

## **Kidney Disease in Cats**

Chronic kidney disease is a very common disorder in cats, especially geriatric cats. Renal (kidney) insufficiency or renal failure occurs when the kidneys are no longer able to perform their normal function of removing waste products from the blood.

Kidney failure is not the same as the inability to make urine. In fact, most cats with kidney 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, kidney failure comes about as the kidneys slowly 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 cat's 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 and will become small and hard. By this time, there are usually signs of progressive kidney disease, and the labwork will indicate associated changes.

The kidneys are nothing more than filters which selectively keep certain compounds in the blood, while allowing unnecessary waste products to escape into the urine. When aging causes the filtration process to become progressively less effective, blood flow to the kidneys increases in an attempt to improve filtration. This is the reason that the cat with kidney failure is producing a large volume of urine. Because of the loss of excessive fluid through the urine, the cat is obligated to drink more water to avoid becoming dehydrated. This is called a compensatory change.

Thus, the typical clinical signs of kidney failure include increased water consumption (polydipsia) and increased urine production (polyuria).

### **Prevalence**

Various clinical studies have evaluated the prevalence of kidney failure in cats. For most cats, onset of clinical signs begins anywhere from 7-12 years of age. However, the prevalence of overt kidney failure is highest in cats older than fifteen years of age. One study found that approximately 30% of cats over 15 years of age had some degree of chronic kidney insufficiency or failure.

The frequency of kidney failure in male cats is essentially the same as for female cats.

### **Contributing Factors**

At the present time, there are three contributing factors identified that may hasten progression of renal disease.

1. **Hyperthyroidism (overactive thyroid glands).** This hormonal disease is relatively common in older cats. Hyperthyroid cats are usually hypertensive (have high blood pressure), and this results in increased blood flow through the kidneys. As mentioned above, extra blood flow helps the aging kidney maintain function. With treatment of hyperthyroidism, blood pressure normalizes and the extra blood flow to the kidneys is no longer present. This can cause a sudden decompensation of kidneys with already marginal function.

2. **Long term intake of 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 in cats; this is also called "cystitis." While these diets are useful for managing certain bladder problems more common to young adult cats, they are potentially very harmful to the kidneys of older cats. These diets cause chronic 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 levels of potassium are normal, older cats may have low levels of total body potassium. Because total body potassium cannot be measured, the contribution of potassium depletion can be overlooked.

3. Urinary tract infection. Infection in the kidneys and/or bladder may be present without any apparent signs. To prevent bacteria from further damaging the kidneys, cats with kidney failure should have the urine checked for the presence of bacteria.

### **Clinical Signs**

As described above, the classic signs of kidney failure are increased urine output and a compensatory increase in water intake (thirst). Also, with more advanced kidney failure, other signs may include loss of appetite, weight loss and a poor haircoat, depression, vomiting, constipation, and very bad breath. Occasionally, ulcers will be found in the mouth. A heart murmur may be present when the anemia of kidney failure develops.

High blood pressure is relatively common in cats with failing kidneys. The sustained high blood pressure causes some cats to detach the retinas in the back of the eye or to have strokes. These situations result in sudden blindness and loss of equilibrium.

### **Diagnosis**

The diagnosis of kidney failure is made by determining the level of two waste products in the blood, blood urea nitrogen (BUN) and blood creatinine, and urine specific gravity. Urine specific gravity is obtained from a urine sample. It helps assess the ability of the kidneys to concentrate urine. The normal cat has very concentrated urine (high specific gravity), whereas the cat with kidney failure has dilute urine (low specific gravity).

When the BUN and creatinine reach certain levels, they are very specific indicators of kidney failure. However, the problem with these tests is that they do not become abnormal until late in the disease. Over 75% of kidney function must be lost before the test results are substantially elevated. The earliest indicator of kidney problems would be a low urine specific gravity (dilute urine).

### **Treatment**

1. A kidney failure diet. This helps in three ways. First, it helps to minimize excess protein waste products that require the kidneys to work excessively. The result is that the BUN will improve, and the cat will usually feel better. These diets also have restricted amounts of phosphorus, and they do not have products that create an acid pH of the urine. Canned food is better than dry because it provides twice as much water as dry food which can help prevent dehydration.

There are several commercially available prescription diets available. Please note that the available brands of cat food which are labeled "For Urinary Health" are designed to manage bladder problems and are harmful to cats with kidney failure. These diets are usually found in grocery stores and pet shops. You will need to purchase the special kidney failure diet from the veterinarian.

2. Potassium supplementation. Potassium is lost in the urine when urine production becomes excessive. This causes that cat to become very weak. A potassium supplement will replace that loss. As mentioned above, depletion of body potassium can worsen kidney function.

3. Fluids given at home. The fluid is dripped under the skin, or subcutaneously. This serves to help flush waste products through the kidneys and help the kidneys function better. This is done once daily to once weekly, depending on the severity of kidney failure. Most owners easily master this technique so don't be afraid to consider this very helpful option.

4. A phosphate binder. As the filtering ability of the kidneys declines, phosphorous begins to accumulate in the blood. High serum phosphorous contributes to depression and anorexia. Phosphate binders will attach to excess dietary phosphorous in the intestine so that it is not absorbed with the food. Blood levels of phosphorous can be monitored to help tailor the drug dosage. These drugs are used when the kidney failure diets are not able to control phosphorous levels.

5. A drug to regulate the parathyroid gland and calcium levels. Calcium and phosphorus must remain at about a 2:1 ratio in the blood. The increase in the blood phosphorus level, as mentioned above, stimulates the parathyroid gland to increase the blood calcium level by removing it from bones. This can be helpful for the sake of the normalizing calcium:phosphorus ratio, but it can make the bones brittle and easily broken. Calcitriol can be used to reduce the function of the parathyroid gland and to increase calcium absorption from the intestinal tract.

6. A drug to stimulate the bone marrow to produce new red blood cells. The kidneys produce erythropoietin, a hormone that stimulates the bone marrow to make red blood cells. Consequently, many cats in kidney failure have a low red blood cell count (anemia). Epogen, a synthetic form of erythropoietin, will correct the anemia in most cats. Unfortunately for some cats, the drug cannot be used long term because the immune system recognizes the drug as "foreign" and will make antibodies (immune proteins) against it. A vitamin/iron supplement will also help with the anemia.

7. Drugs to stimulate appetite. Pepcid AC 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. Cyproheptadine may also be helpful in improving appetite in cats with kidney failure.

8. Drugs to control high blood pressure. About 65% of cats that have kidney failure also have hypertension. Its control is important in preventing blindness and strokes.

Occasionally, it may be necessary to hospitalize your cat if your cat isn't eating at all, or if the kidneys are severely compromised. In the hospital, large volumes of intravenous (IV) fluids are given in an attempt to 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.

Our goal is that intensive fluid therapy will substantially decrease the blood levels of BUN and creatinine (the serum markers for kidney function). If there is improvement in the blood tests 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.

### **Kidney Transplants**

This procedure is being done at a few locations in the country. Generally, the cat must still be in good condition and not ill from the kidney failure in order to be accepted for a transplant. The cat cannot have other diseases that might complicate the transplant or be life-threatening. Many transplant centers require that the owner adopt the cat that has donated a kidney for the procedure. Some find this undesirable; others find it very rewarding. Also, multiple medications must be given daily for the duration of the cat's life; the antirejection drugs can be extremely expensive. Repeated blood tests are required to monitor function of the transplanted kidney and to monitor blood levels of the antirejection drug. The cost for the transplant procedure, medicines, blood monitoring, and follow up care can ultimately be thousands of dollars.

### **Prognosis**

Prognosis can depend on 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 cats will respond and have the potential for good quality life for months to years.

### **Prevention**

For the most part, kidney failure is not a preventable disease. It occurs as a consequence of aging. However, known causes that can be prevented or managed include the following:

1. Urinary tract infections should be identified and treated.
2. Middle aged and older cats should not be fed acidified diets or those labeled "For Urinary Health."
3. Bloodwork and a urinalysis should be done at least once a year in cats over 8 years old to recognize and start treating kidney problems as soon as it develops, which may ultimately prolong your cat's life.