

Canine		DRI Total T ₄ Results (µg/dL)		
		Low <1.0 µg/dL	Normal 1.0–4.0 µg/dL	High >4.0 µg/dL
SNAP Total T ₄ Results (µg/dL)	Low <1.0 µg/dL	16	5	0
	Normal 1.0–4.0 µg/dL	0	37	4
	High >4.0 µg/dL	0	1	26

Table 1. Canine T₄ results compared by reference range.

Feline		DRI Total T ₄ Results (µg/dL)		
		Subnormal <0.8 µg/dL	Normal 0.8–4.7 µg/dL	High >4.7 µg/dL
SNAP Total T ₄ Results (µg/dL)	Subnormal <0.8 µg/dL	1	1	0
	Normal 0.8–4.7 µg/dL	1	42	10
	High >4.7 µg/dL	0	1	27

Table 2. Feline T₄ results compared by reference range.

Equine		DRI Total T ₄ Results (µg/dL)		
		Low <1.0 µg/dL	Normal 1.0–3.8 µg/dL	High >3.8 µg/dL
SNAP Total T ₄ Results (µg/dL)	Low <1.0 µg/dL	2	0	0
	Normal 1.0–3.8 µg/dL	4	34	0
	High >3.8 µg/dL	0	0	11

Table 3. Equine T₄ results compared by reference range.

Conclusions

The SNAPshot Dx Analyzer and SNAP Total T₄ assay produce accurate results when used to quantify total T₄ in serum or plasma samples from dogs, cats and horses. This new immunoassay system demonstrates excellent correlation with the DRI T₄ results and provides an accurate, reliable and convenient option for veterinarians who wish to use their in-house laboratory to diagnose and monitor animals with thyroid disease.

Scientific Research Associates Sue Rauscher and Lindsay Heller-Belt contributed to the data collection and analysis for this document.

Introduction

Thyroid disorders are commonly encountered in veterinary practice. Because thyroid disorders typically respond well to treatment and carry a good prognosis, it is important for the clinician to routinely screen patients with suspected or potential thyroid disease. We recommend that a total T₄ be run as the initial screening test for thyroid disorders. The test is most often used to exclude the diagnosis of hypothyroidism in dogs and horses or to screen for hyperthyroidism in cats. Additionally, regular therapeutic monitoring of total T₄ concentrations is used to assess the efficacy of treatment in all three species. In recent years, new methods and technologies for T₄ measurement have been developed, providing several alternatives for veterinary practitioners. The SNAPshot Dx® Analyzer and SNAP® Total T₄ device comprise IDEXX Laboratories' immunoassay system designed to measure T₄ concentrations in serum or plasma samples from dogs, cats, and horses. This new system uses proven ELISA technology, a state-of-the-art digital imaging system and proprietary image analysis algorithms to produce reliable, accurate test results in the veterinary clinic.

The objective of this study was to conduct a comprehensive comparison of T₄ concentrations determined by the SNAP Total T₄ Test with T₄ concentrations determined by the DRI T₄ method used by reference laboratories.

Materials and Methods

Serum or lithium heparin-treated plasma samples were collected from 89 dogs, 84 cats and 51 horses. All samples were analyzed using both a homogeneous immunoassay (DRI T₄), run on a clinical chemistry analyzer (Olympus® AU400), and the SNAP Total T₄ Test, run on the SNAPshot Dx Analyzer. Both assays were performed according to the manufacturer's specifications.

Results

Least-squares linear regression and calculation of the Pearson product-moment correlation coefficient were used to compare the overall agreement of T₄ values between the two methods. Additionally, to expose any range-specific or sample type-related bias, plots were made, graphing the average of T₄ values obtained using the two methods on the x-axis, versus their difference, plotted on the y-axis.

Canine Samples

The results for the canine samples are summarized in Figures 1 and 2. The regression analysis (Figure 1) shows that T₄ results correlated well. As shown in Figure 2, the overall results from the DRI T₄ assay showed a slight negative bias (-0.1 µg/dL).

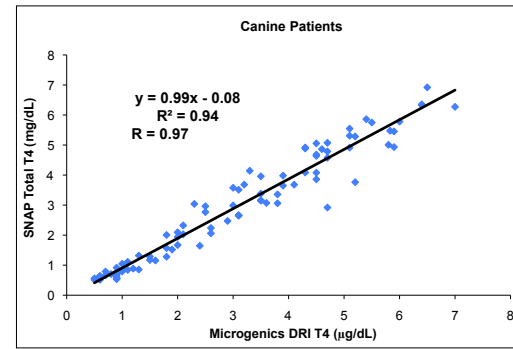


Figure 1. Linear-regression plot of total T₄ concentrations in canine samples.

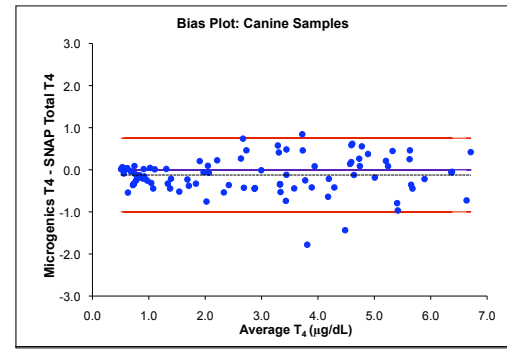


Figure 2. Bias plot comparing total T₄ measurements. The center line shows the points of possible exact agreement (zero bias) and the dashed line shows the average bias of the entire data set.

Feline Samples

The results for the feline samples are summarized in Figures 3 and 4. The regression analysis (Figure 3) shows that T₄ results correlated well. As shown in Figure 4, the overall results from the DRI T₄ assay showed a slight positive bias (0.2 µg/dL).

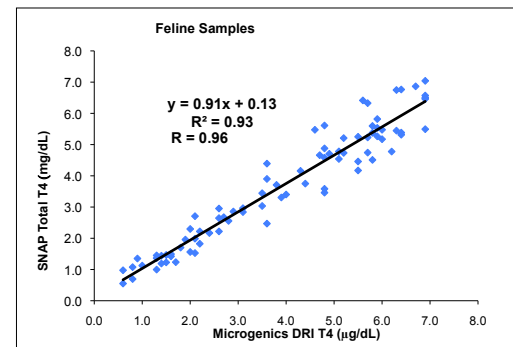


Figure 3. Linear-regression plot of total T₄ concentrations in feline samples.

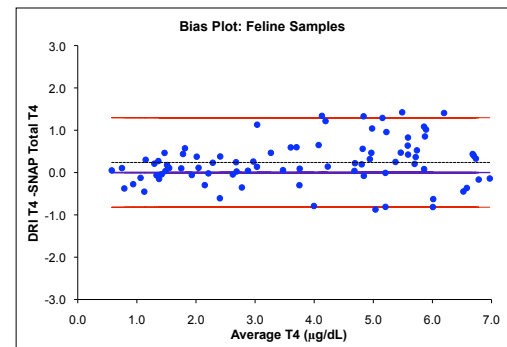


Figure 4. Bias plot comparing total T₄ measurements. The center line shows the points of possible exact agreement (zero bias) and the dashed line shows the average bias of the entire data set.

Equine Samples

The results for the equine samples are summarized in Figures 5 and 6. The regression analysis (Figure 5) shows that T₄ results correlated well. As shown in Figure 6, the overall results from the DRI T₄ assay showed a slight negative bias (-0.3 µg/dL).

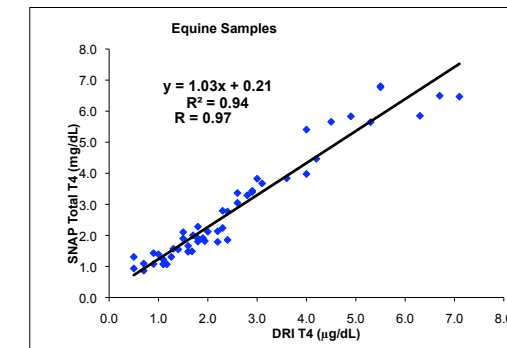


Figure 5. Linear-regression plot of total T₄ concentrations in equine samples.

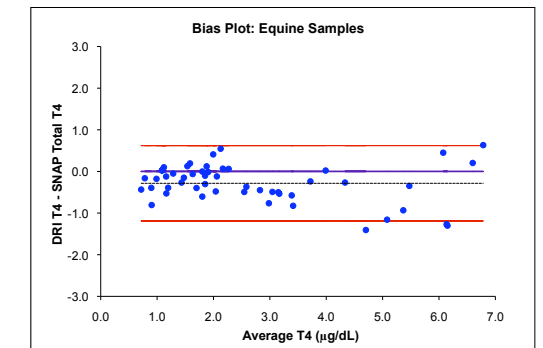


Figure 6. Bias plot comparing total T₄ measurements. The center line shows the points of possible exact agreement (zero bias) and the dashed line shows the average bias of the entire data set.

Discussion

There was very strong agreement between the SNAP Total T₄ and the DRI T₄ results for dogs, cats and horses in this study. A total T₄ assay is recommended as the initial screening test for thyroid disease in dogs, cats and horses. Additional thyroid function tests are then used when clinically appropriate to confirm a diagnosis. In practice, when evaluating a patient for thyroid disease, the overall clinical picture and clinicopathologic test results must be considered. While the T₄ is only part of the overall diagnostic information, inconsistencies in results can delay an accurate diagnosis. Tables 1–3 compare the SNAP Total T₄ and the DRI T₄ results for each species.

Examples of clinically discrepant results were uncommon. In the canine samples, five SNAP Total T₄ results that were normal on DRI and low on SNAP were all in the low-normal range of 1.0–2.0, and so would have had a fT₄ and cTSH recommended. Four normal range SNAP T₄ results were elevated by DRI, but mildly increased T₄ levels are acceptable in dogs on thyroid hormone therapy. In the feline samples, 10 normal SNAP Total T₄ results were high, as measured by DRI. These SNAP Total T₄ results would have led to additional thyroid-function tests or repeat total T₄ testing at a later date, depending on the clinical status. In the equine samples, 4 normal-range SNAP Total T₄ results were low by DRI. It is important to remember that differences may exist between the various methodologies for measuring total T₄, which highlights the need to use a single methodology for repeat testing—especially when monitoring therapy.