

Thyroid Disorders Hyper- and Hypothyroidism

Canine Hypothyroidism

Pathophysiology

- Primary
 - Autoimmune lymphocytic thyroiditis
 - Idiopathic thyroid atrophy
- Secondary

Presentation

- Signalment
 - Middle aged
 - No sex predilection
 - Any breed (medium sized)
- Clinical signs (common)
 - Lethargy
 - Weight gain/obesity
 - Skin and coat
 - Alopecia
 - Seborrhea
- Clinical signs (uncommon)
 - Neurologic:
 - peripheral vestibular disease, facial nerve paralysis, polyneuropathy
 - Central: hypercholesterolemia and hyperlipidemia leading to atherosclerosis and possible thromboembolic disease
 - Myasthenia gravis, megaesophagus, and laryngeal paralysis may be associated
 - Cardiovascular
 - Myxedema coma
 - Others
- Clinical Pathology
 - CBC
 - Anemia (NNN)
 - Chemistry
 - Hypercholesterolemia
 - Hypertriglyceridemia
 - Mildly increased ALP and ALT
 - UA
 - Often normal

Diagnosis

Thyroid Disorders Hyper- and Hypothyroidism

- Total T4
 - Very sensitive, not specific meaning that it is great at correctly identifying almost every animal that has the disease (few false negatives) but may have many false positives
- Free T4 by equilibrium dialysis (fT4-ED)
 - Correlates best with true thyroid status
- TSH
 - Expected to be elevated in dogs with hypothyroidism, but the assay is only mediocre (25% of hypothyroid dogs have a normal TSH)
- Autoantibodies (can indicate autoimmune thyroiditis, but not diagnostic for hypothyroidism)
 - Thyroglobulin autoantibody (TgAA)
 - T3 autoantibody (T3AA)
 - T4 autoantibody (T4AA) – presence may cross-react with tT4 making it artificially elevated
- T3
 - Total T3 and Free T3 are not very useful and don't usually correlate with clinical disease

*Drugs can affect thyroid tests, prednisone and phenobarbital decrease tT4 and fT4 along with carprofen, sulfa abx, and inhaled anesthesia. Systemic illness can also decrease tT4 and sometimes fT4

Options include retesting when the animal is healthy and off of medication and submitting fT4 +/- ancillary tests

Treatment

- Levothyroxine
 - 0.02 mg/kg PO q12-24h
 - Big dogs: 0.8 mg maximum
 - Usually start twice daily and decrease to SID if doing well
 - Start at a low dose in patients with
 - Diabetes mellitus (change in insulin sensitivity)
 - Hypoadrenocorticism (increased glucocorticoid metabolism)
 - Hepatic or renal failure
 - Congestive heart failure
 - Start with a low dose (0.005 mg/kg) and gradually increase with monitoring
- Monitoring
 - Measure tT4
 - If q12: 4-6 hours post-pill
 - If q24: 8-16 hrs post-pill

Thyroid Disorders Hyper- and Hypothyroidism

- First recheck @ 2 weeks
- Follow up @ 4-6 weeks
- Long term q6-12 months
- Prognosis
 - Excellent
 - Energy levels normalize @ about 2-4 weeks
 - Skin and coat normalize @ 3-6 months

Feline Hyperthyroidism

Pathophysiology

- Primary
 - Benign adenomatous hyperplasia
 - Rare: functional thyroid carcinoma

Typical Presentation

- Signalment
 - Age: Older (> 6-8 years)
 - Sex: None
 - Breed: Any
- Presenting signs
 - Hyperactive
 - Weight loss with normal to increased appetite
 - PU/PD
 - GI signs: Vomiting, diarrhea
- Physical exam
 - Unkempt hair coat
 - Muscle loss, poor BCS
 - Cardiac effects, BP (thyroid toxin HCM phenotype)
 - Presence of palpable thyroid slip
- Clinical Pathology
 - CBC
 - Unremarkable
 - Chemistry
 - Mildly increased ALT
 - “Artificially” reduced azotemia
 - UA
 - USG: isosthenuria/minimal concentration
- Overview

Thyroid Disorders Hyper- and Hypothyroidism

- Typical history and physical exam in an older cat can give you a high degree of suspicion
- Minimum Database: Elevated ALT, Hypertension

Diagnosis

- Total T4
 - Very sensitive, very specific
 - *Different than dogs with hypothyroidism*

Ancillary testing

- Free T4 (fT4-ED)
 - Measured by equilibrium dialysis
 - Can be affected by handling, low protein, etc. (less sensitive and specific)
 - Almost never needed to diagnose cats (different than dogs with hypothyroidism)
- TSH
 - Almost never needed to diagnose cats
 - Cats with hyperthyroidism will have low/undetectable levels of TSH
 - Can be used in combination with T4 and fT4
- Scintigraphy
 - Used for confirmation in confusing cases
 - Some centers use this to determine ¹³¹I dose
- Additional tests
 - Blood pressure and fundic exam
 - TXR +/- BNP +/- Echo
 - SDMA
 - AUS
- Summary
 - Diagnose with total T4
 - Don't forget to evaluate for
 - Common sequelae of disease
 - Common comorbidities in older cats

Treatment

- Methimazole
 - Reversibly inhibits thyroid hormone synthesis
 - Lifelong, daily, PO or transdermal, low cost
 - Adverse effects: anorexia, vomiting
 - Most happen within the first three months of starting treatment
 - ~10 transient vomiting, anorexia, depression – if this happens, take a break or switch to transdermal

Thyroid Disorders Hyper- and Hypothyroidism

- ~15% have transient eosinophilia, leukocytosis
- Monitor with tT4
 - @ 2-3 weeks
 - q2-3 weeks until a stable dose has been achieved
 - Once stable, can monitor q6mo forever
- Radioactive iodine (I131)
 - Beta radiation destroys hyperplastic thyroid
 - Curative but high cost
 - Adverse effect: Hypothyroidism
 - Monitoring
 - tT4
 - @ 1-3 months
 - Then q6 months or PRN
- Additional options
 - Hills y/d
 - Low iodine diet decreased thyroid hormone synthesis
 - This diet needs to be lifelong and no cheating (treats ect.)
 - Low-ish cost
- Surgical thyroidectomy
 - Curative option, expensive, higher-risk
 - Adverse effect: Hypocalcemia from removal of the parathyroid gland
 - Good option for a small proportion of cats with carcinoma
 - Referral only

Prognosis

- Good!
 - Multiple treatment options
- Worse prognosis if
 - Hypothyroidism develops
 - More severe CKD is unmasked
 - Rare cases of thyroid carcinoma

Summary

- Treatment options
 - Methimazole (GP)
 - I131 (referral)
 - In select cases: y/d or surgery