

Why and When to Evaluate for Canine Hypothyroidism?

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Obtaining baseline thyroid levels and annual monitoring when the patient is healthy may allow the clinician to spot a downward trend prior to clinical signs developing.



Dermatologic presentation of hypothyroidism. Image used with permission from Dr. Thomas Lewis.

Certain medications suppress total T4 and potentially fT4 levels, including glucocorticoids, NSAIDs, & phenobarbital

Hypothyroidism can be a slow, but progressive endocrine disorder in dogs. Primary hypothyroidism is the most common cause of hypothyroidism in the dog and is the result of either lymphocytic thyroiditis or idiopathic atrophy of the thyroid gland. Lymphocytic thyroiditis is known to be a progressive disorder, with 80% of thyroid tissue destroyed before clinical signs are seen.¹ Research has demonstrated that clinical signs and pathologic changes in serum thyroxine (also known as total T4) and canine thyroid stimulating hormone (TSH) progress over 1-3 years, in-multiple stages.¹

CLINICAL SIGNS

An index of suspicion of hypothyroidism should be based on appropriate clinical signs and clinical pathology changes. Initial clinical signs that may be detected in hypothyroidism include: lethargy and weight gain, exercise intolerance (early fatigue) and a possible bleached-out skin appearance due to a slower turnover or replacement of each individual hair. Bilateral alopecia of the trunk or over sites of wear (lateral hind limbs) may also be observed. Less commonly the patient may present with a keratinization disorder (excessive scale) or facial myxedema, which can lead to the so called “tragic expression.”

DIAGNOSING HYPOTHYROIDISM

Although measurement of total T4 is a good screening test for euthyroidism or hypothyroidism, measurement of combined thyroid function tests, including free thyroxine (fT4) and canine thyroid stimulating hormone (TSH), is preferred to confirm the diagnosis.

Obtaining baseline thyroid levels when the patient is healthy may allow the clinician to spot a downward trend, and institute thyroid replacement therapy before serious dermatological and/or metabolic abnormalities develop.

In a 2015 study of 693 healthy dogs across the 7 different breeds, several of the breeds had total T4 and fT4 at or below lower limit of reference interval. In addition, mean concentrations of total T4, fT4 and cTSH varied significantly among the breeds, with mean total T4 and fT4 higher in females.²

Extra consideration for annual monitoring of thyroid levels should be given for middle aged and older dogs of breeds known to

be at higher risk for the development of hypothyroidism. These breeds include, but are not limited to Golden and Labrador Retrievers and Doberman Pinchers.¹

Changes within a complete blood count (CBC) and serum chemistry panel can help support or rule out a diagnosis of hypothyroidism. Approximately 30% of hypothyroid dogs may develop a normocytic, normochromic, non-regenerative anemia.¹ Abnormalities detected on the chemistry panel could include hypercholesterolemia, present in approximately 75% of hypothyroid dogs, as well as hypertriglyceridemia, also common.¹ If/when hypothyroidism leads to myopathy, increases in alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP) may be detected.¹ The diagnosis of hypothyroidism can be challenging due to the progressive nature of the disease, conflicting or discordant test results, overlap of total T4 levels between euthyroid and hypothyroid patients and variation of normal thyroid levels between different breeds. Further, it should be noted that different analyzers and laboratories have different testing modalities and therefore reference ranges for normal thyroid levels will vary both by laboratory and analyzer. Each patient’s thyroid level should always be evaluated from the perspective of where the value falls within the respective lab’s reference interval.

It is important to remember that certain drugs will suppress resting total T4 and potentially fT4 levels. Some of the more commonly used medications which suppress thyroid levels include: glucocorticoids, sulfonamides, NSAIDs, phenobarbital and clomipramine.¹

Therapeutic monitoring involves both evaluation of clinical improvement and measurement of total T4.

Total T4 measurement should be monitored:

- After the initial 6-8 weeks of therapy
- In 2-4 weeks after a dosing change is made
- Every 6 months once an effective dose has been established



Dermatologic improvement after 4 weeks of treatment for hypothyroidism. Image used with permission from Dr. Thomas Lewis.

THERAPEUTIC MONITORING

Therapeutic monitoring involves evaluation of clinical improvement and measurement of total T4. **Trending and monitoring should be performed using the same lab and analyzer each time to minimize analytical variation.** After the initial 6-8 weeks of therapy, blood is collected 4 to 6 hours post-pill for total T4 measurement. The post-pill total T4 concentration should be at the upper half or just above the baseline reference interval (if the lab publishes separate baseline and monitoring total T4 intervals).¹

If the post-pill total T4 concentration is below the target concentration, the dose of levothyroxine should be gradually increased until the post-pill total T4 concentration is within the target range. Similarly, if the post-pill total T4 concentration is too high, the dose should be decreased, and the concentration rechecked. Whenever a dosing change is made, the total T4 concentration should be rechecked in 2 to 4 weeks.¹ (See Table 1) Once an effective dose has been established, the interval between monitoring visits is increased to every 6 months.

Table 1. Monitoring Hypothyroidism - Clinical Response Present¹

Total T4	+/- TSH*	Dose Change	Interval between monitoring visits
Low	High	Increase	2-4 weeks
Low normal	High	Increase	2-4 weeks
Low normal	Normal	No change	6 months
Normal	N/A	No change	6 months
Slightly high normal	N/A	No change	6 months
Very high	N/A	Decrease	2-4 weeks

Table 2. Monitoring Hypothyroidism - No Clinical Response¹

Total T4	+/- TSH*	Dose Change	Interval between monitoring visits
Low normal	High	Increase	8 weeks
Slightly high normal	Low	Re-evaluate diagnosis and consider another disease	
Very high	Low	Re-evaluate diagnosis and consider another disease	

* TSH not required for monitoring but may be helpful based on Total T4 results.

All results assume sample collection 4- to 6-hour post-pill concentration

Tables adapted from Canine & Feline Endocrinology Figure 3-33

CONCLUSION

Diagnosing a patient with hypothyroidism early, when only milder dermatologic abnormalities have manifested, is clearly preferable to delaying the diagnosis and treatment until more serious cardiac, metabolic and/or neurological abnormalities have developed. Regular physical examinations, CBC, serum chemistry and baseline thyroid level testing are essential for early detection of this disorder.

References

1. Scott-Moncreiff JC. Hypothyroidism. Ed. Feldman, E. Chapter 3. Canine & Feline Endocrinology, 4th Edition. 2015:77-135.
2. Hegstad-Davies, Rebecca et al. Breed-specific reference intervals for assessing thyroid function in seven dog breeds. Jnl Vet Diagn Investig, 2016, Vol 27 (6), 716-727.