

Chronic Renal Failure From Clinical Veterinary Advisor: Dogs and Cats

About the Diagnosis

Cause: A dog or a cat, like a person, has two kidneys, which are located in the belly (abdomen). The kidneys produce urine, which is carried away from the kidneys in thin tubes, the ureters, to the bladder and then voided out the urethra. The main function of the kidneys is to eliminate waste substances from the bloodstream that are produced as part of the body's normal functions every day. Normally, a kidney is oval and is roughly the size of a chicken's egg in a medium-size dog. The kidneys are essential to life. It is possible to live with just one healthy kidney, but if both kidneys stop working altogether (a situation referred to as **acute** renal failure), an individual will not survive unless the kidneys are made to start functioning again.

The normal, healthy kidney tissue is made of a variety of cells types that form the microscopic functional unit of the kidney, the nephron. The nephron is composed of the glomerulus, where the blood is filtered; various segments of renal (kidney) tubules, where metabolic waste is excreted or removed and materials needed by the body are absorbed; and the collecting ducts, where final alterations are made in the formation of urine. In addition to filtering the blood, the kidneys are also responsible for maintaining water, electrolyte, and acid-base balance, as well as producing and releasing hormones, which play an important role in controlling systemic blood pressure, red blood cell production, and parathyroid hormone levels.

Chronic renal failure (CRF) is the name given to the medical condition where the kidneys are not functioning adequately; "renal" simply means "related to the kidneys." Kidney tissue damage may be temporary or permanent. However, like certain other organs (such as the brain and the heart), kidney tissue that is permanently damaged cannot be replaced by the body. Therefore, the goal of treatment of chronic renal failure is to prevent permanent damage and to allow temporarily damaged kidney tissue to recover.

CRF occurs when approximately 75% of the nephrons of both kidneys cease to function. Unfortunately, kidney disease can therefore be going on for a long period of time before this threshold is reached and symptoms of failure are noticed. CRF can occur for a variety of reasons (see below), but the final result is the same: the kidneys fail to perform their main function of filtering the body's waste products out into urine. Abnormal filtration results in a buildup of waste products and toxins in the blood. Failure to produce kidney hormones can result in hyperparathyroidism (increased levels of parathyroid hormone).

CRF is a potentially serious and life-threatening disease, but it has many degrees of severity. It is characterized by kidney dysfunction that deteriorates progressively. Some animals diagnosed early respond very well to treatment and can live very comfortably for their normal life span. In other cases, the onset of symptoms can be so sudden and severe that CRF can progress to acute renal failure and be the cause of death within days to months of diagnosis.

CRF is a common problem in all breeds of cats and dogs. Animals of any age and sex can be affected; however occurrence of CRF increases with age. Breeds thought to be more susceptible include: Abyssinian and Persian cats, Basenji, Beagle, Bull Terrier, Cairn Terrier, Chow Chow, Doberman Pincher, English Cocker Spaniel, German Shepherd, Golden Retriever, Lhasa Apso, Miniature Schnauzer, Norwegian Elkhound, Rottweiler, Samoyed, Chinese Shar-Pei, Shih Tzu, soft-coated Wheaten Terrier, and Standard Poodle dogs. Although the cause (etiology) of CRF is often unknown, there are several different potential diseases in cats and dogs which can lead to kidney failure; hereditary and congenital disorders, immune system abnormalities, toxins, poor blood flow and lack of oxygen (ischemia), inflammatory or infectious diseases, cancer (neoplasia), and urinary tract obstructions.

Diagnosis: Symptoms of CRF can vary from patient to patient and are often common to several other diseases.

Your veterinarian will begin by asking you several questions to try to determine if chronic renal failure, or another type of problem altogether, could be responsible for symptoms. You should provide whatever

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information you have when you answer these questions, which often include: the type of symptoms observed, the length of time they have been occurring, effects on vital functions such as appetite and urine elimination, the possibility of exposure to potentially poisonous substances (such as car antifreeze) in the past, and any current medications or supplements you are giving your pet.

When examining your pet, your veterinarian will look for some of the changes that can occur with chronic renal failure, which include poor body condition, dehydration, bad breath, oral ulcers, loose teeth, pale gums, and kidneys that can be felt with the fingertips to be small and irregular. If CRF is suspected by your veterinarian, further testing will be recommended since none of these symptoms are exclusive to CRF.

Lab work consisting of blood and urine tests is typically recommended in order to diagnose CRF as well as rule out other possible medical problems that produce similar symptoms. A complete blood count (CBC), biochemical profile, and urinalysis are the tests of choice. Your veterinarian should be able to acquire samples for these tests in a short period of time. For the urine test, a needle is often used to remove urine directly from the bladder in order to get the most sterile or clean sample. The urine sampling procedure (cystocentesis) is quick, does not cause significant discomfort, and involves very little risk.

Imaging techniques including x-rays and/or ultrasound are also commonly performed. These tests can help to rule out many other disease processes, which could drastically affect the treatment plan and long-term outlook (prognosis).

Other tests that may be performed depending on the case can include: urine culture and sensitivity, blood pressure, blood gas analysis, urine protein/creatinine levels, serologic tests, specialized x-rays (contrast imaging), and kidney fine-needle aspirate or biopsy. These tests may aid in determining an underlying cause and or the severity of disease. In most cases, however, identification of an underlying cause is often masked by the advanced stages of renal failure.

All of these diagnostic procedures can help your veterinarian help differentiate CRF from acute (sudden) renal failure or other disorders, which may be reversible.

Living with the Diagnosis

An increase in thirst and urination are common early signs of CRF. This is a common misconception since many people assume that if a pet is producing a large amount of urine that the kidneys must be working well. In fact, the opposite is true; when the kidneys start to fail, they are unable to retain the correct amount of the body's fluids, and large volumes of urine (polyuria) are the result. If kidney function deteriorates over time, weakness, decrease in activity, vomiting, diarrhea, a decrease in appetite, weight loss, and lack of coordination when walking, dehydration, oral ulceration, and bad breath are often seen. In the terminal stages of renal failure, severe dehydration, vomiting, convulsions, and coma can lead to death.

CRF is a potentially serious and life-threatening illness. During the course of the disease, it is very important to keep all recommended follow-up appointments and lab tests with your veterinarian in order to monitor the progression of disease and make any needed medication adjustments. At home, by monitoring your pet's weight (if possible) as well as changes in drinking, urination, and appetite, you will learn helpful information to bring to your next appointment.

Give all prescribed medications as directed by your veterinarian. These medications are essential in slowing the progression of disease as well as improving the quality of your pet's life. Most of these medications will be required for the rest of the pet's life.

Always provide unlimited access to fresh clean water. Ask your veterinarian for some ideas on how to encourage your pet to intake more water.

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You should discuss an ideal diet for your pet with your veterinarian and feed only the recommended foods. If your pet is no longer willing to eat the special diet, contact your veterinarian prior to changing foods. An adequate level of nutrition is extremely important in the treatment of renal failure.

Treatment

The goal of treatment is to reduce the renal workload and the symptoms associated with the decreased renal function, prevent or slow any deterioration of kidney function, and improve the quality of the pet's life.

Treatment of CRF must be based on the individual patient, the severity of the symptoms, the underlying cause, and the secondary diseases that may be involved. In every patient, however, all medications that potentially could have harmful side effects to the kidneys should be identified and discontinued, and all underlying diseases should be diagnosed and treated.

Patients with severe symptoms of CRF will likely need to be hospitalized initially while intravenous (IV) fluids are given to correct dehydration, electrolyte, and acid-base abnormalities and medications are initiated. If hospitalization is not required, your veterinarian will start your pet on medications and treatments that can be given at home.

Diets and treats that have a reduced quantity and higher quality of protein content, as well as reduced phosphorus and sodium, are ideal. These diets are formulated to decrease the kidney's workload and also help reduce high blood pressure (hypertension), which is a common problem in animals with CRF. Several specially formulated commercial veterinary diets as well as homemade recipes are available. Appetite stimulants may also be beneficial in cats who are not eating well.

Fresh, clean water should always be available to your pet. In some instances, your veterinarian may suggest periodic injections of fluids by subcutaneous (under the skin) injection. This can be performed at the veterinary clinic, or if your pet needs the injections every day or several times weekly to help prevent dehydration, the veterinary staff may offer to show you how to give this type of treatment to your pet yourself at home.

Vomiting, stomach upset, and poor appetite can be treated with anti-nausea medications as well as antacids. If excessive phosphorus levels are still evident once the proper diet has been established, phosphate-binding gels containing aluminum hydroxide can be administered by mouth. Abnormal blood potassium levels should be managed with appropriate medications.

If secondary problems such as high blood pressure, anemia, or hyperparathyroidism are diagnosed, your veterinarian will choose the most appropriate treatments based on the severity of symptoms and your pet's specific needs.

Hemodialysis and renal transplants are also being successfully performed in cats and dogs at selected referral hospitals. Your veterinarian will be able to tell you if your animal is a good candidate.

Not all of the medications or treatments described above are necessary for every animal with CRF, and some treatments may be changed if the kidneys improve or deteriorate in function.

DOs

- Realize that chronic renal failure does not mean the kidneys have stopped working entirely. Rather, chronic renal failure is a condition in which the kidneys are not functioning enough, which can lead to symptoms related to waste product accumulation in the bloodstream, such as loss of appetite, sluggishness, and vomiting.
- Contact your veterinarian, if your pet's symptoms change, worsen, or any new problems arise.
- Have your veterinarian or veterinary technician show you how to give all medications and demonstrate the correct method of subcutaneous fluid administration. Never reuse needles.

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- Give all medications exactly as directed by your veterinarian. If your animal is having side effects from any medications or you are finding it very difficult to medicate your animal, contact your veterinarian for advice before discontinuing the treatment.
- Ask your veterinarian questions about information you do not understand.
- If you do not trust or are not comfortable with your veterinarian, get a second opinion from another veterinarian or a veterinary internal medicine specialist.
- Consider humane euthanasia if your pet is not responding to all possible treatments and you feel he or she is suffering or has a poor quality of life.

DON'Ts

- Do not postpone a visit to your veterinarian if you observe any symptoms of illness or of CRF since early diagnosis and treatment can aid in preventing the progression of disease and improving the quality of your pet's life. The initial screening only requires a physical exam and routine blood and urine tests.
- Do not assume that drinking and urinating normal or higher-than-normal amounts indicates good kidney function. In fact, one of the earliest symptoms of chronic renal failure is an **increase**, not a decrease, in water consumption and urination.
- Do not give any medications that are not prescribed by your veterinarian for the specific animal in question.
- Do not stop any medications if your animal is feeling better without consulting with your veterinarian first.
- Do not assume that all sources of information are accurate or complete (e.g. internet sites, outdated pamphlets or books, pet store workers, friends). Ask your veterinarian for recommended sources of information.
- If you are giving treatments at home, do not dispose of needles or syringes in the trash. Rather, collect them in a puncture-proof container (e.g., empty bleach jug) and bring it to your veterinarian for disposal.

When to Call your Veterinarian

- If you are unable to give medications as prescribed or if you require a prescription refill.
- When you have any questions or concerns related to your pet's continual treatment plan or current status.

Signs to Watch For

- Watch for general sign of illness, which can include changes in appetite, weight loss, decrease in activity, depression, dull or poorly kept coat, and changes in behavior such as hiding and aggressiveness.
- Watch for signs of CRF, which can include an increase in thirst (Are you filling up the water bowls more often? Is your animal drinking water from taps, bath tubs, fountains, etc.?) and urination (Is your animal asking to go outside more frequently or having accidents in the house? Do you notice larger urine spots in the litter box, or do you have change the box more frequently than usual?), vomiting, diarrhea, dehydration, weakness, lack of coordination when walking, oral ulceration, bad breath, pale gums, convulsions, and coma.