# **Evaluation of a point-of-care test for quantitative determination of total thyroxine in feline serum**

Key Words : Total thyroxine, method comparison, point-of-care immunoassay, immunoassay

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# Introduction

Hyperthyroidism is a common clinical condition in adult and senior cats. Total thyroxine (TT4) evaluation is the most commonly used first-line test for the diagnosis and monitoring of cats with hyperthyroidism. A new dry-slide point-of-care TT4 quantitative assay (Vcheck T4; Bionote) is currently available for in-clinic testing using a benchtop point-of-care analyzer (Vcheck V200; Bionote), which is based on fluorescence immunoassay technology, providing TT4 test results within 20 minutes.

## Purpose

This study aimed to evaluate the analytical performance of the Vcheck T4 assay in feline sera and its agreement in classifying normal, high, and low TT4 concentrations compared to those measured by an enzyme immunoassay (EIA).

# Materials and Methods

All samples were leftover feline serum samples obtained after primary diagnostic testing of client-owned cats clinically evaluated by the authors. The precision, reproducibility, and linearity of the Vcheck T4 assay were evaluated. For method comparison, 73 feline serum samples were analyzed using the Vcheck T4 assay and the EIA method on the automated veterinary analyzer AIA 360 VET, and the results were compared between the two methods.

## Results

The Vcheck T4 assay demonstrated good precision and reproducibility, with intra-assay coefficients of variation ranging from 3.7% to 11.0% and inter-assay coefficients of variation ranging from 2.9% to 13.4% (Table 1), showing a performance level comparable to the reference method (EIA) used in this study. Additionally, the assay exhibited good linearity within the diagnostic range of < 0.5 and > 8 µg/dL (Table 2). Method comparison revealed a strong correlation between Vcheck T4 and the reference analyzer, with a correlation coefficient of r = 0.87 (Figure 1). The Bland–Altman difference plot indicated a +0.5 µg/ dL bias for Vcheck T4 in measuring TT4 (Figure 2). As a diagnostic tool for hyperthyroidism, the Vcheck T4 assay demonstrated a sensitivity of 88.9% and specificity of 84.4%, with a positive predictive value (PPV) of 44.5% and a negative predictive value (NPV) of 98.2%, supporting its clinical utility in feline thyroid function assessment.

# Conclusion

The Vcheck T4 assay provided precise and reproducible TT4 concentration results in substantial agreement with EIA results, and it was able to correctly classify most samples with normal, high, and low TT4 concentrations. This test is useful for screening adult and older cats and ruling out the presence of hyperthyroidism, but samples with high TT4 concentrations using this method need to be analyzed and the result confirmed by another reference method.

### Table 1. Intra- and inter-assay coefficients of variation (CV)

TT4 concentration	Intra-assay variability (n = 5)			Inter-assay variability (n = 5)		
	Mean (µg/dl)	Range (µg/dl)	CV (%)	Mean (µg/dl)	Range (µg/dl)	CV (%)
Normal	1.78	1.50 - 2.04	11.00	1.85	1.45 - 2.13	13.48
High	6.72	6.40 - 7.02	3.70	7.08	6.57 - 7.38	2.97
Low	0.74	0.69 - 0.79	5.81	0.94	0.76 - 0.98	7.33

#### Table 2. Effect of dilution on feline TT4 concentrations measured by Vcheck T4

Dilution	High TT4 concentration (6.74 µg/dl)			Normal TT4 concentration (3.01 $\mu$ g/dl)		
	Observed	Calculated	Recovery (%)	Observed	Calculated	Recovery (%)
75% (3:1)	4.21	5.10	83	2.06	2.25	92
50% (1:2)	3.04	3.37	90	1.40	1.50	93
33% (1:3)	1.97	2.20	90	1.16	1.00	116
25% (1:4)	1.65	1.69	98	0.91	0.75	121









