

An SDMA case study: Reese



SDMA helps lead to the diagnosis and treatment of suspect pyelonephritis and improvement in kidney function



Patient: Reese, 16-year-old, spayed female domestic shorthair

Presenting reason and history: Reese presented for her annual wellness visit. The owners felt that Reese was doing well for a senior cat. Her appetite was good, and they had not noticed any weight loss, coughing, sneezing, vomiting, diarrhea, or change in thirst or urination.

Physical examination: Reese was bright, alert, responsive, and hydrated. She was a little overweight with a body condition score (BCS) of a 6 on 9-point scale. Her temperature, pulse, and respiration were within normal limits. Thoracic auscultation and abdominal palpation were normal, and the remainder of the physical examination was unremarkable.

Diagnostic plan

Complete blood count (CBC); chemistry panel, including the IDEXX SDMA® Test and electrolytes; complete urinalysis; and total T₄ were recommended for a senior wellness minimum database. Reese's CBC results were within normal limits. Other findings are shown below.

Chemistry

Test	Result	Reference Range
Glucose	131	72 - 175 mg/dL
IDEXX SDMA	19	0 - 14 ug/dL
Creatinine	2.1	0.9 - 2.5 mg/dL
BUN	29	16 - 37 mg/dL
BUN:Creatinine Ratio	18.6	
Phosphorus	4.4	2.9 - 6.3 mg/dL
Calcium	10.4	8.2 - 11.2 mg/dL
Sodium	131	147 - 157 mmol/L
Potassium	4.2	3.7 - 5.2 mmol/L
Na/K Ratio	36	29 - 42
Chloride	117	114 - 126 mmol/L
TCD2 (Bicarbonate)	18	12 - 22 mmol/L
Anion Gap	20	12 - 25 mmol/L
Total Protein	7.0	6.3 - 8.0 g/dL
Albumin	3.4	2.6 - 3.9 g/dL
Globulin	4.5	3.0 - 5.0 g/dL
Alb:Glob Ratio	0.8	0.5 - 1.2
ALT	25	27 - 158 U/L
AST	14	16 - 67 U/L
ALP	11	12 - 59 U/L
GGT	1	0 - 6 U/L
Bilirubin - Total	0.1	0.0 - 0.2 mg/dL
Bilirubin - Unconjugated	0.1	0.0 - 0.2 mg/dL
Bilirubin - Conjugated	0.0	0.0 - 0.2 mg/dL
Cholesterol	209	91 - 305 mg/dL

Total T₄

Test	Result	Reference Range
Total T ₄	1.0	0.5 - 4.7 ug/dL

Urinalysis

Test	Result
Collection	CYSTOCENTESIS
Color	YELLOW
Clarity	CLOUDY
Specific Gravity	1.018
pH	5.5
Urine Protein	NEGATIVE
Glucose	NEGATIVE
Ketones	NEGATIVE
Blood / Hemoglobin	NEGATIVE
Bilirubin	NEGATIVE
Urobilinogen	NORMAL
White Blood Cells	>100
Red Blood Cells	NONE SEEN
Bacteria	MARKED (>40 HPF)
Epithelial Cells	RARE (0-1/HPF)
Mucus	NONE SEEN
Casts	NONE SEEN
Crystals	NONE SEEN
Other	

Urine culture and MIC susceptibility

Source	Result
Source	URINE-CYSTO
Method	TINAL
Completed Culture Results	Escherichia coli - GREATER THAN 100,000 ORGANISMS PER PL
Amoxicillin	Sensitive (8 ug/HL)
Amoxicillin / Clavulanic Acid	Sensitive (4 ug/HL)

Diagnostic review

Reese's diagnostic results showed an increased SDMA along with a normal creatinine and increased BUN. She also had inappropriate urine concentrating ability with a urine specific gravity of 1.018. In addition, Reese had an active urine sediment with >100 WBC/hpf and marked bacteriuria. Based on these findings, a urine culture and susceptibility was performed and >100,000 organisms/mL of *Escherichia coli* was grown that was susceptible to most antibiotics, including amoxicillin and amoxicillin/clavulanic acid.

Assessment

Based on Reese's increased SDMA with an inappropriately low urine specific gravity, it was clear that she had decreased kidney function in addition to having a urinary tract infection.

Differentials at this time included:

- Active or acute kidney injury (AKI) secondary to pyelonephritis.
- Chronic kidney disease (CKD) with a concurrent lower urinary tract infection (UTI).
- AKI from pyelonephritis superimposed on CKD, causing a worsening of existing kidney disease.

Plan

Investigate

Additional diagnostics that should have been considered to investigate further but were not performed:

- Abdominal ultrasound to look for evidence of pyelonephritis and rule out urolithiasis.
- Blood pressure since hypertension is a common confounding factor with kidney disease.

Manage

Treatment initiated:

- Clavamox® 62.5 mg by mouth twice daily for one month for possible pyelonephritis.
- Fresh clean water sources available at all times.
- Diet changed to Hill's® Prescription Diet® k/d® Feline and Royal Canin Veterinary Diet® Renal™ cat formula.

Monitor

Recheck visit:

- Ideally in 2 weeks to determine response to treatment.
- However, recheck was done in 1 month to see if infection cleared and if any improvement in kidney function.
- Follow-up diagnostics revealed that the SDMA concentration had declined from 19 µg/dL to 15 µg/dL, there were no WBCs or bacteria on the urine sediment, and the culture was negative.

Chemistry

Test	Result	Reference Range	Units
IDEXX SDMA	15	0 - 14	µg/dL
Creatinine	2.0	0.9 - 3.5	mg/dL
BUN	40	16 - 37	mg/dL

Urinalysis

Collection	09/13/18	09/13/18
Color	YELLOW	YELLOW
Clarity	CLOUDY	CLOUDY
Specific Gravity	1.018	1.018
pH	5.5	5.5
Urine Protein	NEGATIVE	NEGATIVE
Glucose	NEGATIVE	NEGATIVE
Ketones	NEGATIVE	NEGATIVE
Blood / Hemoglobin	TRAC	NEGATIVE
Bilirubin	NEGATIVE	NEGATIVE
Urobilinogen	NORMAL	NORMAL
White Blood Cells	NONE (SEE --)	>100
Red Blood Cells	0-2	NONE (SEE --)
Bacteria	NONE (SEE --)	POSITIVE

Urine culture

Source	URINE-CYSTO
Status	FINAL
Completed Culture Results	NO APPROPRIATE GROWTH

Diagnosis and long-term management

Diagnosis

- Suspect pyelonephritis based on improvement in kidney function after treatment of UTI.
- AKI from pyelonephritis superimposed on CKD.

Long-term management

- Treat for International Renal Interest Society (IRIS) stage 2 CKD, including continuing to feed a kidney therapeutic diet.¹ For more information, visit idexx.com/sdma-iris.
- Recheck urine culture monthly for 3 negative consecutive months.
- Then recheck minimum database and urine culture every 3 months.

Discussion

- SDMA is a more reliable indicator of kidney function than creatinine in both AKI as well as CKD because it is more sensitive and increases earlier.²⁻⁴
- In pets like Reese, an increased SDMA in face of a urinary tract infection, should lead to additional investigation and a consideration for more aggressive treatment for pyelonephritis.
- Long-term management and monitoring of these pets can help prevent and detect future infections and slow progression of underlying CKD.

References

1. International Renal Interest Society. IRIS Guidelines. www.iris-kidney.com. Accessed March 21, 2017.
2. Nabity MB, Lees GE, Boggess M, et al. Symmetric dimethylarginine assay validation, stability, and evaluation as a marker for early detection of chronic kidney disease in dogs. *J Vet Intern Med.* 2015;29(4):1036-1044.
3. Hall JA, Yerramilli M, Obare E, Yerramilli M, Jewell DE. Comparison of serum concentrations of symmetric dimethylarginine and creatinine as kidney function biomarkers in cats with chronic kidney disease. *J Vet Intern Med.* 2014;28(6):1676-1683.
4. Hall JA, Yerramilli M, Obare E, Yerramilli M, Almes K, Jewell DE. Serum concentrations of symmetric dimethylarginine and creatinine in dogs with naturally occurring chronic kidney disease. *J Vet Intern Med.* 2016;30(3):794-802.