Comparative Study

Comparison of six commercial antigen kits for detection of *Dirofilaria immitis* infection in canines[1]

Introduction

Dirofilaria immitis infection in canines is a chronic disease affecting the pulmonary vasculature, lungs, and heart.

In antemortem testing, diagnosis of *D. immitis* infection relies upon the detection of antigen several months after infection when the female *D. immitis* matures.

Antigenemia, mainly contributed by the sexually mature female worm, generally precedes the appearance of microfilariae in the blood; thus antigen-based testing of whole blood or serum has become the primary tool for diagnostic screening.

Purpose

The goal of this study was to evaluate the diagnostic sensitivity and specificity of five commercially available rapid patient-side tests using canine sera defined by adult female *D. immitis* burden.

- Anigen Rapid One Step® (Bionote)
- SNAP® 4Dx Plus Test Kit (IDEXX)
- WITNESS® Heartworm Canine Heartworm Antigen Test Kit (Zoetis)
- VetScan® Canine Heartworm Rapid Test (Abaxis)
- Solo Step® CH Canine Heartworm Antigen Test (Heska)

Additionally, sensitivity and specificity for the rapid microplate ELISA DiroCHEK® (Zoetis) were determined using the same samples.

Materials and Methods

Five in-clinic patient-side *D. immitis* tests and a commercial microwell ELISA were compared. All tests were performed according to each manufacturer's protocol.

A total of 250 sera were divided into one of the five following groups based on necropsy results.

Results

The test results for the comparison of six commercial antigen kits including Anigen were described in Table 1, Table 2, and Table 3.

Conclusion

In this study, all of the commercial patient-side rapid screening tests were highly accurate, sensitive, and specific. Especially, among the five products (including IDEXX SNAP), Anigen Rapid One Step® (Bionote) has the best results. (Sensitivity 99.5%, Specificity 94.0%)

Based on these results, the Anigen Rapid CHW Ag test kit provides accurate and reliable test results in serum samples from dogs, as compared to necropsy and ELISA method.

1. Laura G.H., Katherine J.B., et al., 2018. Comparison of six commercial antigen kits for detection of *Dirofilaria immitis* infections in canines with necropsy-confirmed heartworm status. Veterinary parasitology. 254, 178-182.

Table 1

Overall sensitivity and specificity of tests results from 5 commercial HW kits for patient-side testing of *D. immitis* 200 positive and 50 negative necropsy verified dogs.

Test	Sensitivity (%) (95% C.I.)	Specificity (%) (95% C.I.)
Anigen Rapid (Bionote)	**99.50% (97.25 – 99.99)**	**94.00% (83.45 – 98.75)**
SNAP 4Dx (IDEXX)	97.50% (94.26 – 99.18)	94.00% (83.45 – 98.75)
WITNESS (Zoetis)	99.00% (96.43 – 99.88)	94.00% (83.45 – 98.75)
VetScan (Abaxis)	98.50% (95.68 – 99.69)	94.00% (83.45 – 98.75)
Solo Step (Heska)	98.00% (94.96 – 99.45)	94.00% (83.45 – 98.75)

Table 2

Number of positive test results from 5 commercial test kits for patient-side testing of *D. immitis*. 200 dogs, identified as infected by necropsy, were sorted into groups of 50 based on numbers of female *D. immitis*.

***D. immitis* Burden**	**Anigen Rapid # (%)**	**SNAP 4Dx # (%)**	**WITNESS # (%)**	**VetScan # (%)**	**Solo Step # (%)**
1 – 5 (low)	**50 (100)**	48 (94)	49 (98)	49 (98)	48 (96)
6 – 20 (moderate)	**50 (100)**	49 (98)	50 (100)	50 (100)	49 (98)
21 – 40 (heavy)	**49 (98)**	48 (98)	49 (98)	49 (98)	49 (98)
> 40 (very heavy)	**50 (100)**	49 (98)	50 (100)	49 (98)	50 (100)

Table 3

Percent agreement with 95% C.I. comparing each of 5 commercial heartworm tests with a rapid microplate ELISA DiroCHEK® (Zoetis).

Test	# Matched	% Agreement
Anigen Rapid (Bionote)	**248**	**99.2%**
SNAP 4Dx (IDEXX)	246	98.4%
WITNESS (Zoetis)	247	98.8%
VetScan (Abaxis)	246	98.4%
Solo Step (Heska)	247	98.8%