Over 10 years	2.9	8.6

¹ Kirk CA, Lund EM, Armstrong PJ, et al. *Proceedings*. Waltham International Symposium. Vancouver, British Columbia, Canada. 2001;62.

Importance of nutritional management

The four goals of managing kidney disease are:

- Control clinical signs of uremia
- Maintain adequate fluid, electrolyte and acid–base balance
- Provide adequate nutrition
- Minimize progression of kidney disease

Nutrition plays a role in each goal and is the cornerstone of treatment for dogs and cats with chronic kidney disease.











Signs of kidney disease

- Increased thirst and urine production
- Decreased appetite
- Weight loss
- Bad breath
- Vomiting and diarrhea
- Sore mouth
- Weakness
- Lack of energy

Diagnosing kidney disease using the IRIS (International Renal Interest Society) CKD Staging System*

KIDNEY FUNCTION REMAINING				
				
	Stage I: ≤ 100%	Stage II: ≤ 33%	Stage III: ≤ 25%	Stage IV: < 10%
AZOTEMIA	None	Mild renal	Moderate renal	Severe renal
PLASMA CREATININE (mg/dl)[†]				
	< 1.4	1.4–2.0	2.1–5.0	≥ 5.0
	< 1.6	1.6–2.8	2.9–5.0	≥ 5.0
EFFECTS				
	Hyperphosphatemia unlikely Hypertension possible Proteinuria possible	Hyperphosphatemia possible Hypertension possible Proteinuria possible	Hyperphosphatemia probable Hypertension possible Proteinuria possible	Hyperphosphatemia probable Hypertension possible Proteinuria possible

[†]Levels apply to average size dogs and cats
Measured when patient is well-hydrated

* IRIS was created to advance the scientific understanding of kidney disease in small animals at the 8th Annual Congress of the European Society of Veterinary Internal Medicine, convened in Vienna, Austria, in 1998. The organization is led by a board of 16 independent veterinary experts from ten different countries. The mission of IRIS is to help veterinary practitioners better diagnose, understand and treat kidney disease in dogs and cats. www.iris-kidney.com

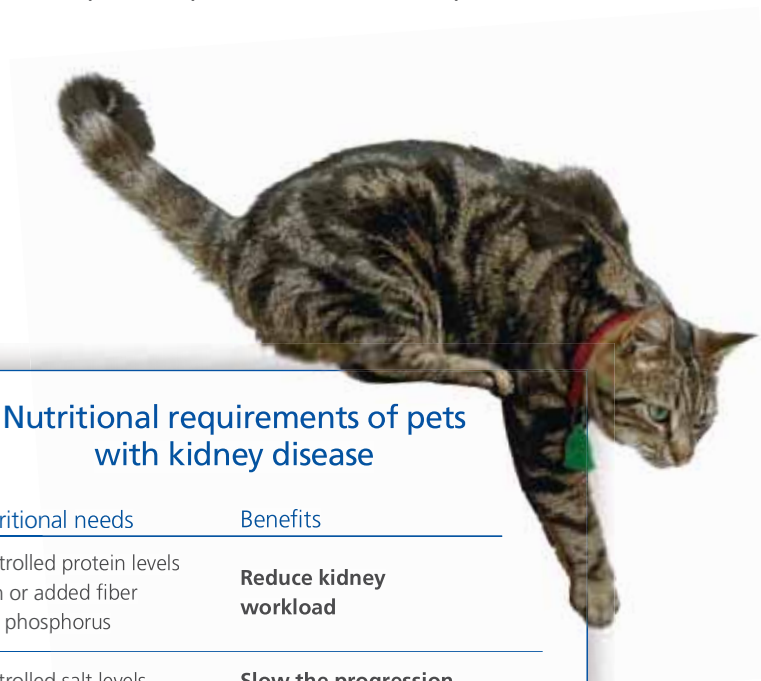


Educating your clients

Emphasizing the importance of screening for kidney disease to your clients is first and foremost in the treatment of this *silent killer*. Once diagnosed, proper nutritional management with Hill's® Prescription Diet® therapeutic pet foods can help increase the pet's lifespan and improve quality of life.

Nutrition

Nutrition plays a key role in each goal of kidney disease management, and is the cornerstone of treatment for dogs and cats with chronic kidney disease. It is ***one of the most effective treatments for prolonging life span*** in dogs and cats with chronic kidney disease.

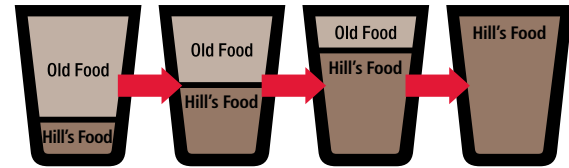


Nutritional requirements of pets with kidney disease

Nutritional needs	Benefits
Controlled protein levels High or added fiber Low phosphorus	Reduce kidney workload
Controlled salt levels High fatty acids	Slow the progression of kidney disease
Added antioxidants	Reduce stress on kidneys and reduce cellular oxidation

Tips on feeding therapeutic foods:

- Gradually transition to new food. This may require 3 to 4 weeks for some pets (especially cats).
- Emphasize the importance of beginning nutritional management earlier than later. Pets are more likely to accept a therapeutic food earlier in the disease progression and therefore receive the benefits for a longer period of time.
- Avoid feeding a therapeutic food for kidney disease while the pet is ill or hospitalized. A food aversion may develop, which can reduce the chance of acceptance when the pet is feeling better.
- Use fresh food at room temperature.
- Try serving refrigerated or warmed food that has been stored in a plastic container versus the can.
- Offer pet foods with different textures such as Hill's® Prescription Diet® k/d® canned pet food formulas rather than dry kibble, or vice versa. Texture and form preferences may change when a pet develops kidney disease.
- Add flavor enhancers, such as low-sodium chicken, beef or tuna broth, to encourage the patient to eat all the therapeutic food. Use small amounts, as excessive use of food other than therapeutic food may decrease beneficial effects of nutritional management.
- Try to keep feeding schedules the same as before the onset of kidney disease, so pets do not feel stress from undue changes in their environment.



Complete compliance when feeding is imperative

Encourage your health care team to educate pet owners about the importance of feeding their pets the recommended amount of therapeutic food. Some clients may feel it is appropriate to supplement dry pet food with any canned food. This practice could compromise your patient's health by diluting the effectiveness of the therapeutic food.



Recommend Hill's® Prescription Diet® pet foods for kidney health

Hill's® Prescription Diet® pet foods are backed by extensive clinical studies with the highest-grade evidence to prolong life in pets with kidney disease. These foods are formulated with the appropriate amounts of minerals and nutrients to provide effective management of dogs and cats with kidney disease. Hill's® Prescription Diet® k/d® Canine and Feline pet foods reduce clinical signs, prolong life in pets with kidney disease, and improve quality of life.

Study shows this food helps pets live longer

A two-year university study found that dogs with chronic kidney disease fed the nutrition in Hill's® Prescription Diet® k/d® Canine **live twice as long as dogs fed an ordinary grocery dog food, had a slower progression of kidney disease, and exhibited fewer clinical signs!** Another two-year university study in cats showed that the nutrition in Hill's® Prescription Diet® k/d® Feline was superior to a typical adult maintenance food in **reducing clinical signs and mortality rates in cats** with chronic kidney disease?²



Hill's® Prescription Diet® k/d® Canine pet food Helps extend and improve quality of life for dogs with kidney disease

- Low sodium helps to control clinical signs (e.g., ascites/edema, hypertension, etc.)
- Low phosphorus helps to slow progression of kidney disease
- Reduced protein helps to meet nutritional needs while minimizing signs of uremia
- High omega-3 fatty acids help to improve blood flow to the kidneys
- Increased dietary buffering capacity helps to counteract the tendency for metabolic acidosis
- Added antioxidants defend cells from free radicals, promoting a healthy immune system



Hill's® Prescription Diet® g/d® Canine pet food Helps manage early stage kidney disease in obese-prone dogs or those that require a lower fat food

- Low sodium helps to minimize systemic and renal hypertension
- Low phosphorus helps to slow progression of kidney disease
- Reduced protein helps to meet nutritional needs while minimizing signs of uremia
- High omega-3 fatty acids help improve blood flow to kidneys
- Added soluble fiber helps to decrease urinary nitrogen excretion and lower serum urea nitrogen
- Added antioxidants defend cells from free radicals, promoting a healthy immune system
- Decreased fat helps maintain body weight in obese-prone dogs with kidney disease



Hill's® Prescription Diet® u/d® Canine pet food Helps manage dogs with end stage kidney disease

- Low protein helps to meet nutritional needs while minimizing signs of uremia
- Increased dietary buffering capacity helps to counteract the tendency for metabolic acidosis
- Omega-3 fatty acids help improve blood flow to the kidneys.
- Added soluble fiber helps to decrease urinary nitrogen excretion and lower serum urea nitrogen



¹ Jacob F, Polzin DJ, Osborne CA, et al. Clinical evaluation of dietary modification for treatment of spontaneous chronic renal failure in dogs. *J Am Vet Med Assoc* 2002;220:1163-1170.
² Ross SJ, Osborne CA, Kirk CA, et al. Clinical evaluation of dietary modification for treatment of spontaneous chronic kidney disease in cats. *J Am Vet Med Assoc* 2006;229:949-957.



Hill's® Prescription Diet® k/d® Feline pet food
Helps extend and improve quality of life in cats with kidney disease

- Reduced sodium chloride helps control clinical signs associated with sodium and fluid retention and hypertension
- Reduced phosphorus helps to slow the progression of kidney disease
- Reduced protein helps to meet nutritional needs while minimizing signs of uremia
- High omega-3 fatty acids help to improve blood flow to the kidneys
- Increased dietary buffering capacity helps to counteract the tendency for metabolic acidosis
- Added antioxidants defend cells from free radicals, promoting a healthy immune system



Hill's® Prescription Diet® g/d® Feline pet food
Helps manage early stage kidney disease in obese-prone cats or those that require a lower fat food

- Reduced sodium helps minimize systemic and renal hypertension, and control clinical signs such as ascites/edema
- Reduced phosphorus helps slow the progression of kidney disease
- High levels of omega-3 fatty acids help improve blood flow to the kidneys
- Added soluble fiber helps decrease urinary nitrogen excretion and lower serum urea nitrogen
- Added taurine helps maintain normal heart muscle function
- Decreased fat helps maintain body weight in obese-prone cats with kidney disease



Recommend Hill's® Prescription Diet® Canine and Feline pet foods with confidence

Product	Can	SKU	Dry	SKU
Hill's® Prescription Diet® g/d® Canine	13-oz. can in cases of 12	7006	10-lb. bag 40-lb. bag	7242 7243
Hill's® Prescription Diet® k/d® Canine	13-oz. can in cases of 12	7010	10-lb. bag 20-lb. bag 40-lb. bag	7247 7248 7249
Hill's® Prescription Diet® u/d® Canine	13-oz. can in cases of 12	7016	10-lb. bag 30-lb. bag	5850 5851
Hill's® Prescription Diet® g/d® Feline	5.5-oz. can in cases of 24	7244	4-lb. bag	7245
Hill's® Prescription Diet® k/d® Feline	n/a	n/a	4-lb. bag 10-lb. bag	7252 7253
Hill's® Prescription Diet® k/d® with Chicken Feline	5.5-oz. can in cases of 24	9453	n/a	n/a

Recommend Hill's® Prescription Diet® Canine and Feline pet foods with confidence

In addition to helping your patients, we have an extensive menu featuring educational materials, tools and visual aids you can use to enhance your clinic and help increase the awareness of kidney disease.

Hill's Pet Nutrition, Inc. provides the professional support you need

Literature	Description	Order Number
IN-CLINIC		
2006 Hill's® Prescription Diet® pet food Kidney Conditions Pet Owner Guide	A simple guide to help educate pet owners on managing kidney conditions in dogs and cats	P-9086
HEALTH CARE TEAM		
2007 Hill's Update on Clinical Nutrition™ <i>Prescription Diet® Renal Pet Foods – Improving Life, Prolonging Life</i>	A summary of the clinical evidence supporting Hill's® Prescription Diet® k/d® Canine and Feline pet foods	TD-179
2006 Evidence-based Clinical Nutrition: Managing Feline CKD	Case study of a cat with chronic kidney disease	P-907
2005 Hill's Update on Clinical Nutrition™ <i>Helping Cats with Chronic Kidney Disease Live Longer, Better Lives</i>	A summary of clinical evidence on the benefits of feeding Hill's® Prescription Diet® k/d® Feline pet food	TD-177
2005 Hill's Update on Clinical Nutrition™ <i>Additional Benefits for Pets with Kidney Disease</i>	A summary of evidence on the benefits of antioxidants in cats with kidney disease	TD-174
2005 Feline Renal Disease & Compliance	Case study of a cat with chronic kidney disease	P-248
2004 Hill's Canine Renal Disease Clinical Evidence Report	Results of a study comparing Hill's® Prescription Diet® k/d® Canine pet food to a typical adult dry maintenance food in dogs with chronic renal failure.	TD-815
2001 Hill's Update on Clinical Nutrition™ <i>Phosphorus and Kidney Disease – Exploring the Link</i>	A summary of studies focusing on the role of excess phosphorus in pets with kidney disease	TD-109

Contact your Hill's territory manager to order these FREE materials while supplies last. Visit HillsVet.com for additional downloadable materials.

Synopses of clinical studies support use of Hill's® Prescription Diet® k/d® pet food

Ross S, Osborne CA, Kirk CA, et al. Clinical evaluation of dietary modification for treatment of spontaneous chronic kidney disease in cats. *J Am Vet Med Assoc* 2006; 229:949-957.

A double-masked, controlled, randomized clinical trial was conducted to determine if Hill's® Prescription Diet® k/d® Feline was superior to a typical adult maintenance food in minimizing uremic episodes and mortality rates in cats with mild to moderate chronic kidney disease. Forty-five client-owned cats were randomly assigned to either k/d Feline or a typical adult maintenance food and evaluated every three months for 24 months. The cats fed k/d Feline showed significantly lower concentrations of serum urea nitrogen and higher blood bicarbonate concentrations compared to cats fed a typical adult maintenance food. Cats fed k/d Feline also experienced significant reductions in uremic episodes and kidney-related mortality vs. the group fed the maintenance food. This study concluded that k/d Feline is superior to the maintenance food in increasing quality of life, minimizing clinical signs and lowering mortality rates in cats with mild (creatinine = 2.1 mg/dl) to moderate (creatinine = 4.5 mg/dl) chronic kidney disease.

Jacob F, Polzin DJ, Osborne CA, et al. Clinical evaluation of dietary modification for treatment of spontaneous chronic renal failure in dogs. *J Am Vet Med Assoc* 2002; 220:1163-70.

A double-masked, controlled, randomized clinical trial was conducted to determine if Hill's® Prescription Diet® k/d® Canine was superior to a typical adult maintenance food in minimizing uremic episodes and mortality rates in dogs with mild to moderate chronic kidney disease. Thirty-eight client-owned dogs were randomly assigned to either k/d Canine or a typical adult maintenance food and evaluated every three months for 24 months. Dogs with spontaneous chronic renal failure had lower incidence of uremic episodes, reduced overall mortality and reduced renal-related mortality when consuming the renal food compared to the maintenance-type food. Renal function generally remained stable in dogs fed the renal food but significantly declined over time in dogs fed the maintenance-type food. This study concluded that k/d Canine is superior to the maintenance food in increasing quality of life, minimizing clinical signs and lowering mortality rates in dogs with mild (creatinine = 2.0 mg/dl) to severe (creatinine = 8.0 mg/dl) chronic kidney disease.

Yu S, Gross KL, Allen TA. A renal food supplemented with vitamins E, C and beta-carotene reduces oxidative stress and improves kidney function in client-owned dogs with stages 2 or 3 kidney disease. *J Vet Intern Med* 2006; 20:1537.

A double-masked, controlled study was conducted to evaluate the effects of feeding a dry renal food supplemented with vitamin E, vitamin C, and beta-carotene

(Hill's® Prescription Diet® k/d® Canine) on 10 healthy dogs and 10 dogs with naturally occurring chronic kidney disease, vs. feeding the same food without antioxidants. When the study began, the dogs with chronic kidney disease had significantly higher serum creatinine concentrations, serum urea nitrogen concentrations and lower urine specific gravity values compared with the healthy dogs. At the conclusion of the study, plasma malondialdehyde concentration and serum concentrations of creatinine and urea nitrogen were significantly reduced by the antioxidant supplements in dogs with chronic kidney disease, indicating lower levels of oxidative stress and improved kidney function.

Yu S, Paetau-Robinson I, Dietary supplements of vitamins E, C and beta-carotene reduce oxidative stress in cats with renal insufficiency. *Vet Res Comm* 2006, Vol 30, Number 4:403-413.

Ten cats with kidney disease and ten control cats matched for breed, age and gender were fed a renal therapeutic food for 4 weeks. The renal food was then supplemented with vitamin E (742 mg/kg), vitamin C (84 mg/kg), and beta-carotene (2.1 mg/kg) and fed to all cats for an additional 4 weeks. Blood and urine samples were collected from all cats at the end of 4 and 8 weeks for measurement of blood urea nitrogen (BUN) and creatinine, urine specific gravity, and oxidative markers. Antioxidant supplementation was associated with significant reduction in oxidative markers and DNA damage in lymphocytes in both groups of cats. Significant changes in serum creatinine or specific gravity were not observed in cats receiving antioxidant supplementation; however, BUN was significantly reduced in cats with kidney disease. The authors concluded that the renal therapeutic food (Hill's® Prescription Diet® k/d® Feline) supplemented with antioxidants significantly reduced oxidative DNA damage in cats with spontaneous chronic kidney disease and may be beneficial to cats with kidney disease.

Kirk CA, Hickman MA, Dietary protein requirement of cats with spontaneous renal disease (abstract #93). *J Vet Intern Med* 2000; 13:351.

Ten cats with spontaneous chronic renal disease and nine healthy controls were enrolled in the study. Cats were randomized into dietary sequences to receive foods consisting of 16%, 20% or 24% protein calories with protein being replaced by carbohydrates. All other nutrients were similar. Cats were fed each food free-choice for 4 months. Parameters measured included hematocrit, serum urea nitrogen, serum albumin, serum total protein, serum creatinine, lean body mass, body weight and nitrogen balance. In this study, the protein requirement of cats with spontaneous chronic renal disease and healthy controls appeared to be approximately 20% protein calories. This value is in agreement with previous studies on protein requirements in healthy cats.



IT'S NOT A MIRACLE, IT'S THE POWER OF PRECISE NUTRITION.™

The therapeutic nutrition in Hill's® Prescription Diet® pet foods makes an incredible difference in your patients' quality of life. Recommend Hill's® Prescription Diet® and see the difference for yourself.

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FeedingIsBelieving.com today.





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