

## Chronic Kidney Disease

Chronic kidney disease (CKD) is common in older cats and can ultimately lead to kidney failure. Occasionally identifiable causes such as bacterial infections and kidney stones are incriminated in CKD. Many times the exact cause of CKD is not determined. Once kidney tissue is destroyed, the damage can not be repaired. Fortunately, the kidneys have the ability to compensate and maintain function, especially when aided by dietary and medical treatments.

CKD is progressive and may take years to run its course. Early signs are increased urine volume and water intake, which is more pronounced as the disease progresses. With diminished kidney function comes a decreased ability to rid the body of waste products (especially products of protein metabolism) and compromised mechanisms of acid-base and electrolyte balance. Low potassium is a common electrolyte complication. All of these changes take a steady toll on the body. Some cats will develop high blood pressure, which can lead to mental confusion, blindness and strokes. As kidney failure worsens more problems can develop. The gastrointestinal tract becomes irritated and may ulcerate and bleed. In advanced kidney failure anemia occurs as the kidneys produce less erythropoietin, a hormone that stimulates red blood cell production.

The following table depicts the progression of signs and laboratory findings for cats in four stages of CKD

	<i>Signs/Conditions</i>	<i>Laboratory Changes</i>
<i>Stage One</i>	Increased water intake and urine volume +/- High blood pressure +/-	Urine becoming dilute Kidney function tests are normal Potassium low +/-
<i>Stage Two</i>	Increased water intake and urine volume Weight loss +/- High blood pressure +/- Selective appetite +/-	Urine dilute Kidney function tests mildly elevated Potassium low +/-
<i>Stage Three</i>	Increased water intake and urine volume High blood pressure +/- Weight loss Poor appetite +/- Vomiting +/- Decreased activity +/-	Urine dilute Kidney function tests moderately elevated Potassium low +/- Phosphorus increased +/- Anemia +/-
<i>Stage Four</i>	Increased water intake and urine volume High blood pressure +/- Weight loss Poor appetite Vomiting +/- Lethargy	Urine dilute Kidney function tests severely elevated Potassium low +/- Phosphorus increased Anemia

## Prognosis

How well your cat will do is influenced by number of issues. How advanced is the kidney disease? Is there an identifiable cause of the kidney disease and how effectively can we treat it? Are other organ systems diseased and how does this affect the kidneys? Will your cat accept and tolerate treatments? Can you devote the time and money needed to treat and monitor the condition?

However we answer these questions, remember that CKD can not be cured. But what we can do, is manage CKD, maybe slow down its progression, and make your cat feel better. Results can be quite rewarding but are sometimes disappointing. Over the long haul, it's all about quality of life. Often we won't know how your cat will do until we try the treatments. When treatment is begun early in the course of CKD cats may enjoy years of quality life.

## The Work-up

A thorough work-up may uncover a cause of your cat's kidney disease, will help provide a prognosis, and will determine which treatments are needed. Baseline tests include a full blood profile, urinalysis, urine culture, blood pressure determination, and urine protein/creatinine ratio. Other tests may be indicated such as x-rays and abdominal ultrasound to look for kidney stones, infection, and other evidence of kidney disease. Kidney biopsies are sometimes performed to pinpoint specific causes of kidney disease..

## Treatments

Prolonging your cat's life is not enough – our primary goal is to improve or sustain a quality life. Many of the treatments listed below will be continued the remainder of your cat's life.

- ❑ Low-protein, low-phosphorous diets. Restricting dietary protein reduces the protein burden on the kidneys and reduces toxic waste products in the blood. Kidney diets also are phosphorous restricted which helps lower elevated blood phosphorous that is damaging to the kidneys. Cats that eat low-protein, low-phosphorous diets willingly, generally do better. Commercial prescription kidney diets include: Hill's K/D, Purina CNM-NF, Royal Canin Renal LP, and Eukanuba Multi-Stage Renal. All of these diets are available in dry and moist formulations. Moist foods are preferred over dry foods because their increased water content helps improve patient hydration. When switching your cat to a kidney diet, gradually transition from the old diet to the new diet over a one to two week period.

*Some cats don't like commercial prescription kidney diets*, so make sure you're a cat is eating enough food and not losing weight. If your cat is not enamored by commercial prescription diets, consider supplementing or substituting with a home-cooked low-protein, low-phosphorous recipe (see attachment one). Despite these efforts, you may be forced to feed whatever your cat likes. We can not starve your cat for the purpose of feeding the best diet.

- ❑ Promote increased water intake to keep your cat hydrated. Moist foods are preferred over dry foods. Adding water to dry food and even moist food is helpful. Make plenty of fresh water available in inviting ways. Avoid plastic bowls that impart a disagreeable taste to the water. Some cats prefer a mug or small glass of fresh water instead of a bowl. A wonderful tool for encouraging water drinking is a small circulating water fountain that can be purchased in pet stores. Cats are fascinated by moving water which mimics natural sources of fresh water. Please remember to clean and maintain circulating water fountains regularly. For cats that are not attracted to circulating water fountains, run a faucet at a trickle periodically throughout the day. Soon your cat may be telling you when they are thirsty.

- ❑ Blood pressure medications. High blood pressure (hypertension) sometimes complicates CKD and can cause mental confusion (wandering and crying), blindness, and strokes. The Cat Doctor will routinely monitor your cat's blood pressure and in most cases treat when high blood pressure occurs. We commonly prescribe amlodipine (Norvasc®) +/- enalapril.
- ❑ ACE inhibitor therapy. Angiotensin converting enzyme inhibitors (ACE inhibitors) may have value in limiting progression of CKD, especially in cats with high levels of protein in their urine. ACE inhibitors have become increasingly popular in treating feline CKD. Enalapril and benazepril are two ACE inhibitors that are used. Benazepril is preferred in cats with elevated kidney function tests.
- ❑ Tumil-K. Potassium is lost from the body during kidney failure and can lead to weakness and diminished kidney function. Tumil-K is a veterinary potassium supplement that is tolerated by most cats. It comes in powder  tablet  and gel  formulations. Potassium supplements can cause vomiting and poor appetite; contact The Cat Doctor if this should occur.
- ❑ Calcitriol. Calcitriol is a hormone produced by the kidneys. It is a physiologically active form of vitamin D that helps regulate calcium and phosphorus metabolism. When the kidneys become diseased they cannot make enough calcitriol, which can cause disruption of the body's calcium and phosphorus balance. This can lead to nausea, vomiting, poor appetite, and worsening of the kidney disease. By administering calcitriol orally in CKD we may slow the progression of kidney damage, and reduce or delay the onset of signs of kidney failure. Many clients note that their cats feel better when they are on calcitriol. We will order your cat's calcitriol through a veterinary compounding pharmacy. See separate handout for additional details.
- ❑ Vitamins. Vitamins, given orally in liquid and pill forms, replace water-soluble vitamins that are lost in the urine in CKD. Some vitamin products contain iron, which helps treat anemia that may be present.
- ❑ Famotidine (Pepcid-AC™) - 10 mg tablets. By acting directly on the stomach to reduce stomach acid production, famotidine may reduce nausea, vomiting, and GI bleeding associated with kidney failure. In doing so, it can make your cat feel better. Famotidine is a human medication that is purchased over-the-counter. Give 1/2 tablet once daily or 1/4 tablet twice daily. Some cats will receive lower doses. Note: famotidine, the generic equivalent of Pepcid-AC, is less expensive and equally effective.
- ❑ Phosphate binders. Phosphate binding medications are mixed into the food to help decrease absorption of phosphorus from the intestines. This lowers blood phosphorus levels, which slows the progression of kidney damage and reduces mineral deposition in soft tissues. The Cat Doctor will prescribe either Epakitin® or aluminum hydroxide powder. Epakitin® is highly palatable and well tolerated by cats. Aluminum hydroxide can cause poor appetite and vomiting in some cats. Please contact The Cat Doctor should this occur.
- ❑ Cyproheptadine - 4 mg tablets. Poor appetite leads to reduced caloric intake and weight loss. By eating well your cat can become stronger and may gain weight. Give 1/4 tablet once to twice daily is the standard dosage. Occasionally cats become agitated or sedated on this drug; contact The Cat Doctor should this occur.

- Fluid and electrolyte solutions. Fluids and electrolytes are administered intravenously in the hospital to treat more advanced cases of kidney failure. By giving fluid and electrolyte solutions under the skin (subcutaneously, SQ) at home you can advance the quality and duration of your cat's life. Feel free to borrow our videotape on home fluid administration.

You will be giving \_\_\_\_\_ — \_\_\_\_ cc once  or twice  daily, or once daily every \_\_\_\_ days.

Additives in fluids: \_\_\_\_\_

- Epogen injections. This is the genetically engineered form of erythropoetin, a hormone that is normally produced by the kidneys and stimulates red blood cell production. Epogen is used to treat more severe anemia that develops secondary to chronic kidney failure. Results can be extremely gratifying as seen by resolution of anemia, and improved strength and appetite. This is also a "feel good" hormone. Use of this drug requires careful patient selection, dosing and regular monitoring of blood tests.

The initial dose is: \_\_\_\_\_

- Other treatments:

#### Follow-up Monitoring

Follow-up Monitoring. We will need to monitor kitty's response and adjust the treatments. Appropriate rechecks are very important! As time goes on, we will add, subtract, and modify treatments..

We should recheck your cat: \_\_\_\_\_

At that time the following tests should be performed:

#### For More Information

Visit an excellent web site, Feline CRF Information Center ([www.felinecrf.com](http://www.felinecrf.com)), for an in-depth discussion of chronic renal failure in cats. It's a bit dated with respect to some medications, but there's lots of good information and tips.

