PEER REVIEWED

Management of Chronic Kidney Disease in Cats

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Chronic kidney disease (CKD) diagnosis requires serum biochemical analysis (persistent azotemia, increased serum symmetric dimethylarginine [SDMA] concentration), urinalysis (low urine specific gravity, proteinuria) and imaging (kidney structural changes). Once CKD is confirmed, the next step is staging according to the guidelines from the International Renal Interest Society (IRIS; iris-kidney.com). The IRIS stages 1 to 4 are based on serum creatinine and SDMA concentrations. There is also sub-staging based on the degree of proteinuria and hypertension. Recent improvement in diagnostic testing has led to early detection and treatment in our patients with CKD.

The following are key considerations in the treatment of CKD in cats:

Nutrition

Early nutritional intervention is the most important aspect in the treatment of CKD. Therapeutic kidney diets are the cornerstone of CKD management (see Table 1). Kidney diets are modified to varying levels in phosphorus, protein, potassium and sodium, and may have increased levels of omega-3 fatty acids, antioxidants and water-soluble vitamins. Some kidney diets also provide L-carnitine or enhanced protein levels to help maintain body condition and muscle health.

In a study by Elliott et al., client-owned cats with stable CKD were fed an adult maintenance diet (n = 21) or a lower-protein/phosphorus kidney diet (n = 29). Use of the kidney diet helped reduce plasma phosphate, blood urea nitrogen, and parathyroid hormone concentrations. The median survival time for cats receiving a kidney diet was 633 days (1.7 years) compared with 264 days (0.7 years) for cats receiving an adult maintenance diet.[1]

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In a study by Ross et al., cats with IRIS stage 2 and 3 CKD were fed a therapeutic kidney diet (n = 22) or an adult maintenance diet (n = 23). In the therapeutic diet group, no cats experienced a uremic crisis and no renal-related deaths occurred, whereas 26% of cats had a uremic crisis and 21.7% of cats died of renal-related causes in the adult maintenance diet group.[2]

To improve acceptance of kidney diets, slow transition is necessary. Do not introduce a kidney diet alone to a sick cat to minimize risk for food aversion. It is important to minimize nausea and try to increase diet acceptance by considering forms, textures, flavors and temperature. Sometimes, the use of appetite stimulants may be necessary. Transdermal mirtazapine has been FDA-approved to manage unintended weight loss, and significantly increased appetite, reduced vomiting, and promoted weight gain in cats with CKD.[3]

Proteinuria

Survival time in azotemic cats was shorter with severe proteinuria and development of azotemia was significantly associated with proteinuria in non-azotemic cats .[4,5] It is important to manage proteinuria (urine protein to creatinine ratio >0.04) with angiotensin-converting enzyme inhibitors or angiotensin receptor blockers.[6]

Hypertension

Hypertension can cause more rapid decline in renal function. Telmisartan as a single agent is FDA-approved to control hypertension in cats with CKD. Amlodipine was used traditionally to control hypertension in cats, but it can activate the renin-angiotensin-aldosterone system and may cause rebound hypertension. Continued research is ongoing.[7]

CKD - Mineral and bone disorder

The use of a restricted-phosphorus kidney diet alone may control serum phosphate concentrations. However, persistent hyperphosphatemia requires intestinal phosphate binders, such as aluminum hydroxide and others.[8]

Persistent hyperphosphatemia can lead to soft tissue mineralization and progression of CKD. In a study by Ross et al., cats with induced kidney disease were divided into 2 groups and fed either a normal- or low-phosphorus diet. Those that received a normal phosphorus diet had evidence of renal mineralization, fibrosis, and mononuclear cell infiltrates. Those that received a low phosphorus diet had mild to no histologic changes.[9]

Hyperphosphatemia can also reduce calcitriol and increase fibroblast growth factor-23 (FGF-23) secretion, promoting hyperparathyroidism and bone pathology.[8]

For therapeutic targets, recommended phosphorus levels are between 2.7 and 4.6 mg/dl with IRIS stage 2 CKD, less than 5 mg/dl with IRIS stage 3 CKD and less than 6 mg/dl with IRIS stage 4 CKD.[6]

Gastrointestinal disturbance

Cats with CKD have been shown to develop gastric mineralization and gastric gland hypertrophy.[10] A therapeutic kidney diet may help lessen gastrointestinal signs in some cats by managing hydration, hypokalemia, and acidosis, but anti-nausea medications are often necessary in late-stage CKD.

Hypokalemia

Hypokalemia is common in cats with IRIS stage 3 and 4 CKD. Maintaining potassium concentration in the middle or upper half of the laboratory reference range is recommended. Oral supplementation with potassium gluconate or potassium citrate is recommended if persistent hypokalemia is noted despite the use of a potassium-supplemented kidney diet.[11,12]

Anemia

Moderate to severe non-regenerative anemia can develop in cats with late-stage CKD. Cats will have weakness, lethargy, cold intolerance, and anorexia. The use of iron supplementation with or without an erythropoiesis-stimulating agent is recommended, with packed cell volume greater than 25% as the therapeutic target.[8]

Metabolic acidosis

A therapeutic kidney diet may help address acidosis secondary to CKD. In late-stage CKD, alkalinizing agents such as sodium bicarbonate or potassium citrate may be necessary to address metabolic acidosis, which also contributes to inappetence.[8]

TABLE 1: CURRENT THERAPEUTIC KIDNEY DIETS FOR CATS (TYPICAL ANALYSIS FOR 100 KCAL)

DIET (DRY)	CALORIES (kcal/cup)	PHOSPHORUS (mg)	PROTEIN (g)	CARBOHYDRATE (g)
BLUE NVD K+M	425	130	6.88	9.67
Hill's k/d Early Support	536	127	7.7	8.7
Hill's k/d with Chicken	541	116	6.8	9.1
Hill's k/d with Ocean Fish	444	116	6.7	9.1
Hill's k/d + Mobility	484	116	6.6	9.7
Purina NF Early Care	494	90	8.95	8.37
Purina NF Advanced Care	536	90	6.92	9.51
Royal Canin Renal Support A	345	110	5.86	11.2
Royal Canin Renal Support F	373	110	6.55	10.5
Royal Canin Renal Support S	398	100	5.84	9.37
Royal Canin Renal Support + HP	402	110	6.07	9.76

DIET (CAN)	CALORIES (kcal/can)	PHOSPHORUS (mg)	PROTEIN (g)	CARBOHYDRATE (g)
BLUE NVD K+M	153	110	6.13	11.65
Hill's k/d Early Support	79	133	7.6	7.7
Hill's k/d Chicken & Vegetable Stew	70	111	6.8	8.7
Hill's k/d Vegetable & Tuna Stew	77	115	7.1	8.8
Hill's k/d Pate with Chicken	177	124	7.6	9.8
Hill's k/d + Mobility	68	108	6.6	8.5
Purina NF Early Care	162	110	9.49	7.67
Purina NF Advanced Care	165	90	6.69	8.96
Royal Canin Renal Support D	97	80	6.29	4.09
Royal Canin Renal Support E	171	90	6.64	5.4
Royal Canin Renal Support T	82	100	6.25	5.97

Source for diet information: BLUE Natural Veterinary Diet Product Guide 6-2020, Royal Canin Veterinary Health Nutrition Product Book 2019, Hill's Key to Clinical Nutrition 2018, Purina ProPlan Veterinary Diets Product Guide 2020

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