SDMA on the Element i+ Technical Summary

Introduction

Symmetric Dimethylarginine (SDMA) is a methylated derivative of arginine produced during normal protein turnover and eliminated almost exclusively by the kidneys. As a renal biomarker, SDMA reflects Glomerular Filtration Rate (GFR) in dogs and cats. Unlike direct GFR measurement, which is costly and impractical in clinical practice, SDMA can be measured from a single blood sample, providing a practical and efficient tool for assessing kidney health.

Compared with creatinine, SDMA can increase earlier during renal dysfunction, supporting earlier detection and monitoring of chronic kidney disease (CKD) and acute kidney injury (AKI).[8, 9] International Renal Interest Society (IRIS) guidelines explicitly include SDMA for CKD diagnosis, staging and monitoring, aligning therapeutic decisions with laboratory trends.[6, 7] Although some recent reviews note that SDMA's superiority to creatinine can depend on thresholds and study design, evidence generally supports SDMA as a sensitive adjunct that is less impacted by lean body mass than creatinine.[10, 9] As with any renal biomarker, SDMA should be interpreted alongside a complete clinical evaluation, including urinalysis, to distinguish pre-renal, renal, and post-renal causes of azotemia. For example, dehydration or urinary obstruction can transiently elevate SDMA without indicating permanent renal damage. When persistent and renal in origin, SDMA provides a sensitive tool for early detection, staging, and monitoring disease progression .

Antech has long provided SDMA through its reference laboratories, ensuring broad access; adding SDMA onto the Element i+ brings the same analyte in-hospital for faster, same-visit assessment without compromising alignment to reference-lab staging cutoffs.[11, 1] This advancement enables veterinarians to make timely decisions for early detection, staging, and monitoring of kidney disease in dogs and cats—improving patient outcomes and client compliance.

Assay Overview

Intended use and reporting range

The Element i+ SDMA assay is an in vitro diagnostic test for the quantitative determination of SDMA in canine or feline serum or lithium heparin plasma; it is intended to aid in assessing renal function, early CKD detection, monitoring disease progression, and therapy response. Reportable range: 7.0–80.0 µg/dL.

Principle of measurement

The test is a competitive immunoassay on a proprietary planar-waveguide cartridge. Sample mixes with fluorophore-labeled anti-SDMA antibody; sample SDMA competes with surface-bound SDMA for antibody, generating an inverse fluorescence signal quantified via lot-specific calibration.[1]

Point-of-care platform

The assay runs on the Element i+ Analyzer using single-use cartridges (100 µL sample). Results display automatically upon completion.[1]

Materials and Methods

Specimens and reagents

- Matrix: Canine/feline serum or lithium heparin plasma (other anticoagulants not evaluated)
- Cartridge: Element i+ SDMA cartridge with dried reagent pellet and lot-specific calibration
- Analyzer: Element i+ Analyzer[1]

Method comparison

A method-comparison study followed CLSI EP09c for measurement procedure comparison and bias estimation using patient samples. Statistical analyses included regression (Passing–Bablok/Deming), scatter/difference plots, and estimation of bias and confidence intervals across the measuring interval. The Antech reference laboratory SDMA immunoassay on a Beckman AU served as the comparative procedure.[3, 4, 1, 11] Feline (177) and canine (188) samples spanning the reportable range (7–80 µg/dL) were tested on both reference method and Element i+.[3, 4]

Precision and reproducibility

Precision study was executed with 15×2×3 (15 days, 2 runs/day, 3 replicates/run) format to estimate repeatability and within-laboratory precision. A reproducibility study was conducted with 5×5×3 (5 days, 5 replicates, 3 instruments) to estimate repeatability and between-laboratory reproducibility. The study designs were based on CLSI EP05-A3.

Interference testing

A dedicated interference study evaluated the effect of five common endogenous substances on SDMA measurement using the Element i+ assay, following CLSI EP07[6] principles. Two contrived canine serum samples were tested at clinically relevant SDMA concentrations: low (<15 µg/dL) and high (>20 µg/dL). Acceptance criteria required the percent difference between spiked and control samples to be within ±15% for concentrations >10 µg/dL (or ≤1.5 µg/dL for ≤10 µg/dL).

Interferents and concentrations tested

- Protein: 7 g/dL
- Bilirubin: 35 mg/dL
- Cholesterol: 600 mg/dL
- Hemoglobin: 1 g/dL
- Triglycerides: 1,000 mg/dL

Cross-reactivity

Cross-reactivity to structural analogs of SDMA was studied per the EP07 framework using a 1×2 model (one reactant concentration at two SDMA sample concentrations), 16 replicates per condition, across four instruments. Analytes: ADMA (50 µg/dL), MMA (50 µg/dL), and L-arginine (2,500 µg/dL). Acceptance criterion: ≤6% cross-reactivity for samples >7 µg/dL.[2]

Results

Method comparison to Antech reference lab

Based on Passing–Bablok regression, overall bias was <20% within the 95% CI for samples ≥7 µg/dL (per product insert)[1]. Agreement to the established lab method supports use of common interpretive cut-points (e.g., normal ≤14 µg/dL, mild increase 15–19 µg/dL, high ≥20 µg/dL) in alignment with IRIS-aligned resources.[1,12] Regression plots demonstrated excellent correlation for both species:

- Canine: slope ≈ 0.98, confirming minimal proportional bias
- Feline: slope ≈ 0.99, indicating proportional agreement

Visual inspection of scatter and difference plots showed tight clustering around the line of identity, with no clinically significant systematic bias across the measuring interval. These findings reinforce that the Element i+ SDMA assay provides results consistent with the Antech reference method, enabling continuity in clinical interpretation between in-hospital and reference-lab workflows.

Figure 1: Bias plot of the canine serum samples Element i+ vs. reference method. Red dotted line represents 95% Confidence Interval to the Regression Line.

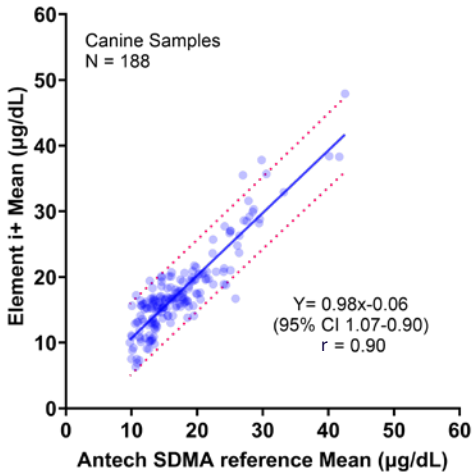
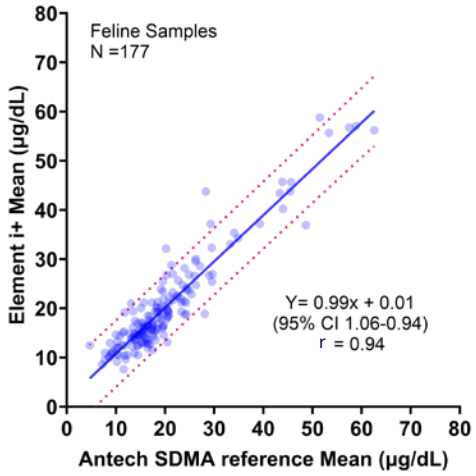


Figure 2: Bias plot of the feline serum samples Element i+ vs. reference method. Red dotted line represents 95% Confidence Interval to the Regression Line.



Precision and reproducibility (EP05-A3)

The data, summarized in Figure 1 and 2, demonstrate good analytical precision and reproducibility across clinically relevant SDMA concentrations. These results confirm that the Element i+ SDMA assay meets or exceeds performance expectations under routine operating conditions.

Table 1: Summary of Precision Results

SAMPLE	N	MEAN (DOSE (µg/dL)	TOTAL PRECISION %CV
1	180	12.1	5.0
2	178	17.0	4.8
3	179	27.0	5.2
4	178	68.0	10.8

Table 2: Summary of reproducibility results

SAMPLE	N	MEAN DOSE (µg/dL)	BETWEEN SITE %CV	REPRODUCIBILITY %CV
1	74	13	0.8	4.0
2	73	17	4.3	6.2
3	70	27.3	0.7	6.1
4	60	69.3	3.1	14.0

Interfering substances (EP07)

The results for interfering substance testing are summarized in Table 3. For both low and high SDMA samples, all substances produced ≤ 15% change versus controls. The largest observed effect was +14% for triglycerides at the high SDMA level; all others were ≤10%. Precision (%CV) remained within acceptable limits across replicates. None of the tested substances caused clinically significant interference with the Element i+ SDMA assay. The assay demonstrates robustness against common endogenous interferents, including hemolysis, icterus, lipemia, and hyperproteinemia.

Table 3: Interfering substance summary

INTERFERENT	CONCENTRATION TESTED	RESULT
Protein	7 g/dL	No significant effect[1]
Bilirubin	35 mg/dL	No significant effect[1]
Cholesterol	600 mg/dL	No significant effect[1]
Hemoglobin	Up to 1 g/dL	No significant effect[1]
Triglycerides	1,000 mg/dL	No significant effect[1]

Cross-reactivity (EP07 framework)

The results for cross reactivity testing are summarized in Table 4 for both low and high SDMA samples, all substances produced ≤ 2% change versus controls. None of the tested reactants caused clinically significant change to the assay results.

TEST REACTANT	LEVEL (ug/dL)	SAMPLE LEVEL (ug/dL)	N	% CROSS-REACTIVITY[2]
ADMA	50	Low (~16)	16	≈ -1.4
ADMA	50	High (~30)	16	≈ +1.0
MMA	50	Low (~16)	16	≈ -1.8
MMA	50	High (~29–30)	16	≈ -1.5
L-Arginine	2,500	Low (~16)	16	≈ 0.0
L-Arginine	2,500	High (~28–30)	16	≈ -0.1

Conclusion

The Element i+ SDMA assay provides a robust in-hospital complement to the Antech reference-lab SDMA test with: (a) a validated reportable range of 7–80 µg/dL and a competitive immunoassay architecture suitable for small-animal practice; (b) EP09c-based method comparison demonstrating acceptable bias versus the reference method; (c) EP05-A3 precision and reproducibility claims meeting low CV targets across clinically relevant concentrations; and (d) EP07 interference and cross-reactivity results indicating resilience to common interferents and minimal analytical cross-reactivity to structurally similar analytes.[1–6, 11–12] These analytical characteristics, coupled with SDMA's recognized clinical utility in CKD staging and monitoring, support broad adoption of Element i+ SDMA for same-visit renal assessment in dogs and cats.

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