

Nutritional Management of CKD

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Chronic kidney disease (CKD) is a major cause of morbidity and mortality in cats and dogs¹ but nutritional interventions can help them live a longer life and have a better quality of life^{2,3}. Although nutritional management of CKD has been demonstrated to benefit these pets, some cats and dogs experience appetite loss and changes in lean body mass that can interfere with quality of life. For these problems, nutrition should be part of the solution.

Evidence Based Nutrition

When looking at the benefits of therapeutic nutrition, it is important to remember that most studies evaluate the food as whole and not individual components of the formula. Renal foods are often thought of as only “low-protein” foods but they have numerous features that add to their benefits. They contain controlled levels of dietary phosphorus to decrease renal secondary hyperparathyroidism and control serum phosphorus, increased levels of omega-3 fatty acids to help manage inflammation, buffers to help control acidemia, potassium to prevent hypokalemia and added antioxidants such as Vitamin E and C. An overview of the research has been included below.

In dogs, a randomized, double-blinded, controlled study was performed evaluating two treatments (renal therapeutic food vs. control food) in dogs with naturally occurring CKD². During this 2 year study, dogs consuming the renal therapeutic food lived more than 3 times longer than the dogs consuming the control food. The median survival time for the dogs fed the renal therapeutic food was 594 days vs. 188 days for the dogs consuming the control food. Additionally, feeding the therapeutic renal food significantly delayed the onset of uremia. The median days until onset of uremia for the dogs consuming the therapeutic renal food was 615 days compared to 252 days for the group consuming the control food. This study also included a blinded evaluation of quality of life which indicated that the therapeutic renal food used in the study was superior to the control food for sustaining health-related quality of dogs with CKD⁴.

In cats, a non-randomized, non-blinded clinical study showed that cats eating a therapeutic renal food lived more than 2.5 times longer compared with cats that continued eating their regular food⁵. The median survival time was 633 days in the renal food group and was significantly lower (254 days) in the regular food group. Another study (randomized, controlled, double-blinded clinical study) found that cats consuming a renal therapeutic food had fewer uremic crises³. During this 2 year study, 26% of the cats fed the control food had a uremic crisis while no cats consuming the renal therapeutic food had a uremic crisis. In addition, cats fed the therapeutic renal food had fewer deaths due to CKD. Twenty two percent of cats fed the control food died from CKD compared with no deaths due to CKD in the group fed the therapeutic renal food and this difference was significant.

Addressing Appetite Loss

In addition to eating an appropriate therapeutic food, these pets need to consume sufficient calories each day to prevent weight loss and muscle loss. Pets with CKD may suffer from a decreased appetite for a number of reasons including uremia-related stomatitis, gastritis and nausea. They may also be dehydrated and/or hypokalemic. It is important to address these

underlying causes of inappetence and nausea or the feeding plan may not be successful. Pets consuming an inadequate amount of calories each day will lose weight. In fact, they may actually lose more lean mass than healthy pets due to a lack of an adaptive response to inadequate caloric intake. Adequate caloric intake is important for maintaining both body weight and muscle mass.

When creating a nutritional plan, one of the first steps should be to ensure that adequate kilocalories are offered and consumed each day. Making a recommendation for a particular food and an amount to feed provides the pet owner with a target that needs to be met. Discussing how to transition the cat to the new food during the initial visit is also extremely important. For finicky cats, a prolonged transition period of 6 weeks may be necessary in order to have a successful transition. Discussing strategies to entice the pet to eat such as warming canned food to body temperature and adding low sodium or no salt added chicken broth to dry food can be extremely helpful to the owner. A follow-up visit, approximately two weeks after the transition period, allows for adjustment of the feeding recommendations if necessary before significant weight loss occurs. In addition to these recommendations, pet food manufacturers are also working to help pets who experience appetite loss. Many pet food companies that formulate therapeutic foods offer renal foods in a variety of textures and flavors for finicky pets.

If these strategies and appetite stimulant medications fail, a feeding tube may be necessary. Therapeutic renal foods can be mixed with water in a blender to achieve a smooth consistency that can be fed through esophageal and gastric feeding tubes.

Addressing Muscle Wasting

In addition to changes in appetite, muscle wasting is another concern in CKD patients. Some pets may be losing muscle mass because they are not consuming adequate kilocalories each day but it is important to recognize all of the causes and mechanisms for this change in body composition. Adequate daily caloric intake will help ensure that the cat or dog is consuming an appropriate level of protein each day. However, feeding foods with lower levels of protein and its impact on lean muscle mass is frequently brought up as a concern. Based on results of published studies, muscle mass is maintained in cats while eating therapeutic renal foods^{6,7}.

Protein quality is another factor that needs to be considered when looking at the protein level in a food. In reality, pets have an amino acid requirement, not a protein requirement. This makes the balance and amount of essential amino acids critical. High digestibility is also needed to that the protein can be well utilized by the body. Proper formulation of therapeutic foods with lower levels of protein can ensure that more than adequate levels of all the essential amino acids are present, avoiding deficiencies that would limit the body's ability to rebuild muscle during normal daily turnover of muscle proteins.

When looking at other causes of muscle loss, cachexia and sarcopenia can both be seen in pets with CKD. Cachexia is the loss of lean body mass due to diseases such as CKD and can occur due to multiple mechanisms including changes in cytokine, catecholamine, and insulin production as well as changes in muscle fiber synthesis and type⁸. While few studies evaluating cachexia exist in the veterinary literature, loss of lean body mass in humans due to cachexia is directly associated with decreased survival time and quality of life⁸. Because cachexia differs from starvation, solely providing nutritional support including an increased protein intake has failed to demonstrate efficacy in improving weight gain or lean body mass in humans. The

impact of increased protein intake alone on cachexia has not been investigated in pets but is likely to result in similar results. Sarcopenia is the age-related loss of lean body mass in the absence of disease. Like cachexia, its cause is multifactorial. For this reason, just increasing protein intake has not been shown to lessen this muscle loss. Cachexia and sarcopenia are managed by ensuring that any underlying diseases and associated inflammation are well managed and that adequate energy intake and high quality protein are consumed daily. Other management strategies include providing L-carnitine and omega-3 fatty acids from fish oil.

Carnitine supplementation may help improve mitochondrial function in aging animals through improved efficiency of energy metabolism. Furthermore, carnitine is excreted primarily by the kidneys and is conserved by renal reabsorption. In many species, reabsorption of carnitine is as high as 90%, but efficiency of reabsorption has been found to be impacted by kidney disease, further highlighting the rationale for supplementation in a renal supportive food^{9,10}.

Omega-3 fatty acids from fish oil have been demonstrated to down regulate protein catabolism in cachexia through attenuation of proteasome expression, decrease inflammatory cytokines, and have benefits on muscle mass in dogs with cardiac cachexia^{11,12}. Studies investigating the beneficial effects of omega-3 fatty acids in management of sarcopenia suggest fish oil may further enhance protein synthesis in response to an anabolic substrate such as amino acids.

Summary

In conclusion, renal therapeutic food is a vital aspect of managing CKD because it has been shown to increase quality of life and survival^{2,3}. It is the standard of care for cats and dogs with chronic kidney disease and is included in the treatment guidelines established by IRIS, 2016 International Society of Feline Medicine (ISFM) Consensus Guidelines on the Diagnosis and Management of Feline CKD and the 2004 ACVIM Consensus Recommendations for Management of Proteinuria in Cats/Dogs. In addition to offering a therapeutic food, it is also important to ensure that the pet is consuming adequate calories each day and intervene when necessary. This will help ensure that these pets have a good quality of life.

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