Hypothyroidism in Dogs
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Hypothyroidism is the most commonly over-diagnosed endocrine disease in dogs\(^1,2\) because it can have many symptoms and no single test is diagnostic. Dogs need to have an appropriate history, clinical signs, lab work, and response to therapy to diagnose this disease. Many other diseases cause similar clinical signs and many things interfere with thyroid hormone levels tested for in the blood.

Hypothyroidism caused by thyroid gland failure only occurs in dogs over 2 years of age. Although it is possible to have congenital hypothyroidism, these dogs have severe growth retardation issues and usually present with dwarfism as young puppies.

Hair coat changes and lethargy are always present with hypothyroidism. Lethargy has a slow gradual onset over weeks to months typically, and not all dogs with hypothyroidism have noticeable hair loss, but the hair coat will have changes associated with non-cycling like dry, faded, and broken hairs and recurrent bacterial infections\(^3\). Hair loss may be noticed over the bridge of the nose, tail, dorsum, and areas of friction (collar area)\(^3\). Neurologic symptoms can be seen with hypothyroidism, such as proprioceptive deficits, facial paralysis, vestibular signs, weakness, and exercise intolerance\(^2,3\). Dogs may have bradycardia. Obesity in an otherwise healthy energetic dog does not warrant testing for hypothyroidism, and thyroid supplementation is not ever appropriate to “treat” obesity.

Dermatological rule outs for hypothyroidism include dogs with Cushing’s (natural or iatrogenic), sertoli cell tumors (non-neutered dogs), dermal or oral exposure to human topical hormone replacement therapy creams (used during menopause), and dogs with hair cycling abnormalities (alopecia X, pattern alopecia, or flank alopecia). These dogs are usually not lethargic related to their coat changes. Dogs with allergic dermatitis may have recurrent infections and poor hair coat like dogs with thyroid illness, but their main symptom is pruritus and not lethargy. Most hypothyroid dogs I have seen are minimally or not pruritic, even with skin infections.

If you strongly suspect hypothyroidism based on history and clinical signs, a full CBC, chemistry, urinalysis, and thyroid panel should be performed that includes a total T4, free T4 by equilibrium dialysis, and TSH. CBC indicates a mild non-regenerative anemia in 30% of cases. Chemistry shows high cholesterol in 75% of cases\(^2\). Urinalysis should be normal. The thyroid panel should show low total T4 (TT4), low free T4 (fT4), and high thyroid stimulating hormone levels (cTSH).

Sighthound breeds should always have a full thyroid panel (including TSH) performed for diagnosis because total T4 and free T4 levels are normally in the low range for these breeds and are rarely helpful by themselves\(^4,5\). With hypothyroidism in sighthound breeds, the TSH should be high and the dog should have outward clinical signs prior to considering treatment since monitoring these dogs with bloodwork is difficult.

There are many things that can cause a total T4 (and often free T4 and cTSH) values to appear to be low including hyperadrenocorticism, severe inflammation or illness, or drugs. Steroids\(^6\), phenobarbital\(^7,8\), and sulfa drugs\(^9-11\) can cause the most dramatic changes with thyroid levels, complicating the diagnosis. Other drugs affect TT4 values as well (zonisamide\(^12\), clomipramine\(^13\), aspirin\(^14\) are a few). Sulfas and phenobarbital can cause a hypothyroid state nearly indistinguishable from true hypothyroidism, with a low tT4, low fT4, and high TSH. Steroids can cause low TT4 and fT4. Ideally, these drugs should be stopped for several weeks prior to testing the thyroid values.
Levothyroxine supplementation should be dosed at 0.02mg/kg every 12 hours until recheck in a month, and then decreased to 0.02mg/kg every 24 hours to see if response can be maintained. If clinical signs return, then twice daily dosing should be resumed. Massively obese dogs should be dosed based on ideal body weight. Dogs with heart disease should be started on 0.005mg/kg every 12 hours and the dose increased by 0.005mg/kg every 2 weeks until the maintenance dose. Total T4 levels to monitor medication dosing should be performed 4-6 hours after the morning dose after starting the maintenance dose of thyroid supplementation. The main determinant for dosage increases should be if TT4 is low or in the normal range but clinical signs are not resolving. Food can interfere with the absorption of thyroid supplement, consider giving pills before or after a meal rather than at the same time if there are issues. The dose should be decreased if any signs of thyrotoxicosis are noticed (see below). The TT4 level is almost always elevated with thyrotoxicosis symptoms. A TSH level is not accurate enough to monitor thyroid dosing, sometimes a fT4 value needs to be performed for monitoring if non-thyroidal illness is interfering with the TT4. Keep in mind that non-thyroidal illness can also decrease fT4, just to a lesser extent than TT4 is affected. Sighthound breeds are very difficult to monitor with blood work (TT4 and fT4 often low normally and even on supplementation, TSH is not accurate for monitoring thyroid supplementation), so although bloodwork can be somewhat useful, careful observation of clinical signs needs to be the main monitoring tool in these breeds.

Treatment trials should not be performed unless the dog has lethargy and other signs consistent with thyroid disease and then only if the owner cannot afford testing or repeat testing. Even then, keep in mind thyroid supplementation may cause a dog with any disease to “perk up”. If there is no change in clinical signs of lethargy within 1-2 weeks of starting supplementation, then the dog should be re-evaluated.

Over-supplementation of levothyroxine can cause polycythemia, high blood pressure, excessive weight loss, polydipsia, polyuria (with dilute urine and accidents in the house), diarrhea, and behavioral changes such as panting, pacing, and anxiety. Oversupplementation is usually caused by calculating dose based on morbidly obese weight and not ideal body weight, in addition, thyroid supplementation is variably absorbed. Some dogs seem to have an exquisite sensitivity to thyroid hormone supplementation and I have seen dramatic hyperthyroid symptoms in correctly dosed dogs, including mdr-1 (ABCB-1) gene mutant breeds like collies and shelties. If symptoms of thyrotoxicosis are noticed, the dose of thyroid supplement should be divided in half while waiting for bloodwork results. There are reports of dogs on raw diets and coprophagia of supplemented dogs to develop hyperthyroid symptoms.

References:

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