# The Role of Biomarkers in Diagnosis and Monitoring of Cats With CKD

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**Q Why should early diagnosis of chronic kidney disease (CKD) in cats be a goal for veterinarians?**

**A** The goal of early CKD diagnosis and intervention is to improve patient outcomes, slow progression of disease and help improve patient quality of life. By identifying CKD earlier in the disease process through the use of biomarkers, we can hopefully better target potential treatment to slow or stop kidney injury and progression of disease.

**Q What are the advantages and limitations of the CKD biomarkers being used today? Are additional options needed?**

**A** **Serum creatinine** is probably the most familiar feline CKD biomarker to practicing veterinarians, and it has played a significant role in International Renal Interest Society (IRIS) disease staging[1] for years. However, the use of serum creatinine as a biomarker of renal disease has certain limitations:

- The greatest challenge in using serum creatine in early diagnosis of CKD is the steep curvilinear relationship with GFR (marker of renal function). A significant reduction in GFR from normal is required before we see a corresponding increase in serum creatinine.[2]
- Serum creatinine is influenced by muscle mass; however, many CKD patients are geriatric with reduced muscle mass. Cachexia secondary to CKD may result in falsely low serum creatinine levels and the practitioner may overestimate the degree of kidney function left.

**Symmetric dimethylarginine (SDMA)** is a newer biomarker that is similar to serum creatinine and also believed to be an indicator of GFR. Studies have indicated SDMA may increase above the normal reference interval sooner in the disease process than serum creatinine[2] and is not affected by muscle mass. However, one of the limitations of SDMA is that there have not been many studies done yet to fully evaluate what non-renal factors may affect it.

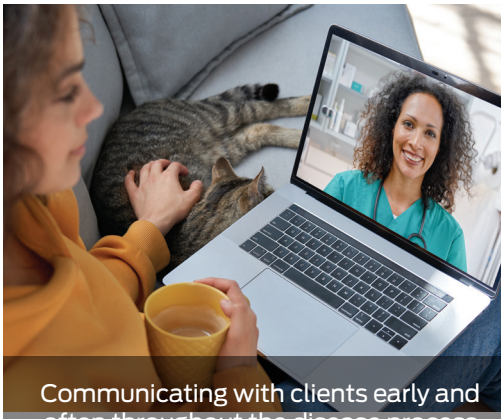
While SDMA might be an earlier marker of renal disease in cats, I think it's too early to say it is better than serum creatinine. I recommend measuring and monitoring both SDMA and serum creatinine over time. Even small changes might indicate a decline in kidney function. Meanwhile, a new school of thought suggests we should perhaps be looking for additional biomarkers that let us know there is active kidney injury or inflammation. These may be helpful in determining if patients are either at risk for CKD or at risk for disease progression if they already have it.

**Q What is your recommended approach for diagnosis and management of cats with CKD?**

**A** The prevalence of CKD is much higher in older cats, so I recommend blood work on cats starting at 8 to 10 years of age to identify a serum creatinine baseline and to monitor changes in SDMA levels. I also recommend routine urinalysis to look for evidence of proteinuria. Hypertension is another risk factor for CKD development, so monitoring blood pressure in cats as they age can be helpful.

Some of the best evidence for successful management of cats with CKD is to offer them a therapeutic renal diet beginning in IRIS Stage 2. Studies have shown cats with CKD (IRIS Stage 2 or higher) that were fed a therapeutic renal diet had improved survival times and fewer uremic crises than cats not fed a therapeutic renal diet.[3,4,5] Managing hypertension, proteinuria and dehydration are also important.

In the future, my hope is that we will have more targeted treatments for feline CKD. New and better biomarkers that facilitate early diagnosis will be the key to achieving these goals .



Communicating with clients early and often throughout the disease process and feeding patients a therapeutic renal diet can help improve quality of life for cats with CKD.

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1 *IRIS Guidelines for Staging of CKD: http://www.iris-kidney.com/guidelines/staging.html*

2 *Hall JA, Yerramilli M, Obare E, et al. Comparison of Serum Concentrations of Symmetric dimethylarginine and Creatinine as Kidney Function Biomarkers in Cats with Chronic Kidney Disease. J Vet Intern Med 2014;28:1676-83.*

3 *Ross SJ, Osborne CA, Kirk CA, et al. Clinical evaluation of dietary modification for treatment of spontaneous chronic kidney disease in cats. JAVMA 2006 Sept 15;229(6):949-57.*

4 *Plantinga EA, Everts H, Kastelein AMC, et al. Retrospective study of the survival of cats with acquired chronic renal insufficiency offered different commercial diets. Vet Rec 2005 Aug 13; 157(7):185-7.*

5 *Elliott J, Rawlings JM, Markwell PJ, et al. Survival of cats with naturally occurring chronic renal failure: effect of dietary management. J Small Anim Pract 2000 June;41(6):235-42.*

# Tailor Renal Diet Recommendations to Patient Needs

**Laura Eirmann, DVM, DACVN**
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Feeding cats with chronic kidney disease (CKD) requires a holistic approach. I emphasize to clients that we are feeding their cat, not just their cat's kidneys, and that a cat's dietary needs may change over time. Following are five leading considerations.

## 1. Provide targeted nutrition with a therapeutic renal diet.

Nestlé Purina offers two options for dietary management of cats with CKD. The first is Purina® Pro Plan® Veterinary Diets NF Kidney Function® Early Care Feline Formulas, which contain a moderate amount of high-quality protein and restricted phosphorus to nutritionally manage cats with CKD. The second is NF Advanced Care Feline Formulas, with a reduced amount of high-quality protein and restricted phosphorus to nutritionally manage cats with CKD.

The primary difference between these diets is the level of protein. Cats with more advanced CKD may retain uremic toxins, which can cause nausea and inappetence. Some of these toxins are breakdown products of protein metabolites. While the protein level in Advanced Care is reduced, it still provides adequate protein for cats with CKD assuming appropriate intake.

## 2. Determine what the cat will eat.

While the diets are designed for staged feeding, there are no hard and fast rules dictating when to feed a particular formulation. In fact, cats at any stage of CKD may benefit from either formulation, and the decision of which is optimal might boil down to which one the cat will eat. If you believe the cat will benefit from a slightly higher or lower protein level, you might try Early or Advanced Care. If you're looking for a way to contribute to the cat's total water intake, a canned formulation, which contains significant moisture, may be your recommended choice. If you have a cat that needs a calorically dense diet and doesn't eat a lot of volume, one of the dry formulations may be the best option.

## 3. Keep the cat adequately hydrated.

It is common for cats with CKD to have increased difficulty maintaining hydration, which can cause them to be nauseous and inappetent. Strategies to consider include feeding a canned formulation, adding a supplement such as Purina® Pro Plan® Veterinary Supplements Hydra Care® to support hydration or administering fluids subcutaneously or through an enteral feeding tube.

## 4. Encourage consumption.

Many cats prefer to eat alone in a quiet environment. If cats prefer to graze all day, a dry diet may work best. With canned food, temperature can be important. If the cat prefers the food to be between room temperature and body temperature, clients will need to gently warm it prior to serving. Other cats like their canned food cold. I encourage clients to experiment with different food temperatures.

Ensuring that cats with CKD continue to eat often requires additional steps as the disease progresses. Purina® Pro Plan® Veterinary Supplements FortiFlora® Feline Probiotic Supplement may enhance palatability without significantly impacting phosphorus intake and can be sprinkled on the cat's food. Mirtazapine is a medication with appetite stimulant and anti-nausea properties for cats with CKD that is available both in oral form and as a transdermal gel applied to the ear. An esophagostomy tube is also a good option for many cats. It's easy for veterinarians to place, comfortable for the cat and can be used long-term to provide nutrition, hydration and, in some cases, medication.

## 5. Consider other factors that may affect consumption.

It's important to refer to the patient's history, clinical signs and physical exam to ensure a concurrent issue isn't affecting the cat's willingness to eat. Does the cat have a dental or GI issue? Is the patient arthritic and needing food positioned differently? Is there competition for food or bullying from a dog or another cat in the home? Are there cognitive issues? If the sole focus is on the cat's kidneys, something else may be missed.

Employing a holistic approach while keeping individual patient nuances top of mind can go a long way toward achieving successful nutritional management of cats with CKD.

## Dry vs. Canned for Cats with CKD

**Weighing the renal therapeutic diet choices**

| CANNED DIET | DRY DIET |
|---|---|
| Optimal choice if cat accepts; supports hydration | Option for cats that won't eat canned diets *or* require a nutritionally dense food |
| Best for cats that are "meal" feeders | Best for "grazers" |
| May need to experiment with food temperature to appeal to the cat | Consider hydration supplement to promote adequate fluid intake in cats |

# Proactive Approach Paves Way for Better CKD Patient Outcomes

**Jamie Senthirajah, DVM**
Paz Veterinary
Austin, Texas

Feline chronic kidney disease (CKD) is typically a disease of older cats, but a key to a better outcome is starting screening when cats are younger.

Our practice is an urban veterinary hospital that caters to a clientele with a holistic pet-care mindset. Clients with this outlook believe in the importance of preventive care and regular disease screening. They are also committed to providing good nutrition for their pets, because they understand its connection to health. As a veterinarian, my job is to educate my clients and help guide them toward making educated decisions that are backed by research.

## Starting young sets the stage for early intervention

Diagnosing feline CKD early is dependent on detecting changes seen on bloodwork before the cat begins exhibiting clinical signs of disease. I recommend annual bloodwork for cats starting at 1 year of age, and we price screenings affordably to help clients. By obtaining annual bloodwork, I am able to monitor trends in the patient. Once the cat reaches senior status, when CKD is more likely to manifest, we closely monitor symmetric dimethylarginine (SDMA) values in addition to other blood and urine parameters.

If bloodwork and urinalysis indicate the onset of CKD, the first thing I do is thank clients for allowing us to catch the disease early. I also assure them that cats with CKD can live long lives and that we will have options along the way that will help them play active roles in providing care.

## Nutrition is the cornerstone of patient management

Diet and hydration form the foundation of managing cats with CKD, whether we catch the disease early or don't see a patient until they are at IRIS Stage 4. Every cat needs to eat and drink, so we can always do a great deal for our patients, even if feeding a therapeutic renal diet is the only change a client is willing to make.

It's important to manage cats as individuals when it comes to diet and fluids. A cat with severe periodontal disease may not be able to eat dry food and a cat that grazes vs. eating meals may not be a candidate for a wet diet. While I prefer CKD patients switch to wet food if possible, a newer option for cats on dry diets is to add Purina® Pro Plan® Veterinary Supplements Hydra Care® to support hydration.

## Stay a step ahead of patient interventions

Education of clients is often an overlooked part of veterinary practice. I strive to prepare clients for what may come next. For example, I'll talk to them about administration of subcutaneous fluids before they're needed so they'll be ready when the time comes. I also explain that we have therapeutic options like anti-nausea medications to reduce vomiting and appetite stimulants if their cats become unwilling to eat.

With cats, gradual changes are almost always better than sudden ones. When cats transition to a diet or transition from Purina® Pro Plan® Veterinary Diets NF Kidney Function® Early Care formulas to NF Advanced Care formulas, I recommend they do so over a 7- to 10-day period or longer. I have had excellent dietary acceptance, even with cats that are known to be selective, provided we don't rush the dietary change.

The key to managing cats with CKD is educating clients and building trust. When clients understand that we are treating their cats as individuals and considering their needs and priorities, we can work together to do what's best for their pets.

Routine blood screening that includes a metabolic panel starting at a young age, along with SDMA testing when cats reach senior status, is key to early diagnosis of feline CKD.

## Key Takeaways

- Obtaining bloodwork on cats starting at 8 to 10 years of age to identify a serum creatinine baseline and to monitor changes in SDMA levels—in addition to performing routine urinalysis and monitoring blood pressure—can help with early detection of impaired kidney function.
- Feeding cats with chronic kidney disease (CKD) requires a holistic approach. Emphasize to clients the importance of feeding their cat, not just their cat's kidneys, and that a cat's dietary needs may change over time.
- A proactive approach to diagnosis of feline CKD can facilitate early intervention and equip clients to partner with the veterinary team in managing the patient.

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