

Chronic Kidney Disease (CKD, CRF)

The kidneys perform several major functions to keep the body in check. The most well-known is the production of urine, which helps to get rid of certain wastes and balance the body's electrolytes. The kidneys also help control blood pressure (renin-angiotensin activating system) and produce a hormone that promotes red blood cell development (erythropoietin). When the kidneys are diseased, the body is thrown out of whack, causing the various symptoms we may see along the way.

Unlike other diseases, chronic kidney disease is NOT a disease that can be treated. The goal is management to slow the progression of disease before reaching a point that is incompatible with life. Quality of life is often the most important factor in deciding when CKD has progressed too far. Cats tend to tolerate kidney disease much better than dogs.

Symptoms:

Excessive drinking and urinating, dilute urine

Muscle wasting and weight loss

Vomiting, nausea, loss of appetite

Uremic halitosis and ulcers due to toxic acid buildup.

Dental disease (including fibrous dystrophy - "rubber jaw")

Weakness - anemia, low potassium.

Signs of systemic hypertension - blindness from detached retinas, "stroke", nose bleeds.

Most of the time, these symptoms are chronic and additive; however, some animals present as an "acute-on-chronic" case, which is a flare up after a dehydration-inducing event (vomiting, diarrhea, etc).

Diagnosis:

- 1) SDMA (symmetric dimethyl-arginine) detects damage at 40% disease. Unlike Creatinine, SDMA is not affected by muscle mass changes.
- 2) Urine specific gravity (USG) detects damage at 66% disease. Numerous other diseases cause the USG to decrease, so bloodwork and urine are often used together to rule out other issues.
- 3) Azotemia (BUN, Creatinine) and Phos become elevated above 75% damage. The higher the numbers, the more progressed the disease. Creatinine will be artificially lowered (possibly normal) in a severely muscle-wasted patient.
- 4) Blood pressure can be measured using a non-invasive route with an inflatable cuff, such as that on our surgical monitor. A normal blood pressure (MAP) in dogs and cats is 120-130mmHg (up to 160mmHg for "white coat effect").
- 5) Proteinuria - "leaky" kidneys allow protein loss, resulting in loss of muscle mass/weight and promoting clot production. Measured by UP/C ratio in urine.
- 6) Radiographs, ultrasound, urine culture - rule out underlying disease that could potentially be treated and reversed, including pyelonephritis and kidney stones.
- 7) CBC: Non-regenerative anemia. Since red blood cells live approximately 90 days, the anemia is generally well-tolerated until the body reaches its threshold.

Staging of CKD (IRIS):

- Stage 1 - Crea < 1.4 (dog), < 1.6 (cat); SDMA 14-18; USG < 1.030 or other renal abnormality (ultrasound, etc).
- Stage 2 - Crea 1.4-2.8 (dog), 1.6-2.8 (cat); SDMA 18-35 (dog), 18-25 (cat). Clinical signs are usually mild or absent.
- Stage 3 - Crea 2.8-5.0 (dog and cat); SDMA 36-54 (dog), 26-38 (cat). Clinical signs range in extent and severity.
- Stage 4 - Crea > 5.0 (dog and cat); SDMA > 54 (dog), > 38 (cat). Increasing risk of systemic signs and uremic crisis.

Proteinuria Substage - Leakage of proteins into the urine, which causes progressive inflammation of the kidney (glomerulonephritis) and may account for weight/muscle loss.

- Non-proteinuric: < 0.2 (dog and cat)
- Borderline proteinuric: 0.2-0.5 (dog), 0.2-0.4 (cat)
- Proteinuric: > 0.5 (dog), > 0.4 (cat)

Hypertension Substage:

- Normotensive < 140mmHg -- minimal risk of future target organ damage
- Prehypertensive 140-159mmHg
- Hypertensive 160-179mmHg
- Severely Hypertensive > 180mmHg -- high risk of future target organ damage

Early diagnosis and intervention are important to allow us to protect the kidneys before they are too far gone. Trend-monitoring and evaluation of both urine and blood parameters can be performed yearly, except when certain medications are used (such as antiinflammatory drugs and diuretics).

Treatment:

- 1) Stop any potentially kidney-damaging medications.
- 2) Fluids to flush the kidneys - may be given Subcutaneously (under the skin) or IV.
- 3) Change food to a special kidney diet (Purina NF, etc). Early= stages 1-2, advanced= stages 3-4.
- 4) ACE inhibitor (benazepril, enalapril) if BP > 160mmHg.
- 5) Phosphorus binder if Phos > 6. (Ca x P) causes mineralization of the kidneys and other tissues, worsening the kidney disease.
- 6) Azodyl, a probiotic that helps decrease BUN and Creatinine, by preventing intestinal absorption. It won't hurt, but personal experience shows an expensive product that has to be given on an empty stomach to a sick animal isn't usually the best option.
- 7) Potassium supplementation - may be low due to increased excretion, decreased intake (not eating)
- 8) Acid-controlling medications (famotidine, ranitidine, omeprazole) to decrease the feeling of nausea associated with uremia.
- 9) Ondansetron or Cerenia (maropitant) - for nausea and vomiting.
- 10) Darbopoeitin or erythropoietin (Epo) injections when PCV <20% or showing evidence of anemia (weakness, etc).
- 11) Recheck blood work on a regular basis. If SQ fluids, I recommend 2-4 weeks after starting, then every 3-6 months afterwards. Monitor weight trends.