

Overview of Thyroid Disorders

Fall Family Medicine Review Course

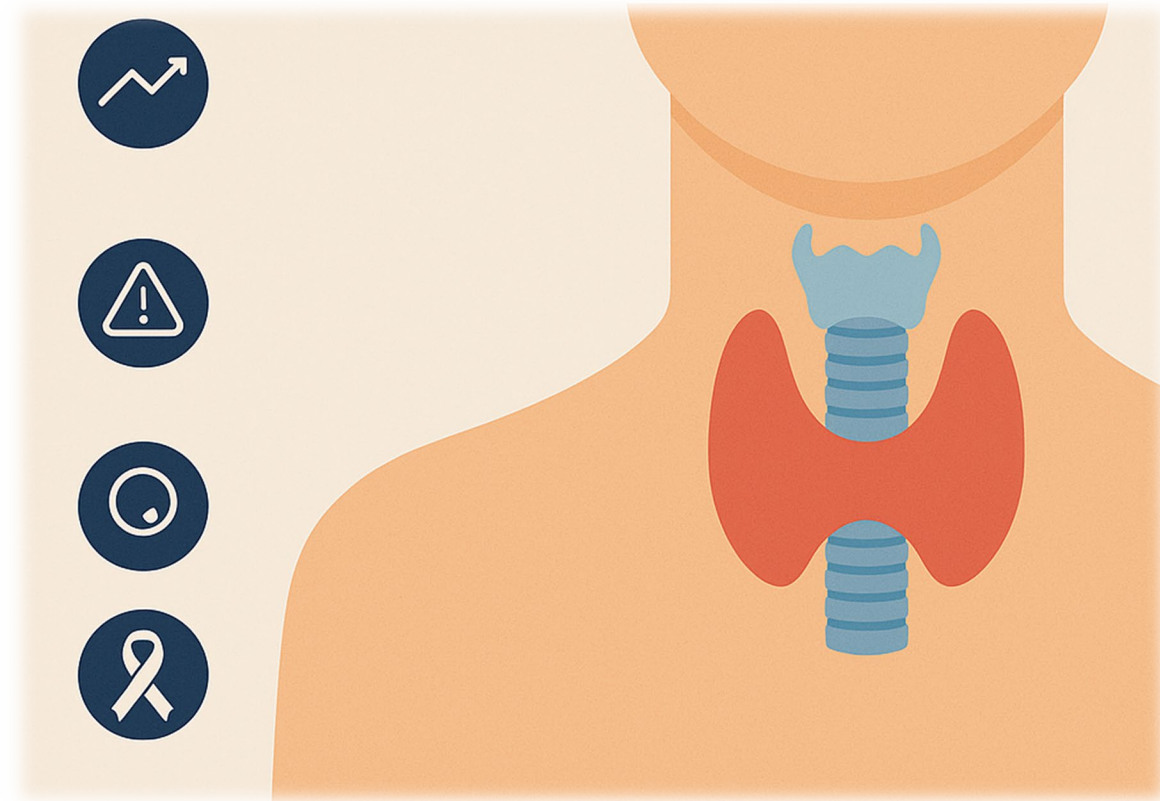
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11/1/2025



LEARNING OBJECTIVES



Evaluate and manage hyperthyroidism and hypothyroidism, including subclinical disease



Diagnose and manage thyroid medical emergencies

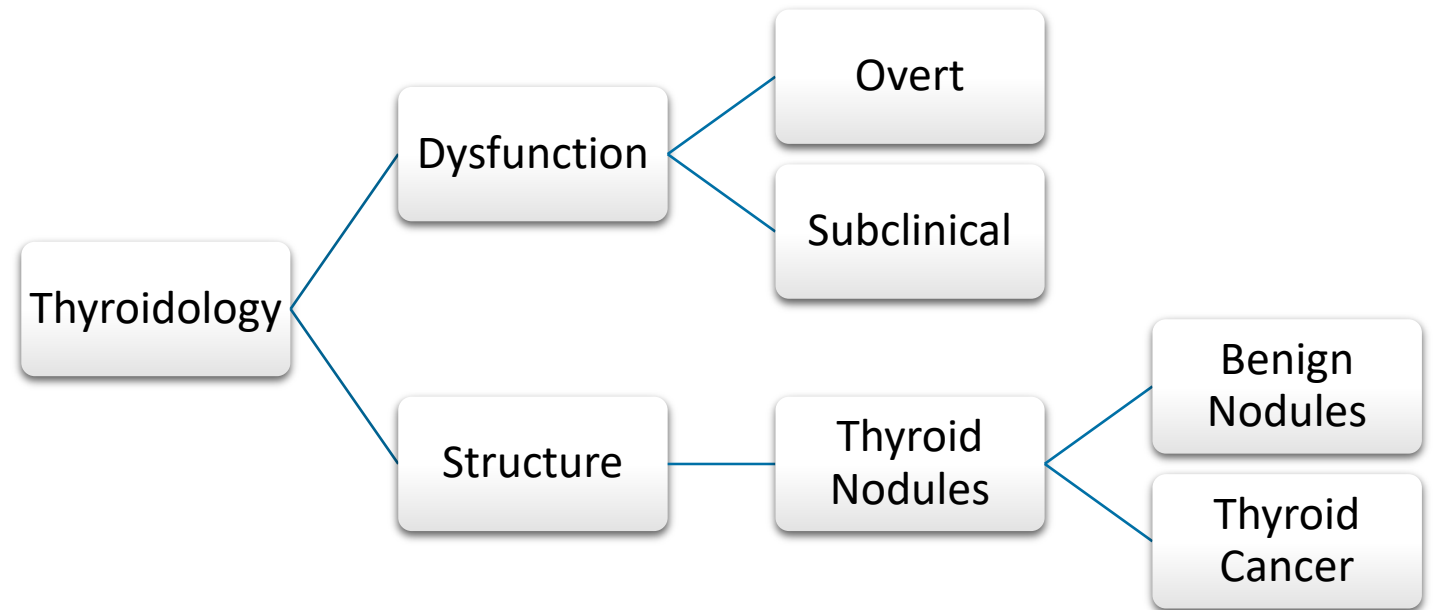


Evaluate and manage thyroid nodules



Describe and manage different types of thyroid cancer

Schematic Overview

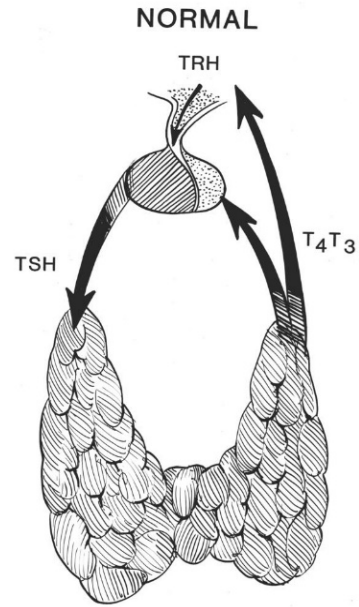




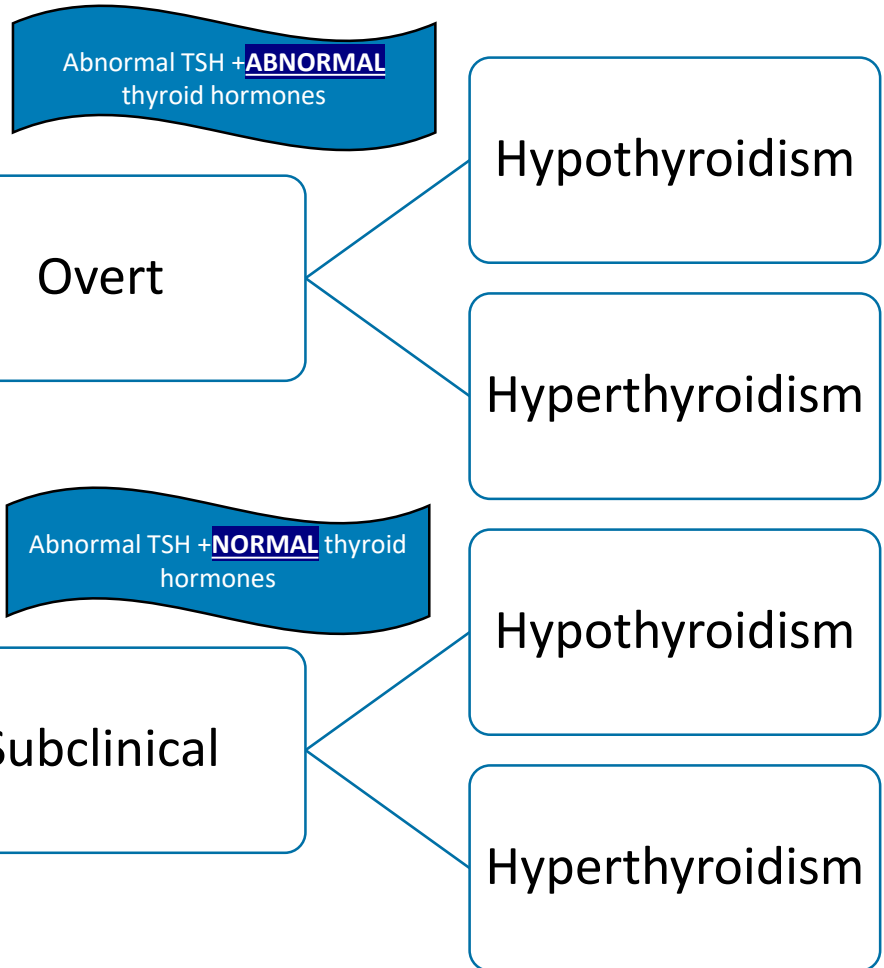
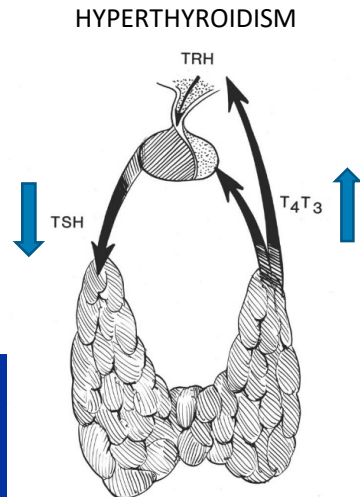
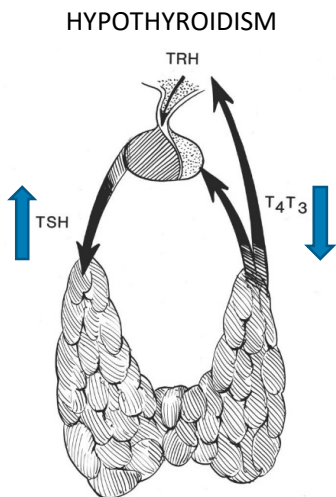
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THYROID DYSFUNCTION:
TOO MUCH OR TOO LITTLE

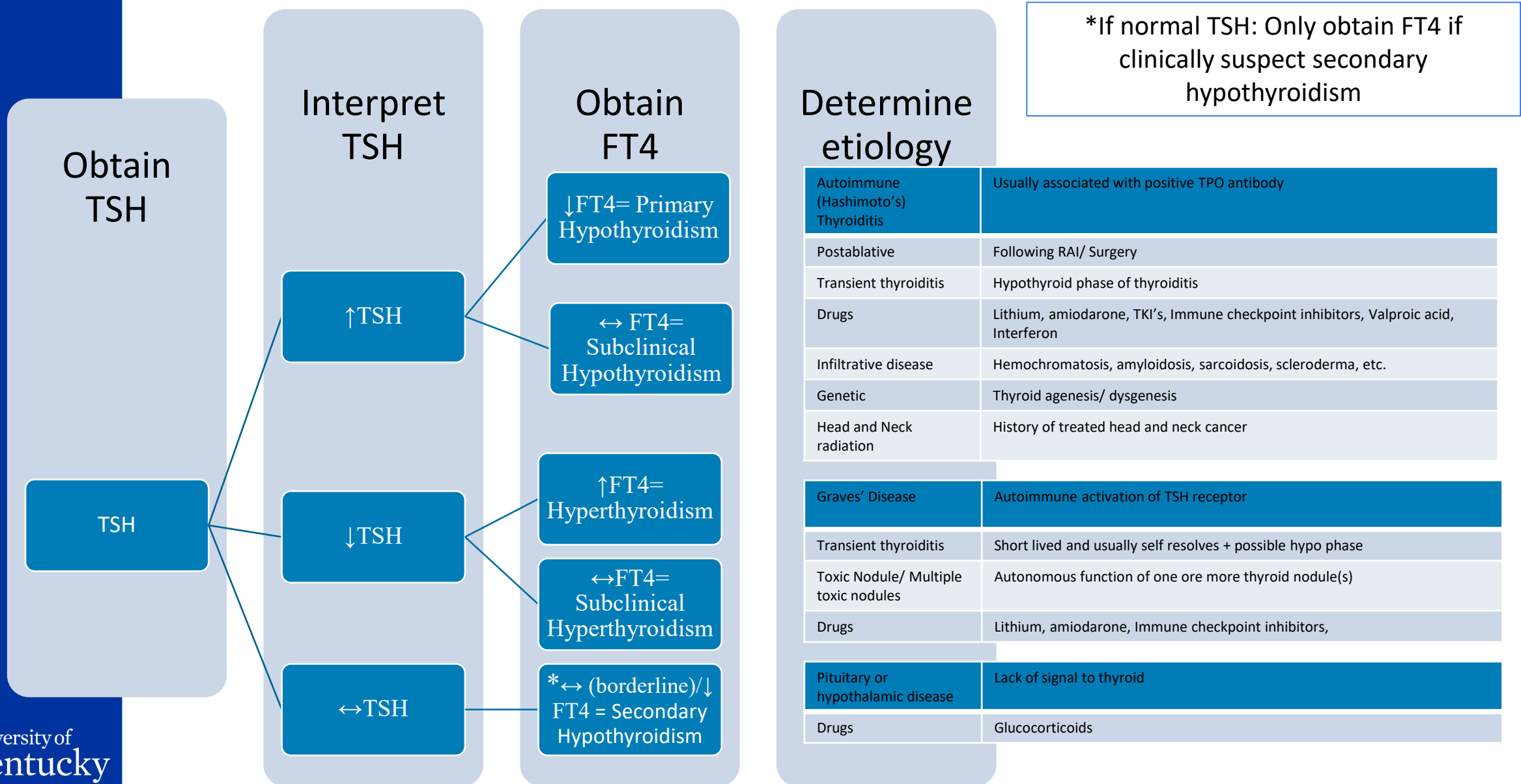
Thyroid Dysfunction



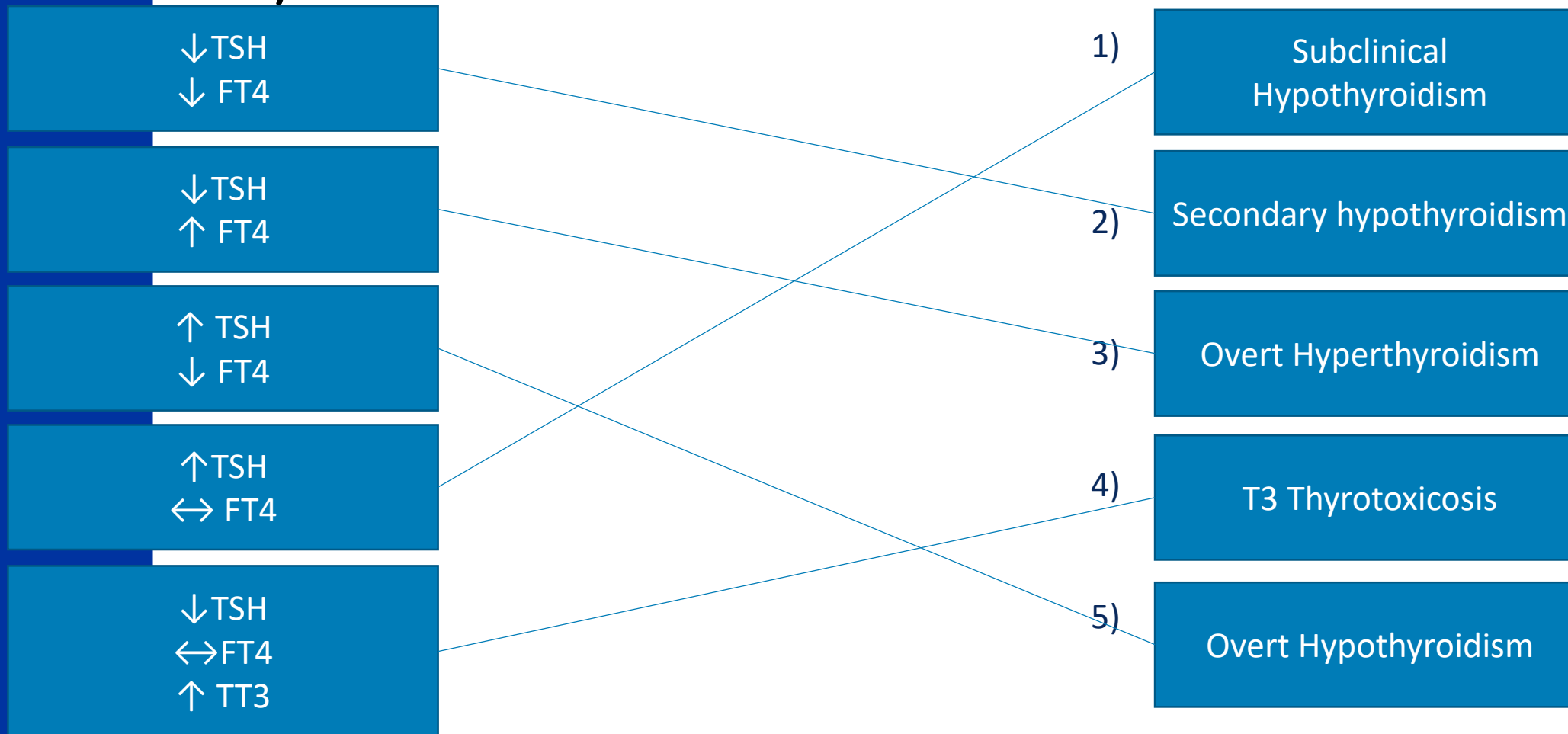
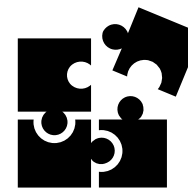
Dysfunction



4 Steps to Thyroid Function Problems

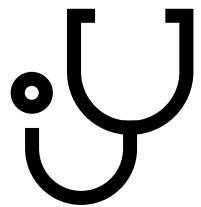
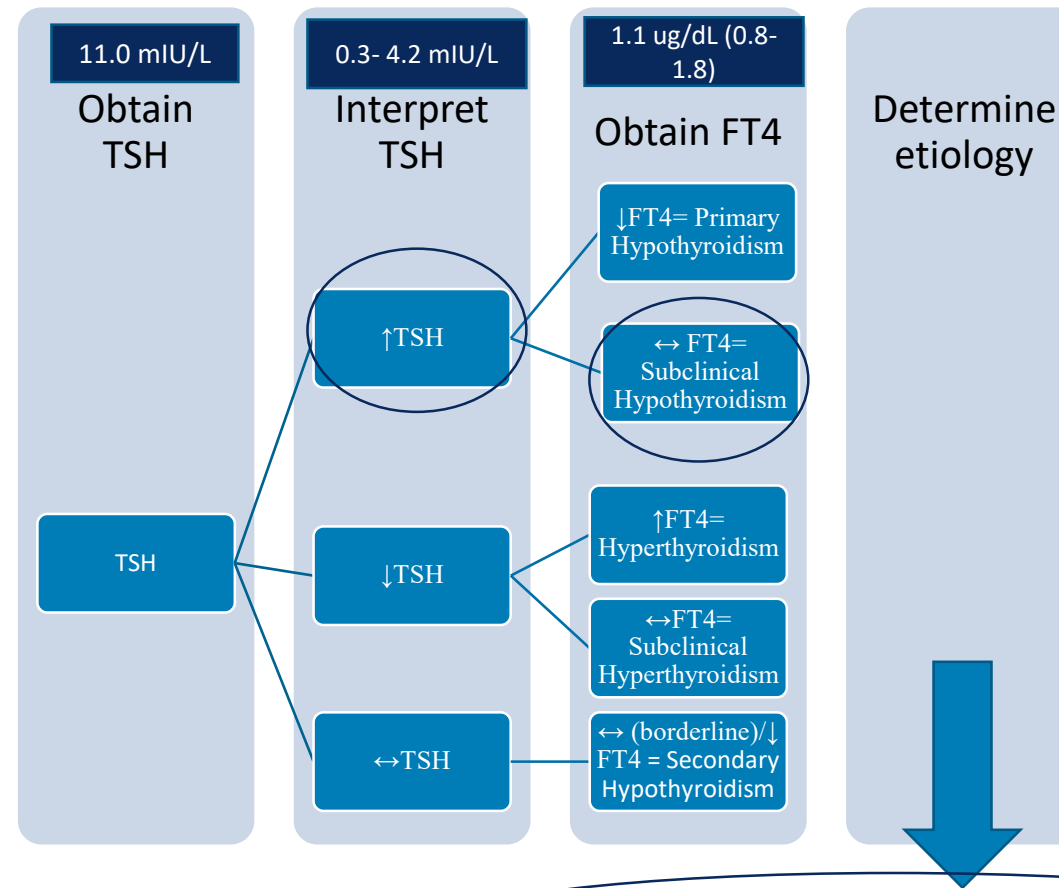


If you see this Choose This...



Case #1

- 55-year-old female
- Complains of mild fatigue
- Physical exam:
 - Diffuse goiter
- TPO antibody positive



Subclinical Hypothyroidism
Due to Hashimoto's Thyroiditis

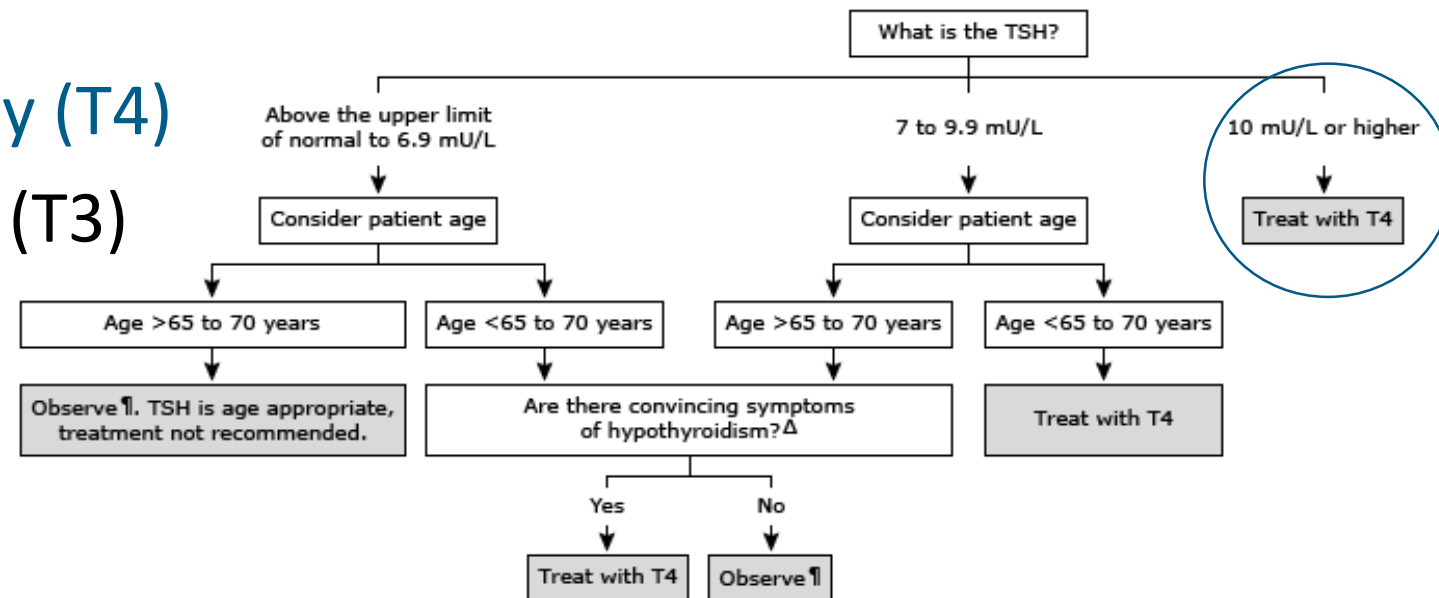
Autoimmune (Hashimoto's) Thyroiditis	Usually associated with positive TPO antibody
Postablative	Following RAI/ Surgery
Transient thyroiditis	Hypothyroid phase of thyroiditis
Drugs	Lithium, amiodarone, TKI's, Immune checkpoint inhibitors, Valproic acid, Interferon
Infiltrative disease	Hemochromatosis, amyloidosis, sarcoidosis, scleroderma, etc.
Genetic	Thyroid agenesis/ dysgenesis
Head and Neck radiation	History of treated head and neck cancer

What is the best next step in management?

- A) Start levothyroxine therapy (T4)
- B) Start liothyronine therapy (T3)
- C) Recheck in 3 months
- D) Obtain thyroid ultrasound

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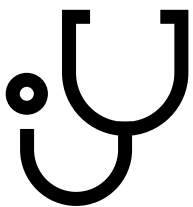
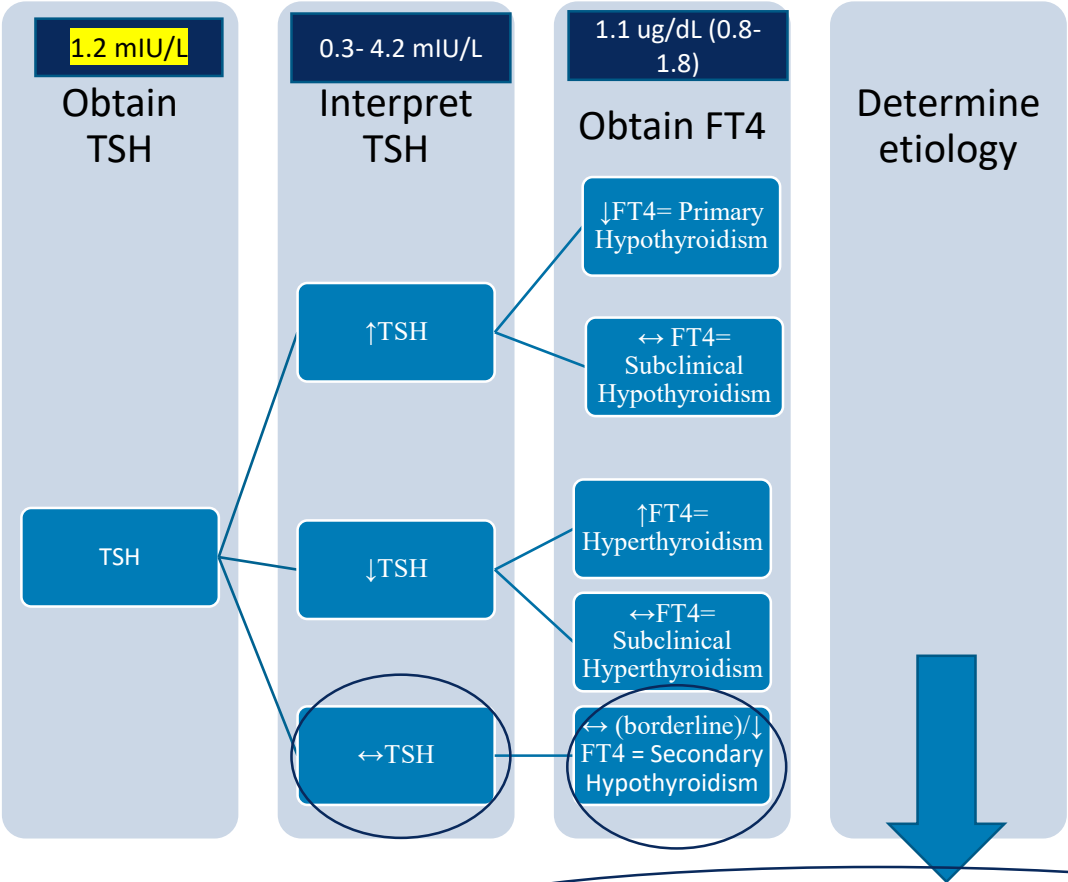
Teaching Point



Treat hypothyroidism with LT4
Start when TSH > 10 or if highly symptomatic*, TPO +ve
High TSH may be normal at older age

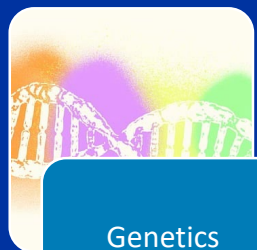
Don't Treat the Antibody Treat the Thyroid Function

- 55-year-old female
- Complains of mild fatigue
- Physical exam:
 - Diffuse goiter
- TPO antibody positive



Positive TPO antibody but Euthyroid
? Hashimoto's Thyroiditis

Autoimmune (Hashimoto's) Thyroiditis	Usually associated with positive TPO antibody
Postablative	Following RAI/ Surgery
Transient thyroiditis	Hypothyroid phase of thyroiditis
Drugs	Lithium, amiodarone, TKI's, Immune checkpoint inhibitors, Valproic acid, Interferon
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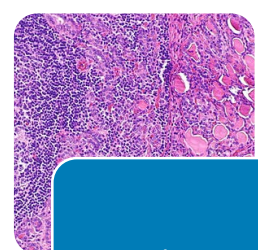


Genetics
Immune
Triggers

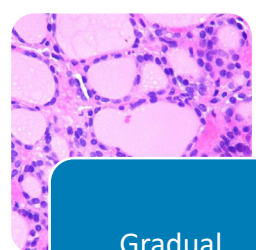


Antibody
Positive

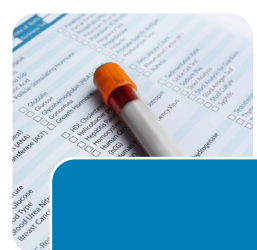
- TPO
- Thyroglobulin



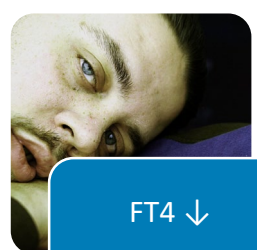
Lymphocytic
Infiltration



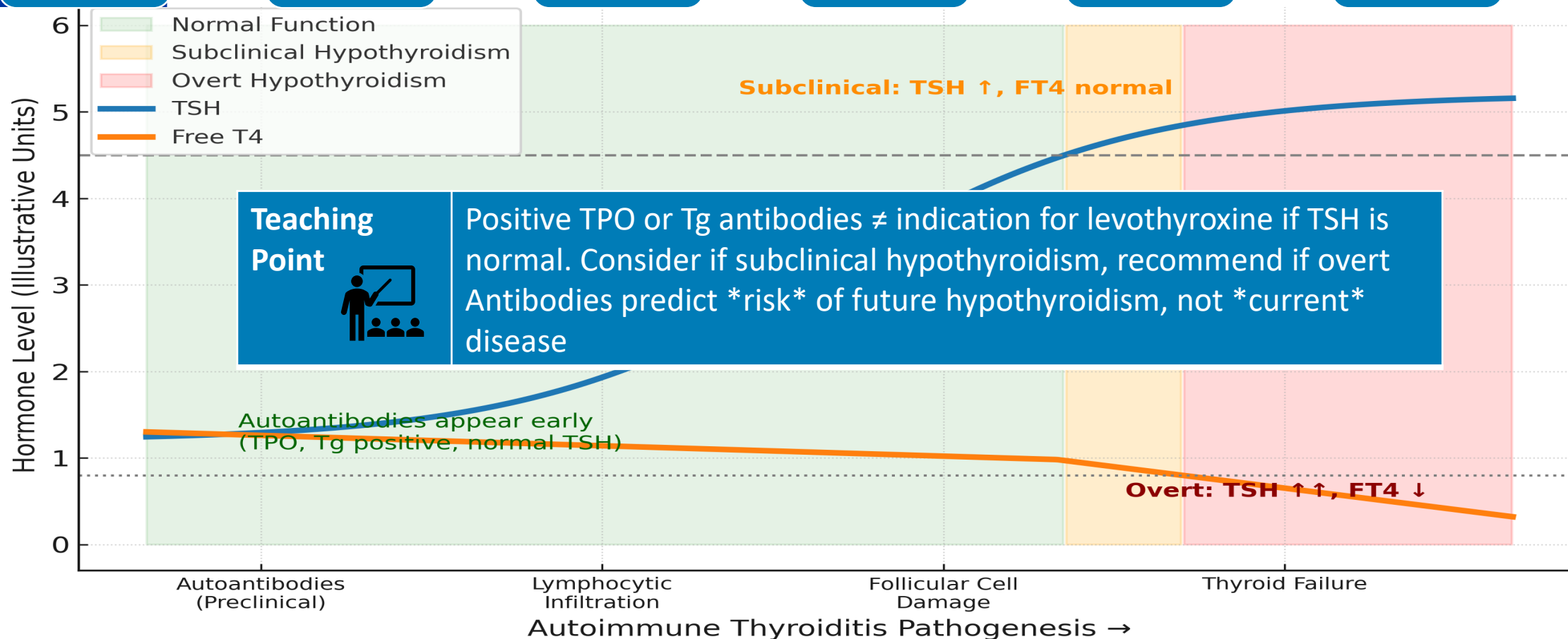
Gradual
Follicular Cell
Damage



TSH ↑



FT4 ↓
=
Overt
Hypothyroidism



Case #1 Continued

Started on LT4

Her other medications include omeprazole 20 mg daily, calcium supplements, lisinopril 5 mg daily

She is taking her medications and supplements in the morning with breakfast

6 weeks later:

- TSH 10 mIU/mL (↑)
- FT4 1.2 (normal)

What is the best next step in management?

- A) Increase dosage of levothyroxine
- B) Continue current dose of levothyroxine and add T3 therapy
- C) Assess compliance and educate on how to take levothyroxine
- D) Obtain levothyroxine absorption test

What is the best next step in management?

- A) Increase dosage of levothyroxine
- B) Continue current dose of levothyroxine and add T3 therapy
- C) Assess compliance and educate on how to take levothyroxine
- D) Obtain levothyroxine absorption test

**Teaching
Point**



Persistently elevated TSH → Adherence?
Food, PPI, Calcium, Iron effect levothyroxine absorption
If compliant → consider celiac testing

Mild Elevated TSH not Associated with Subclinical Hypothyroidism

- **Non-thyroid disease related** etiologies for elevated TSH:

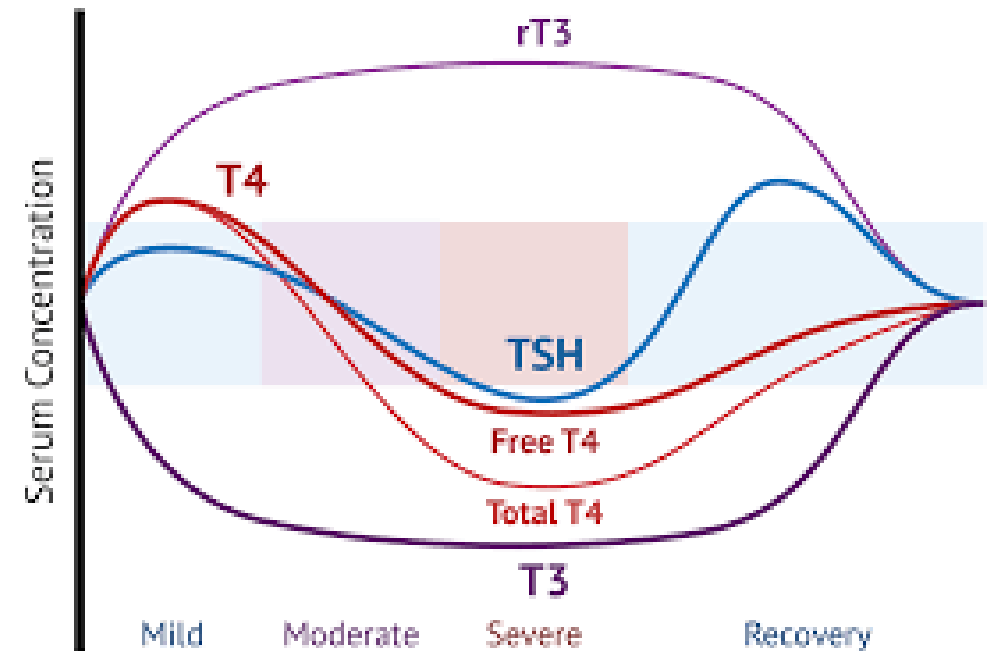
- Non-thyroidal illnesses/critical illness
- Age – age appropriate rise in TSH
- Drugs: metoclopramide, domperidone

- **Spuriously** elevated TSH

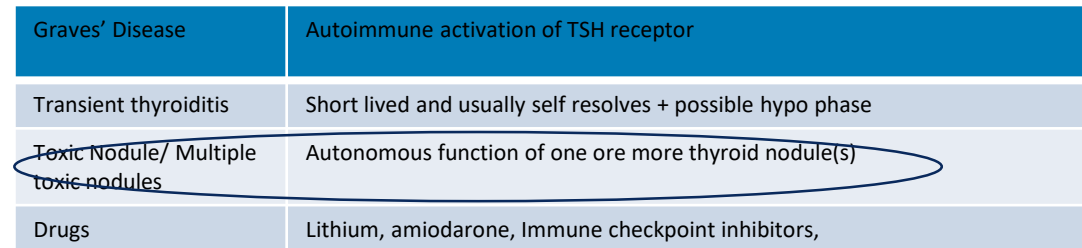
- Assay variability
- Heterophile antibodies

- **Pituitary**-related rises in TSH

- TSH-secreting adenoma – rare (high TSH & normal or high T4/T3)
- Resistance to TSH



- ## Hyperthyroidism. Etiology?



Graves' Disease	Autoimmune activation of TSH receptor
Transient thyroiditis	Short lived and usually self resolves + possible hypo phase
Toxic Nodule/ Multiple toxic nodules	Autonomous function of one ore more thyroid nodule(s)
Drugs	Lithium, amiodarone, Immune checkpoint inhibitors,

What is the best next step in management?

- A) Start methimazole 20 mg daily
- B) Recheck thyroid function in 3 months
- C) Obtain I-131 thyroid uptake and scan
- D) Start PTU 150 mg daily

What is the best next step in management?

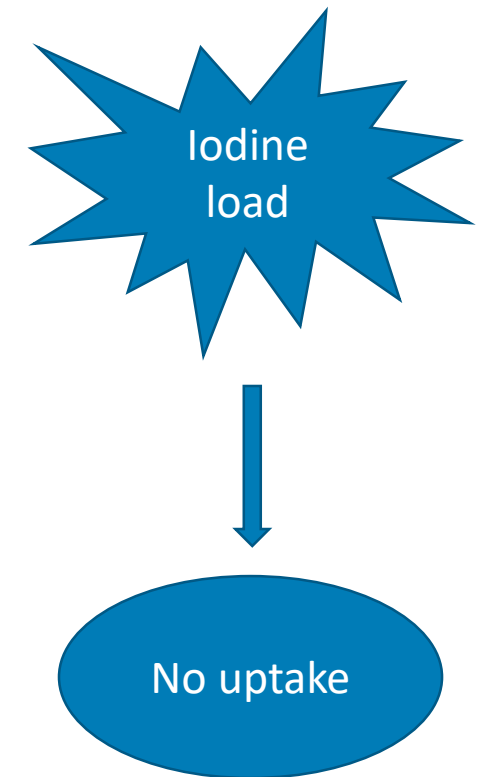
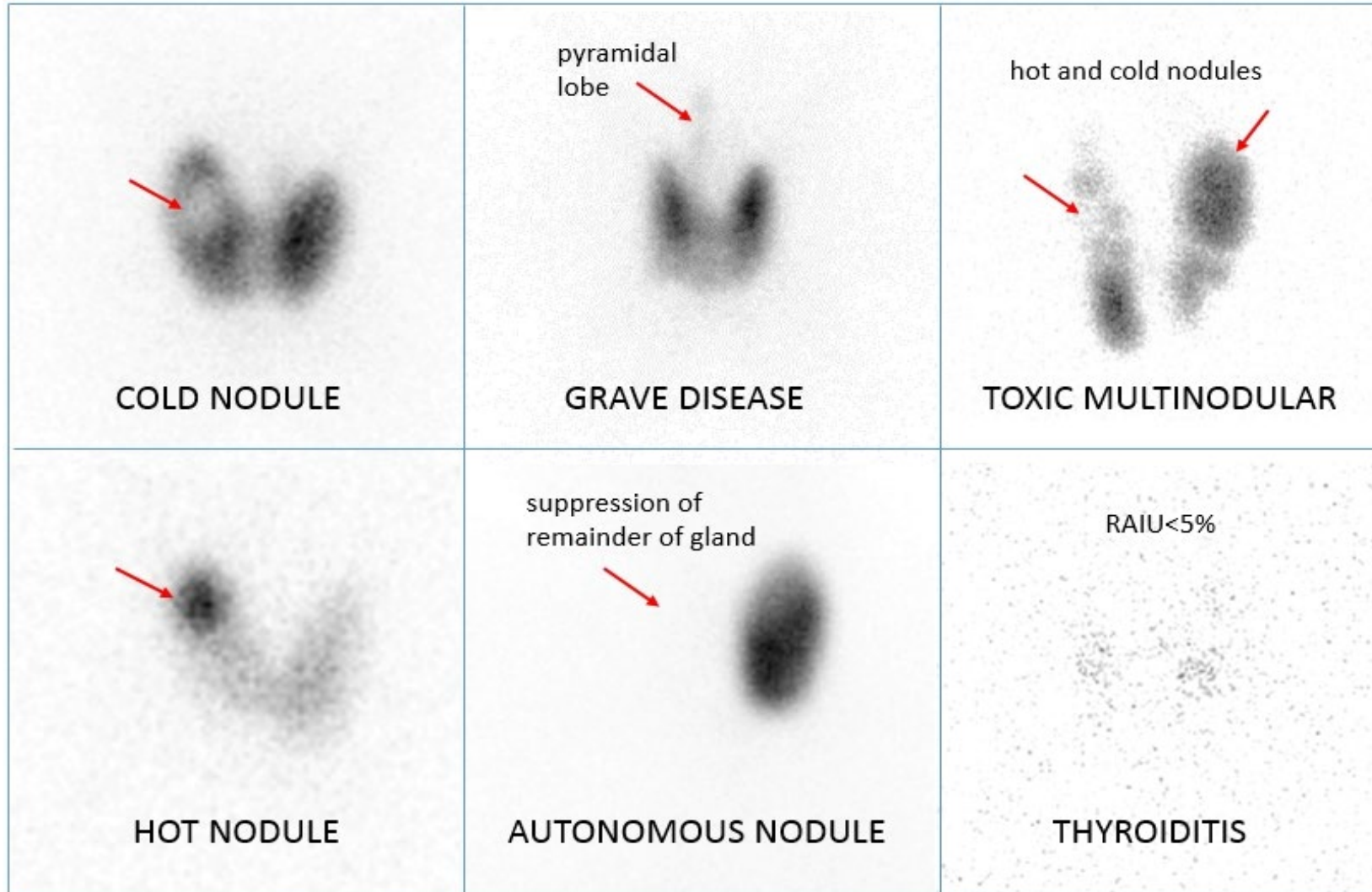
- A) Start methimazole 20 mg daily
- B) Recheck thyroid function in 3 months
- C) Obtain I-131 thyroid uptake and scan
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If given option of TRAb testing vs. uptake and scan → chose TRAb first



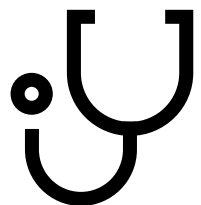
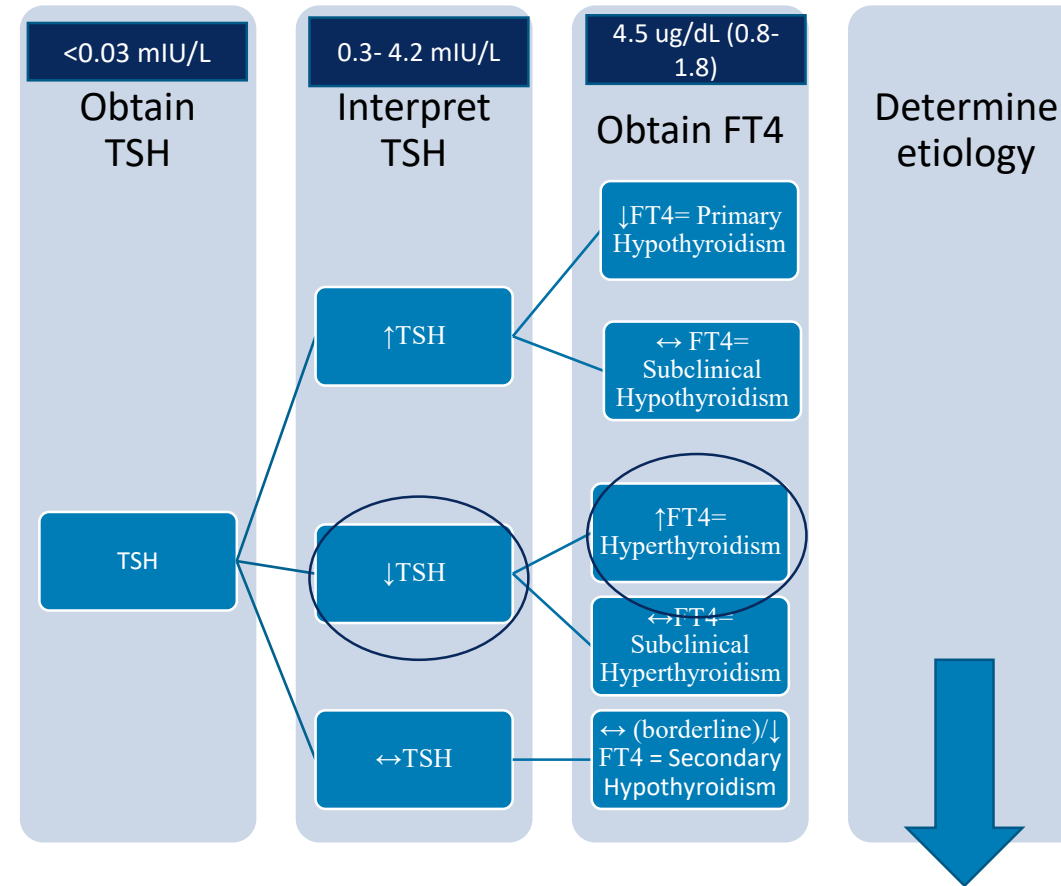
Uptake and scan can help determine cause of hyperthyroidism
NOT useful if already received high iodine load

Interpreting Thyroid Uptake and Scan



Case #3

- 33-year-old female
- Complains of palpitations
- Physical exam:
 - Diffuse goiter
 - Bilateral proptosis
 - Conjunctival erythema
- TRAb antibody positive



Hyperthyroidism due to Graves' Disease

Graves' Disease	Autoimmune activation of TSH Receptor
Transient thyroiditis	Short lived and usually self resolves + possible hypo phase
Toxic Nodule/ Multiple toxic nodules	Autonomous function of one ore more thyroid nodule(s)
Drugs	Lithium, amiodarone, Immune checkpoint inhibitors,

What is the best next step in management?

- A) Obtain I-131 thyroid uptake and scan
- B) Start methimazole 20 mg daily
- C) Treat with 10 mCi of radioactive iodine
- D) Obtain TSI antibody level

What is the best next step in management?

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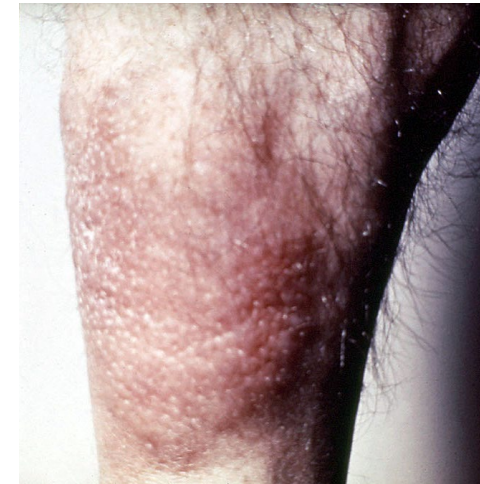
Teaching
Point



Avoid RAI treatment in Graves' disease and active thyroid eye disease. TRAb is the most sensitive marker for diagnosis.

Graves' Disease

- Most common cause of hyperthyroidism
- Presents with classic hyperthyroid symptoms
- Goiter
- Specific P/E findings:
 - Thyroid eye disease
 - Pre-tibial myxedema
 - Thyroid acropachy
- TRAb/ TSI positive in most cases
- Diffuse uptake on uptake and scan
- Treated with:
 - Anti thyroid drugs- first line
 - RAI
 - Surgery



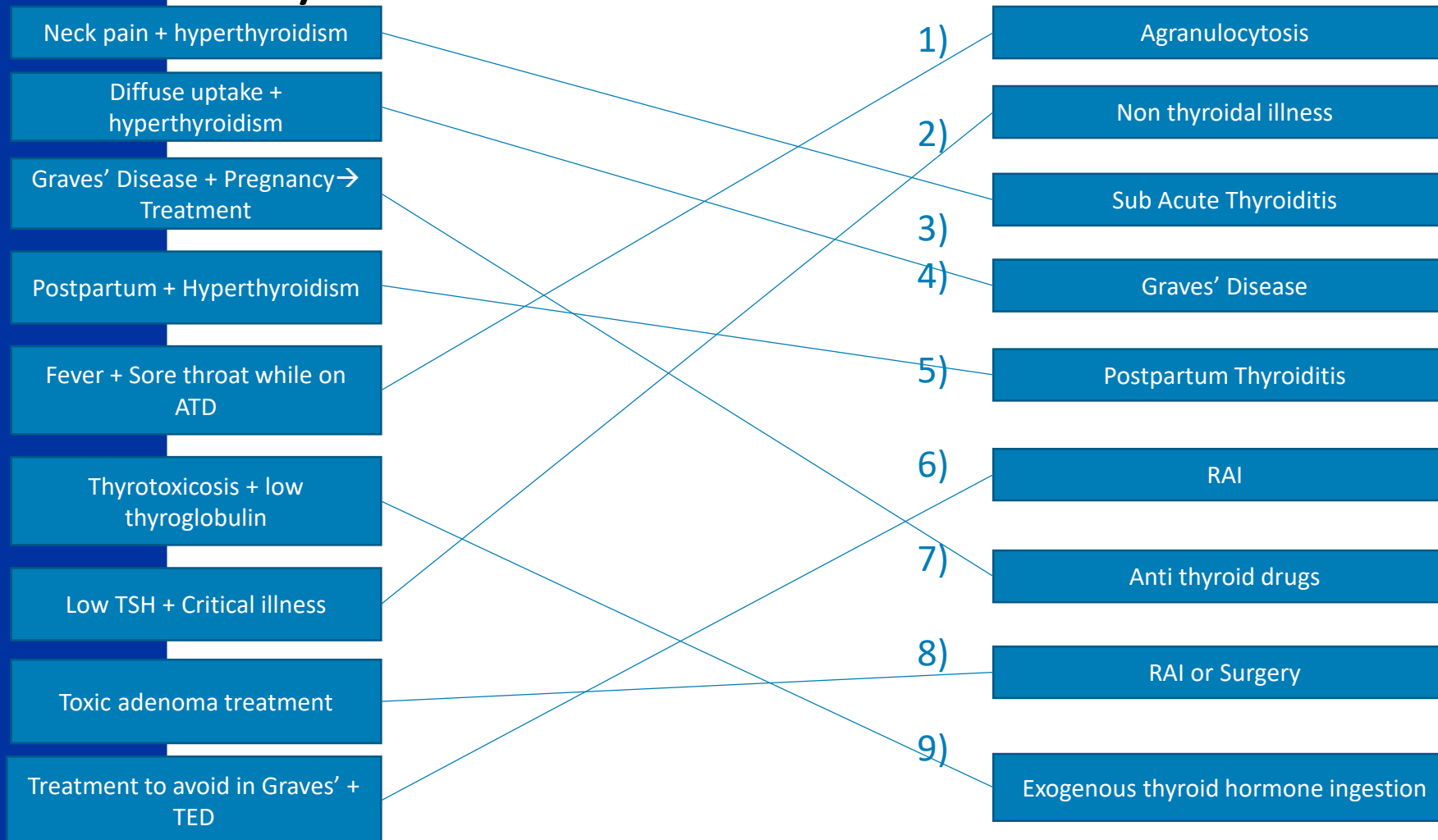
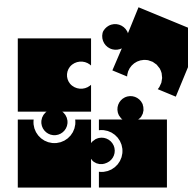
ATD Toxicity

Agranulocytosis, rash,
hepatotoxicity

Other Causes of Abnormally Low Serum TSH

- Subclinical hyperthyroidism
- Recovery from hyperthyroidism (lag in TSH suppression)
- Pituitary / hypothalamic disease (adenoma)
- Euthyroid sick syndrome (non-thyroidal illness syndrome)
- Some medications such as corticosteroids, dopamine , dobutamine
- First trimester of pregnancy

If you see this Choose This...



Thyroid Dysfunction Emergencies

Thyroid Storm:

Trigger: acutely ill, iodine load, etc.

- Fever (thermoregulatory dysfunction)
- CNS (metabolic encephalopathy)
- Severe cardiovascular problems (marked sinus tachycardia, atrial arrhythmias, heart failure, hypotension)
- Gastrointestinal and hepatic (vomiting, diarrhea, abnormal LFTs)

-Treatment:

ICU, beta blockers, anti-thyroid drugs (PTU) then SSKI, glucocorticoids

Myxedema Coma:

Trigger: acutely ill, dehydration, opiates, medication nonadherence

- Hypothermia (thermoregulatory dysfunction)
- CNS (metabolic encephalopathy)
- Severe cardiovascular problems (bradycardia, hypotension, heart failure)
- Respiratory (hypoventilation, hypoxia)
- Biochemical (hyponatremia, hypoglycemia)

-Treatment:

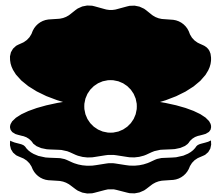
ICU, hydrocortisone (until concomitant AI ruled out), levothyroxine +/- T3

**Teaching
Point**



Clinical diagnosis. No thyroid hormone level is diagnostic. Give ATD **BEFORE** Iodine in Thyroid storm.

Thyroid Dysfunction High Yield Pearls



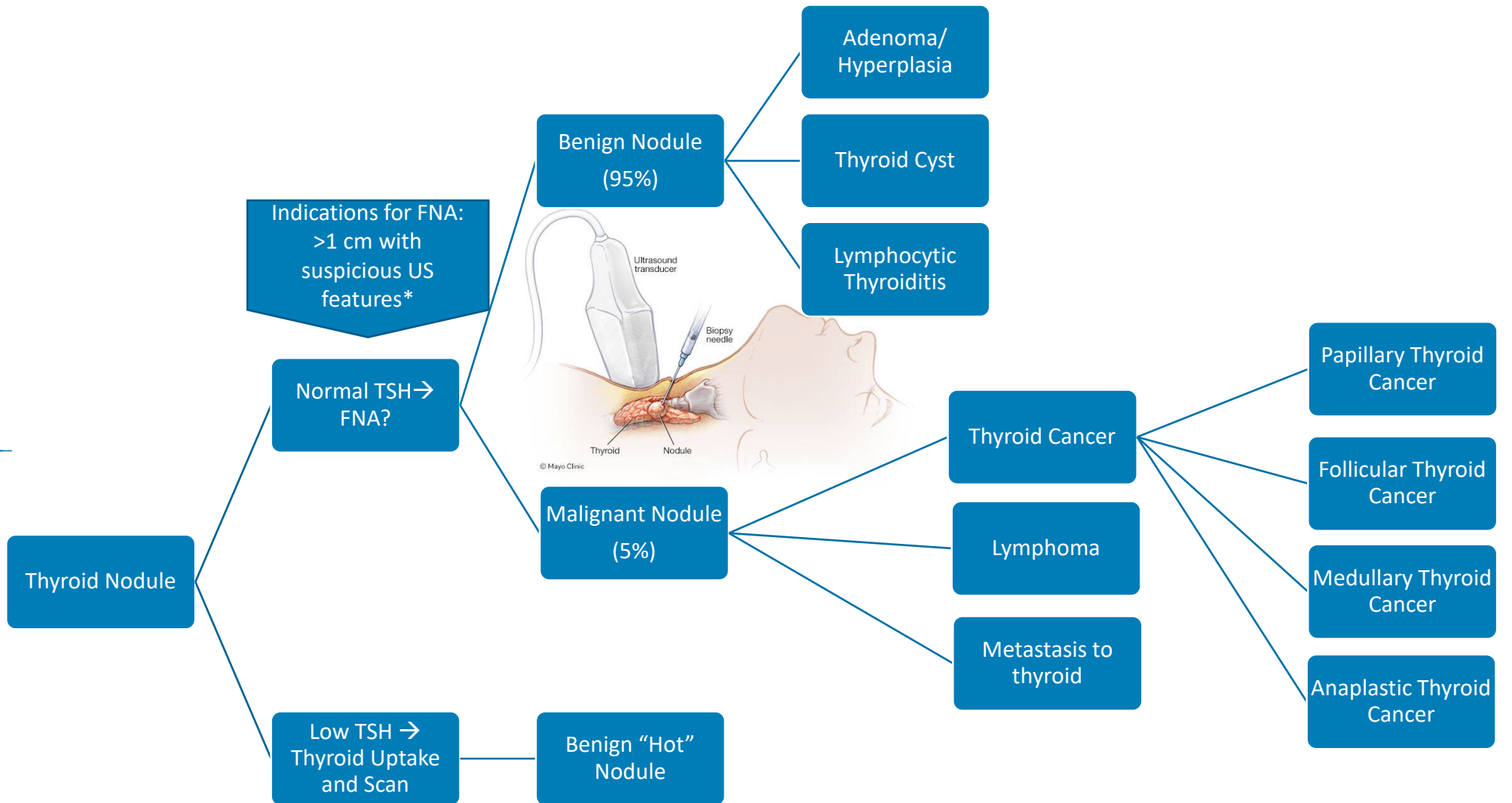
- 1) TSH is the single most sensitive test in detecting thyroid disease as it is affected BEFORE T4*
- 2) I- 131 Scan cannot be interpreted in patients who received a high iodine load (contrast, amiodarone, etc.) within the last 30-90 days
- 3) Treat thyroid storm with steroids, beta blockers, PTU, iodine
- 4) Treat Graves' disease with ATD, RAI or surgery. Never use RAI in pregnancy or in those with TED



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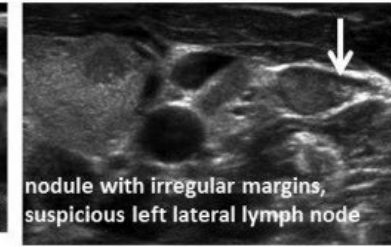
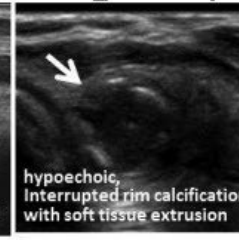
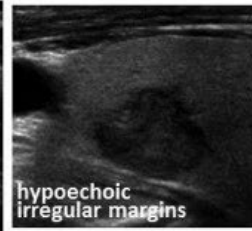
THYROID STRUCTURE: LUMPS & BUMPS

Thyroid Structural Disorders



ATA Nodule Sonographic Pattern Risk of Malignancy

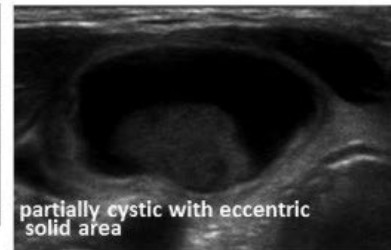
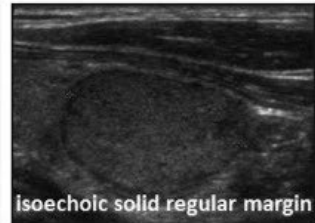
High
Suspicion
70-90%



Intermediate
Suspicion
10-20%



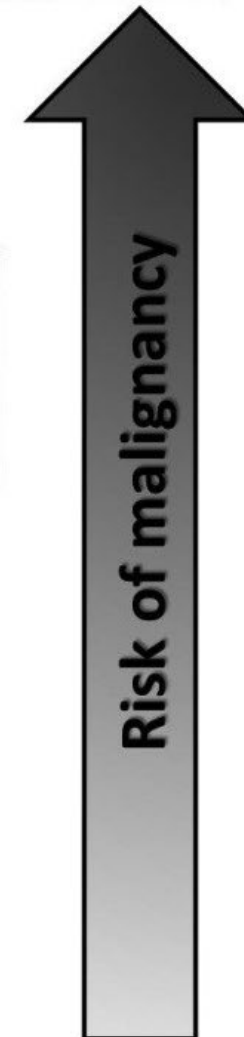
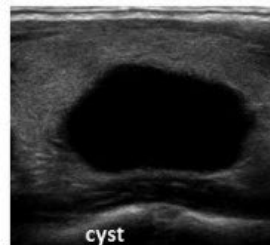
Low
Suspicion
5-10%



Very low
Suspicion
<3%

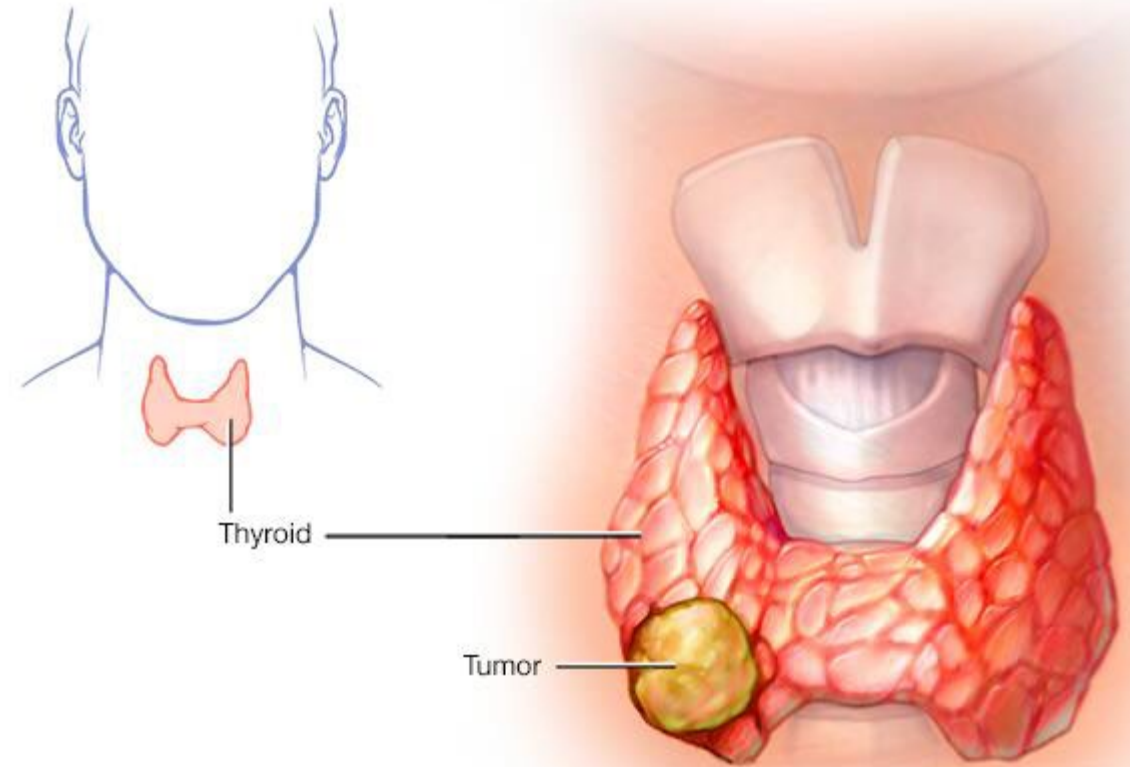


Benign
<1%



Risk Factors for Thyroid Cancer

- Age >70 or <14
- Head/ neck radiation history
- Family history
 - PTC: FAP, Cowden, Carney complex
 - Follicular: Werner Syndrome
 - MTC: MEN2a, MEN 2b
- Hashimoto's → Lymphoma?

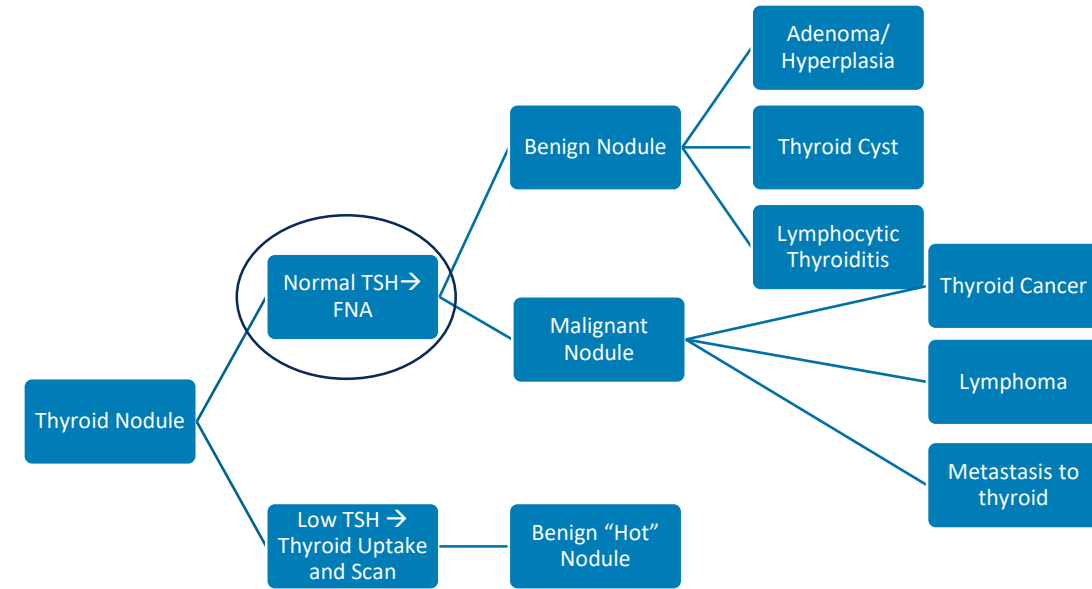


Types of Thyroid Cancer

Type	Incidence	Survival Rate	Clinical Characteristics
Papillary	70-80%	95%	• Local spread • Lymph node mets. • Slow growing • Biochemical marker: Thyroglobulin
Follicular	10-15%	91%	• Hematological spread • Bone and lung mets. • Slow growing • Biochemical marker: Thyroglobulin
Medullary	5-10%	91%	• May be sporadic or A/W MEN 2A or MEN2B • RET mutation • Biochemical marker: Calcitonin
Anaplastic	1-2%	1-7%	• Locoregional invasion • Bone and lung mets. • Fast growing

Case #4

- 49-year-old female
- CT neck obtained in ED due to MVA
- Incidental thyroid nodule
- Thyroid US: 1.8 cm left thyroid nodule of intermediate suspicion
- Lab Results:
 - TSH 0.8 (0.3-4.2 mIU/L)
- Physical exam:
 - Palpable left nodule
 - Mobile with swallowing
 - No cervical lymphadenopathy



What is the best next step in management?

- A) Obtain thyroglobulin level
- B) Obtain calcitonin level
- C) Refer for surgery
- D) Perform fine needle aspiration biopsy

What is the best next step in management?

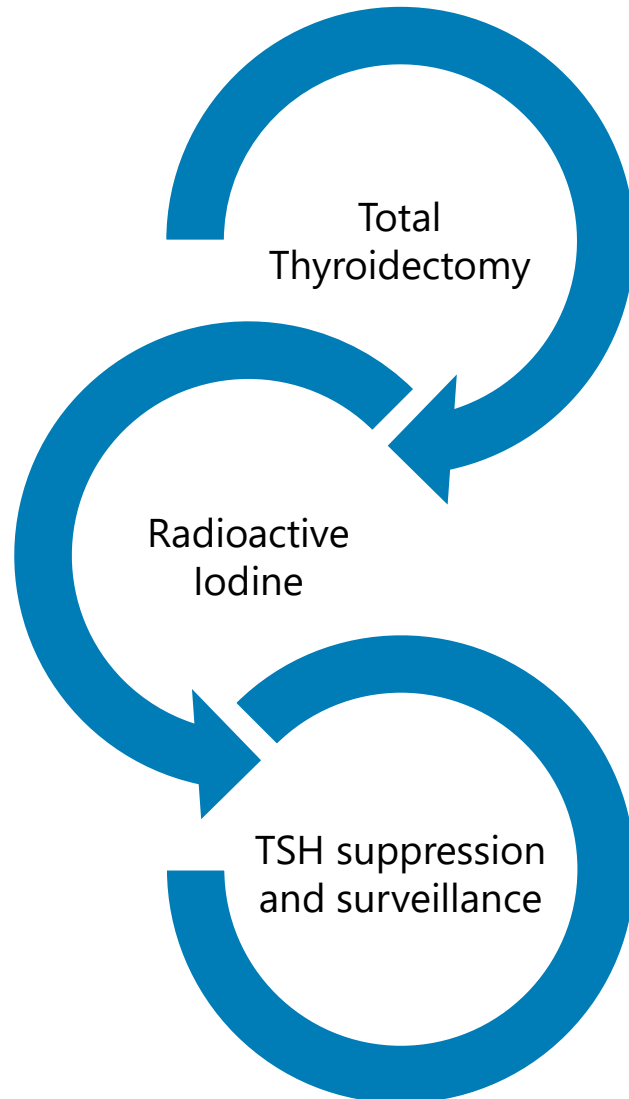
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**Teaching
Point**

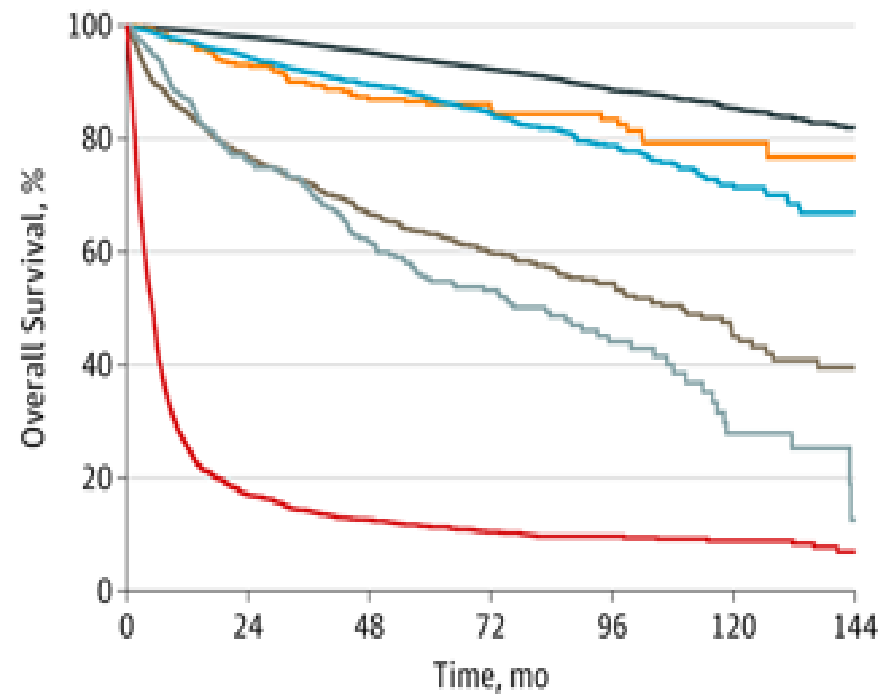


Thyroglobulin level is not helpful in determining malignant vs. benign nodules. Calcitonin is only used when medullary thyroid cancer is suspected.

Historical Approach To Thyroid Cancer Treatment

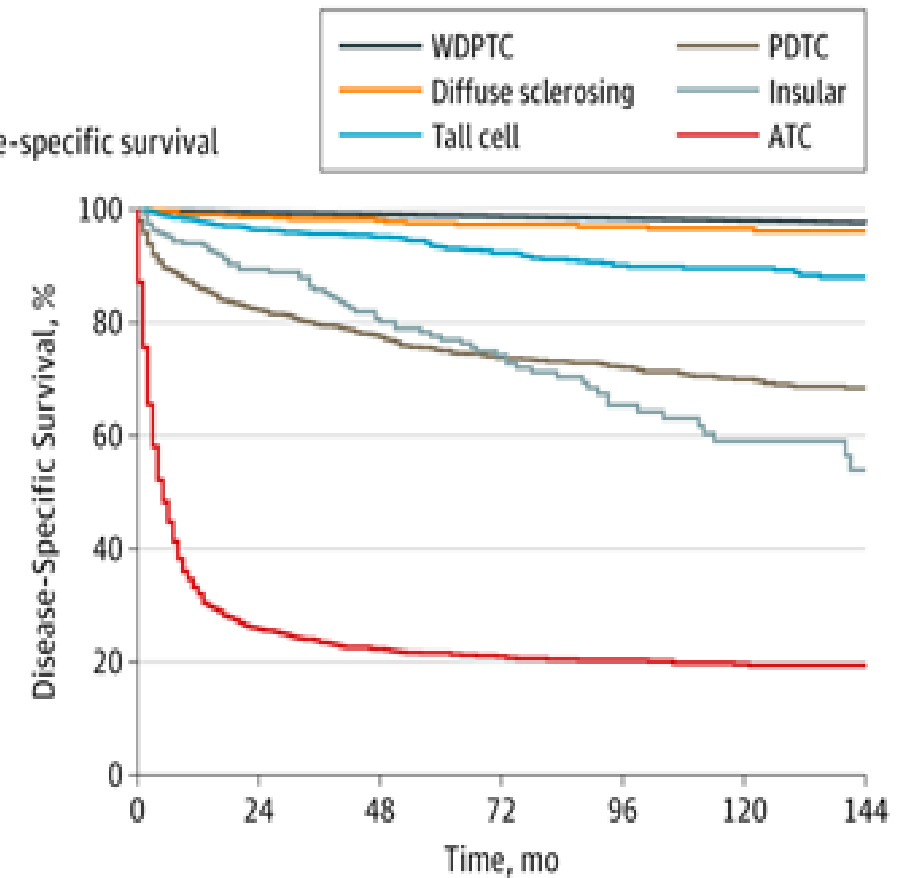


A Overall survival



No. at risk	0	24	48	72	96	120	144
WDPTC	35812	28411	18314	9047	3883	1898	618
Diffuse sclerosing	415	319	236	147	85	45	14
Tall cell	3339	2535	1528	807	344	139	46
PDTC	1331	843	523	295	153	54	15
Insular	362	239	152	95	43	14	2
ATC	2249	323	181	103	54	21	7

B Disease-specific survival



No. at risk	0	24	48	72	96	120	144
WDPTC	33577	27533	22852	18510	14623	11406	8782
Diffuse sclerosing	600	508	420	340	270	215	162
Tall cell	1747	1267	930	653	433	284	168
PDTC	1570	999	780	622	498	388	313
Insular	284	194	136	104	61	40	18
ATC	2241	319	225	169	127	97	74

Century: A Population-Based Study

Natalia Genere, MD; Omar M. El Kawgi, MB, BCh, BAO; Rachel E. Giblon, MS;
Salvatore Vaccarella, PhD; John C. Morris, MD; Ian D. Hay, MD, PhD;
and Juan P. Brito, MBBS

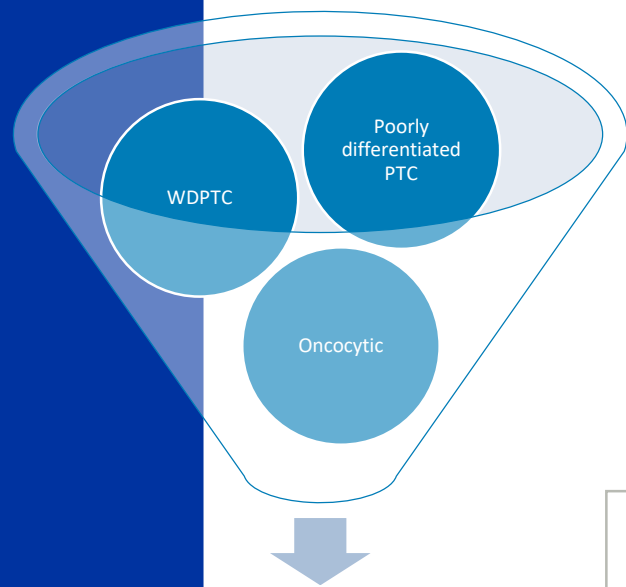
STRIKING A BALANCE

Under-Treatment
of Intermediate or
High Risk Disease



Over-Treatment
of Low Risk
Disease

Heterogenous Group of Diseases Need Individualized Approaches



Thyroid cancer

Thyroid
Surgery

Radioactive
Iodine?

TSH
suppression

Low risk disease

What therapies are of limited
benefit and what therapies are
harmful?

Active surveillance?
Lobectomy?
RFA?

Intermediate risk disease

What therapies reduce recurrence?

RAI?

High risk disease

What therapies improve survival?

Systemic therapies?

Low Risk Disease- Extent of Surgery and Recurrence

World J Surg (2023) 47:1211–1218
<https://doi.org/10.1007/s00268-022-06813-5>



ORIGINAL SCIENTIFIC REPORT

Thyroid Lobectomy for Low-Risk 1–4 CM Papillary Thyroid Cancer is not Associated with Increased Recurrence Rates in the Dutch Population with a Restricted Diagnostic Work-Up

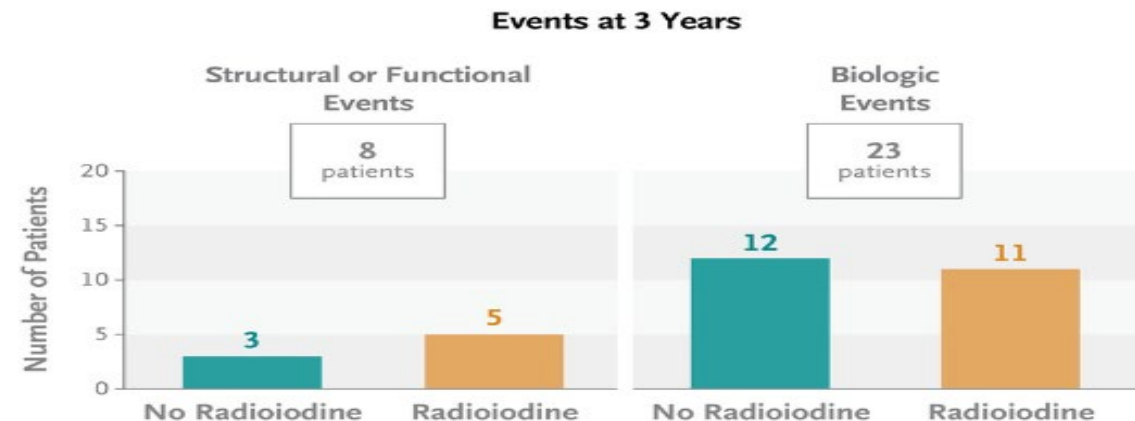
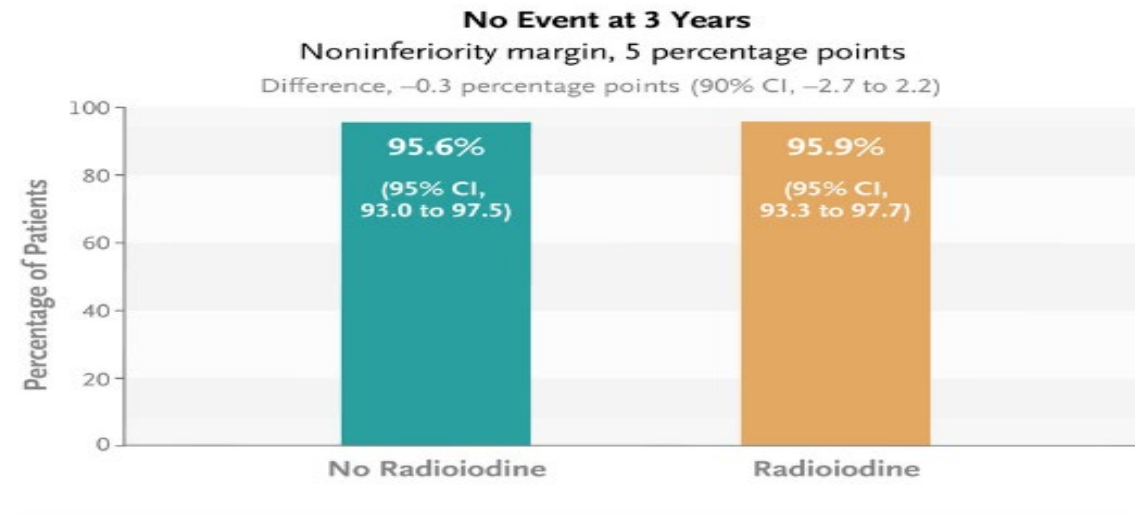
J. F. Lin¹ · P. M. Rodriguez Schaap² · M. J. H. Metman¹ · E. J. M. Nieveen van Dijkum² · C. Dickhoff² · T. P. Links³ · S. Kruijff¹ · A. F. Engelsman²

901 patients diagnosed with low risk 1-4 cm PTC between 2005-2015 with median follow up of 7.7 years

2.6%
recurrence
rate in cohort

No SS
difference in
TT vs. TL

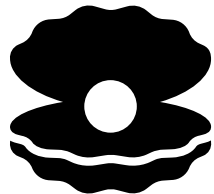
Low Risk Disease- Role for RAI?



2025 ATA DTC Guideline Recommendations

Risk category	Typical RAI recommendation	Recommended ¹³¹ I activity level	Goals of therapy
Low	No	1.1–1.85 GBq (30–50 mCi)	None or remnant ablation
Intermediate-low and intermediate-high	Consider	1.1–3.7 GBq (30–100 mCi)	Remnant ablation +/- adjuvant therapy
High	Yes	3.7–5.55 GBq (100–150 mCi)	Remnant ablation and adjuvant therapy
Distant metastases	Yes	3.7–7.4 GBq (100–200 mCi) or consider dosimetry	Treatment of known disease, remnant ablation

Thyroid Structure High Yield Pearls



- 1) Incidence: PTC > Follicular > Medullary > Anaplastic
- 2) Do not FNA hot nodules (Low TSH, High localized uptake)
- 3) Do FNA cold nodules that are > 1 cm + US features
- 4) No role for pre-operative tumor markers
- 5) Not all thyroid cancers require Surgery, RAI and TSH
Suppression- low risk PTC cancers can be managed with
lobectomy without RAI

Questions?

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