

## Hypothyroidism in Dogs

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Hypothyroidism is an endocrine disorder with impaired production and secretion of thyroid hormones T4 and T3, and a decreased metabolic rate. It has an estimated prevalence of 0.5%. Males and females are equally predisposed, but it is more prevalent in spayed females and neutered males.



**Figure 1:** Bilaterally symmetrical alopecia.

Characteristics Hypothyroidism are Obesity, lethargy, heat-seeking behaviour, myxedema, Tragic-facial expression, skin-abnormalities (bilaterally symmetric alopecia), cardiac abnormalities, ocular abnormalities.

### Predisposition and Susceptibility

Most cases are seen in middle-aged dogs (4-10 years of age). There is no sex predilection. Golden retrievers, German shepherds, Basenji, Dalmatian, Cocker-spaniel, Shetland sheepdog, Beagle, Siberian husky are breeds predisposed.

### Etiology and pathogenesis

#### Primary hypothyroidism

Thyroid gland loss appears to be the cause of over 95% of clinical cases in dogs. This impairs thyroid production and lowers serum thyroid hormone concentrations. To promote the production of thyroid hormone, TSH (thyroid stimulating hormone) rises.

Causes of Primary Hypothyroidism includes Lymphocytic thyroiditis (immune-mediated) and Idiopathic atrophy of thyroid gland (loss of thyroid parenchyma).

#### Secondary hypothyroidism

It occurs due to destruction of pituitary thyrotrophs, by an expanding, space occupying tumour.

Congenital primary Hypothyroidism:

It results from thyroid dysgenesis or dysmorphogenesis (inherent ability to synthesise iodine). It occurs mainly due to thyroid peroxidase deficiency.

#### Congenital secondary hypothyroidism

Most commonly reported in Giant Schnauzers, German shepherds and toy fox terriers, associated with disproportionate dwarfism, gait-abnormalities and constipation.

#### Thyroid carcinoma

Rare cause of hypothyroidism, it develops when 75% of thyroid destruction has occurred.

### Clinical manifestations

Numerous metabolic processes are impacted by thyroid hormones, and low thyroid level results in constellation of clinical signs and laboratory abnormalities. Signs related to lowering of cellular metabolism

- Dull mentation
- Exercise intolerance
- Weight gain
- Cold intolerance (heat-seeking)

### Dermatological Changes

- Bilaterally symmetric non-pruritic alopecia
- Recurrent pyoderma
- Dry, dull hair coat with hyperpigmentation
- Myxedema (thickening of skin including forehead and eyes resulting in puffy appearance) also known as Tragic facial expression.

### Uncommon Findings associated

- Reproductive disturbances including anestrus, infertility, abortion, testicular atrophy, infertility, periparturient mortality.
- Ocular findings: keratoconjunctivitis sicca, uveitis, lipemia retinalis, and corneal lipidosis.
- Cardiac abnormalities like weak apex beat, bradycardia, atherosclerosis.
- Peripheral nervous system signs consisting of facial nerve paralysis, laryngeal paralysis, polyneuropathy, megaesophagus etc.



**Figure 2:** Ocular findings.

### Myxedema Coma

It is the result of severe hypothyroidism, in which lethargy progresses to stupor and then coma.



**Figure 3:** Tragic facial expression.

### Laboratory Findings

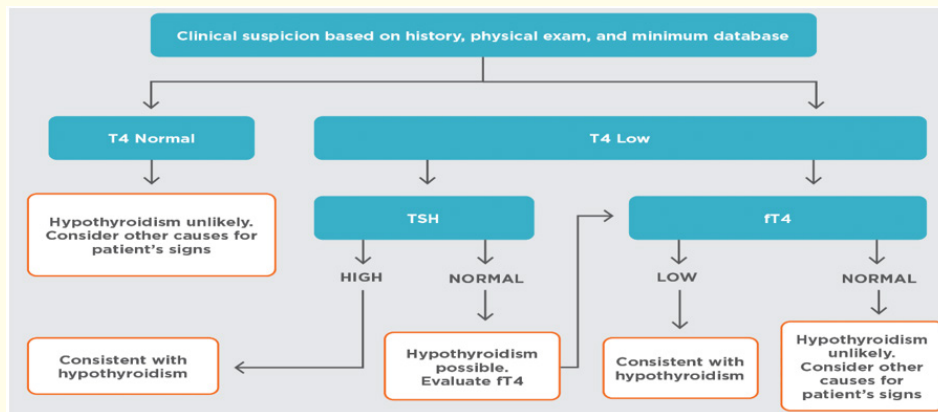
- Clinical pathology findings: Chronic fasting hyperlipidemia, hypercholesterolemia, hypertriglyceridemia, normochromic normocytic non-regenerative anemia.
- Elevations in Alkaline Phosphatase (ALP), Alanine Aminotransferase (AST).
- Thyroid-specific diagnostics: TotalT4 and freeT4 concentrations are measured.
- Primary hypothyroidism is diagnosed based on finding low concentrations of thyroid hormones with elevation of TSH.
- Measurement of FreeT4 by equilibrium dialysis is most accurate indicator of thyroid function.

### Imaging

Ultrasonography demonstrates decreased echogenicity and smaller thyroid lobes in hypothyroid dogs.

### Treatment and Management

- Levothyroxine given @ 0.02 mg/kg body weight twice every day orally.



**Figure 4:** Diagnosis of Hypothyroidism.

- Patients that respond to therapy and have appropriate total T4 concentrations can be given dosage once a day, but if response is not maintained dosages must be given twice daily.
- Fatty foods improve absorption of T4.
- After taking the supplement for three to four weeks, check patient's thyroid hormone levels.
- As Thyroxine increases, cardiac oxygen demand, initial dose to be decreased by 25-50% in patients suffering from cardiomyopathy.
- Pet-parents may note an increase in dog's energy levels in 1-2 weeks of initiating therapy, but weight-loss, dermatological changes and hair regrowth can take several months.
- Neurological changes may initially improve rapidly, but full resolution might take several months.

### Prognosis

While treatment is lifelong, the outlook is excellent.