Hyperthyroidism
Diagnosis and Treatment

Family Practice Refresher Course

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Issues

• Which tests to order
• When to do a scan or uptake
• Distinguishing Graves from thyroiditis
• Using antithyroid agents
• When to refer to endocrine
Thyrotoxicosis

- Weight loss, tremor, fatigue, amenorrhea, palpitations, heat intolerance, hyperdefecation
- Apathetic thyrotoxicosis in elderly
# DDx Hyperthyroidism

<table>
<thead>
<tr>
<th>Condition</th>
<th>FT$_4$</th>
<th>TSH</th>
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<tbody>
<tr>
<td>Graves</td>
<td>↑</td>
<td>↓</td>
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<tr>
<td>Hot nodule</td>
<td>↑</td>
<td>↓</td>
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<tr>
<td>Thyroiditis</td>
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<td>↓</td>
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<tr>
<td>Toxic goiter</td>
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A thyroid scan and/or iodine uptake can help determine etiology BUT is not always necessary.
Graves Disease

Diffuse increased uptake of radioactive iodine or technetium
Toxic Multinodular Thyroid

Multiple nodules
Enlarged gland
Heterogeneous uptake with hot and cold nodules
Hyperfunctioning (Hot) Nodule

- Rarely malignant
- Many are euthyroid
- Remainder of gland suppressed
Subacute Thyroiditis
Patient #1

A 36 y.o. with amenorrhea has lost 15 pounds in the last six months and has heat intolerance and palpitations. Her thyroid gland is enlarged and smooth. She has a tremor, her pulse is 110 and she has mild proptosis. \( \text{FT}_4 \ 3.6 \ (↑), \ TSH \ 0.01. \)
A 50 y.o. has noted a tremor and tachycardia for three weeks. She has been irritable and complains of diarrhea. Her pulse is 98 and the thyroid is not palpable. \( \text{FT}_4 \text{ 2.0}, \text{TSH 0.01}. \)
Graves Disease

- Autoimmune
- Thyroid stimulating antibodies bind to TSH receptors
- Diffuse smooth thyroid enlargement
- Orbitopathy in 5-10%
Graves

• Work-up
  - FT$_4$, TSH
  - Thyroid stimulating immunoglobulin (TSIG)
  - TSH receptor antibodies
  - don’t ROUTINELY need T$_3$, scan, uptake or ultrasound
Treatment of Hyperthyroidism

• Antithyroid agents
  - propylthiouracil
  - methimazole
• Radioactive iodine
• Surgery
• Beta blocker
Methimazole

- Decreases thyroid stimulating immunoglobulin levels and blocks $T_4$ synthesis
- 30–40% have spontaneous remission after 1 year of therapy
- Agranulocytosis – rare
- Cholestatic hepatitis – rare
Propylthiouracil (PTU)

- Decreases conversion of $T_4$ to $T_3$
- TID dosing
- Use in 1st trimester of pregnancy
Radioactive Iodine

- Gland destruction
- TSH receptor antibodies persist after treatment
- Avoid RAI in patient with severe Graves ophthalmopathy
- Single dose effective in 90%
- Most become hypothyroid after 2-3 months, time course variable
Surgery

• Recurrence is possible
• Potential hypocalcemia and recurrent laryngeal nerve damage
• Use for nodules or extremely large glands
• Use experienced surgeon
Graves Disease

- Beta blocker
- Methimazole
- Refer to endocrine and ophthalmology
A 24 yo with Graves disease was treated with RAI 9 months ago. Her free $T_4$ was 3.1 (↑) at diagnosis. Palpitations and heat intolerance are gone, her periods are regular, and her weight has normalized.

$FT_4$ 1.4 (nl)
TSH 0.05 (↓)

Which of the following should you recommend?

A. Start methimazole
B. Another dose of RAI
C. Measure $T_3$
D. No intervention
• In Graves TSH may remain suppressed for months after treatment
• Don’t make post-treatment decisions on TSH alone
Patient #2

- A 50 y.o. has noted a tremor and tachycardia for three weeks. She has been irritable and complains of diarrhea. Her pulse is 98 and the thyroid is not palpable.
**Graves**

TSIG  \downarrow
→
thyroid hormone synthesis  \downarrow
→
↑ T₄  ↑ T₃  ↓
suppressed TSH

**Thyroiditis**

inflammation  \downarrow
→
release of thyroid hormone  \downarrow
→
↑ T₄  ↑ T₃  ↓
suppressed TSH
→
↓ thyroid hormone synthesis
Subacute or Painless Thyroiditis

- Painful gland, ear pain
- Elevated ESR
- Mild hyperthyroidism followed by transient hypothyroidism before normalization
- Usually resolves without Rx
- Occurs postpartum too
- No uptake on technetium scan
Patient #2

- A 50 y.o. has noted a tremor and tachycardia for three weeks. She has been irritable and complains of diarrhea. Her pulse is 98 and the thyroid is not palpable.
- Beta blocker
- Follow-up 3 months
A 75 y.o. has lost weight, has palpitations and has noted declining energy. On exam his thyroid is smooth and not enlarged.

TSH 0.01 (0.2-4.2) 
FT$_4$ 1.2 (0.9-1.5)

Is this hyperthyroidism?
What is the next step?

- Repeat FT$_4$ and TSH levels in 6 weeks
- Measure T$_3$
- Measure TPO antibodies
- Measure reverse T$_3$
$T_3$ Toxicosis

- Normal FT$_4$, elevated $T_3$ and suppressed TSH
- Symptoms of hyperthyroidism
- Apathetic thyrotoxicosis especially in elderly
Control of thyroid hormone secretion important in reducing preterm delivery, preeclampsia and IUGR

Propylthiouracil (PTU) in 1st trimester then methimazole (MMI)

PTU and MMI cross the placenta equally

MMI associated with scalp defect, aplasia cutis and choanal atresia
During Pregnancy

- Keep FT$_4$ at upper limit of normal and monitor monthly
- High doses of PTU or MMI can lead to fetal goiter or hypothyroidism
- May be able to stop antithyroid agent in later stages of pregnancy
- Breastfeeding is ok with both PTU and MMI
During an evaluation for fatigue and muscle weakness an 80 y.o. is found to have a 1.5 cm thyroid nodule. Her exam is otherwise normal. Her TSH is 0.09 (0.2-4.2), the free T4 is 1.6 (0.9-1.5).

What is the next step in evaluating the nodule?
What is the next step?

A. Ultrasound
B. Thyroid scan
C. Fine needle aspiration
D. TPO antibodies
Hyperfunctioning (Hot) Nodule

- 5-10% of nodules
- Malignancy uncommon
- FNA not required
- When $T_4$ is elevated - surgery or radioactive iodine
A 65 y.o. with lifelong goiter

FT$_4$ 1.3, T$_3$ 1.2, TSH <0.01

No dysphagia or palpitations

How to treat?
Suppressive therapy not uniformly effective

Cancer risk is the same in solitary nodules and multinodular goiter

Hyper or hypothyroid

Dysphagia, hoarseness with substernal extension

Thyroid hormone risky when TSH is low
Who to Refer

- Radioactive iodine therapy
- Thyroidectomy
- Severe ophthalmopathy
- Hyperthyroidism during pregnancy
Questions