

THYROID DISEASES

CASE BASED WORKSHOP

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DISCLOSURE

I have no relevant financial disclosure



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OBJECTIVES

Upon attending the workshop, you will be able to

- **Diagnose and manage thyroid diseases commonly seen in the primary care setting**
- **Manage patients with challenging thyroid disorders prior to their transition to specialty care**



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TOP 10 LIST ON THYROID DISEASE

- **Biochemical evaluation of thyroid function should be interpreted in the proper clinical context.**
- **TSH/FT4 are reliable measures of the initial thyroid function assessment.**
- **Radioiodine uptake/scan can be used to differentiate thyroiditis vs Graves' disease vs toxic nodule(s) in the evaluation of hyperthyroidism.**
- **Anti-thyroid medications or radioactive iodine treatments are both first line therapy for hyperthyroidism depending on the clinical context and patient preferences.**
- **LT4 monotherapy is the mainstay of treatment for patients with hypothyroidism.**
- **LT4 monotherapy is justified in selective patients with subclinical hypothyroidism.**
- **TSH followed by thyroid US are the initial workup for thyroid nodule(s).**



TOP 10 LIST ON THYROID DISEASE

- **Thyroid ultrasound-guided fine needle aspiration biopsy and cytology evaluation are recommended for euthyroid or hypothyroid patients with significant thyroid nodule(s)**
- **Thyroidectomy; post-surgery radioactive iodine ablation and subsequent TSH suppression therapy in selected patients are the standard of care for patients with differentiated thyroid cancers.**
- **Thyroid storm and myxedema coma are rare but life-threatening thyroid emergencies and should be assessed with a high degree of clinical suspicion.**



LABORATORY ASSESSMENT OF THYROID FUNCTION

	Diagnosis	TSH	FT4	Total T3	Total T4	RAIU	Thyroid scan
Thyrotoxicosis	Graves' Disease	↓↓	↑	↑↑	↑	↑↑	Diffuse
	Nodular thyrotoxicosis	↓↓	↑	↑↑ - ↑↑↑	↑	↑	Hot nodule(s), single or multiple
	Thyroiditis (Early Phase)	↓↓	↑	↑	↑	↓ (<8%)	Poor uptake
	Factitious thyrotoxicosis	↓	↑ or ↔	↑ or ↔	↑ or ↔	↓	Poor uptake
	hCG-mediated thyrotoxicosis	↓↓	↑	↑	↑	N/A	N/A
	Ectopic thyrotoxicosis	↓↓	↑	↑	↑	↓	Positive full body radioactive iodine scan
	Central thyrotoxicosis	↔ or ↑	↑	↑	↑	↑	Diffuse

RAIU: Radioactive Iodine Uptake



LABORATORY ASSESSMENT OF THYROID FUNCTION

	Diagnosis	TSH	FT4	Total T3	Total T4	RAIU	Thyroid scan
Hypothyroidism	Chronic Thyroiditis	↑ - ↑↑	↓	↓ or ↔	↓	N/A	N/A
	Iatrogenic	↑↑	↓	↓	↓	N/A	N/A
	Central hypothyroidism	↓ or ↔	↓	↓ or ↔	↓	N/A	N/A
	Iodine deficiency	↑	↓	↓	↓	↑↑↑	Diffuse / nodular

RAIU: Radioactive Iodine Uptake



EVALUATION OF HYPERTHYROIDISM

Graves' disease (GD) vs Acute phase of thyroiditis vs Toxic nodules vs Other rare conditions

- **Hyperthyroidism + pathognomonic findings are diagnostic for Graves' disease (ophthalmopathy/pretibial myxedema)**
- **TSH/FT4 is always the initial laboratory assessment, total T3 and total T4 may be helpful in differentiating acute phase of thyroiditis from GD and toxic nodule(s)**
- **Radioactive iodine uptake (RAIU) and/or scan is helpful in differentiating GD vs thyroiditis vs toxic nodule(s)**
- **Thyroid stimulating immunoglobulin (TSI) or thyrotropin binding inhibitory immunoglobulin (TBII) may be helpful but not required to diagnose GD**
- **Technetium 99 scan or thyroid ultrasound may be helpful in selective patient population**



TREATMENT OPTIONS FOR HYPERTHYROIDISM

Supportive management:

Beta blocker: Propranolol or Atenolol

Antithyroid therapies:

ATD	RAI	SURGERY
GD	Toxic nodule(s)	Compression symptoms
Pregnancy & lactation	Patients without contraindication	Not tolerating ATD/RAI
Housing or accommodation issues	Females not planning pregnancy within 6 months	Pregnant patients with GD not properly controlled with ATD
Severe ophthalmopathy		Patient preference
Prior to RAI or surgery		Suspicion of malignancy



SPECIAL CONSIDERATIONS

Baseline laboratories: CBC + differential; hepatic function; thyroid function

What to watch for...

ATD	RAI	SURGERY
Hypothyroidism	Hypothyroidism	Hypothyroidism
Rash	Swollen neck, tenderness	Other surgical complications
GI discomfort	Thyrotoxicosis	
Agranulocytosis	Worsening of ophthalmopathy	
Liver damage		

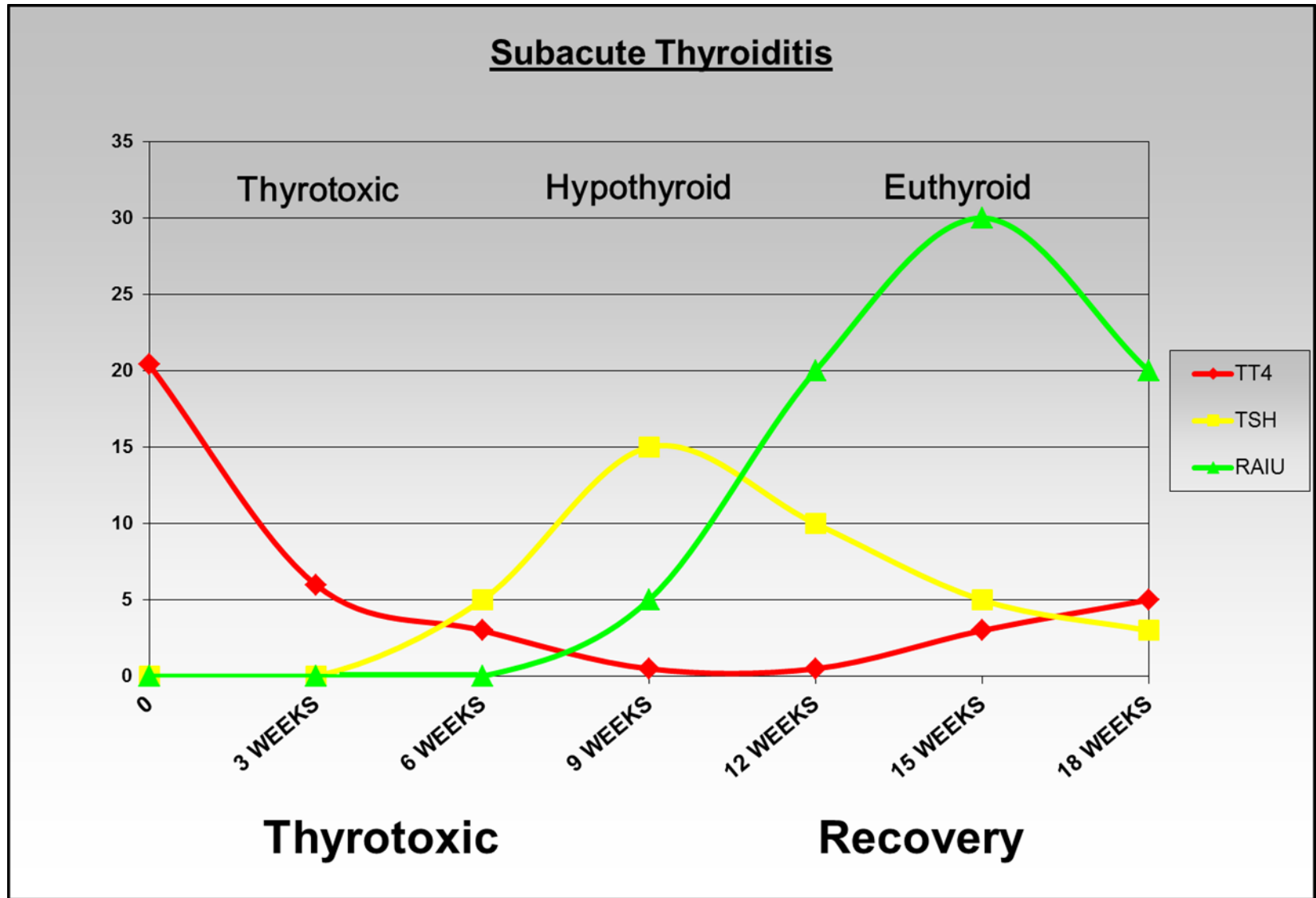


HYPOTHYROIDISM

- **Etiology is important for the establishment of treatment goal.**
- **There is no sufficient evidence to support the use of LT3 or LT4/LT3 combination therapy**
- **LT4 should be taken in fasting state with water only, wait for at least 30 minutes before food intake or the ingestion of other medications**
- **Hypothyroidism in females should be properly controlled prior to pregnancy.**



HORMONAL CHANGES IN THYROIDITIS



SUBCLINICAL THYROID DISEASES

Subclinical hyperthyroidism

TSH > 0.1,

Graves' disease:

Asymptomatic young patients: observation

65 + yr: Low dose ATD

Toxic nodule(s):

Symptomatic patients: RAI

65+ yr : RAI

TSH < 0.1.

Graves' disease:

Symptomatic pts: RAI for anyone 65+ yr or postmenopausal, ATD for young patients.

Asymptomatic pts: RAI for 65+yr or postmenopausal.

Toxic nodule(s):

Symptomatic pts: RAI

Asymptomatic pts: RAI for 65+yr or postmenopausal.



SUBCLINICAL THYROID DISEASES

Subclinical hypothyroidism,

Consider pharmacological intervention if the patient has one of the following conditions:

- Positive TPO antibody
- Hypothyroid symptoms
- CVD or risk factors



THYROID DISEASE IN PREGNANCY

Graves' disease vs Hyperemesis Graviduram (Gestational hyperthyroidism)

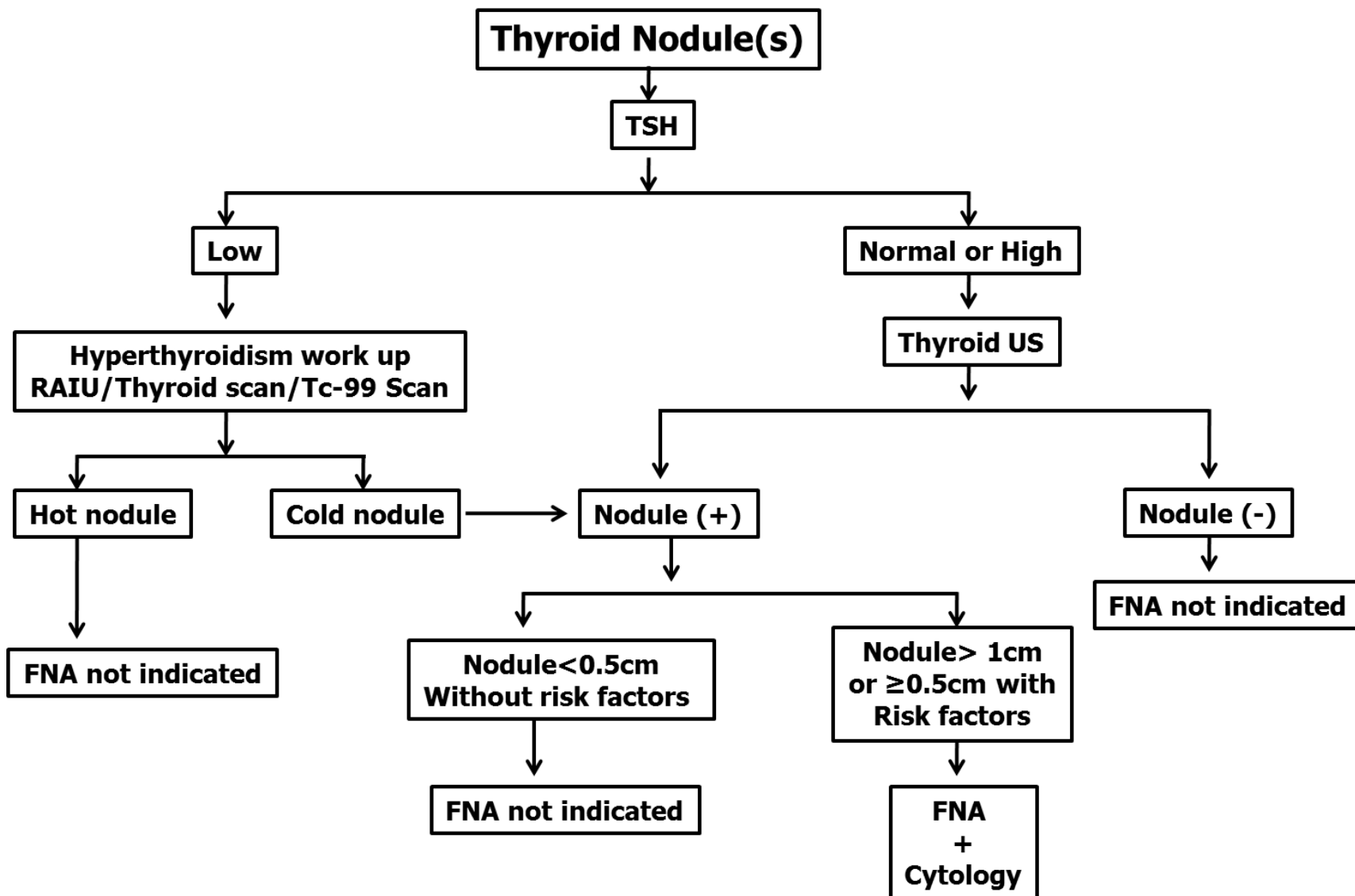
	Graves' disease	Gestational Hyperthyroidism
History of thyroid disease	+	-
Other autoimmune diseases	Usually +	Usually -
Ophthalmopathy, pretibial myxedema	+	-
TSI & TBII	Usually +	-
Treatment	ATD medications	Supportive measures

Hypothyroidism:

	1 Trimester	2 Trimester	3 Trimester
TSH	0.1 – 2.5	0.2 - 3	0.3 - 3



EVALUATION OF THYROID NODULE



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CASE #1

A 59-year-old female is in the office for the evaluation of hypothyroidism. She carries a diagnosis of Hashimoto's thyroiditis made many years ago. Her thyroid function has been stable on 125 micrograms of Levothyroxine daily for many years. However, she feels that she is having progressive fatigue for the past several months. Her appetite is decreased but she has gained 10 pounds despite of reduced food intake and adequate exercise. She has also noticed that she is losing hair. In addition, her chronic constipation is getting worse. She has been using the same brand of Levothyroxine.

Physical examination, BP: 134/80 mmHg, HR: Regular rate and rhythm, 76/minute. Weight: 180 lbs, Height: 64". BMI: 30.9 kg/m².

Thyroid examination reveals a small thyroid without any obvious nodule. Other unremarkable.



CASE #1

Laboratories.

TSH: 8.1 uIU/mL (Reference: 0.5 – 4.2 uIU/mL)

Total T4: 6.8 mcg/dL (Reference: 4.6 – 12.0 mcg/dL)

Free T4: 1.0 ng/dL (Reference: 0.93 – 1.7 ng/dL)



CASE #1

What else do you need to know?

Is this the right blood test?

What is the best management for this patient?

What is the goal for the therapy?

What else may cause her problem?



CASE #2

A 28 year old female was evaluated in the office for palpitations and shortness of breath. Her symptoms started approximately one month ago. She did not recall any specific event associated with the symptoms but complains of progressive fatigue, shortness of breath, and constant palpitations that have bothered her. This was especially obvious when she was climbing stairs to her apartment located on 4th floor. She has also noticed that both of her legs are swollen and this is more pronounced in the past week. She has been feeling nervous, and having a hard time falling asleep at night. Her husband noticed that she becomes easily irritated and has been argumentative all the time. She lost 20 pounds in the past month and has been sweating easily during the winter. Her appetite is fair but she complains of feeling nausea frequently. She works in a medical office and checked her resting pulse, which was around 120 beats/minute. Her past medical history is significant for celiac disease and lactose intolerance.

She is not taking any other medication.

Her grandfather had asthma. Both mother and grandmother were diagnosed with hypertension.



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CASE #2

Physical examination

Nervous appearing young female. Tm: 97 °F, BP: 139/63 mmHg, HR: 119/Min., RR: 18/min., O2 sat: 99%.

Bilateral proptosis. Both eyes have lid lag.

Diffuse goiter without focal tenderness. No nodules were palpated but a bruit was easily appreciated by auscultation.

Tachycardia without any murmur, gallop or rubs.

Bilateral lower extremity non-pitting edema extending up to the knees.

Hands were trembling and reflexes were brisk bilaterally.

All other physical examination findings were negative.



CASE #2

What else do you want to know?

What test(s) will you order?



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CASE #2

Laboratories

TSH: <0.02 uIU/mL (Reference: 0.5 – 4.2 uIU/mL)
Total T4: 23.3 mcg/dL (Reference: 4.6 – 12.0 mcg/dL)
Total T3: 586 ng/dL (Reference: 80 – 200 ng/dL)
Free T4: 5.0 ng/dL (Reference: 0.93 – 1.7 ng/dL)

What is the diagnosis?

What more tests do you need to confirm the diagnosis?

What radiology do you need?

What is the initial treatment?

What is the long term management?

What are the specific considerations about the treatment?



CASE #3

A 57 year-old man was seen in the office for fever of 101 °F and sore throat. His symptoms started about 8 days ago, after what he described as a cold. He noticed that his left neck was painful and he had developed a fever without any chill. His neck pain was persistent, 7 out of 10 by scale and radiated to his left ear. His discomfort was alleviated by the ingestion of over the counter ibuprofen. However, he continues to have low grade fevers despite of frequent NSAID intake. In addition, he was restless and was not able to fall asleep at night. He feels nervousness about everything and his heart is beating so fast that it almost “jumps out of his chest”. He is otherwise well. The patient is an immigrant from Vietnam, living in the USA for more than 30 years, working as a lab technician.

He has no known past medical history. No known prior history of thyroid disease. He is not taking any medications other than the ibuprofen. His family history is significant for hypertension and dyslipidemia in both parents.



CASE #3

Physical examinations.

HR: 130 beats/minutes; Tm: 100.5 °F.

When attempting to palpate his thyroid, the patient complains of tenderness of the neck and was unable to tolerate the examination. He refused further neck evaluation. Hyperreflexia was elicited in both upper and lower extremities. He also had bilateral hand tremor.

#1. What else do you want to know?

#2. What test(s) should you order?



CASE #3

Laboratories:

TSH: <0.02 uIU/mL;

TT4: 28 mcg/dL (Reference: 4.6-12 ug/dL);

TT3: 505 ng/dL (Reference: 80 – 200 ng/dL);

Free T4, 7.7 ng/dL (Reference: 0.93-1.7 ng/dL).

Blood culture: Pending;

ESR: Elevated



CASE #3

What is the diagnosis ?

What is the management?

What is the prognosis?



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CASE #4

A 28-year-old female is in the office for routine visit for excessive nausea and vomiting. She was in her usual state of health until approximately one week ago when she developed excessive emesis. Typically this occurs about five times per day, in association with poor oral intake and an approximately 13 pound unintentional weight loss of 13 lbs since 2 months ago.

She has been healthy and was negative for family history of thyroid disease. She is taking prenatal vitamin only.



CASE #4

Physical examination

Young female who appears uncomfortable. Tm: 97.8°F, HR: 90/minute; BP: 104/60 mmHg; RR: 18/minute.

Eyes: normal extraocular movements, there was no lid lag or proptosis. Mucus membranes appear dry.

Thyroid: Mildly enlarged thyroid , approximately 30 grams. No tenderness was appreciated and no nodules were identified. There was no bruit during auscultation.

Skin: Negative for pre-tibial skin thickness or lower extremity edema.



CASE #4

#1. What else do you want to know?

#2. What will you do now?

#3. What test(s) should you order?



CASE #4

Laboratories:

TSH:	< 0.02 uIU/ml	(0.5 – 4.2 uIU/mL);
Total T4:	14 mcg/dL	(4.6 – 12.0 mcg/dL);
Total T3:	224 ng/dL	(80 – 200 ng/dL);
Urine HCG:	Positive	



CASE #5

A 42-year-old woman was seen in your clinic for fatigue of 3 months duration. She was previously very energetic but complains of feeling progressively tired. She also complains of several pounds of weight gain for the past six months despite of strict dietary control and exercise. She is a secretary working for a consulting firm with regular schedule.

She denies any specific complaints including muscle weakness, ache or joint pain. She denies hair loss or dry skin. Her appetite is fair. She denies any chest pain, shortness of breath, or dyspnea on exertion. She denies any abdominal pain, bloating, constipation, or diarrhea.

Past medical history: HTN on hydrochlorothiazide with proper control. She is not taking any other medication.

She is married and has two healthy children. Family history includes mother with Graves' disease that was treated with radioactive iodine ablation and has been on Levothyroxine supplementation.



CASE #5

Physical examination

BP: 118/79 mmHg; HR: 70 beats/minute.

Normal appearing and is not in acute distress.

Eyes: Extraocular movement is intact and is without lid lag or proptosis.

Thyroid: Normal size and no nodules are palpated. All other examination is negative.

#1. What else do you want to know?

#2. what test(s) to order?



CASE #5

Laboratory tests:

TSH: 7.8 uIU/mL (Reference: 0.5 – 4.2 uIU/mL)
free T4: 0.97 ng/dL (Reference: 0.93 – 1.7 ng/dL)
TPO ab: 790 IU/mL (Reference: 0-35 IU/mL)



CASE #6

A 32-year-old man was seen in the office for insomnia and restlessness which developed 2 months prior to this visit. It was progressive in nature. He feels very tired as he can not rest at night. He also complains that he has no mental focus. Review of systems was positive for occasional palpitations and intentional weight loss of 9 pounds over the past several months. His past medical history includes bipolar disorder and he was transiently placed on lithium two years ago but has not been taking it since that time because of intolerance. His family history is significant for Graves' disease in maternal grandmother. He is currently taking a multi vitamin, and biotin. He also takes some over the counter supplements that he purchased over the internet but can not remember the name of the preparation. He explains that he is doing lots of exercise in the gym and feels hungry all the time. He denies any use of tobacco, alcohol or illicit drugs. He feels that his insomnia is compromising his daily activities.



CASE #6

Physical examination

Calm male, not in acute distress. BP: 120/84 mmHg; HR: 92 beats/min; BMI: 27.1.

Eyes: Extraocular muscles are intact without proptosis or lid lag.

Thyroid: Negative for goiter, negative for nodule; or bruits. Negative for cervical lymphadenopathy.

Cardiovascular: heart was regular without murmur, rub, or gallop. Bilateral lung fields were clear to auscultation. There was no tremor of outstretched hands. His skin was cool and dry to touch.



CASE #6

#1. What else do you want to know?

#2. What is on the list of differential diagnosis?

#3. What test(s) to order?



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CASE #6

LABORATORIES

TSH:	0.22 uIU/mL	(Ref: 0.5 – 4.2 uIU/mL)
Free T4:	1.4 ng/dL	(Ref: 0.93 – 1.7 ng/dL)
Total T3:	223 ng/dL	(Ref: 80 – 200 ng/dL)



CASE #6

SUBSEQUENT LABORATORIES

TPO antibody:	Negative.	
Thyroglobulin:	0.9 ng/mL	(Ref: 0 – 55 ng/mL)
Thyroglobulin antibody:	Negative	
TSI:	53%	(Ref: < 140%)
TBII:	<6%	(Ref: < 16%)
Spot urine iodine		
Iodine:	168 mg	
Creatine:	1.34 gram	
Ratio:	125 mg/Gram	



CASE #6

Nuclear medicine.

Thyroid scan and uptake at 24 Hrs:

Thyroid images show uniform activity in both lobes. Iodine uptake was measured to be 4%. (Normal: 8% – 10%)



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THANK YOU

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