



Chronic Kidney Disease

Chronic kidney disease is a common disease process in pets over 10 years old. While more common in cats, the following information applies to dogs also. It occurs when the kidneys are no longer able to fully perform their normal duty of removing waste by-products from the blood. This is not the same as the inability to make urine. In fact, most cats with renal failure are producing large volumes of urine in an attempt to remove the waste products that have accumulated in the blood. This apparent contradiction between the large volume of urine produced and declining kidney function is often a source of confusion for owners.

Typically, renal failure comes about as the kidneys undergo aging changes and begin to "wear out." It is a process that develops over months to years. Initially, there may be no apparent signs, and the bloodwork is normal. However, there are irreversible microscopic changes underway in the aging kidney. Eventually, the kidneys will begin to shrink because of scar tissue. By this time, there are usually signs of progressive kidney disease, and the lab work will indicate associated abnormalities. Kidney failure is very difficult to detect until about 70% of the total kidney mass is no longer working. In the earliest stages, the only detectable signs are the blood and urine tests. Occasionally, kidney failure occurs suddenly due to infection or injury.

The kidneys serve as filters which keep certain compounds in the blood, while allowing harmful waste products to escape into the urine. They also help regulate red blood cell levels, fluid and electrolyte balance. With age, the filtration process becomes progressively less effective, blood flow to the kidneys increases in an attempt to improve filtration. This is the reason that a pet with kidney failure produces more urine. Because of the excessive *fluid loss* through the urine, the pet may drink more water, trying to avoid dehydration. Increased water consumption is the body's attempt to compensate for lost kidney function.

Thus, the common early clinical signs of kidney failure are increased water consumption (polydipsia) and increased urine production (polyuria). For a time, this compensatory change keeps the individual from becoming seriously ill. Eventually, the total amount of functional kidney becomes so small (less than 30%) that the body's compensation is not adequate. This is a long term, non-curable illness. However, many pets can continue relatively comfortable lives with proper ongoing treatment.

CAUSES: The most common cause of chronic renal failure is a very gradual degeneration due mainly to aging. In some cases, infection or toxins play a role, but in most cats there is not

specific cause. In fact, in most cases, the exact cause for renal failure cannot be determined. It is not considered to be a contagious problem.

There are several factors identified that may hasten the typical progression of renal disease. In cats, perhaps the most common long-term factor is eating an acidified diet. Diets that are used to make urine pH more acid are very common. These diets have been developed to aid in management of *lower urinary tract (bladder) problems* (cystitis or "FUS"). These diets are useful for managing certain bladder problems more common to young adult cats. Unfortunately, they are potentially harmful to the kidneys of older cats. These diets can increase the total body acid and enhance loss of potassium from the body. Chronic low potassium has been identified as a significant factor in progression of kidney disease in older cats. Even when blood tests indicate normal potassium serum levels, older cats may have low levels of total body potassium. Other contributing factors include excess minerals in diet, mineral imbalance in the blood, hyperthyroidism, urinary tract infections, and high blood pressure.

CLINICAL SIGNS: In the early stages of kidney insufficiency there may be no outward signs. The classic, early signs of increased urine output and a compensatory increase in thirst, are not always seen. As failure progresses, signs may include loss of appetite, weight loss and a poor hair coat. In the advanced stages there may be severe depression, vomiting, diarrhea, mouth ulcers and foul breath. A heart murmur can occur if significant anemia develops. An untreated patient eventually stops eating, gradually becomes weaker, goes into a coma and dies over weeks to months.

DIAGNOSIS: The diagnosis of kidney failure is made by determining the level of two waste products in the blood: BUN and Creatinine. Urine specific gravity (obtained from a urine sample) helps determine the kidneys' ability to maintain normal body fluid balance, if there is infection present, and overall kidney function. The normal pet has a concentrated urine (high specific gravity). Those with renal failure usually have dilute urine (low specific gravity).

When the BUN and Creatinine reach certain levels, they are very specific indicators of renal failure. Unfortunately, tests do not become abnormal until there is significant kidney damage. In most cases over 70% of kidney function must be lost before the test results are substantially elevated. In the early stages there may be no signs other than abnormal blood tests.

PROGNOSIS: Prognosis depends upon how much healthy kidney is remaining, response to the initial stage of treatment, and your ability to perform the follow-up care. However, we encourage treatment in most situations because many pets, especially cats, will respond and have the potential for good quality life for several months to many years.

TREATMENT: The first, *intense*, phase of treatment is called fluid diuresis. This is needed for animals that are dehydrated and have a high BUN. Large volumes of balanced electrolyte fluids are given by injection (either intravenously or subcutaneously) in an attempt to rehydrate the patient and flush toxins from the body. This flushing process, called diuresis, is designed to maximize the function of all remaining kidney tissue. If enough functional kidney cells remain,

they may be able to adequately meet the body's needs for waste removal with the help of this additional fluid. Also, the fluid therapy helps to replace various electrolytes, especially potassium. Other important aspects of initial treatment include drugs to control vomiting and diarrhea and proper nutrition.

The goal of intensive fluid therapy is to substantially decrease the blood levels of BUN and creatinine (the serum markers for kidney function). If there is significant reduction in these serum markers after 3-4 days of fluid therapy, the prognosis is good -- as long as continued treatment *at home* occurs. If there is no improvement after 3-4 days of fluid therapy, the prognosis is not good. Unfortunately, there is not a test that will predict which cats will respond and which will not. Please understand that we cannot make the kidneys return to normal, but we can help the body cope with kidney failure.

The second, *maintenance*, phase of treatment is designed to continue supporting the kidneys. Short term treatment will usually only provide short term improvement. Maintenance involves one or more of the following, based on individual needs:

- **Renal Prescription Diet (Hill's k/d, Purina NF)**-This helps in three ways. First, it helps to minimize excess protein waste products that kidneys need to eliminate. The result is that the BUN decreases and the pet usually feels better. These diets also have more potassium, less phosphorus, and they do not promote an acid urine. Please note that the most cat foods which are labeled for "urinary health", commonly found in pet or grocery stores, are designed to manage urinary bladder problems common to cats under seven years old. They can be harmful to cats over 7, especially if there is any degree of kidney failure. You will need to purchase the special prescription renal failure diet from your veterinarian. Canned foods have much more fluid than *dry* and are preferred for pets with kidney failure; however, food intake is very important and if your cat won't eat canned food, give in and feed them the dry renal diet formulas.
- **Subcutaneous Fluids**- Pets in all stages of kidney failure benefit greatly from regular fluid therapy given at home. The fluid is dripped subcutaneously (i.e. under the skin). This helps prevent dehydration, a major factor in further kidney deterioration, increases flushing of waste products, and slows overall rate of kidney decline. This is done once weekly to once daily, depending upon the stage of the renal disease. Most owners easily master this technique, so don't be afraid to consider this very helpful option. We have an excellent You Tube video and accompanying handout available on our fairhavenvet.com website that describes this process in detail. Some patients start on fluids before they are seriously ill, avoiding hospitalization and diuresis.
- **Calcitriol supplementation**- Calcium and phosphorus must remain at about a 2:1 ratio in the blood. With kidney failure, these minerals often become imbalanced which can result in mineral deposits in the kidneys, further damaging them. Calcitriol can be used counteract this, helping to prevent further kidney damage.

- **Potassium supplementation-** Potassium is lost through the urine when urine production becomes excessive. A potassium supplement will replace that loss. Potassium is unpalatable and can be difficult to give orally. It is usually given in the subcutaneous fluids or as a dietary supplement. Depletion of body potassium can worsen kidney function.
- **Phosphate binder-** As the kidney's function declines, phosphorus begins to accumulate in the blood. High serum phosphorus contributes to depression, anorexia, and further kidney damage. Phosphate binders will attach to dietary phosphorus in the intestine so that it is not absorbed with the food. These are used when the kidney failure diets are not successful in controlling phosphorus.
- **Appetite Stimulants-** Famotidine (aka Pepcid) is a drug that helps to neutralize excess stomach acid. This is often helpful in improving appetite because excess stomach acid is a cause of nausea that adversely affects the appetite. Additional acid neutralizers, anti-nausea and appetite stimulants are available and may be prescribed to increase quality of life.
- **Drugs to control high blood pressure-** About half of the cats that have kidney failure also have hypertension. Its control is important in preventing blindness, strokes, and further kidney damage.

Continual monitoring of your pet's condition is critical and we often recommend recheck exams every 3-6 months. Periodic blood tests are needed to monitor treatments. These are done every 1-4 months depending on the individual case.