SDMA (Symmetric Dimethylarginine)

Interpretive Summary

Description: Symmetric dimethylarginine (SDMA) is a new kidney function test. It increases earlier than creatinine in some animals with chronic kidney disease. Unlike creatinine, SDMA is not impacted by lean body mass. SDMA and creatinine should be interpreted together, along with a urinalysis.

For additional information about SDMA, please visit **www.idexx.com/SDMA**

Normal SDMA (≤14 µg/dL)

Common Causes

- Normal SDMA with normal or low Creatinine
  - Normal kidney function is likely
    - If SDMA and/or creatinine is at the upper end of the reference interval, early kidney disease cannot be ruled out. Evaluate a complete urinalysis to confirm there is no other evidence of kidney disease.
- Normal SDMA with high Creatinine
  - Kidney disease is possible
    - Determine if there is other evidence of kidney disease such as supportive history, abnormal kidney palpation, inappropriate urine specific gravity, proteinuria and/or abnormal imaging.
  - Muscular dogs with normal kidney function may have a normal SDMA and creatinine just exceeding the reference interval.
    - Assess body condition score and complete urinalysis to help determine significance of these results.

Increased SDMA (>14 µg/dL)

Common Causes

- High SDMA with normal or low Creatinine
  - Renal Disease
    - Early kidney disease is likely
- SDMA increases earlier than creatinine in early renal disease.
- Most animals with early kidney disease have an SDMA between 15-20 µg/dL. Since SDMA increases as kidney function decreases, SDMA > 20 µg/dL are typically seen in more advanced disease along with an increased creatinine.
  - In poorly muscled animals, creatinine may be a poor indicator of renal function and may not be increased even with more advanced disease.
  - Infectious, inflammatory, toxic and ischaemic renal diseases are most common.
  - SDMA results may be slightly higher (~1 µg/dL) in puppies, kittens and Greyhounds and results should be interpreted in light of other findings.
  - Evaluate for other evidence of kidney disease such as supportive history, abnormal kidney palpation, inappropriate urine specific gravity, proteinuria and/or abnormal imaging.
- High SDMA with high Creatinine
  - Renal Disease
    - Kidney function is likely impaired
    - Infectious, inflammatory, toxic and ischaemic renal diseases are most common.
    - Confirm that there is other evidence of kidney disease such as supportive history, abnormal kidney palpation, inappropriate urine specific gravity, proteinuria and/or abnormal imaging.

Uncommon Causes

- High SDMA with high Creatinine
  - Renal Disease
    - Congenital kidney disease, amyloidosis, and renal neoplasia are less common causes of renal disease.
  - Dehydration

- If dehydration results in a prerenal azotemia reflecting a reduction in glomerular filtration rate (GFR), then SDMA should also increase along with creatinine.
- Assess hydration status and urine specific gravity for evidence of dehydration.

o Post-renal

- If ureteral or urethral obstruction results in a decrease in GFR, then SDMA will increase along with creatinine.

Related Findings

- Renal disease

o Increased BUN, creatinine and phosphorus

- SDMA can be increased prior to development of azotaemia

o Electrolyte abnormalities, metabolic acidosis, hypo- or hypercalcaemia
o Mild to moderate nonregenerative anaemia
o Inappropriate urine specific gravity
o Urinary casts, pyuria, hematuria, proteinuria, microalbuminuria, glucosuria, bacteriuria
o Positive urine culture
o Increased blood pressure
o Protein losing nephropathy (glomerulonephritis or amyloidosis)

- Decreased albumin
- Increased urine protein:creatinine ratio
- High cholesterol in nephrotic syndrome

o Positive PCR or serology for leptospirosis, Lyme disease, ehrlichiosis or other infections
o Abnormal kidney imaging findings such as abnormal renal size and/or structure
o History of kidney toxin exposure

Additional Information

Physiology

- SDMA is a molecule formed by post-translational methylation of the amino acid L-arginine in the nucleus of cells by the enzyme protein-arginine methyltransferase.

o During protein degradation these methylated arginine molecules are released.
o Biologically, SDMA is considered an inert molecule.

- SDMA is eliminated by renal excretion, therefore blood concentrations are affected by changes in GFR making SDMA a good marker for renal disease.
- SDMA is a biomarker for kidney function and has been shown to rise in proportion to creatinine and is inversely related to GFR (measured by iohexol clearance) in dogs and cats with kidney disease.
- SDMA increases earlier than creatinine in chronic kidney disease.

o SDMA increases on average with 40% loss of kidney function versus creatinine, which does not increase until 75% of kidney function is lost.
o In cats, SDMA increases on average of 17 months before creatinine.
o In dogs, SDMA increases on average of 9.5 months before creatinine.

- SDMA is specific for kidney function. It is not impacted by various diseases including liver disease, Cushing's disease and heart disease, unless there is concurrent kidney disease
- SDMA is not impacted by lean body mass. Reductions in lean body mass occur with aging and chronic disease can lower creatinine concentrations, but SDMA increases as kidney function declines with no correlation to lean body mass.
- Week to week variability of iohexol clearance, serum creatinine and SDMA are similar in dogs with stable renal disease.

- SDMA results may be slightly higher (~1 µg/dL) in puppies, kittens and Greyhounds with normal kidney function.

Diagnostic Methodology

- No information is currently available on how to interpret SDMA in species other than dogs and cats.
- SDMA is measured at IDEXX Reference Laboratories using a high throughput immunoassay.
- SDMA can be performed on serum or lithium heparin plasma.
- SDMA is stable for 4 days at room temperature and 14 days refrigerated. It is also stable for years in specimens that remain frozen and do not undergo freeze thaw cycles.
- Lipemia, hemolysis and icterus do not affect SDMA results. However, rarely in specimens with extreme hemolysis and lipemia, SDMA cannot be measured.

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