

RENAL DISEASE = KIDNEY FAILURE

About Renal Failure

Renal failure is the medical term for a kidney that has lost its function to concentrate urine and filter toxins from the blood into the urine. The degree of renal failure is measured by a number of clinical & laboratory parameters. For any of these values to be abnormal, *more than 2/3* of the kidney function must be lost. Values include:

- **Specific gravity** of urine (concentration)- will be low if kidney can not concentrate the urine
- **BUN** (blood urea nitrogen)- blood test- will be greater than 30- BUN is a blood toxin filtered by kidney
- **Creatinine**- blood test- will be greater than 2.0 if kidney not filtering well- another blood test
- **Phosphorus**- blood test- increased in chronic renal failure
- **Urine protein**- elevated level of protein compared to urine concentration- kidney leaks protein from blood
- **Urine production**- decreases or stops when the kidney is so damaged, that the kidney literally shuts down.

These are only a few of the most common markers of kidney function. The veterinarian will use results of other lab tests, radiographs (x-rays), ultrasound, & possibly kidney biopsy to diagnosis renal failure and more importantly classify it as **acute vs chronic disease**.

Acute vs Chronic Disease

Acute renal failure occurs over a short period of time and is usually attributed to a toxin (antifreeze, some antibiotics,) or underlying medical condition (infection, cancer, heat stroke, multiple organ failure etc). In acute renal failure, the kidney shuts down and stops making urine, termed anuric. Without aggressive emergency therapy, the patient will die due to electrolyte imbalances (high potassium) causing the heart to fail. Acute renal failure can happen in any aged animal.

Chronic renal failure occurs as a progressive disorder which develops over time as more than 2/3 percent of the kidney is damaged and ceases to function. Chronic renal patients are usually older pets who slowly waste away with no obvious sickness other than vague signs such as losing weight, decreased appetite, increased drinking and urinating, and occasional vomiting. At some point however, the animal is no longer able to compensate for the kidney's lack of function, and the pet acutely decompensates- throwing the animal into clinical renal failure. The patient appears to become very sick in a short time though the damage has really been accumulating for a long period- many times over years. A common feature of chronic renal failure is a non-regenerative anemia.

Symptoms- Acute renal failure

- Very small amounts or no urine produced
- Vomiting
- Dehydration / collapse
- Anorexia
- Ataxia /stumbling
- Comatose (end stage)
- Seizures (end stage)

Symptoms- Chronic renal failure

- PU/PD (urinates lots, drinks lots)
- Chronic weight loss- becomes very thin- skin over bones
- Chronic anorexia
- Lethargy/weakness
- Chronic vomiting
- Ulcers in mouth
- Pale mucus membranes (gums)- from chronic anemia
- Possible swollen belly from low blood protein (ascites)

Diagnosis

In both acute and chronic renal failure, the diagnosis is based on urinalysis and blood work. With either type of renal failure, the blood work will show increased levels of BUN, creatinine, potassium, phosphorus, and calcium- all substances that the kidney eliminates in the blood. When kidney function deteriorates, these substances build up in the blood. Additionally, the urine is always checked for the specific gravity which equals the concentration of the urine. In both types of renal failure, the urine will be very dilute as the kidney loses the ability to concentrate causing the production of large amounts of dilute urine. In pets suffering acute renal failure, the kidney can shut down and make little or no urine. Both radiographs and ultrasound show changes in the kidney shape, size, and architecture.

Chronic renal failure- Owners frequently report that their pets have become completely anorexic, have been vomiting, or suffer chronic constipation. On physical exam, pets with chronic renal failure are often very thin (can be emaciated), weak, dehydrated, and have a rough dry hair coat. The kidneys are small, asymmetric, and feel bumpy. Pets are usually anemic (low red blood cells) with chronic renal failure and have severe oral ulcers from the high levels of BUN & creatinine.

Acute renal failure patients are usually younger animals who have suddenly become very sick in a short period of time. Often very sick with a primary renal toxin such as antifreeze, or is suffering another serious illness such as heat stroke, or Leptospirosis, a lethal bacterial infection. Pets with acute renal failure can therefore present with a plethora of clinical signs. Typically the kidneys are smooth and enlarged or normal sized.

Therapy

- **Acute renal failure** requires very intensive therapy aimed at re-establishing urine production, and rebalancing electrolyte imbalance (especially high potassium) by keeping the blood flow to the kidney high as well as flushing out the kidney (IV fluid diuresis). Underlying problems must be treated aggressively with any combination of IV fluids, antibiotics, diuretics, blood pressure medication, dialysis etc. Even with intensive 24 hour care, these animals can die if the kidney function does not return after an acute insult to the organ such as a toxin.
- **Chronic renal failure** is treated with aggressive diuresis (IV fluids for several days in hospital) aimed at flushing out the kidney, restoring the electrolyte balance, and lowering the BUN and Creatinine levels in the blood. Anemia is treated with Erythropoetin, a drug that stimulates red blood cell production. Anorexia is treated with appetite stimulants. All cats should receive ongoing therapy with fluids given under the skin 1-3 x/week once the major IV diuresis is complete.

Prognosis

- **Acute renal failure is highly variable-** depending on the underlying source of the kidney insult. Causes of acute renal failure that carry a grave prognosis include ethylene glycol (antifreeze) toxicity, heat stroke, septic shock, long standing urinary blockage.
- **Chronic renal failure-** fair to poor if diagnosed in the early stages and treated with SQ fluids several times a week as an ongoing maintenance therapy. If diagnosed in the end stages, the prognosis is poor to grave.
- **Cats** do much better than dogs with similar renal values and can live comfortably with moderately elevated values.
- **Dogs** in general do very poorly with even mild increases in kidney values.