

Chronic Renal Disease (CRD)

What do kidneys normally do?

The kidneys function on many levels to maintain homeostasis (internal balance) in the body. The kidneys make urine as well as determining how concentrate or dilute the urine is (based on hydration status). In doing so, they regulate water, electrolyte, and pH (acid/base) balance in the body. Additionally, the kidneys help to excrete toxins, hormones, and drugs from the body and play a role in blood pressure regulation. Finally, kidneys make a hormone called erythropoietin which tells the bone marrow to make red blood cells.

What is chronic renal disease (CRD)?

Unfortunately the kidneys do not generally heal well from injury, and chronic renal disease is the ultimate dysfunction and scarring of the kidneys resulting from some previous insult. This injury can result from an acute event or from chronic progressive changes in the kidney. The end result is that an animal loses kidney function and begins to develop a constellation of clinical signs and/or laboratory changes. While animals can live for years with CRD, as these signs progress, the quality of life declines. Ultimately, patients may die or require humane euthanasia due to signs of CRD.

What causes CRD?

CRD can result from acute or chronic injury to the kidneys. Examples of acute diseases that can eventually lead to CRD include toxins (e.g. antifreeze, certain plants, non-steroidal pain medications, and grapes/raisins), infectious diseases, cancer, urinary obstruction, and decreased blood supply to the kidneys. Congenital or genetic kidney disease (e.g. renal dysplasia) typically leads to early onset of CRD in dogs and cats. Most commonly chronic “age related” renal disease is diagnosed with no obvious underlying cause ever identified.

What clinical signs does CRD cause?

CRD may cause no clinical signs at all and simply be a laboratory diagnosis. Likewise, as the disease progresses, there are many signs that may arise. These signs arise not only because of the loss of kidney function, but because of the secondary internal effects this has.

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Common signs include:

- Nausea
- Vomiting
- Anorexia
- Melena
- Polydipsia
- Polyuria
- Dehydration
- Weight loss
- Lethargy

Less common clinical signs include:

- Blindness
- Seizures
- Bleeding disorders
- Tremors
- Oral ulceration
- Constipation

- ❖ *Uremia* is the cluster of clinical signs resulting from progressive kidney disease
- ❖ *Melena* is a dark, tarry stool indicative of gastrointestinal bleeding
- ❖ *Polyuria* (PU) is the increased urination that results when the kidney loses the ability to concentrate urine
- ❖ *Polydipsia* (PD) is the increased drinking that results secondary to the polyuria of kidney disease
- ❖ *Blood pressure* increase is common with CRD and can result in damage to the brain, eyes, kidneys and heart

What laboratory changes does CRD cause?

CRD can cause many changes on laboratory tests. Depending on the severity of disease, the changes may be mild or extreme. As the kidneys become more diseased, they lose their ability to concentrate urine and fulfill their normal regulatory functions. Because of the reserve capabilities that the kidneys have, many of these abnormalities are insensitive and only occur after 65% to 75% of normal kidney function is lost.

Common laboratory changes include:

- Dilute urine
- Electrolyte abnormalities
- Anemia
- Azotemia
- Urinary infection

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- ❖ *Azotemia* is the increase in BUN and creatinine, two specific blood parameters measured on the chemistry panel
- ❖ *Isosthenuria* is the production of dilute urine most common in kidney disease
- ❖ Common *electrolytes* affected in CRD include potassium, phosphorus, calcium and magnesium
- ❖ *Anemia* is the low red blood cell count that results from decreased erythropoietin production in CRD

What testing is recommended for CRD patients?

In evaluating patients with kidney disease, there are many things that need to be considered. A urinalysis is essential for confirming the diagnosis. In addition, a urine culture is recommended to assess for urinary infection. Even with no signs of infection on the urinalysis, a urinary infection is still possible. A complete blood count (CBC) helps us to evaluate for anemia, signs of infection, and platelet changes. A chemistry profile evaluates for azotemia, electrolyte changes and other internal organ damage that may be present. Because elevated blood pressure is common in CRD and can both worsen disease and cause other clinical signs, blood pressure monitoring is essential. Finally, abdominal ultrasound will aid in evaluation of the kidney and bladder structure, measurement of kidney size, and screening for other underlying diseases, such as kidney tumors.

Most patients evaluated for CRD will need the following tests:

- Chemistry profile
 - Urine culture
 - Complete Blood Count (CBC)
 - Urinalysis
 - Blood pressure
 - Abdominal ultrasound
- ❖ *Abdominal ultrasound* is a non-invasive test that uses sound waves to create images of internal organs and structures
 - ❖ By evaluating all these tests *together*, we can confirm the diagnosis, provide an indication of severity of disease and prognosis, and help develop a treatment and monitoring plan

What treatment options are available for CRD patients?

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The treatments options available for CRD are multiple and depend on what clinical and laboratory abnormalities are present. The ultimate goal of therapy is to improve quality of life. In this light, medical therapy involves treatments both to reduce clinical signs and slow progression of disease. Because patients with CRD cannot usually concentrate urine, they have a tendency towards dehydration. For this reason, patients with CRD should always have access to water. Some patients will need additional at-home or in-hospital fluid therapy to help them feel well.

Nutrition is an important part of slowing progression of kidney disease and reducing clinical signs. In particular, low-phosphorus and low-protein diets are generally recommended. Depending on the stage of disease, more or less protein restriction may be utilized. There are a number of prescription diets available for this specific purpose. Some animals do not like these diets, however, and need home cooked meals or to eat regular dog food. Ultimately, the most important thing is that patients continue to eat well and maintain body weight.

A combination of other medications may also be used for various purposes:

- ❖ *Multi-vitamin* therapy is recommended because CRD patients tend to lose water soluble vitamins such as vitamins B and C
- ❖ *Antacid* therapy is recommended to relieve the commonly noted gastrointestinal signs noted in CRD patients
- ❖ *ACE inhibitor* therapy has been shown to reduce elevated blood pressure in the kidneys, improve quality of life and slow progression of CRD
- ❖ *Blood pressure* medications may be required in patients with elevated blood pressure
- ❖ *Erythropoietin* therapy may be required in more severe cases of anemia (because of potential significant side effects, this is reserved for only certain patients)
- ❖ *Potassium* supplementation is often required in cats with CRD and low potassium levels
- ❖ *Phosphate binder* therapy may be required in cases that diet alone is not useful for controlling phosphorous levels

What sort of long-term monitoring is recommended for CRD patients?

General recommendations for patients with CRD include every 3-6 month (depending on the case) blood pressure, CBC, and chemistry values. Urinalysis and urine culture may also need to

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be repeated in certain cases. Monitoring is often patient specific and unique recommendations may be made.

What is the prognosis with CRD?

The prognosis with CRD is highly dependent on the stage of disease and clinical signs present. Some patients may live for years with this disease, while others may not thrive for long after the time of diagnosis. Of course, we will strive to maintain the maximum quality of life and longevity of your pet.

