

Thyroid Disorders

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Objectives

- ▶ At the completion of this presentation participants will be able to:
 - ▶ Identify the appropriate elements of the history and physical exam for patients presenting with endocrine pathologies
 - ▶ Describe the diagnostic reasoning in the approach to evaluations of endocrine dysfunction
 - ▶ Differentiate and choose the appropriately treatment options for endocrine pathologies.

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Thyroid Gland

Second largest endocrine gland in body

Small butterfly shaped gland located at base of neck below the sternocleidomastoid muscles

Thyroid is controlled by:
* hypothalamus
* pituitary

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Functions

Stimulates & maintains metabolic processes


- Produces thyroid hormones T3-triiodothyronine and T4-thyroxine
- These hormones regulate metabolism & affect the growth and function of other systems in the body

Secretes calcitonin to lower serum calcium levels

Parathyroid gland secretes PTH to raise serum calcium levels

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Functions

- ▶ Metabolic stimulants of:
 - ▶ Neural and skeletal development
 - ▶ Oxygen consumption at rest
 - ▶ Stimulating bone turnover by increasing formation and resorption
- ▶ Cardiac
 - ▶ Promoting chronotropic and inotropic effects
 - ▶ Increasing number of catecholamine receptors in heart
- ▶ Increasing production of RBC
- ▶ Altering the metabolism of carbs, fats, and protein

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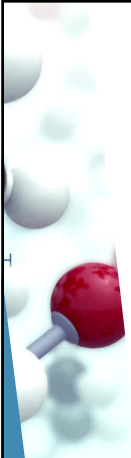


Thyroid gland function:

- ▶ Secretes 3 main hormones
 - ▶ T3 (Triiodothyronine)
 - ▶ T4 (Tetraiodothyronine)
 - ▶ Both are used for energy and growth
 - ▶ T3 is 10x more active than T 4
 - ▶ Calcitonin → control of calcium
 - ▶ Calcitonin stimulates movement of calcium into bone
 - ▶ Parathyroid hormone (PTH) opposite effect of calcitonin

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Hormones- TSH

- ▶ TSH
 - ▶ TSH is a **pituitary hormone (central)**
 - ▶ Controlled by TRH-thyrotropin releasing hormone from hypothalamus
 - ▶ Functions to stimulate thyroid hormone production
 - ▶ May enlarge thyroid (goiter) when gland is under producing
 - ▶ Labs:
 - ▶ High TSH indicates low thyroid hormone= hypo
 - ▶ Low TSH indicates high thyroid hormone = hyper

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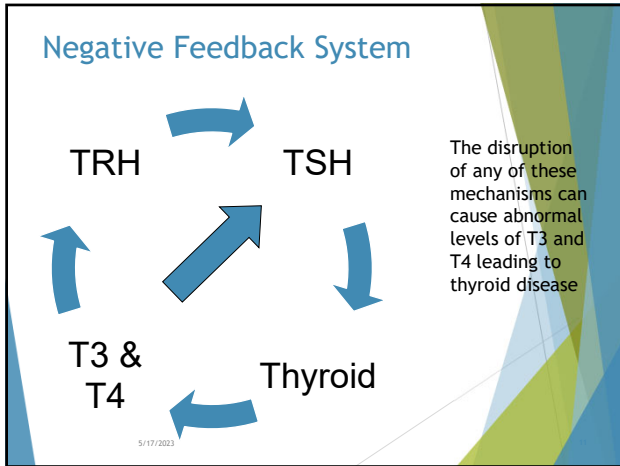
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Physiology

- Hypothalamus** • Thyroid releasing Hormone (TRH)
- Pituitary** • Thyroid stimulating hormone (TSH)
- Thyroid Glad** • Target site
- Tyrosine** • Target Hormone
 - T3
 - T4

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Causes/triggers for Thyroid Disease?

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Diseases

- ▶ Hormonal disorders
 - ▶ Hypothyroidism-Under Activity
 - ▶ Slows the metabolic activity of the body
 - ▶ Prevalence
 - ▶ Affects 5-17% of population
 - ▶ Females> Males
 - ▶ Higher in >60 years old
 - ▶ Causes (Hashimoto's (Primary), Rarely pituitary (Secondary) or hypothalamic hypo-function (Tertiary))
 - ▶ Hyperthyroidism- Over activity
 - ▶ Accelerates metabolism in the peripheral tissue.
 - ▶ Prevalence
 - ▶ Affect 5-17% of population
 - ▶ Females> Males
 - ▶ More common in younger persons
 - ▶ Causes: Graves (toxic goiter); Toxic adenoma; Plummer's disease (multi-nodular goiter), thyroiditis; Secondary or tertiary hyperthyroidism.


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Diseases



Tumors
Such as thyroid cancer



Drug induced
May be seen with amiodarone and interferon

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Labs

Hyperthyroidism

- ↑ FT4
- ↓ TSH

Hypothyroidism

- ↓ FT4
- ↑ TSH

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Case

- ▶ Presentation:
- ▶ 38-year-old woman, who in the past had tried to lose weight without success, is happy to see that in the last 2 months she has lost 25 pounds. She also has difficulty sleeping at night. Her husband complains that she is keeping the house very cool. She recently consulted her ophthalmologist because of redness and watering of the eyes. Eye drops were not helpful. She consults her healthcare provider for fatigue and anxiety, palpitation, and easy fatigability.

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Considerations:

? Identify the pertinent information from the history?

What else do you need to know?
Where to start?
What not to miss?

✓ What differentials are being considered?

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Key Elements

- ▶ Key points:
 - ▶ lost 25 pounds.
 - ▶ difficulty sleeping at night.
 - ▶ Keeping the house very cool.
 - ▶ Eye symptoms: redness and watering of the eyes.
 - ▶ fatigue and anxiety, palpitation, and easy fatigability.

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Differential

- ▶ What are we thinking?
 - ▶ Hyperthyroidism
 - ▶ Graves
 - ▶ Toxic nodular goiter
 - ▶ Painless thyroiditis
 - ▶ TSH-producing pituitary adenoma

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Hyperthyroidism

- ▶ Heterogeneous group of conditions
- ▶ Excessive secretion and synthesis of one or both of the thyroid hormones
- ▶ Signs and symptoms result from the effects of excessive thyroid hormone on body tissue
 - ▶ Alterations in growth, metabolism, and development
- ▶ Long-term effects of inadequately treated hyperthyroidism
 - ▶ Heart disease
 - ▶ Osteoporosis (in post-menopausal women)
 - ▶ Mental illness
 - ▶ Infertility

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Hyperthyroidism

- ▶ Pathophysiology
- ▶ Overproduction and/or secretion of thyroid hormones
 - ▶ Excessive release of T4 and T3 from the thyroid into the circulation up-regulates metabolism
 - ▶ T3 is normally 20 to 100 times more biologically active than T4
 - ▶ Symptomatology does not consistently correlate with the extent of thyroid hormone overproduction

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Hyperthyroidism-Types

- ▶ Graves disease
 - ▶ Most common form (70-80%)
 - ▶ Autoimmune disorder in which thyroid-stimulating antibodies are circulating in blood. These bind to thyroid cells and activate cells in the same manner as TSH.
 - ▶ More common in females (5:1)
 - ▶ Peak onset incidence at age 30 - 60 yrs.
 - ▶ Often occurs spontaneously
 - ▶ Comprised of a multifactorial autoimmune disorder (combo of genetic & environmental factors)
- ▶ Keep in mind the other forms
 - ▶ Toxic adenoma; Plummer's disease (multinodular goiter), thyroiditis; Secondary or tertiary hyperthyroidism.

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Goiter

- ▶ Different etiologies
 - ▶ Hyperthyroidism/Graves
 - ▶ Excessive thyroid stimulating hormone
 - ▶ Increase in thyroid stimulating hormone (TSH) in response to a defect in normal hormone synthesis within the thyroid gland.
 - ▶ Multinodular - results in gland enlargement
 - ▶ Iodine deficiency
 - ▶ Mostly in those areas with no iodized salt
 - ▶ Typically benign

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Hyperthyroidism-Symptoms

Presentation:

↓

Dependent upon age at onset, duration & severity of hyperthyroidism, sex & comorbid conditions.

Hyperthyroidism	Goiter	Extrathyroidal manifestations of underlying autoimmunity
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Signs & Symptoms


Weight loss*	Tachycardia/ tachypnea	Bulging eyes	Nervous/Anxious & tremor*	Insomnia	Intolerant of heat
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Hyperthyroid ophthalmopathy

 Periorbital edema, conjunctival edema and injection known as chemosis, proptosis, lid lag, and even diplopia

 http://en.wikipedia.org/wiki/File:Proptosis_and_lid_retraction_from_Graves%27_Disease.jpg

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Case Presentation

- ▶ Back to the case - Anything more you want to know?
- ▶ History:
 - ▶ Gen
 - ▶ HEENT
 - ▶ Resp
 - ▶ CV
 - ▶ GI
 - ▶ PMH? FHx? SH?
- ▶ Medications? Why?
- ▶ What might you expect to find on exam?

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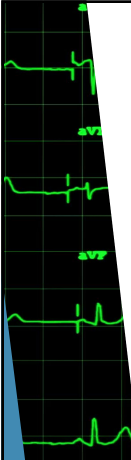
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Hyperthyroidism

- ▶ Clinical Presentation
- ▶ Depends on duration and amount of excessive thyroid hormone secretion
- ▶ Subjective
 - ▶ A complete history and review of systems is indicated
 - ▶ Anxiety, nervousness, diaphoresis, fatigue, heat intolerance, palpitations, weight loss, and insomnia
 - ▶ Reports fullness or pressure in the neck with enlarged thyroid
 - ▶ Exercise intolerance, tremors, lower extremity edema, weight loss in the presence of an increased appetite, menstrual irregularities, frequent bowel movements or diarrhea, and exertional dyspnea
 - ▶ Eye complaints include blurred vision, proptosis (downward displacement of the eyeball), photophobia, and double vision
 - ▶ Unable to concentrate, extremely irritable, and emotionally labile
 - ▶ Older patients may present with vague symptoms

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Hyperthyroidism

- ▶ Variation of presentation:
 - ▶ Older patients:
 - ▶ cardiopulmonary symptoms such as tachycardia (or atrial fibrillation)
 - ▶ dyspnea on exertion,
 - ▶ edema may predominate
 - ▶ Tend to have more weight loss and less of an increase in appetite
 - ▶ phenomenon is "apathetic thyrotoxicosis," no symptoms except for weakness and asthenia (loss of strength/energy)

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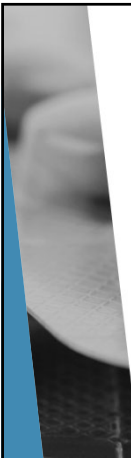


What else?

- ▶ What PE will need to be done?
- ▶ What will you be looking for in each of the body systems?

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Case Presentation

- ▶ Physical examination:
 - ▶ BP : 140/60 (typical 120's/70s) P 104 bpm (baseline 68)
 - ▶ Skin is smooth, nails thin & peeling, negative clubbing
 - ▶ Hair is dry
 - ▶ Conjunctivae are red and she has a "stare".
 - ▶ Thyroid is slightly enlarged symmetrically.
 - ▶ Heart sounds are bounding throughout, PMI 5th ICS MCL
 - ▶ Abd - SNT, neg HSM, no masses
 - ▶ MS/Neuro: MS 5/5 bilat upper/lower extrem; DTRs lower extremities

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Hyperthyroidism

Clinical Presentation

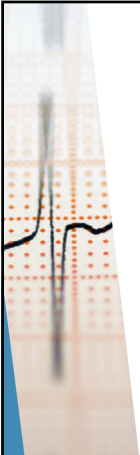
Objective

- Manifestations:
 - Range from overt in young adults to a more subtle presentation
 - Older adult will present with symptoms typically diagnosed as failure to thrive
- Skin, hair and nails: edema, thinning hair, moist, skin velvety to the touch, increased pigmentation, spider angiomas, vitiligo, onycholysis, splitting and spooning of the nails, clubbing of the digits (rare)
- HEENT: lid lag, conjunctiva inflammation, decreased visual acuity, exophthalmos, excessive lacrimation
- Thyroid may be enlarged, nodules may be palpable, and a bruit may be heard over the thyroid gland

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Hyperthyroidism



- ▶ Clinical Presentation:
- ▶ Objective (cont'd)
 - ▶ CV: tachycardia, irregular pulse, systolic murmurs, and widening of the pulse pressure
 - ▶ Precordium - often hyper-dynamic
 - ▶ Threefold increase in the risk of atrial fibrillation in older persons
 - ▶ Neurology/MS:
 - ▶ Decreased strength in the extremities and fine tremors
 - ▶ DTR's (deep tendon reflexes)
 - ▶ Relaxation of the reflex
 - ▶ Hyperactive reflex--Achilles tendon reflex

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Diagnostic Reasoning

- ▶ Initial testing
 - ▶ TSH level less than 0.35 μ U/mL
 - ▶ Usually accompanies an elevated FT4 measurement (above 12.5 μ g/dL)
 - ▶ Medications may alter the laboratory results: anabolic steroids, androgens, estrogens, heparin, iodine-containing compounds, phenytoin, rifampin, and salicylates
 - ▶ Low TSH & if FT4 is normal, obtain T3 level
 - ▶ IF suspect Grave's - Thyroid autoantibodies
 - ▶ 24-hour RAIU test can differentiate Graves' disease from subacute thyroiditis
 - ▶ Elevated
 - ▶ CBC, LFT
 - ▶ MRI to assess ophthalmopathy - (not always done)
 - ▶ If significant may need separate treatment regimen
 - ▶ Reversal hyperthyroidism
 - ▶ Symptomatic treatment (shades/ saline drops)
 - ▶ Tx steroids, orbital decompression, orbital irradiation

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Thyroid Storm

- ▶ Life threatening syndrome
 - ▶ 3-5 times F:M
 - ▶ Exact freq unknown
 - ▶ Estimated 2% of older women
 - ▶ 0.2-0.4% pediatric/adolescent population
 - ▶ 1-2% neonates born to women with active Graves disease
- ▶ Decompensated hyperthyroidism
 - ▶ Symptoms
 - ▶ Hyperthyroid symptoms with agitation, confusion, delirium, psychosis
 - ▶ Gastrointestinal: Nausea/Vomiting, Abdominal pain
 - ▶ Tachycardia associated with CHF

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Thyroid Storm/Crisis

- Emergency**
 - Immediate treatment needed
- Setting**
 - Hospitalization
 - IV access needed
- Meds**
 - Thyroid blocking meds
 - Treats the symptoms until root cause identified.

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Thyroid Storm Treatment

- Thyroid**
 - Antithyroids
 - Glucorticoids
- Systemic Symptoms**
 - Beta Blockers

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Hyperthyroidism

- ▶ Management - similar to storm
 - ▶ Differs depending on the cause and patient characteristics
 - ▶ Should be managed in a collaboration or referral with specialist in endocrinology
 - ▶ Euthyroid state is the goal of treatment
 - ▶ Minimizing the adverse effects of treatment
 - ▶ Decreasing the incidence of hypothyroidism
- ▶ American Thyroid Association Guidelines: <https://www.thyroid.org/professionals/ata-professional-guidelines/>

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Hyperthyroidism

Anti-thyroids

- Treatment span 3 - 12 m
- Evaluate Tx. - 1 m & 3m, more if symptomatic

Radioiodine

- Monitor thyroid function test: 6, 12 wks. & then 6 m and then annually

Ongoing

- Monitor at least twice/yr.
- Smoking cessation

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Hyperthyroidism

- ▶ Patient Education
 - ▶ Disease process
 - ▶ Various treatment options available
 - ▶ Importance of strict adherence
 - ▶ Antithyroid medication patients should be instructed to report immediately any signs of infection
 - ▶ Need for adequate rest, exercise, sleep, good nutrition
 - ▶ Teach relaxation

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Case

- ▶ Ms. A, age 25, has a gastrointestinal stromal tumor (GIST) and states that she feels “like an 80-year-old woman.” She is sore all over with facial swelling, abdominal cramping, and fatigue. This feeling has worsened since she started chemotherapy with sunitinib (Sutent) for the GIST.
 - ▶ What do you need to consider?
 - ▶ What are you considering with this history?
 - ▶ What screenings in the history would you do?
 - ▶ Screenings?

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Differential

- ▶ Primary hypothyroidism
- ▶ Central (secondary) hypothyroidism
- ▶ Depression
- ▶ Anemia

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Hypothyroidism

- ▶ Types:
 - ▶ Primary hypothyroidism
 - ▶ Most common cause Failure of thyroid gland
 - ▶ Chronic autoimmune thyroiditis or Hashimoto's disease is the most common primary hypothyroidism AND hypothyroidism overall
 - ▶ Central hypothyroidism
 - ▶ Secondary Hypothyroidism (hypopituitarism)
 - ▶ Tertiary Hypothyroidism (hypothalamic)
 - ▶ Severe illness - functional central hypothyroidism

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Hypothyroidism

- ▶ Slow progression of thyroid hypo-function
 - ▶ An insidious onset and progresses slowly
 - ▶ One Form: Congenital hypothyroidism—deficiency present at birth
- ▶ Epidemiology & Causes
 - ▶ Various causes that lead to inadequate amounts of thyroid hormone being produced and/or secreted
 - ▶ U.S. autoimmune processes are the primary cause
 - ▶ Most common worldwide cause of thyroid disorders is iodine deficiency

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Hypothyroidism

Hashimoto's thyroiditis

- Of primary hypothyroidism
- Most common form of autoimmune thyroid disease
- Average age of onset from 30 to 60 years

Iatrogenic hypothyroidism

- Occurs following treatment with radioactive iodine or surgery

Central hypothyroidism (2 types)

- Direct impingement by tumors on the pituitary gland or the hypothalamus
- Secondary hypothyroidism
 - Failure of the pituitary gland to secrete adequate amounts of TSH
- Tertiary hypothyroidism
 - Inadequate secretion of thyrotropin-releasing hormone (TRH) by the hypothalamus or failure of TRH to activate its cognate receptors within the pituitary (peripheral resistance)

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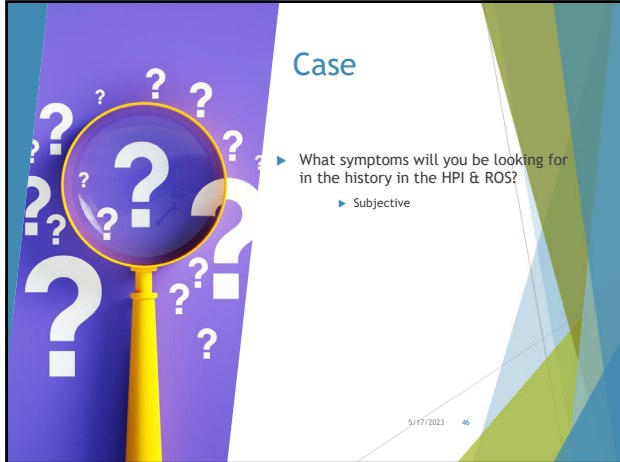
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Hypothyroidism

- ▶ Low levels of thyroid hormones affect virtually every bodily system, resulting in an overall decrease in basal metabolic rate
 - ▶ Abnormalities in lipid metabolism
 - ▶ GI slowed in gastric emptying and intestinal transit time, impaired digestion, deficiencies in vitamin B12, iron, and folate
 - ▶ Endocrine abnormalities
 - ▶ <https://www.dynamed.com/condition/hypothyroidism-in-adults>

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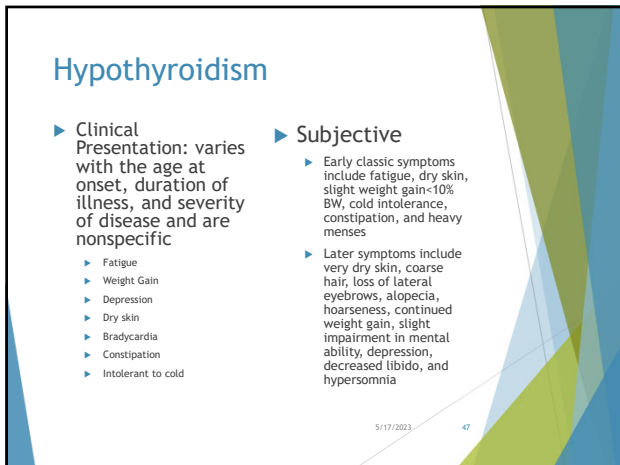


Case

- ▶ What symptoms will you be looking for in the history in the HPI & ROS?
 - ▶ Subjective

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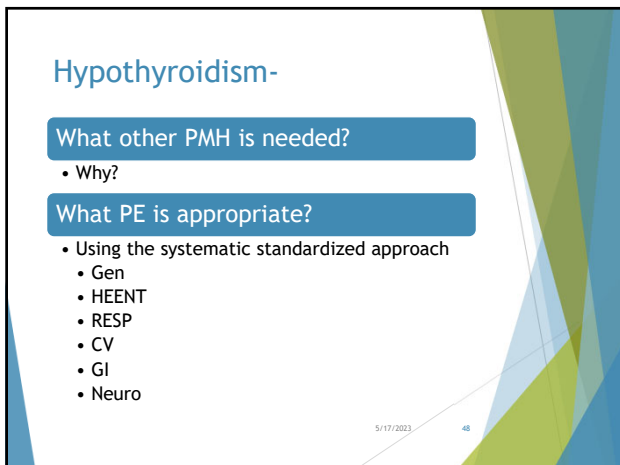


Hypothyroidism

- ▶ **Clinical Presentation:** varies with the age at onset, duration of illness, and severity of disease and are nonspecific
 - ▶ Fatigue
 - ▶ Weight Gain
 - ▶ Depression
 - ▶ Dry skin
 - ▶ Bradycardia
 - ▶ Constipation
 - ▶ Intolerant to cold
- ▶ **Subjective**
 - ▶ Early classic symptoms include fatigue, dry skin, slight weight gain<10% BW, cold intolerance, constipation, and heavy menses
 - ▶ Later symptoms include very dry skin, coarse hair, loss of lateral eyebrows, alopecia, hoarseness, continued weight gain, slight impairment in mental ability, depression, decreased libido, and hypersomnia

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Hypothyroidism-

What other PMH is needed?

- Why?

What PE is appropriate?

- Using the systematic standardized approach
 - Gen
 - HEENT
 - RESP
 - CV
 - GI
 - Neuro

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Hypothyroidism- signs

- ▶ Objective
 - ▶ General: facial puffiness; periorbital edema; dry, coarse, thick skin and hair; brittle nails; slow speech; bradykinesia; hoarseness; large tongue, hair may become coarse and thin, and thinning of eyebrows may occur
 - ▶ Eyes - puffy eyelids; hair loss of lateral eyebrows
 - ▶ Thyroid may be enlarged and tender or not palpable**
 - ▶ What approach is used?
 - ▶ CV: bradycardia, Lateralized PMI
 - ▶ GI: diminished or hypoactive BS, mild diastolic hypertension
 - ▶ Neuro: hypotonic and hyporeflexic with a prolonged relaxation phase and/or ataxic, edema

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Primary Hypothyroidism

Hashimoto's	Drug induced	Iatrogenic
<ul style="list-style-type: none"> • Autoimmune disorder in which antibodies are directed against a thyroid sites to: <ul style="list-style-type: none"> • Inhibit thyroid peroxidase • Inhibit effects of TSH • Stimulate thyroid growth 	<ul style="list-style-type: none"> • Amiodarone, lithium, thiocyanates, phenylbutazone, sulfonyleureas, PTU & methimazole 	<ul style="list-style-type: none"> • Surgical removal of the thyroid gland and radiation treatment

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Primary Hypothyroidism

- ▶ Thyroid gland failure
 - ▶ Decrease T3 & T4
 - ▶ Increase TRH due to negative feedback
 - ▶ Increased TSH due to decreased TRH

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Secondary Hypothyroid

- ▶ Pituitary failure
 - ▶ Insufficient TSH release as a result of:
 - ▶ Pituitary tumors
 - ▶ Surgery
 - ▶ Pituitary radiation
 - ▶ Pituitary necrosis
 - ▶ Autoimmune mechanisms

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Tertiary Hypothyroidism

- ▶ Hypothalamic Failure- very rare
- ▶ Insufficient TRH release as a result of:
 - ▶ Trauma
 - ▶ Irradiation
 - ▶ Tumors

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Hypothyroidism

Diagnostic Reasoning

- ▶ No universally accepted screening recommendations
 - ▶ USPSTF - Insufficient data to support routine screening
 - ▶ Amer Thyroid Assoc: baseline at 35yr & then every 5 yrs & in high risk (preg >60s) more freq.
 - ▶ Amer Assoc of Endo: prior to preg & 1st trimester and if > 60 years.
 - ▶ Newborns - states require (congenital = mental retardation)
 - ▶ <https://www.dynamed.com/condition/hypothyroidism-in-adults?GUID=7DE9A7AE-35BB-468C-A9BB-F467E0EE9C7F>
- ▶ Measurement of free T4 is always preferred over total T4;
 - ▶ Alterations in hormone protein binding that may result in large fluctuations in total serum T4 level
- ▶ Initial testing
 - ▶ Elevated TSH and decreased FT4
 - ▶ If the TSH is low, normal, or insufficiently elevated in the presence of low T4 values, central hypothyroidism caused by hypothalamic or pituitary disease should be excluded

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Case

- ▶ Labs:
- ▶ TSH - 110 mIU/L; (range 0.28 to 5.00)
- ▶ serum free T4 (FT4) - 0.5 ng/dL (range 0.7 to 1.8).
 - ▶ consistent with overt hypothyroidism,
 - ▶ defined as low FT4 and elevated TSH levels.
 - ▶ subclinical hypothyroidism (SH) would be having an elevated serum TSH with normal thyroid hormone (T3 and T4) levels.
 - ▶ Typically SH presents in 5% of young patients (age <45) and increasingly is being diagnoses in older patients (age >55), who are most likely to suffer adverse effects in mood or cognition

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Hypothyroidism

- ▶ Subsequent testing
 - ▶ CBC, Chemistry panel, UA, lipid panel, ECG, CXR
 - ▶ Anemia
 - ▶ Renal failure
 - ▶ Elevated LDL and triglycerides
 - ▶ Antibody titers if suspecting Hashimoto's
 - ▶ Antithyroid antibody titers, either antimicrosomal antibody (antithyroid peroxidase [TPO] antibody) or antithyroglobulin antibody
 - ▶ Antimicrosomal antibody (anti-TPO antibody) is diagnostic for Hashimoto's thyroiditis when found in high titers (1:400)
 - ▶ Antithyroglobulin antibody is also increased, but it is not as specific for Hashimoto's thyroiditis
 - ▶ Scans if nodules

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Hypothyroidism-Treatment

Management

Goal: normalize, not suppress, the TSH

Daily administration of thyroid hormone

- Usual medication is levothyroxine
- Usual dose is 1.6 µg/kg per day for full replacement
- Patients who are older or have coronary artery disease should begin with one-half of the expected replacement dose or 25 to 50 µg/day PO, increasing the dose gradually by 25 µg/day once every 4 to 6 weeks
- Dosing is best done in the morning to avoid nighttime insomnia
- Concurrent severe illness or major surgery may alter dosing requirements in either direction in the hypothyroid patient
- Pregnancy is also well known to increase replacement therapy requirements

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Hypothyroidism Treatment

Drug Therapy

- Levothyroxine Sodium-DOC synthetic T4
- Adults 1-1.5mcg/kg/day orally initially, adjust as needed. Average dose 1.6-1.8mcg/kg/day
- Pediatrics 1-1.5mcg/kg/day, Average 4 mcg/kg/day
- Thyroid (Armour - desiccated thyroid therapy (DTE)
- 30mg PO daily, increase 15mg q 2-3 week
- Lacks RCT comparing clinical effectiveness, though now regulated to assure consistent dosing
- Studies support increase patient satisfaction
- Liotrix (Thyrolar) synthetic combo T3 & T4
- Thyrolar 1/2 (6.25/25mcg) start 1 tab daily , increase PRN q 2-3 weeks.
- L-triiodothyronine (Cytomel) synthetic T3
- 25mcg PO daily/ increase 12.5-25mcg daily every 1-2 weeks

<https://www.dynamed.com/condition/hypothyroidism-in-adults#GUID-51551E65-088E-4390-AE59-FF9A5ADD57A2>

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Hypothyroidism-Treatment

Adverse Effects - over treatment

MI
Osteopenia
HA

Contraindicated

Acute MI
Treatment of obesity
Uncontrolled HTN

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Monitoring

Obtain baseline FT4, TSH, LFT, CBCs before initiation of therapy

Repeat FT4 and TSH after 4-6 weeks on therapy and 4-6 weeks after adjustments

Once euthyroid state obtain thyroid function test after 3-6 months and then annually.

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Hypothyroidism

PT Education

Disease process

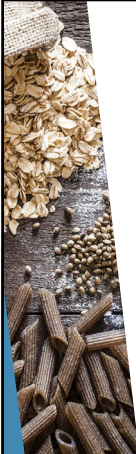
- Lifelong thyroid replacement therapy (if indicated).
- Reviewing the symptoms of hypothyroidism and hyperthyroidism
- Stressing the importance of follow-up
- Signs of thyrotoxicity, angina pectoris, and arrhythmias

Medication

- Interference: iron, calcium carbonate, aluminum hydroxide, sucralfate, and tube feedings
- Write prescriptions that do no allow substitution and use the same brand for the patient
- May affect the levels of phenytoin, lithium, tricyclic antidepressants, estrogen, digitalis, anticoagulants, and indomethacin
- Patients should be cautioned against the use of analgesics and sedatives due to increase sensitivity to those medications.
- Patient should be discouraged from increasing the dose of medication

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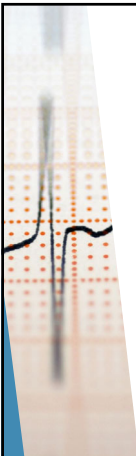


Hypothyroidism

- ▶ **Nutrition**
 - ▶ Healthy diet, with an emphasis on low-fat, high-fiber foods
- ▶ **To prevent constipation**
 - ▶ Increase intake of raw fruits and vegetables, bran or high-fiber cereals and breads, and add unprocessed bran (two tablespoons/day) to cereal or liquids
 - ▶ Bulk-forming laxative containing psyllium may be taken on a daily basis
 - ▶ Increasing water intake to six to eight glasses a day
 - ▶ Increasing physical activity

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Case

- ▶ **What to do?**
 - ▶ Ms. A is started on a full levothyroxine replacement dose of 1.6 µg/kg/d.
 - ▶ No history of cardiac symptoms, weight-based replacement is thought to be safe and more convenient than starting with a low dose and titrating up.
 - ▶ **Response time?**
 - ▶ Typically responds quickly.
 - ▶ **Follow up -**
 - ▶ 6 week follow-up—the recommended time interval for repeat thyroid lab testing after initiating thyroid replacement
 - ▶ Pt's depressive symptoms are markedly improved and her PHQ-9 score is 6, indicating mild depression.
 - ▶ Should we do anything else?
 - ▶ Consider treatment - antidepressant

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Case

- ▶ LEK 75-year-old female
 - ▶ CC: notices lump in her neck and anterior cervical lymph node palpable.
 - ▶ PMH GERD, osteopenia and palpitations (non-pathologic)
 - ▶ What else do you need to know?

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Case

- ▶ Previous medical history?
 - ▶ Radiation for acne treatments as a teenager
- ▶ Family History:
 - ▶ First cousin & MA with thyroid cancer
- ▶ With this history what is your leading Dx?
 - ▶ Why?
- ▶ Is the approach to the workup any different knowing this?

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Diagnostic reasoning

- ▶ Start with thyroid function labs
 - ▶ In this patient
 - ▶ TSH 1.7 (0.4 - 4.0) * may vary by lab
 - ▶ Free T4 1.4
- ▶ Interpretation:
 - ▶ Suggest normal thyroid function
- ▶ Next step:
 - ▶ Thyroid imaging

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Thyroid Cancer

- ▶ Most common *endocrine*-related cancer
 - ▶ Classified as differentiated (papillary and follicular) and undifferentiated (medullary and anaplastic)
 - ▶ Medullary thyroid cancer is more likely to be familial
 - ▶ Anaplastic tumors are the fastest growing of all thyroid neoplasms—associated with a high mortality rate

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Thyroid Cancer

Epidemiology

- Incidence of thyroid cancer in the United States is 0.4% of the population
- Small and slow growing
- More common in women than in men
- Major risk factor: exposure to ionizing radiation
- Increased incidence where iodine deficiency and goiter are more prevalent

Pathophysiology

- Believed to develop from a series of mutational events producing a cell that is genetically different from its source

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Thyroid Nodule

Presentation

Subjective

- Major symptom: lump or nodule in the neck
- Usually, painless
- Complain of
 - Tight or full feeling in the neck
 - Difficulty breathing or swallowing
- Hoarseness
- Hemoptysis
- Swollen lymph nodes
- New onset of hoarseness with hemoptysis is strongly suggestive of a malignant growth
- Progressive dysphagia and shortness of breath may indicate invasiveness

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Thyroid Nodule

- ▶ Differential
 - ▶ Lymphocytic thyroiditis
 - ▶ Multinodular goiter
 - ▶ Benign thyroid nodule
 - ▶ Cystic nodules
 - ▶ Regional lymphadenopathy
 - ▶ If medullary thyroid carcinoma is diagnosed, it is critical to take a thorough family history

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Thyroid Nodule

- ▶ Objective
 - ▶ 4-7% of people have a palpable thyroid nodule, making clinical examination of the thyroid an ineffective method of screening
 - ▶ Differentiated thyroid carcinomas most commonly present as a thyroid mass or nodule
 - ▶ Malignant neoplasms are more likely to be fixed, non-tender, firm, and irregular in shape; only a biopsy can rule in malignancy
 - ▶ Physical examination should include examination of the tongue, oropharynx, and cervical spine for swelling, nodules, or tenderness

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Thyroid Nodule

- ▶ Diagnostic Reasoning
 - ▶ Biopsy is the only reliable method of differentiating a benign from a malignant lesion
 - ▶ Nodules that develop in men, in persons younger than age 20 years or older than age 60 years, in persons with a family history of thyroid cancer, or in those with a personal history of exposure to radiation are suggestive of malignancy
 - ▶ Multiple nodules of the same consistency are more likely to be benign
 - ▶ Fewer than 10% of nodules are malignant.
 - ▶ Prognosis is good for thyroid cancer found early, less than 2 cm in diameter, a favorable histologic type, and has not invaded locally or metastasized

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Thyroid Nodule

- ▶ Initial testing
 - ▶ High-resolution ultrasonography
 - ▶ Beneficial in identifying thyroid nodules
 - ▶ Not reliable in differentiating a benign from a malignant lesion
 - ▶ Indicated when there is suspicion of multinodular disease or when the thyroid is difficult to evaluate clinically

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Thyroid Nodule

- ▶ Subsequent testing
 - ▶ FNA biopsy is usually successful in differentiating a benign from cancerous lesion of the thyroid gland and has an 83% sensitivity and a 92% specificity
 - ▶ Sensitivity of FNA is increased when it is ultrasound guided
 - ▶ Elevated serum calcitonin is a strong tumor marker of medullary thyroid carcinoma
 - ▶ Radiiodine uptake testing is a means of determining functionality of a thyroid nodule
 - ▶ CT and MRI
 - ▶ Used when the tumor is large, recurrent, or when there is expected extrathyroidal extension of the tumor, but not helpful for evaluation of a simple, isolated nodule
 - ▶ Assess for distant metastases and regional lymph node involvement
 - ▶ Thyroid function tests may show levels within the normal range unless the patient has thyroiditis

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Thyroid Nodule

- ▶ Initial management
 - ▶ Any swelling suggestive of malignancy should be referred to an endocrinologist
 - ▶ Subsequent referral to an oncologist for surgery if indicated (and possibly a radiation or medical oncologist) once a diagnosis of cancer has been established
 - ▶ Multidisciplinary approach: endocrinologist, thyroid surgeon, radiologist & occasionally - medical/radiation oncologist.
 - ▶ Surgery (thyroidectomy) remains the mainstay of treatment.

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Thyroid Nodule

- ▶ Post-Op Subsequent Management
 - ▶ Possible radioactive iodine therapy to ablate any remnant thyroid tissue
 - ▶ Thyroid replacement therapy is initiated to suppress TSH to a goal of 0.1 μ IU/mL
 - ▶ Some forms of malignancy have unique treatments
 - ▶ Chemotherapy may be considered for advanced disease or tumors unresponsive to radiiodine tx.
 - ▶ Long-term prognosis depends on type

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Case

LEK results

- Indeterminate
- Follicular cells with enlarged and crowded nuclei with rare nuclear grooves
- Slight nuclear membrane irregularity but no inclusion
- Results such as these suggestive of thyroid malignancy

LEK's treatment

- Right thyroid lobectomy
- Path: papillary thyroid carcinoma, no lymph involvement
- Subsequent complete thyroidectomy 2 wks later
 - + small papillary carcinoma in left lobe (as well!)

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Thyroid Nodule

- ▶ Follow Up
 - ▶ No single diagnostic tool is sufficient to evaluate for recurrent disease
 - ▶ Periodic clinical examinations, serum thyroglobulin measurements, chest x-ray films, and ultrasound examination to assess for recurrence
 - ▶ Followed more closely during the first 3 to 4 years following surgery because recurrence is more likely within this time
 - ▶ Total thyroidectomy requires thyroid hormone replacement for life
 - ▶ Genetic Testing:
 - ▶ Patients with medullary carcinoma MEN2 should be offered RET protooncogene testing—if positive, all first-degree relatives should be offered the RET mutation analysis as well

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Thyroid Nodule

- ▶ Education
 - ▶ Discuss Genetic testing if indicated
 - ▶ Family history of thyroid cancer should be advised to perform a "neck check" monthly
 - ▶ Any signs of bulging should be reported immediately

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Case

- ▶ <https://prezi.com/-zxp-vmn0-4k/thyroid-nodule-a-case-report/>
- ▶ Very informative
- ▶ Link active as of 5/16/2023 @ 1030.

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References

- ▶ American Thyroid Association
 - ▶ <https://www.liebertpub.com/doi/pdfplus/10.1089/thy.2016.0229>
 - ▶ <https://www.liebertpub.com/doi/pdfplus/10.1089/thy.2014.0028>
- ▶ DynaMed:
 - ▶ Thyroid disease, Cushing's & Adrenal Insufficiency
- ▶ Kahaly, G. J. (2020). Management of Graves thyroidal and extrathyroidal disease: an update. *The Journal of Clinical Endocrinology & Metabolism*, 105(12), 3704-3720.
- ▶ Prete, A., Borges de Souza, P., Censi, S., Muzza, M., Nucci, N., & Sponziello, M. (2020). Update on fundamental mechanisms of thyroid cancer. *Frontiers in endocrinology*, 11, 102.
- ▶ Ralli, M., Angeletti, D., Fiore, M., D'Aguanno, V., Lambiase, A., Artico, M., ... & Greco, A. (2020). Hashimoto's thyroiditis: An update on pathogenic mechanisms, diagnostic protocols, therapeutic strategies, and potential malignant transformation. *Autoimmunity Reviews*, 19(10), 102649.

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