

# Chronic Kidney Disease

## ABOUT THE DIAGNOSIS

**Cause:** A dog or a cat, like a person, has two kidneys, which are located in the abdomen (belly). The kidneys produce urine, which is carried away from the kidneys in thin tubes, the ureters, to the bladder for temporary storage 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, 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 cell 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 reabsorbed; 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 the body's water, electrolyte, and acid-base balance, as well as producing and releasing hormones that play an important role in controlling systemic blood pressure, red blood cell production, and parathyroid hormone levels.

Chronic kidney disease (CKD, formerly called chronic renal failure) 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 kidney disease is to address symptoms of disease, treat imbalances created by disease, and slow further damage to the kidney tissue.

As mentioned, a large proportion of kidney function can be lost and the animal still be well. In fact, symptoms will not typically occur until more than 75% of normal kidney function is lost. This means the kidneys have a great deal of reserve and may tolerate damage for months or years without producing visible symptoms. Unfortunately, this also means that kidney disease can be ongoing for a long period of time before this threshold is reached and symptoms of failure are noticed. CKD 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 an accumulation of waste products and toxins in the blood, triggering a sense of lethargy, loss of appetite, and nausea. Failure to produce kidney hormones can result in high blood pressure, a decrease in red blood cell production resulting in anemia, and secondary hyperparathyroidism (increased levels of parathyroid hormone), among other things.

CKD 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 with a normal life span. In other cases, the onset of symptoms can be so sudden and severe that CKD can progress to be the cause of death within days to months of diagnosis. Recognition of kidney disease might be based on tests done on an ill animal or might be discovered unexpectedly when an animal has blood tests done for

another reason (such as blood tests run prior to dental cleanings, or as a routine screen of geriatric pets for disease).

CKD is a common problem in all breeds of cats and dogs. Animals of any age and either sex can be affected; however, occurrence of CKD increases with age. There are several cat and dog breeds that are particularly prone to kidney disease. Although the cause (etiology) of CKD is often unknown, there are several different diseases in cats and dogs which potentially can lead to kidney failure: hereditary and congenital malformations of the kidneys (renal dysplasia), immune system abnormalities, toxins (raisins, grapes, lilies, etc.), poor blood flow and lack of oxygen (ischemia) to the kidneys, inflammatory or infectious diseases, cancer (neoplasia), urinary tract obstructions, and more. Unlike acute (sudden) kidney disease, the initial cause of CKD is never discovered in most cases.

**Diagnosis:** Symptoms of CKD can vary from patient to patient and are often common to several other diseases that are completely unrelated to kidney disease. That is, the symptoms of kidney disease are nonspecific. Therefore, an important step for using the correct treatment is to confirm that kidney disease, and not an impostor, is the cause of symptoms.

Your veterinarian will begin by asking you several questions to try to determine if chronic kidney disease, or another type of problem altogether, could be responsible for symptoms. You should provide whatever information you have when you answer these questions, which often include: the type of symptoms you have 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 kidney disease, 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 CKD is suspected by your veterinarian, further testing will be recommended since none of these symptoms are exclusive to CKD.

Lab work consisting of blood and urine tests is typically recommended in order to diagnose CKD as well as rule out other possible medical problems that produce similar symptoms. A complete blood count (CBC), biochemical profile, and urinalysis are the initial 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 for removing urine directly from the bladder in order to get the most sterile or clean sample. The urine sampling procedure (cystocentesis) is similar to an amniocentesis in a pregnant woman: it is done easily, 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 some cases. Often, not all these tests are needed, and your veterinarian can explain which, if any, are

recommended, and the reasons for performing them in your pet's case.

## LIVING WITH THE DIAGNOSIS

An increase in thirst and urination are common early signs of CKD. There is a common misconception by many people 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, 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.

CKD 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, screen for complications to address them early if they occur, 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. Medications help to slow the worsening 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 take in more water, which helps prevent dehydration and keeps the kidneys functioning as well as possible.

You should discuss an ideal diet for your pet with your veterinarian and try to 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 kidney disease.

## TREATMENT

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

Treatment of CKD must be based on the individual patient, the severity of the symptoms, the underlying cause, and the secondary complications or concurrent 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 CKD often 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 can start your pet on treatments at home. Because there are varying symptoms of disease, and severity of disease varies, so does treatment. There are a great many possible treatments for CKD, but only a few may be implemented at first, with others added on as necessary. The first step (and perhaps the only change initially) is typically a change in diet.

Diets and treats that have a reduced quantity and higher quality of protein content, as well as reduced phosphorus and sodium, are ideal for patients with CKD. 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 CKD. Several specially-formulated commercial veterinary diets as well as

homemade recipes are available; if your pet does not like one, there are other options to try both in canned and dry kibble formulations. Home-cooked diets should be formulated by veterinarians, ideally in consultation with a veterinary nutritionist. Remember that the internet is a "buyer-beware" zone and many diets that are not formulated by veterinarians are imbalanced and harmful, even if their claims and testimonials sound very appealing. For many pets, a change in diet may be the only real change required for several months, or even several years. Antinausea medications and appetite stimulants may be beneficial in pets with advanced disease who are not eating well. Eventually, the use of feeding tubes might need to be considered as the disease advances.

Fresh, clean water should always be available to your pet as hydration is vitally important. 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. 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. With practice, this can be a simple and rewarding procedure, especially if your pet knows you will give him or her a treat afterwards. Be sure that you are comfortable doing so before taking this task on, and that your pet tolerates this procedure so you do not put yourself in a position of risk of being bitten, scratched, or otherwise harmed. If there is a possibility that your pet might harm you, be sure to tell this to the veterinarian ahead of time so a different approach can be chosen.

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

Secondary problems such as high blood pressure, anemia, and hyperparathyroidism are fairly common, and if one or more is/are present, your veterinarian will choose the most appropriate treatments based on the severity of symptoms and your pet's specific needs.

Renal transplants are sometimes an option for cats but not dogs; this is a very complicated, expensive surgical operation and requires ongoing treatment for life. Although hemodialysis is a good option for pets with acute kidney disease to allow time for the kidneys to heal after injury, chronic hemodialysis is rarely a good choice for animals with CKD. If you are interested in advanced therapies, you should ask your veterinarian for an early referral to a specialist in veterinary internal medicine. These specialists can be found at [www.acvim.org](http://www.acvim.org) or [www.vetspecialists.com](http://www.vetspecialists.com) in North America, or [www.ecvim-ca.org](http://www.ecvim-ca.org) in Europe.

Not all of the medications or treatments described above are necessary for every animal with CKD, and some treatments may be changed over time. Some animals with CKD will live well for years and eventually die of something entirely unrelated. However, other animals will succumb to kidney failure. At some point, if you believe your pet's quality of life is suffering and has not improved with treatment, it may be appropriate to consider human euthanasia (putting to death by lethal injection).

## DOs

- Realize that chronic kidney disease 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. Although it is not reversible, many pets can live a good quality of life for long periods of time despite kidney disease.
- 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 for subcutaneous fluid administration if injectable fluids are part of the treatment plan. Never reuse needles.
- Stick to diet recommendations. Diets formulated for animals with kidney disease are one of the single most important aspects of treatment. If your pet doesn't like the prescribed diet, tell your veterinarian so that you can try another prescription diet type, or a specially formulated homemade kidney diet.
- Give all medications exactly as directed by your veterinarian. If you believe your pet is having side effects from any medications or you are finding it very difficult to medicate your pet, contact your veterinarian for advice before discontinuing the treatment.
- Ask your veterinarian questions about information you do not understand.
- Understand that CKD can be difficult to treat, and that a second opinion from a veterinary internal medicine specialist may be helpful. You can discuss this with your veterinarian.
- Consider humane euthanasia if your pet is not responding to 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 CKD 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 kidney disease 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 pet in question. Some over-the-counter human medications are extremely damaging to the kidneys and can be toxic for pets.
- Do not stop any medications if your pet is feeling better without consulting with your veterinarian first.
- Do not assume that all sources of information are accurate or complete (e.g., many 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 and bring them to your veterinarian for disposal in accordance with local laws.

### 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

As indicators of kidney disease in general, and indicators of increased symptoms of CKD specifically:

- 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 CKD, which can include an increase in thirst and urination, vomiting, diarrhea, dehydration, weakness, lack of coordination when walking, oral ulceration, bad breath, pale gums, convulsions, and coma.

### ROUTINE FOLLOW-UP

- As CKD is an ongoing disease that can deteriorate over time, it is important to keep all recommended follow-up appointments and lab tests with your veterinarian in order to monitor the progression of disease, document and treat any new problems that may arise, and make any needed medication adjustments.

*Other information that may be useful: "How-To" Client Education Sheets:*

- How to Administer Subcutaneous Fluids
- How to Change a Pet's Diet



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