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Comparison of 2 point-of-care analyzers and the Eurolyser assay with an IDEXX reference laboratory method for measurement of symmetric dimethylarginine in dogs

Key Words : SDMA, Vcheck, Catalyst, IDEXX, Comparison

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Introduction

Symmetric dimethylarginine (SDMA) analysis has become widely utilized in canine veterinary practice for assessment of renal function and is often routinely analyzed during disease investigation, wellness monitoring, and screening.

Liquid chromatography-mass spectrometry is considered the gold standard for canine SDMA analysis. This methodology is not widely available, is often costly, and is therefore inconvenient for routine veterinary analysis. To the author's knowledge, there currently are limited studies evaluating the performance of non-IDEXX laboratory proprietary SDMA methodologies, and, unlike cats, independent comparative analytical performance analysis of IDEXX Catalyst point-of-care (POC) and IDEXX reference laboratory (RL) for canine SDMA is lacking.

Objective

The objective of this study was to determine if canine serum SDMA results obtained by the IDEXX Catalyst POC, Bionote Vcheck V200 POC, and Eurolyser RL analyses are comparable with IDEXX RL SDMA. Our hypothesis was that each of these analyzers would have an acceptable agreement with the IDEXX RL SDMA results.

Methods

This was a prospective study conducted between August 2019 and March 2023. Blood collected from dogs treated at a referral hospital underwent SDMA analysis by 2 POC analyzers (IDEXX Catalyst and Vcheck V200) and 2 RL methods (Eurolyser and IDEXX). Dogs with suspected or known renal disease were preferentially included later in the study.

Results

75 samples were included in the final analysis. There was a difference in SDMA results obtained from Eurolyser assays but not IDEXX Catalyst POC and Vcheck V200 POC assay compared to IDEXX RL results. When applied to the International Renal Interest Society (IRIS) chronic kidney disease staging classification, there was almost perfect agreement between Eurolyser and Vcheck V200 POC SDMA compared to IDEXX RL SDMA.

Comparison with IDEXX Lab SDMA

Strong positive correlations were observed between IDEXX RL SDMA and both POC analyzers, with r = 0.95 for IDEXX Catalyst and r = 0.93 for the Vcheck V200 POC (Figure 1-A), respectively. Despite the strong correlations, agreement analysis revealed that the Vcheck analyzer showed a smaller overall bias compared to the IDEXX Catalyst.

Based on Bland-Altman analysis, the number of data points exceeding the limits of agreement based on total allowable error (LoA_{TEa}) was 40% (27/68) for IDEXX Catalyst and 24% (10/42) for Vcheck (Figure 1-B, Table 1). Similarly, 6% (4/68) and 5% (2/42) of results exceeded the limits of agreement of the observed differences (LoA_o) for IDEXX Catalyst and Vcheck, respectively. These results suggest that Vcheck demonstrated better agreement with the IDEXX Lab SDMA.

Agreement Based on IRIS CKD Staging

Staging agreement was assessed based on IRIS guidelines. Cohen's weighted kappa demonstrated substantial agreement between IDEXX Catalyst and IDEXX RL SDMA results (κ = 0.77), with 87% of the results falling within the same IRIS stage and 12% differing by one stage (Table 2).

For Vcheck, almost perfect agreement was observed (κ = 0.88), with 93% of the results in the same IRIS stage and only 7% differing by a single stage (Table 3). Notably, no results from either analyzer deviated by more than one IRIS stage compared to IDEXX Lab SDMA, indicating minimal expected impact on clinical decision-making.

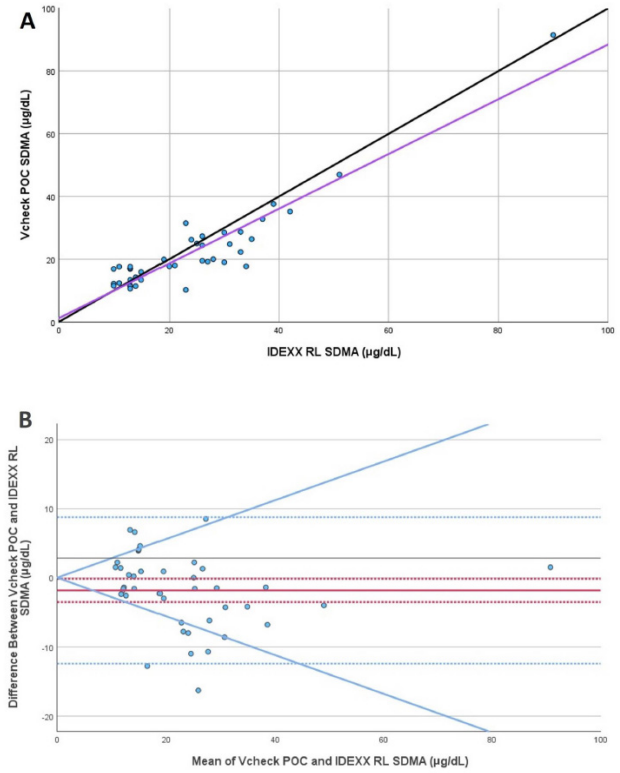

Figure 1. Scatter plot (A) and Bland-Altman difference (B) plot comparing Vcheck V200 POC and IDEXX RL SDMA concentrations

Table 1. Number of data points exceeding LoA_o and LoA_{TEa} thresholds compared to IDEXX Lab SDMA

Method	Exceeding the **LoA_o threshold**	Exceeding the **LoA_{TEa} threshold**
IDEXX Catalyst	4/68 (6%)	27/68 (40%)
Vcheck V200	2/42 (5%)	10/42 (24%)

Table 2. Agreement between IDEXX Catalyst and IDEXX RL SDMA results based on IRIS CKD staging categories

IRIS Stage		IDEXX Catalyst SDMA			
		Stage 1	Stage 2	Stage 3	Stage 4
IDEXX RL SDMA	Stage 1	**44**	0	0	0
	Stage 2	5	**13**	1	0
	Stage 3	0	3	**1**	0
	Stage 4	0	0	0	**1**

Table 3. Agreement between Vcheck and IDEXX RL SDMA results based on IRIS CKD staging categories

IRIS Stage		Vcheck SDMA			
		Stage 1	Stage 2	Stage 3	Stage 4
IDEXX RL SDMA	Stage 1	**44**	2	0	0
	Stage 2	1	**18**	0	0
	Stage 3	0	2	**2**	0
	Stage 4	0	0	0	**1**

Conclusions

While there was a strong to excellent correlation between assays, the results obtained via each assay demonstrated that there may be significant bias and analytical variation affecting the results. However, this may have minimal effect when applied clinically.