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Kidney Failure - Chronic in Dogs

What do my dog's kidneys do?

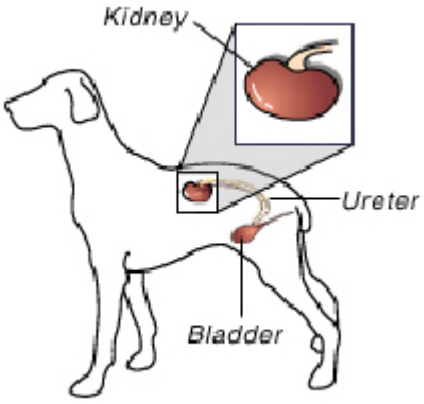
The kidneys have many functions. They principally act to remove metabolic waste products from the blood stream, regulate the levels of certain essential nutrients such potassium and sodium, conserve water and produce urine.

What does \"Chronic Renal Failure\" mean?

Many people think that "chronic kidney failure" or "chronic renal failure" means that the kidneys have stopped working and are not making urine. Fortunately, this is not the case. By definition, chronic renal failure (CRF) is the inability of the kidneys to efficiently filter the blood of its physiological waste products, not the inability to produce urine. Ironically, most dogs in kidney failure produce large quantities of urine, but the body's toxic wastes are not being effectively eliminated.

When do most cases of chronic kidney failure occur?

Since kidney tissue cannot regenerate if destroyed, the kidneys have a large amount of spare capacity to perform their various functions. At least 2/3 of the kidneys must be dysfunctional before any clinical signs are seen.



"Destruction has been occurring for months to years (chronic) before failure has become evident."

In many cases, this means that the destruction has been occurring for months to years (chronic) before failure has become evident.

In dogs, chronic kidney failure is associated with aging, and in simple terms can be considered to be "wearing out" of the kidney tissues. The age of onset is often related to the size of the dog. For most small dogs, the early signs of kidney failure occur at about ten to fourteen years of age. However, large dogs have a shorter life span and may undergo kidney failure as early as seven years of age.

What are the clinical signs of chronic kidney failure?

When disease or advanced age causes the filtration process to become inefficient and ineffective, blood flow to the kidneys is increased in an attempt to increase filtration. The body must increase the amount of blood flowing through the kidneys since less and less of the metabolic toxins are being removed each time. This results in the production of more urine. To keep the dog from becoming dehydrated due to increased fluid loss in the urine, thirst and water consumption is increased.

"Thus, one of the earliest clinical signs of kidney failure is increased water consumption and urination."

Thus, one of the earliest clinical signs of kidney failure is increased water consumption and urination, and is called compensated renal failure. After approximately 2/3 of the kidney tissue is destroyed, there is a rapid rise in waste products in the bloodstream and an apparent sudden onset of severe disease. The clinical signs of more advanced kidney failure include loss of appetite, depression, vomiting, diarrhea, and very bad breath. Occasionally, ulcers will be found in the mouth.

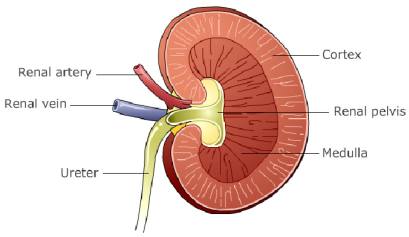
How is chronic kidney failure diagnosed?

There are two basic tests for kidney function:

1) a complete urinalysis and

2) a blood biochemistry analysis.

A urinalysis is needed to evaluate kidney function. A low urine specific gravity (USpG) is the earliest indication of kidney failure. An increase in protein in the urine also indicates decreased kidney function.



A blood biochemistry analysis assesses the function of various internal organs. Measuring the level of two waste products in the blood, namely blood urea nitrogen (BUN) and blood creatinine (CREA), indicates decreased kidney function. Tests to measure the blood levels of other substances such as albumin, globulin, potassium, sodium, phosphorus and calcium, as well as the red and white blood cell counts are important in order to determine the extent of failure and the best course of treatment.

A dog in compensated chronic kidney failure with marginal kidney function may have normal levels of BUN and creatinine but will have a low urine specific gravity. If a major stress such as illness or surgery occurs, the kidneys may fail, sending the blood test values up quickly.

A dog diagnosed with low urine specific gravity as well as elevated BUN and CREA is said to be *azotemic*.

"Degree of kidney failure may be estimated."

In general terms, the degree of kidney failure may be estimated as follows:

1. Low USpG - approximately two-thirds (67%) of the kidney function is impaired. This is the earliest level of kidney failure routinely detected.

2. Low USpG, elevated BUN and CREA (azotemia) - approximately three-fourths (75%) of the kidney function is compromised.

3. Low USpG, elevated BUN and CREA, elevated phosphorus (PHOS) - these findings indicate severe kidney failure (approximately 83-87% of the kidney function is compromised).

Since chronic renal failure is basically just a "wearing out" process, how is it treated?

The treatment of CRF depends on the results of blood tests, and specific treatments are aimed at resolving specific abnormalities. In the worst case, the kidneys are damaged beyond repair before diagnosis, and medical treatment will be ineffective. However, with early diagnosis and aggressive treatment, many dogs will live a normal lifestyle for months or years.

For sick patients, treatment usually occurs in two phases; first flushing the kidneys and removing the accumulated toxins from the blood, and then providing treatments to manage the disease and delay its progression.

What is involved in the first phase of treatment?

In the first phase, high doses of intravenous fluids are give to "flush out" the kidneys and bloodstream. This flushing process is called *diuresis* and helps mildly damaged kidney cells to function again by removing the toxic metabolites and creating a healthier environment for healing.

The second phase of treatment is to help keep the kidneys functioning as long and normally as possible. This is usually accomplished with one or more of the following, depending on your pet's condition:

A special diet - Nutrition is one of the cornerstones in the effective treatment of dogs with chronic kidney failure. The ideal diet for a dog with kidney failure is lower in protein, low in phosphorus, and is not acidified. This type of diet helps reduce the amount of protein wastes or "metabolic toxins" that may make your pet feel sick and lethargic. In advanced kidney disease, a decreased protein diet will also decrease the workload on the kidneys. Nutritionists have developed commercial therapeutic diets that are designed for treating various stages of chronic kidney disease. Your veterinarian will recommend the most appropriate diet, containing the necessary quantity and quality of nutrients for your dog.

A phosphate binder - Phosphorus is removed from the body by filtering through the kidneys. Once the filtration process is impaired, phosphorous begins to accumulate in the blood. Elevated blood phosphorus levels also contribute to lethargy and poor appetite. Certain drugs will bind excess phosphates in the intestinal tract so they are not absorbed into the bloodstream, resulting in lower blood levels of phosphorus.

Home fluid therapy - Once your dog is stabilized, you can give maintenance levels of fluids under the skin (subcutaneously) to your dog at home. This serves to prevent dehydration, helps continually flush toxins from the kidneys and provides additional levels of electrolytes. This is done from twice daily to once weekly, depending on the degree of your dog's kidney failure. Most dogs do best when they receive a small amount of fluids on a daily basis. Once the dog becomes stable, the frequency of treatment may be decreased. Although home fluid therapy might not sound like something you can do, you will be surprised at how easy the technique is and how well most dogs tolerate it. For detailed instructions on this procedure, see the handout "Subcutaneous Fluid Administration".

A drug to regulate the parathyroid gland and calcium levels - Calcium and phosphorus must remain at about a two-to-one (2:1) ratio in the blood. The increase in blood phosphorus level secondary to kidney failure 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 to 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. This medication is needed if there is evidence of abnormal function of the parathyroid gland.

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. Therefore, many dogs in kidney failure will be unable to produce erythropoietin and have *anemia* or a low red blood cell count. Synthetic erythropoietin may stimulate the bone marrow to make red blood cells and correct the anemia in most dogs. Unfortunately for some dogs, the drug cannot be used long term because the immune system recognizes the drug as "foreign" and will make antibodies against it. This treatment may be recommended if your dog has persistent anemia.

How long can I expect my dog to live?

The prognosis is quite variable depending on the dog's response to the initial stage of treatment and your ability to perform the follow-up care. Veterinarians encourage treatment in most situations because many dogs will respond well and maintain a good quality of life.

This client information sheet is based on material written by: Ernest Ward, DVM

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