What You NEED to Diagnose and Monitor Chronic Kidney Disease in Dogs and Cats

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There is no **single** test that used alone accurately diagnoses chronic kidney disease (CKD). When evaluating a patient for CKD it is important to consider ALL of the following information:

Signalment & History

History can provide indicators that renal disease may be occurring.

- 55% of cats 5-20 years of age are positive for CKD based on IRIS guidelines.[2]
- Increased water intake and/or urine output
- Weight loss +/- muscle loss
- Decreased appetite and/or activity
- Vomiting, constipation, or diarrhea

Physical Examination

- Assess and trend decreases in weight, body condition (BCS), and muscle condition score (MCS).
- Assess renal size (small or large, vs. normal), symmetry, and shape.
- Perform blood pressure screening, in older cats and dogs.

Laboratory Testing

Annual or semi-annual preventive testing should be performed, especially in senior/geriatric patients, regardless of history or physical exam findings.

Blood Chemistry:[3]

Creatinine (CRE): may be influenced by the animal's muscle mass
- CRE patient trending throughout the animal's life can be very useful in detecting early CKD.
    - Small changes in creatinine, if performed by the same laboratory equipment, may indicate a significant change in kidney function.
- **IRIS[†] recommends evaluating CRE >1.4 mg/dL in dogs or >1.6 mg/dL in cats for CKD.***
    - Patients with IRIS Stage 1 or 2 may have CRE values within the laboratory reference range.

Blood Urea Nitrogen (BUN):
- Not influenced by muscle mass
- Can be decreased with concurrent liver disease or increased with high protein diet, gastrointestinal bleeding

Phosphorus (PHOS):[4] Evidence suggests that chronic reduction of phosphate intake to maintain a PHOS <4.6 mg/dL, but PHOS >2.7 mg/dL is beneficial to patients with CKD.

Electrolytes (Na+, K+): can become abnormal and require correction with fluid therapy

Ionized Calcium (iCa): useful for monitoring/treating secondary hyperparathyroidism seen with CKD. Ionized hypercalcemia can promote the progression of CKD.[5]

Urinalysis:
- A USG <1.030 in dogs and <1.035 in cats with azotemia (BUN and/or CRE elevated) is indicative for CKD.[1]
    - Monitoring serial USG changes can help catch early CKD, sometimes prior to serum BUN or CRE elevations.

Urine Protein:Creatinine Ratio (UPC): required for IRIS substaging of CKD.

Microalbumin: Detection of albumin >2.5 mg/dL may allow earlier diagnosis of pathologically increased urine protein excretion, which can occur with primary glomerular disease or systemic inflammatory diseases that secondarily damage the kidneys.[6]

⊕ Additional Diagnostic Testing

Abdominal Imaging: to evaluate renal size, echotexture, and obstruction, and to rule out urinary tract stones and/or neoplasia.

Symmetric Dimethylarginine (SDMA): amino acid metabolite. Cleared primarily (90%) by the kidneys.[7]
- SDMA is a measure of GFR and not a specific indicator of renal failure.
  - **- Any factor that can cause BUN and creatinine to rise can cause SDMA to rise (ex: dehydration).**
- Elevations of SDMA can be seen prior to elevations in BUN and CRE.[7]
- No unbiased studies support therapeutic renal diet or other supplements improve patient outcome when started with SDMA elevation alone.
  - Trending CRE increases its sensitivity in detecting reduced GFR.[3]
  - False positives, especially in puppies/kittens are possible.[8]
- **When is SDMA most useful?:** Animals with severe muscle wasting will have lower blood CRE levels, which will make diagnosis of CKD based on serum creatinine changes more difficult. In these cases, SDMA may be used in conjunction with other screening tests to detect early kidney disease.[3]

⊘ Conclusion

Veterinarians can detect kidney disease earlier by analysis of creatinine using a more restricted upper reference range, and evaluating the kidney's ability to concentrate urine (USG). Performing a full evaluation of the patient, including UPC ratio, microalbumin, and blood pressure, is necessary to classify the IRIS stage of kidney disease and institute appropriate treatment and monitoring. **Creatinine, USG, blood pressure and UPC remain the pillars of IRIS staging. Other tests, such as SDMA, may be useful, adjunct analytes.**

*Laboratory values provided are for guideline purposes only. Exact values/ranges may differ depending on the manufacturer of laboratory equipment used to measure biochemical analytes.
†See IRIS Treatment Recommendations for CKD. www.iris-kidney.com/guidelines/recommendations.html

Bibliography

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