Key Points
- Hyperthyroidism in cats is almost always result of adenomatous hyperplasia or a benign adenoma
- Hypertension is not as common as once thought, so other causes for hypertension in a hyperthyroid cat should be investigated
- Hyperthyroidism can mask CKD and careful monitoring is important
- Transient subclinical or clinical hypocalcemia is an important concern for post-surgical thyroidectomies
- Methimazole is the medical treatment of choice for cats, but can cause transient severe blood dyscrasias

Causes of hyperthyroidism
- Adenoma or adenomatous hyperplasia
  - Clinically equivalent
  - Vast majority of cases
- Thyroid carcinoma
  - 1-3%

Risk Factors
- Multifactorial (lots of studies say different things)
- Eating canned diet increases risk

Clinical Features of Feline Hyperthyroidism
- Mean age of onset = 13 years
  - Rare < 8 years old
  - Purebreds are underrepresented
- Progressive, insidious disease for the most part
  - Weight loss despite good appetite***
  - Increased activity
  - PU/PD
  - Vomiting
  - Diarrhea

<table>
<thead>
<tr>
<th>BOX 4-1</th>
<th>Differential Diagnosis for Cats with Polyphagia and Weight Loss</th>
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</thead>
<tbody>
<tr>
<td>Hyperthyroidism</td>
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<tr>
<td>Diabetes mellitus</td>
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<td>Poor quality or insufficient diet</td>
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<tr>
<td>Gastrointestinal disease</td>
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<td>Malabsorptive (inflammatory bowel disease, gastrointestinal lymphoma, gastrointestinal parasitism)</td>
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<tr>
<td>Malabsorption (exocrine pancreatic insufficiency)</td>
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<tr>
<td>Hyperadrenocorticism</td>
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</table>
Mech of PU/PD
- Primary PD
  - Leads to downreg of aquaporin 1 and 2
  - Increased GFR

Mech of Resp distress
- Respiratory muscle weakness
- Enhanced ventilatory drive
- Decreased pulmonary compliance
- Concurrent diseases

Heart changes
- Heart is sensitive to effects of thyroid hormone
  - Tachycardia
    - Increased sympathetic and decreased parasympathetic tone
  - Cardiac output is increased
    - Tachycardia
    - Increased ejection fraction
      - Increased systolic function due to gene activation of $T_3$
    - Increased blood volume
    - Decreased vascular resistance
      - Vasodilatory effect of $T_3$
        - Activates RAAS
    - Increased oxygen demand of peripheral tissues leads to cardiac dilation and hypertrophy

Thyroid Storm
- Usually combination of infection, non-thyroidal illness, or withdrawal of antithyroid medications
  - Four clinical signs required (in humans)
    - Fever
    - CNS manifestations
    - Gastrointestinal or hepatic dysfunction
    - Cardiovascular signs such as tachycardia, a-fi

Diagnostics
- Chem
  - Mild to moderate increases in ALT and ALP
- UA
  - Proteinuria is possible
    - Thought to be proteins other than albumin
      - Resolves after treatment
- However presence prior to treatment is associated with reduced survival

- UTIs more common
- Possible ketonuria

Thyroid hormone
- Total $T_4$ is most useful for diagnosis
  - Non-thyroidal illness also affects $T_4$ concentrations in cats
  - Sen 91%, Sp 100%

Treatment
- Estimated 40% of hyperT cats have CKD
  - Treatment can uncover CKD
  - Pretreatment normal BUN and UGS >1.035 are unlikely to develop azotemia after treatment
  - Pre-definitive treatment trial with methimazole recommended
    - If CKD present, continue medical management titrated to ‘least harmful’ disease balance

- Methimazole
  - Reversibly inhibits thyroid hormone synthesis
  - Can be administered transdermal
  - Mild side effects are common (up to 25%)
    - Usually within 4-8 weeks of start of treatment
    - Direct gastric irritation
    - Facial excoriations
      - May improve after glucocorticoids
    - Eosinophilia, lymphocytosis, mild leukopenia
  - Uncommon side effects
    - Severe thrombocytopenia resulting in bleeding
    - Neutropenia <500/μL
      - Fever, lethargy, local or systemic infection
    - Cessation of drug usually results in resolution of signs within 1 week
    - Possibly immune mediated
  - Rare effects
    - Vit-k dependant coag factor interference
      - Did not result in PT prolongation in these cats
      - PIVKA more sensitive

Anesthesia of hyperthyroid cats
- Avoid drugs that potentiate adrenergic activity as well as anticholinergic drugs

Post-surgical management of thyroidectomy
- Monitor for hypocalcemia
- Once daily for 4-7 days
- Mild transient hypocalcemia is common
  - If clinical:
    - Treat with IV calcium
    - Oral vit D and calcium supplementation
  - Some cats have hypocalcemia lasting days, others have it the rest of their life

Other treatments

- Beta blockers
  - For cats that do not tolerate anti-thyroid drugs to help slow heart rate
Questions:

1. What is the most common side effects of methimazole treatment
   a. Neutropenia <500k
   b. Thrombocytopenia resulting in bleeding
   c. Prolongation of PT
   d. Facial excoriations

2. What is the recommended screening test for cats for hyperthyroidism
   a. Baseline T3
   b. Free T4
   c. Baseline T4
   d. Thyroid scintigraphy

3. What urological related diagnostic finding in a cat with hyperthyroidism is expected to resolve after treatment
   a. Increased BUN
   b. Proteinuria
   c. Isosthenuria
   d. Decreased GFR

4. True/False: Hypertension is a common finding in hyperthyroid cats and can be controlled with beta blockers and/or amlodipine
Answers:

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4. **True/False**: Hypertension is a common finding in hyperthyroid cats and can be controlled with beta blockers and/or amlodipine