

Interpretive Guidelines for Thyroid and Cortisol Testing Results for Dogs and Cats



Analyte/Test	Species	Interpretive Guidelines
Total T4 (TT4)	Canine	<p>Evaluation of total T4 (TT4) is best used to rule out a diagnosis of hypothyroidism or monitor dogs on levothyroxine supplementation.</p> <p>TT4 concentrations below the lower reference limit are suspicious (but not confirmatory) for hypothyroidism. Evaluation of FT4 and TSH is recommended, if hypothyroidism is clinically suspected.</p> <p>TT4 concentrations up to 2.0 µg/dL may be consistent with hypothyroidism. Evaluation of FT4 and TSH should be considered, if hypothyroidism is clinically suspected.</p> <p>TT4 concentrations \geq 2.0 µg/dL make hypothyroidism highly unlikely.</p> <p>Peak TT4 (6 hours) post-levothyroxine administration, target TT4 concentrations are in the upper half of the reference interval; however, results should be correlated with the clinical response to treatment.</p>
Total T4 (TT4)	Feline	<p>A serum total T4 (TT4) concentration that is within the reference interval does not rule out a diagnosis of hyperthyroidism. If TT4 is within the reference interval, but clinical suspicion is high, the presence of concurrent non-thyroidal illness should be considered and further testing may be warranted, including TSH in conjunction with T4 and FT4, or thyroid scintigraphy.</p> <p>If TT4 is elevated but clinical suspicion is low, re-evaluation of TT4 in 2 weeks is recommended.</p>
Free T4 (FT4)	Canine	<p>FT4 is the biologically active form of T4 and most accurately reflects thyroid function. It can be used as the initial diagnostic test for hypothyroidism or to further evaluate thyroid function when the TT4 is borderline or below the lower limit of the reference interval.</p> <p><i>Note:</i> Although more effective for distinguishing euthyroidism from hypothyroidism, the FT4 can also be affected by non-thyroidal illness and some drugs.</p>
Free T4 (FT4)	Feline	<p>FT4 is the biologically active form of T4 and therefore more accurately reflects thyroid function and is less affected by non-thyroidal factors.</p> <p>FT4 is most commonly used to diagnosis mild or early hyperthyroidism and in cats with non-thyroidal illness with a TT4 in the upper normal range.</p> <p>FT4 may be increased in sick euthyroid cats. Therefore, a TT4 should be measured when screening cats for hyperthyroidism.</p> <p>For hyperthyroid suspects where the TT4 and FT4 are equivocal, diagnostic options include: repeating a TT4 measurement on a new sample as TT4 can fluctuate in hyperthyroid cats, thyroid scintigraphy (most definitive), and T3 suppression test (rarely performed).</p>
TSH	Canine	<p>In primary hypothyroid dogs, loss of negative feedback to the pituitary results in increased canine thyroid stimulating hormone (TSH) concentration. TSH is used extensively for the diagnosis and therapeutic monitoring of thyroid disease in humans but is not as reliable in dogs. Concentrations of TSH are increased in 60 to >85% of hypothyroid dogs, but a significant proportion will have normal TSH levels and 10-20% of euthyroid dogs will have increased TSH concentrations. These limitations should be considered in interpretation. TSH should not be used as the sole criterion for diagnosing hypothyroidism, but rather should be interpreted in the context of the patient history, physical examination, routine laboratory findings, and TT4 and/or FT4 concentrations.</p>
TSH	Feline	<p>In cats with total T4 >2.5 ug/dL, an undetectable TSH concentration (<0.03 ng/mL) supports a diagnosis of hyperthyroidism.</p> <p>TSH may be increased in cats with iatrogenic hypothyroidism (post I-131 treatment) and primary hypothyroidism (rare).</p>

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Analyte/Test	Species	Interpretive Guidelines
Cortisol (baseline)	Canine	<p>The following guidelines should be considered only if the patient has not received any oral or topical steroids in the last 6 weeks.</p> <p>If the baseline cortisol concentration is $\leq 2 \mu\text{g/dL}$, an ACTH stimulation test is recommended to evaluate for hypoadrenocorticism.</p> <p>A baseline cortisol concentration $> 2 \mu\text{g/dL}$ is not consistent with a diagnosis of hypoadrenocorticism.</p>
Cortisol (baseline)	Feline	<p>The following guidelines should be considered only if the patient has not received any oral or topical steroids in the last 6 weeks.</p> <p>Interpretation of baseline cortisol values in cats has not been thoroughly evaluated. However, a resting cortisol $> 2.0 \mu\text{g/dl}$ in the cat is considered inconsistent with hypoadrenocorticism. If the baseline cortisol concentration is $\leq 2 \mu\text{g/dL}$, measurement of cortisol concentration 1 hour following administration of ACTH is recommended to evaluate for hypoadrenocorticism.</p>
ACTH stimulation (pre and post)	Canine	<p>Normal pre-ACTH (resting) cortisol: $0.5\text{-}4.0 \mu\text{g/dL}$</p> <p>Normal post-ACTH cortisol: $8.0\text{-}20 \mu\text{g/dL}$</p> <p>Equivocal for hyperadrenocorticism post-ACTH cortisol: $18\text{-}22 \mu\text{g/dL}$</p> <p>Post-ACTH cortisol consistent with hyperadrenocorticism: $> 22 \mu\text{g/dL}$</p> <p>Post-ACTH cortisol consistent with hypoadrenocorticism: $< 2 \mu\text{g/dL}$</p> <p>Desired pre- and post-ACTH cortisol for dogs on trilostane* (or Lysodren) therapy: Both pre and post samples between $1.0 \text{ \& } 5.0 \mu\text{g/dL}$</p> <p><i>Please note:</i> Optimal timing for administering ACTH (Cortrosyn) is 2-4 hours post administration of trilostane.</p> <p>Some dogs with hyperadrenocorticism may have not have an exaggerated response to ACTH administration. Additionally, an exaggerated response in some dogs may be a result of non-adrenal illness.</p> <p>Dogs with iatrogenic Cushing's syndrome will have a flatline or minimal response to ACTH stimulation due to adrenal atrophy resulting in a post-ACTH cortisol similar or only slightly higher than their baseline cortisol.</p> <p>Patient identity, as well as 'pre' vs 'post' descriptions, were confirmed from labels on submitted tubes - values from both samples were rechecked and verified.</p>
ACTH stimulation (pre and post)	Feline	<p>Hypoadrenocorticism: Baseline cortisol $< 1 \mu\text{g/dL}$ and 30 and 60 minute post-cortisol samples $< 2 \mu\text{g/dL}$ are consistent with hypoadrenocorticism.</p> <p>Hyperadrenocorticism (Cushing's disease): When testing for Cushing's disease in cats, ACTH stimulation testing is not recommended due to its poor sensitivity (false negatives) and specificity (false positives). If an exaggerated response to ACTH is observed, a low dose dexamethasone suppression test (LDDST) should be performed to confirm a diagnosis of Cushing's disease prior to treatment.</p> <p>For cats with suspected Cushing's disease, a urine cortisol:creatinine ratio (UCCR) is the initial screening test of choice, as an abnormal UCCR result is 95-100% sensitive for detection of feline Cushing's disease (normal UCCR makes Cushing's syndrome highly unlikely). LDDST may be more sensitive for the detection of Cushing's disease, but is of limited utility in clinically ill cats.</p>

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Analyte/Test	Species	Interpretive Guidelines
Dexamethasone suppression (pre and post)	Canine	<p>An 8-hour post-dexamethasone cortisol < 1.1 µg/dL in the dog is not consistent with hyperadrenocorticism (HAC).</p> <p>An 8-hour post-dexamethasone cortisol > 1.4 µg/dL in the dog is consistent with HAC in the presence of supportive clinical signs.</p> <p>Failure to suppress (>1.4 ug/dL) at 4 hours with suppression (<1.1 ug/dL) at 8 hours (“inverse pattern”) is atypical. Testing for HAC should be repeated if clinical signs of HAC are present.</p> <p>For the Low Dose Dexamethasone Suppression Test (LDDST), please consider the following:</p> <p>The LDDST can identify dogs with pituitary-dependent hyperadrenocorticism (PDH) based on the following criteria:</p> <ul style="list-style-type: none"> • 4-hour post-dexamethasone cortisol of < 1.1 µg/dL or less than 50% of the pre-dexamethasone cortisol with an 8-hour post dexamethasone cortisol of > 1.4 µg/dL. • 8-hour post-dexamethasone cortisol less than 50% of the pre-dexamethasone cortisol and > 1.4 µg/dL. <p>Cortisol concentrations between 1.1 and 1.4 ug/dL (at either time-point) are considered inconclusive for HAC.</p> <p>Please note that PDH is still possible, even if the above criteria are not met, and that non-adrenal illness may also result in a positive LDDST.</p> <p>For the High Dose Dexamethasone Suppression Test (HDDST), please consider the following:</p> <p>An 8-hour post-dexamethasone concentration <1.1 ug/dL is consistent with pituitary-dependent hyperadrenocorticism (PDH) in patients with previously diagnosed hyperadrenocorticism (HAC).</p> <p>An 8-hour post-dexamethasone concentration >1.4 µg/dL is consistent with adrenal-dependent (adrenal tumor) HAC, but PDH cannot be ruled out.</p> <p>Cortisol concentrations between 1.1 and 1.4 ug/dL are considered inconclusive.</p>
Dexamethasone suppression (pre and post)	Feline	<p>An 8-hour post-dexamethasone concentration <1.1 ug/dL is consistent with pituitary-dependent hyperadrenocorticism (PDH) in patients with previously diagnosed hyperadrenocorticism (HAC).</p> <p>An 8-hour post-dexamethasone concentration >1.4 µg/dL is consistent with adrenal-dependent HAC (adrenal tumor), but PDH cannot be ruled out.</p> <p>Cortisol concentrations between 1.1 and 1.4 ug/dL are considered inconclusive.</p>
Urine cortisol: creatinine ratio (UCCR)	Canine & feline	<p>A urinary cortisol:creatinine ratio (UCCR) >20 is supportive of (but not confirmatory for) a diagnosis of hyperadrenocorticism.</p> <p>Many non-adrenal illnesses may cause an elevated (>20) UCCR.</p> <p>A UCCR <20 makes a diagnosis of hyperadrenocorticism very unlikely.</p>