An SDMA case study: Bess

Patient: Bess, 15-year-old, spayed female domestic shorthair

Presenting reason: Bess was due for a routine annual wellness examination.

History: The owner reported that Bess was slowing down as she got older and was not eating as much as she used to. Her owner had not noticed any changes in drinking or urinating, though she is part of a multiple-cat household.

Physical examination: Bess appeared to have moderate dental disease, and other examination parameters were within normal limits. There was appreciable loss of lean muscle mass over her spine and hips. Her BCS was determined to be 3/9.

Diagnostic plan

Complete blood count (CBC); chemistry panel, including the IDEXX SDMA® Test and electrolytes; complete urinalysis; and total T_4 were recommended. For Bess and patients her age with similar pet-owner observations, these tests are appropriate to build a good clinical picture alongside the physical examination.

Diagnostic review

Bess showed an increased SDMA* and concurrent decrease in urine-concentrating ability with a **urine specific gravity of 1.014.** Her CBC, other chemistry panel indicators, and total T_4 were otherwise within normal limits.

BESS

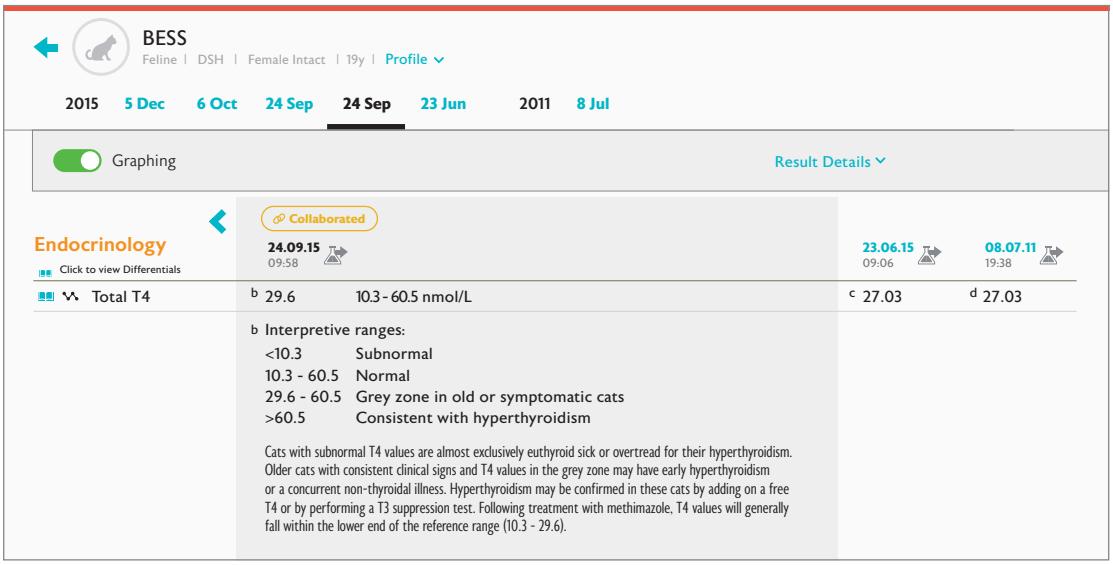
Feline | DSH | Female Intact | 19y | Profile

2015 5 Dec 6 Oct 24 Sep **24 Sep** 23 Jun 2011 8 Jul

Graphing Result Details

Collaborated

Chemistry (Click to view Differentials)	24.09.15 09:58			23.06.15 09:06	08.07.11 19:38
Glucose	4.55	4 - 9.71 mmol/L		5.22	5.22
IDEXX SDMA (Learn More)	[g] 23	0 - 14 µg/dL			
Creatinine	168	80 - 221 µmol/L		177	115
Urea	12.85	5.71 - 13.21 mmol/L		14.99	8.57
BUN: Creatinine Ratio	18.9			21.0	18.5
Phosphorus	1.42	0.94 - 2.03 mmol/L		1.42	1.68
Calcium	2.42	2.05 - 2.79 mmol/L		2.37	2.32
Sodium	154	147 - 157 mmol/L		150	151
Potassium	4.9	3.7 - 5.2 mmol/L		4.8	5.0
Na: K Ratio	31	29 - 42		31	30
Chloride	116	114 - 126 mmol/L		113	123
Total Protein	73	63 - 88 g/L		73	73
Albumin	32	26 - 39 gL		32	31
Globulin	41	30 - 59 gL		41	42
Albumin: Globulin Ratio	0.8	0.5 - 1.2		0.8	0.7
ALT	64	27 - 158 U/L		56	48
AST	40	16 - 67 UL		32	24
ALP	36	12 - 59 U/L		54	59
GGT	1	0 - 6 U/L		<1	3
Bilirubin - Total	1.71	0 - 5.13 µmol/L		1.71	1.71
Bilirubin - Unconjugated	0	0 - 3.42 µmol/L		0	0
Bilirubin - Conjugated	1.71	0 - 3.42 µmol/L		<1.71	1.71
Cholesterol	4.94	2.35 - 7.89 mmol/L		5.25	5.77
Creatine Kinase	164	64 - 440 U/L		305	193
Haemolysis Index	[h] 3+			[j] N	[l] N
Lipaemia Index	[i] N			[k] N	[m] N
Spec fPL	2.5	0.0 - 3.5 µg/L			



Possible next steps

- **The increased SDMA indicates impaired GFR and signaled the need to investigate kidney health further. The appropriate next step is a complete urinalysis,** which had been performed already. The low urine specific gravity was further evidence of kidney health compromise.
- Diagnostic imaging can be of value to further evaluate the kidneys, to confirm kidney disease, and to help determine an underlying cause (e.g., evidence of infection or stone), and it should be considered in patients showing evidence of kidney disease.
- Blood pressure and proteinuria should be further evaluated in patients with kidney disease.
- Consider also urine culture and MIC (minimum inhibitory concentration) susceptibility and updated retrovirus testing to exclude occult infectious disease.

Follow-up action

- Follow-up diagnostics 2 weeks later included radiographs, blood pressure measurement, and follow-up CBC, chemistry with IDEXX SDMA®, and complete urinalysis along with a urine protein:creatinine (UPC) ratio.
- **Results:** Radiographs revealed kidneys which were smaller than normal but no stones in the urinary tract. Her lab results revealed an **elevated SDMA of 25 µg/dL,** and urine specific **gravity remained low at 1.016. She was prehypertensive with a blood pressure of 145 mm Hg. Her UPC was normal at 0.1.**

Diagnosis

Following the International Renal Interest Society (IRIS) Chronic Kidney Disease (CKD) Staging Guidelines, the persistent and stable increase of SDMA showed that Bess had IRIS CKD Stage 2 disease, substaged as prehypertensive and nonproteinuric.

Discussion

- **SDMA is a biomarker of kidney function that is highly correlated with glomerular filtration rate (GFR).**[1-3]
- **SDMA is more sensitive than creatinine because it detects as little as a 25 percent loss of kidney function.**[1, 2] **Additionally, SDMA increases earlier than creatinine with progressive kidney disease and is often the first indicator of kidney disease.**[2, 3]
- Cases like Bess's are common in our practices—an older patient experiencing muscle loss with age and decreased activity. Creatinine is a breakdown product of muscle, and as muscle mass decreases it will impact creatinine levels on chemistry evaluations. **SDMA is more reliable than creatinine as a biomarker of kidney function because it is not influenced by muscle mass.**[4, 5]
- Both primary kidney disease and secondary kidney insults, such as concurrent disease, can cause an elevation in SDMA concentration.[6]
- IRIS has recognized the medical importance of SDMA and has included it in its guidelines for diagnosing, staging, and treating CKD.

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2015 5 Dec 6 Oct 24 Sep **24 Sep** 23 Jun 2011 8 Jul

Graphing Result Details

Haematology

Click to view Differentials

Collaborated

	24.09.15 09:58		23.06.15 09:06	08.07.11 19:38
RBC	8.84	7.12 - 11.46 x 10^12/L	7.70	9.26
Haematocrit	0.447	0.282 - 0.527 L/L	0.4	**0.479**
Haemoglobin	137	103 - 162 g/L	124	148
MCV	51	39 - 56 fL	52	52
MCH	15,5	12.6 - 16.5 pg	16.1	16.0
MCHC	306	285 - 378 g/L	310	309
% Reticulocyte	0.1	%	0.1	0.3
Reticulocyte	9	3 - 50 K/µL	8	27.78
WBC	7.0	3.9 - 19.0 x 10^9/L	6.0	7.3
% Neutrophils	72.3	%	64.0	60
% Lymphocytes	17.5	%	26.5	28
% Monocytes	3.0	%	2.3	2
% Eosinophils	7.2	%	7.2	9
% Basophils	0.0	%	0.0	0
Neutrophils	5.061	2.62 - 15.17 x 10^9/L	3.84	4.38
Lymphocytes	1.225	0.85 - 5.85 x 10^9/L	1.59	2.044
Monocytes	0.21	0.04 - 0.53 x 10^9/L	0.138	0.146
Eosinophils	0.504	0.09 - 2.18 x 10^9/L	0.432	0.657
Basophils	0	0 - 0.1 x 10^9/L	0	0
Platelets	580	155 - 641 x 10^9/L	389	462
Remarks	SLIDE REVIEWED MICROSCOPICALLY.		SLIDE REVIEW...	SLIDE REVIEW

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Graphing Result Details

Urinalysis

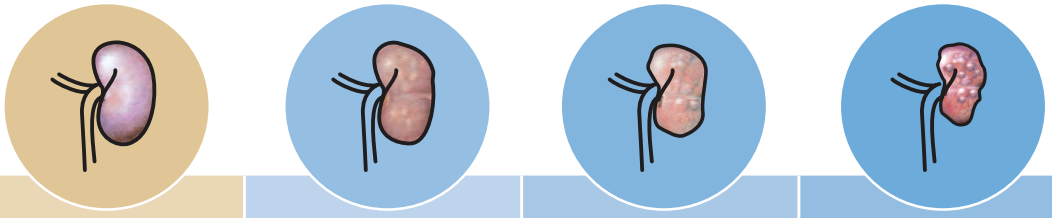
Click to view Differentials

Collaborated

	24.09.15 09:58	23.06.15 09:06	08.07.11 19:38
Collection	CYSTOCENTESIS	NOT GIVEN	UN
Colour	YELLOW	YELLOW	YELLOW
Clarity	HAZY	CLEAR	CLOUDY
Specific Gravity	1.014	1.014	1.050
pH	6.5	6.5	7.0
Urine Protein	[b] NEGATIVE	[c] NEGATIVE	NEGATIVE
Glucose	NEGATIVE	NEGATIVE	NEGATIVE
Ketones	NEGATIVE	NEGATIVE	NEGATIVE
Blood / Haemoglobin	NEGATIVE	NEGATIVE	**3+**
Bilirubin	NEGATIVE	NEGATIVE	NEGATIVE
Urobilinogen	NORMAL	NORMAL	NORMAL
White Blood Cells	0-2	0-2	2-5
Red Blood Cells	NONE SEEN	NONE SEEN	**>100**
Bacteria	NONE SEEN	NONE SEEN	NONE SEEN
Epithelial Cells	RARE (0-1)	RARE (0-1)	RARE (0-1)
Mucus	NONE SEEN	NONE SEEN	NONE SEEN
Casts	NONE SEEN	NONE SEEN	NONE SEEN
Crystals	NONE SEEN	NONE SEEN	NONE SEEN
Other			

[b] Protein test is performed and confirmed by the sulfosalicylic acid test

IRIS CKD Staging Guidelines



	Stage 1 No azotemia (Normal creatinine)	Stage 2 Mild azotemia (Normal or mildly elevated creatinine)	Stage 3 Moderate azotemia	Stage 4 Severe azotemia
Creatinine in µmol/L Stage based on stable creatinine	Less than 140 (1.6 mg/dL)	140–250 (1.6–2.8 mg/dL)	251–440 (2.9–5.0 mg/dL)	Greater than 440 (5.0 mg/dL)
SDMA* in µg/dL Stage based on stable SDMA	Less than 18	18–25	26–38	Greater than 38
UPC ratio Substage based on proteinuria	Nonproteinuric **<0.2**	Borderline proteinuric **0.2–0.4**	Proteinuric **>0.4**	
Systolic blood pressure in mm Hg Substage based on blood pressure	Normotensive **<140**	Prehypertensive **140–159**	Hypertensive **160–179**	Severely hypertensive **≥180**

1. 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.
2. 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.
3. 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.
4. Hall JA, Yerramilli M, Obare E, Yerramilli M, Yu S, Jewell DE. Comparison of serum concentrations of symmetric dimethylarginine and creatinine as kidney function biomarkers in healthy geriatric cats fed reduced protein foods enriched with fish oil, L-carnitine, and medium-chain triglycerides. Vet J. 2014;202(3):588–596.
5. Hall JA, Yerramilli M, Obare E, Yerramilli M, Melendez LD, Jewell DE. Relationship between lean body mass and serum renal biomarkers in healthy dogs. J Vet Intern Med. 2015;29(3):808–814.
6. Data on file at IDEXX Laboratories, Inc. Westbrook, Maine USA.

For more information on treatment of chronic kidney disease visit **www.iris-kidney.com/guidelines/recommendations.html** or visit **idexx.com/sdma**

*Symmetric dimethylarginine