

Using Patient Established Reference Intervals to Diagnose Thyroid Disease in Cats

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In the Literature

Prieto JM, Carney PC, Miller ML, et al. Short-term biological variation of serum thyroid hormone concentrations in clinically healthy cats. *Domest Anim Endocrinol.* 2020;71:106389.

FROM THE PAGE ...

Hyperthyroidism is a common endocrine disease in cats, with a reported prevalence of 8.4% to 11.7% in cats >10 years of age.¹ The disease is typically diagnosed based on elevated total thyroxine (T4) values and presence of typical clinical signs (ie, weight loss in conjunction with increased appetite, polyuria, polydipsia, vomiting, diarrhea, hyperactivity). A small percentage of cats with apathetic hyperthyroidism are presented with lethargy, obtundation, and poor appetite.

Elevated total T4 values confirm a diagnosis of hyperthyroidism in 91% of cats²; however, the established population-based reference intervals for euthyroidism may not always be accurate, and some cats with normal values may be preclinically hyperthyroid. Many cats that have early stages of hyperthyroidism will fall in the high end of the normal reference range for T4. Free thyroxine (fT4) is the small percentage of T4 not bound to serum proteins. When elevated, fT4 has a sensitivity of 98% for diagnosis of hyperthyroidism and can be used as a second-line test in cats with high normal T4.² Still, there is a large day-to-day biologic variation in T4 and triiodothyronine (T3) values in hyperthyroid cats, and some patients with clinical disease fall within normal reference ranges; this variation is minimal in normal cats.³

This study evaluated biologic variation of T4, fT4, and thyroid-stimulating hormone (TSH) values in clinically healthy cats. For each of the 10 cats in the study, biologic variation, individual reference

intervals, and index of individuality (ie, the ratio of the within-subject biologic variation to the between-subject variation) were determined for T4, fT4, and TSH values by measuring hormones weekly for 6 weeks. By comparing thyroid values over time and establishing each patient's own reference interval, clinicians may detect thyroid dysfunction earlier.

The reference change values for T4 and fT4 in this population of cats were $\approx 30\%$. Thus, a $>30\%$ increase in T4 or fT4 from the patient's previous levels may suggest early hyperthyroidism. Relying only on population-based reference intervals might be misleading and could cause the clinician to miss changes in T4 values for individual patients that indicate preclinical hyperthyroidism, even though the values may fall within the normal population-based range.

... TO YOUR PATIENTS

Key pearls to put into practice:

- 1 Obtaining T4, fT4, and TSH values during early mature life (ie, 5-8 years of age) might improve diagnosis of thyroid dysfunction by establishing an individual cat's normal reference range.
- 2 A euthyroid cat with a previously detectable TSH value that becomes undetectable should be suspected of having emerging hyperthyroidism.
- 3 Clinicians should not rely solely on laboratory-generated or population-generated reference intervals to diagnose thyroid disease; cats that have T4 values that are increased $>30\%$ but within normal population reference limits may still have preclinical hyperthyroidism.

References

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