# CHRONIC KIDNEY DISEASE:

## WHAT YOU NEED TO EVALUATE CHRONIC KIDNEY DISEASE (CKD)

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## WHEN DIAGNOSING AND MONITORING CKD PATIENTS, WE MUST CONSIDER THE FOLLOWING:

### Signalment & Health History

+ **Obtain breed, age and complete history.**
  **Some notable areas include:**
  - Increased water intake and/or urine output
  - Weight and muscle change
  - Change in appetite and/or activity
  - Vomiting, constipation, or diarrhea

### Physical Examination

+ **Assess and trend decreases in:**
  - Weight
  - Body Condition Score (BCS)
  - Muscle Condition Score (MCS)
+ **Assess renal size, symmetry and shape**

### Laboratory Testing

**No single test definitively diagnoses CKD.**
**Testing should include:**

+ Chemistry Profile
+ Complete Blood Count (CBC)
+ Urinalysis
+ Total T4 in older cats
+ Urine Protein:Creatinine (UPC) ratio

### Additional Diagnostic Testing

+ **Blood Pressure Screening**
  - Especially in older cats and dogs
+ **Abdominal Imaging**
  - Evaluate renal size, echotexture and obstruction
  - Rule out urinary tract stones and/or neoplasia
  - Evaluate other abdominal organs

**Accurately diagnosing CKD requires a combination of health history, a physical exam, laboratory and additional diagnostic testing.**

When available, evaluating Creatinine (CRE) and Symmetric Dimethylarginine (SDMA) **together with complete urinalysis, blood pressure and UPC are recommended for complete staging and monitoring of CKD.**[1] Considering the results of more than one kind of laboratory test, PLUS history and trending are critical for diagnosis.





### Know the patient and the pet owner

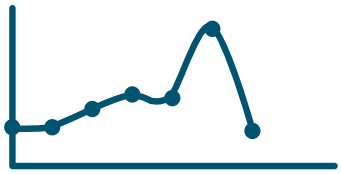
Early disease detection can be achieved through understanding pet owner concerns and monitoring patient trends for vitals, history, and ongoing laboratory testing.[2]

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

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# CKD MONITORING

Individual patient trending is more sensitive to detect pathologic changes than reliance on published reference values for chemistry and hematology.[3]



## BLOOD CHEMISTRY[4]

### Creatinine (CRE)

+ CRE patient trending throughout the animal's life can be very useful in detecting early CKD.
+ A CRE within the reference interval may still indicate early stage CKD.
+ 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.

### Electrolytes (Na+, K+)

+ Electrolytes can become abnormal and require correction with fluid therapy.

### Ionized Calcium (iCa)

+ iCa is useful for monitoring/ treating secondary hyperparathyroidism seen with CKD.
+ Ionized hypercalcemia can promote the progression of CKD.[6]

### SDMA

**Amino acid metabolite. Cleared primarily (90%) by the kidneys.[7]**

+ Like CRE, must be evaluated with complete urinalysis and USG.
+ 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 also cause SDMA to rise (e.g.: dehydration)
+ Elevations of SDMA can be seen prior to elevations in BUN and CRE.[7]
  - Trending CRE increases its sensitivity in detecting reduced GFR[8]
  - One study showed overall diagnostic performance of blood creatinine and SDMA for detection of decreased GFR was similar[9]
  - False positives are possible[10]

### Blood Urea Nitrogen (BUN)

+ Not influenced by muscle mass.
+ Can be decreased with concurrent liver disease.
+ Can be increased with high protein diet or gastroitestinal bleeding.

### Phosphorus (PHOS)

+ 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 cats with CKD.[5]

**+ SDMA should be evaluated alongside CRE and complete urinalysis on at least 2 occasions in a fasted, stable, hydrated patient.**

## URINALYSIS

### Urine Specific Gravity (USG)

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

### Urine Protein: Creatinine Ratio (UPC)

+ UPC is required for IRIS substaging of CKD.

### Urine Sediment

+ Evaluate urine for inflamation, infection, and other abnormalities.

### Microalbumin (MA)

+ Detection of urine albumin >2.5 mg/dL may allow earlier diagnosis of pathologically increased urine protein excretion, which can occur with:
  - Primary glomerular disease
  - Systemic inflammatory diseases

These diseases can lead to secondary damage to the kidneys[8]

*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.
†International Renal Interest Society (IRIS) Treatment Recommendations for CKD www.iris-kidney.com/guidelines/recommendations.html

**References:**
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**9.** Pelander L, Haggstrom J, Larsson A, et al. Comparison of the diagnostic value of symmetric dimethylarginine, cystatin C, and creatinine for detection of decreased glomerular filtration rate in dogs. Journal of Veterinary Internal Medicine. 2019;33(2):630-639. **10.** SDMA Frequently Asked Questions—IDEXX US. https://www.idexx.com/en/veterinary/reference-laboratories/sdma-faqs/(accessed March 2, 2021)

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