

Understanding Kidney Disease in Dogs

Kidney disease, also known as **renal (or kidney) dysfunction, insufficiency, or failure**, is a fairly common condition in dogs. The kidneys are hard-working organs that contribute to the normal function of many bodily processes, a few of which are:

- Removing waste from the body in the form of urine.
- Regulating the amount of water in the body by disposing of extra and retaining enough to avoid dehydration.
- Stimulating red blood cell production by producing a hormone called erythropoietin.
- Regulating blood pressure.
- Balancing salt levels in the body.
- Aiding in the control of calcium and vitamin D, helping to keep bones strong.

Kidney Disease Terminology

The following terms are useful to understand when discussing kidney disease.

- **Azotemia** means that, because the kidneys are not functioning properly, toxins have built up in the blood enough to be appear as increased values on bloodwork results. The presence of azotemia does not necessarily mean that the pet is feeling ill or showing signs of kidney disease.
- **Uremia** means that there are increased toxins in the blood due to kidney dysfunction AND the pet is showing signs of feeling ill. It is not always possible to resolve azotemia with treatment, but uremia can often be resolved, resulting in better quality of life for the dog.
- **Failure** means that the kidney is not able to perform one or more of its tasks adequately for a long enough period of time to impact blood values.

Types and Causes of Kidney Failure in Dogs

There are two types of kidney failure in dogs, as follows:

- **Acute Renal Failure (ARF)** occurs when something injures or interferes with the function of the kidneys suddenly. The dog shows signs of illness rapidly, sometimes within days or a week. The most common causes of acute kidney failure in dogs are:
 - Toxin ingestions such as antifreeze or grapes.
 - Infections such as leptospirosis, a bacteria that can affect kidney function.
 - Conditions that decrease blood flow to the kidneys such as heat stroke, severe sudden dehydration, shock, or snakebites.
- **Chronic Renal Failure (CRF)** refers to a situation in which a dog's kidneys have not been able to perform properly over a long period of time. In this situation, 75% or more of the kidney tissue is usually not functioning. Causes of CRF include:
 - Birth defects affecting the kidneys.
 - Chronic bacterial infections.
 - Kidney stones.

- High blood pressure.
- Chronic immune-mediated diseases.
- ARF that permanently damages the kidneys.

Signs of Kidney Failure in Dogs

The most common sign of kidney failure in dogs, which is usually noticed first, is **increased water consumption and urination**. In the case of acute renal failure, this is very sudden and usually quite noticeable. In chronic renal failure, the signs come on more gradually and they may be missed by the dog's owner for a while. Later signs of kidney failure include vomiting, lethargy, weight loss, and decreased appetite. In the latest stages of kidney failure, urine production slows down or stops, and the pet may vomit material that looks like coffee grounds or produce tarry (bloody) feces.

Diagnosis of Kidney Failure in Dogs

Your veterinarian will take a thorough history of any signs of illness that you have been noticing in your dog. He or she will then do a complete physical examination. If these procedures are suspicious for kidney disease, bloodwork and a urinalysis may be ordered. There are numerous values on these tests that can be impacted by kidney disease, and your veterinarian will evaluate them all together. Below are some of the test results that can aid in the diagnosis of kidney disease.

- **Urinalysis:** When a dog's kidneys aren't working properly, they can't produce a normally-concentrated urine. A urinalysis (the microscopic, chemical, and physical evaluation of a urine sample) will reveal a dilute urine in the form of a low specific gravity test result. An increased protein level in the urine may also be present as the kidneys lose the ability to conserve it properly. A urinalysis can also help to determine whether a bladder or kidney infection is present that needs to be addressed.
- **Blood Urea Nitrogen (BUN):** As the kidneys break down proteins for use in the body, one of the byproducts that is produced is BUN. When kidney disease is present, the BUN level in the blood increases.
- **Creatinine:** Creatinine is another byproduct of the breakdown of proteins, and it can be an even more sensitive test for the presence of kidney disease than BUN. As the creatinine level becomes too high in a dog's bloodstream, she begins to feel and act sick.
- **Symmetric dimethylarginine (SMDA):** This is a revolutionary new kidney function test that enables veterinarians to diagnose chronic renal failure in dogs months or even years earlier than traditional methods, making it possible to intervene earlier and more effectively manage kidney disease.
- **Phosphorus:** Dogs with kidney disease are not able to dispose of excess phosphorus properly, and they can develop hyperphosphatemia (increased blood phosphorus levels). This, in turn, causes a disturbance in the calcium-phosphorus balance of the body. As a result, calcium is mobilized from bones in an attempt to rebalance the system. This leads to demineralization and weakness of the bones.

- **Potassium:** Kidney disease in dogs can be associated with low potassium levels (hypokalemia). It is unclear whether low potassium is a cause or an effect of the illness, but it results in weakness.
- **Blood Pressure:** High blood pressure (hypertension) may develop in dogs with renal disease. Hypertension can cause damage to the dog's eyes, brain, and heart as it progresses. It also causes further damage to the kidneys, hastening the progression of the renal failure.
- **Hematocrit:** The hematocrit is the percentage of a dog's blood volume that is made up of red blood cells. When the kidneys are failing, they do not make enough of the hormone erythropoietin, which stimulates the production of red blood cells. Because these important cells carry oxygen to all tissues, every system in the body is affected when there are not enough of them. A low hematocrit is associated with pale gums, general weakness, and a decreased appetite.

Sometimes x-rays, abdominal ultrasound, or kidney biopsy are used in the diagnosis of kidney disease.

Once it is diagnosed, renal disease in dogs is often staged according to a system created by the International Renal Interest Society. This system uses mainly blood creatinine levels as well as factors such as signs of illness, BUN levels, and blood pressure to classify the severity of a dog's kidney disease. While the entire system contains many more specifics, the general values for each stage are as follows:

- **Stage 1 (pre-failure):** Creatinine levels at this stage are generally less than 1.4 mg/dL (125 umol/l)
- **Stage 2 (mild failure):** Creatinine levels are between 1.4 and 2.0 mg/dL (125-180 umol/l) The dog may or may not be showing signs of illness.
- **Stage 3 (moderate failure):** Creatinine levels are 2.1-5.0 mg/dL (180-440 umol/l) The BUN is usually moderately elevated, and the dog is showing some signs of illness, especially increased water consumption and urination.
- **Stage 4 (severe failure):** Creatinine levels in Stage 4 are greater than 5.0 mg/dL (440 umol/l), the BUN is severely elevated, and the dog is ill.

Treatment of Renal Disease in Dogs

There are numerous treatments available for kidney disease in dogs. Which ones your veterinarian chooses for your pet will depend on her individual signs, condition, and lab values. The most common treatments are:

- **Medications for Nausea.** The kidneys are responsible for producing gastrin, a hormone that causes the release of gastric acid in order to aid in digestion. Dogs with renal disease are not able to shut off the production of gastrin properly, so they often have too much gastric acid, leading to nausea. Anti-nausea medications may be necessary for dogs that are vomiting or those that aren't eating well.
- **Antacids.** These medications can also help counteract the extra gastric acid in the stomach.

- **Gastro-protectants.** Stomach-coating medications are sometimes used in dogs with kidney disease to protect their stomach lining from the effects of too much gastric acid.
- **Appetite Stimulants.** The toxins that build up in a dog's blood stream during renal disease can cause decreased appetite, and stimulants are sometimes used to combat this until the toxin levels can be better-controlled.
- **Erythropoietin Injections Along with Oral Iron Supplements.** Anemia occurs in dogs with renal disease because the failing kidneys cannot produce enough erythropoietin, the hormone that triggers red blood cell production. Erythropoietin can be replaced through injections. These injections are usually given along with oral iron supplements so the body has the necessary building blocks for producing red blood cells. Unfortunately, there is a high rate of the development of auto-immune reactions to erythropoietin injections in dogs, which leads to even more profound anemia. If these injections are used in the treatment of kidney disease in dogs, it is in the later stages.
- **Phosphate Binders.** Increased phosphorus levels in the blood can cause decreased appetite and lethargy in dogs. Phosphate binder medications can decrease phosphorus levels and increase quality of life. Controlling phosphorus levels in kidney patients has also been linked with increased survival times.
- **Potassium Supplements.** Potassium supplements can help with the weakness that is associated with low potassium levels in dogs with renal disease.
- **Fluid Therapy.** The cornerstone of treatment for canine kidney disease is fluid therapy. The toxin build-up in the blood that results in sickness can be diminished by resolving dehydration and increasing urination. More normal phosphorus, potassium, and vitamin levels can also be restored, allowing the dog to feel better. Fluids may be given into a vein (intravenously) in the hospital during acute renal failure or when chronic renal failure is first diagnosed. Maintenance with fluid injections under the skin (subcutaneously) at home is sometimes used in the treatment of chronic renal failure in dogs.
- **Nutritional Support.** If a dog is extremely sick when she is diagnosed with renal disease and isn't eating, aggressive types of nutritional support such as force-feeding or the placement of a stomach tube may be employed during the stabilization period.
- **Special Diets.** Specially-formulated renal care diets are usually recommended at some point in the disease progression for dogs with kidney dysfunction. These diets may include some or all of the following characteristics:
 - Protein restriction.
 - Phosphate restriction.
 - Sodium restriction.
 - Canned diet to increase water consumption.
 - Home-cooked renal diet if it is balanced by a veterinary nutritionist.
- **Multivitamins.** Because dogs with kidney disease may not be as able to conserve water-soluble vitamins, a daily multivitamin is recommended.
- **Omega Fatty Acid Supplementation.** These are sometimes used as part of the support of a dog with kidney disease, and they are often present in kidney formulation diets.

- **Angiotensin Converting Enzyme (ACE) Inhibitors.** These medications decrease the pressure inside the kidney cells and help to reduce the body's loss of protein into the urine.
- **Blood Pressure Medication.** Blood pressure should be monitored closely in dogs with kidney disease, and medications can be used if it is increased. This may slow the progression of the illness and guard against other consequences of high blood pressure such as eye, brain, and heart changes.

Prevention of Renal Disease in Dogs

It is not possible to prevent all instances of kidney disease in dogs. However, many cases of acute renal failure can be avoided by:

- Keeping all toxins and human medications away from your dog.
- Not giving your dog any medications without asking your veterinarian first.
- Not allowing your dog to have access to foods such as grapes and raisins that can cause kidney disease.

It's possible that many cases of chronic renal disease can be avoided or mitigated by doing the following:

- Providing your pet with good dental care throughout her entire life. Brushing her teeth, using specific dental treats and foods, and having her teeth cleaned by her veterinarian as needed can decrease the bacteria and inflammation in her mouth that is associated with the development of renal failure.
- Taking your dog to the veterinarian regularly. When disease processes can be caught and managed early, they are less likely to result in chronic inflammatory conditions that can trigger renal disease.

Questions to Ask Your Veterinarian If Your Dog Is Diagnosed with Kidney Disease

- **Can kidney disease in dogs be cured?**
 - Acute renal failure can have a good prognosis if it is treated very quickly and very aggressively. However, depending on the individual circumstances, it may also result in chronic renal failure, which is not reversible. Treatment of chronic kidney disease is aimed at holding the toxin levels in the blood low enough to keep the dog feeling comfortable.
- **How long will my dog live once she is diagnosed with kidney disease?**
 - This depends on the severity of the condition at the time of diagnosis and whether your dog has any concurrent illnesses. The average lifespan of a dog following diagnosis of chronic renal disease is one to three years.
- **Are there holistic treatment alternatives for kidney disease that we can explore?**
 - **Probiotic formulations** for kidney patients are thought to help flush out the toxins present when the kidneys aren't functioning properly.

- **Antioxidant** formulations are used in dogs with kidney disease to help decrease the damage caused to cells in the body by the increased toxin levels in the blood.
- **Decreasing stress** in the home as much as possible may keep dogs with kidney disease stable longer.
- **Kidney formulations** of natural herbs, such as ***Kidney Support Gold***, are sometimes used with success to support dogs with kidney disease.
- **Acupuncture and chiropractic care** may be used as part of a holistic treatment approach in dogs with renal dysfunction.

by Dr. Jan Huntingford - Monday, June 8, 2015

<http://www.petwellbeing.com/blog/dogs/kidney-disease-in-dogs-2>