

# Hypothyroidism

## DEFINITION

Hypothyroidism is a clinical syndrome associated with a failure of the thyroid glands to produce and release thyroid hormones. Thyroid hormone is necessary for the initiation of the anagen (growth) phase of the hair cycle and normal metabolism of the skin.

## THYROID PHYSIOLOGY

In a healthy animal all thyroxine, (T4) is produced by the thyroid gland, but only 20% of the (T3) is of thyroid origin, with the majority derived from de-iodination of T4 in peripheral tissues. T4 is a pro-hormone, T3 the major metabolically active thyroid hormone.

Circulating levels of T4 and T3 may be lowered due to non-thyroidal illness or euthyroid sick syndrome (including renal failure, liver disease, allergies, diabetes mellitus, hyperadrenocorticism, systemic infection, pyoderma and demodicosis), and drugs (e.g. steroids, phenobarbital, clomipramine and sulfonamides) The low thyroid hormone levels are thought to be a normal adaptation and do not reflect thyroid dysfunction, although prolonged courses of sulfonamides may result in clinical hypothyroidism.

## AETIOLOGY AND PATHOGENESIS

In dogs, more than 90% of clinical cases of hypothyroidism are caused by primary destruction of the thyroid gland. Lymphocytic thyroiditis and idiopathic thyroid necrosis and atrophy are cited as the two main causes of acquired primary hypothyroidism. Lymphocytic thyroiditis is thought to be an autoimmune disorder involving cell-mediated destruction of the thyroid gland. Thyroglobulin autoantibodies (TGAA) can be detected prior to or in the earlier stages of the disease, but may be undetectable in end-stage disease with thyroid atrophy.

Predisposed breeds include Labradors, Golden Retrievers, Dobermans, Bearded Collies, Borzoi and Beagles. It is therefore likely that there is a genetic predisposition and affected dogs should not be used for breeding.

## CLINICAL FEATURES

The clinical signs of canine hypothyroidism are extremely variable and may include both systemic signs and dermatologic signs. Bilaterally symmetrical truncal alopecia with thickened, hyperpigmented and cool skin is classical, but is unusual except in advanced cases. Common dermatological problems include a dry, brittle, lacklustre coat, greasy coat, scaling, failure of hair to grow after clipping, hyperpigmentation and recurrent secondary bacterial infections. In others, alopecia may be restricted to the tail and dorsal nose. Clinical hypothyroidism is rarely seen in dogs under two years old. In some cases the animals will be less active and many cases will be heat seekers (will lay by hot air ducts or radiators or lay in the sun as it shines in through a window)



## DIFFERENTIAL DIAGNOSES

- Hyperadrenocorticism
- Alopecia 'X'/alopecia of follicular arrest
- Sex hormone disorders including Sertoli cell tumour
- Sebaceous adenitis
- Colour-dilution alopecia
- Seasonal flank alopecia
- Telogen effluvium/anagen defluxion
- Pattern baldness
- Ringworm
- Demodectic mange
- Superficial bacterial infection



Hypothyroidism may be the underlying cause for some of these conditions in older dogs, e.g. superficial pyoderma, demodicosis and dermatophytosis.

## DIAGNOSTIC TESTS

**Basal total T4 (tT4) is not by itself a reliable test to confirm hypothyroidism because tT4 is commonly lowered by various drugs and non-thyroidal illnesses.** Free T4, which is maintained at the expense of total T4, is less affected by drugs and concurrent disease, but nevertheless should not be solely relied on for diagnosis. In one study, free T4 (fT4) measured by equilibrium dialysis more accurately differentiated hypothyroid, sick euthyroid and healthy dogs than the same tests done by radioimmunoassay. Free or total T3 is no more informative than T4, and is rarely used in diagnosis.

Endogenous canine TSH assays are now available and can be combined with tT4 or fT4. Values are elevated in 80-85% of animals with primary hypothyroidism. It is possible that false negative tests represent pituitary thyrotroph exhaustion in more chronic cases or concurrent non-thyroidal illness. Elevated TSH levels can also be seen in some dogs with non-thyroidal illness or receiving sulfonamides. TSH levels also vary up to 43.6% between dogs and up to 13.6% in individual dog.

Therapeutic trials with L-thyroxine can be used to confirm the diagnosis where test results are inconclusive or unavailable. Trial therapy must be undertaken carefully as the metabolic effects of thyroxine can result in non-specific hair growth and clinical improvement. The outcome measures must be clearly established before treatment, with assessments at one, two and three months.

## MANAGEMENT

Therapy involves life-long administration of levothyroxine (L-thyroxine). The dose should be adjusted following the results of pre- and 4-6 hour post-thyroxine dosing T4 levels. Pre-treatment T4 should be near the lower end of the normal range and the post-treatment sample should be near the upper end. T4 testing and dose adjustments should be performed at one, two and three months, and then every 3-6 months or as necessary in the long term. Signs of overdose are uncommon, but include anxiety, restlessness, polyphagia, weight loss and tachycardia. It may be necessary to use appropriate systemic and/or topical treatment to control secondary infections or demodicosis initially.

## KEY POINTS

- A common, but over diagnosed clinical syndrome.
- Diagnosis can be difficult in some cases and should always be based on a thyroid panel or profile rather than baseline T4.
- The prognosis is good.