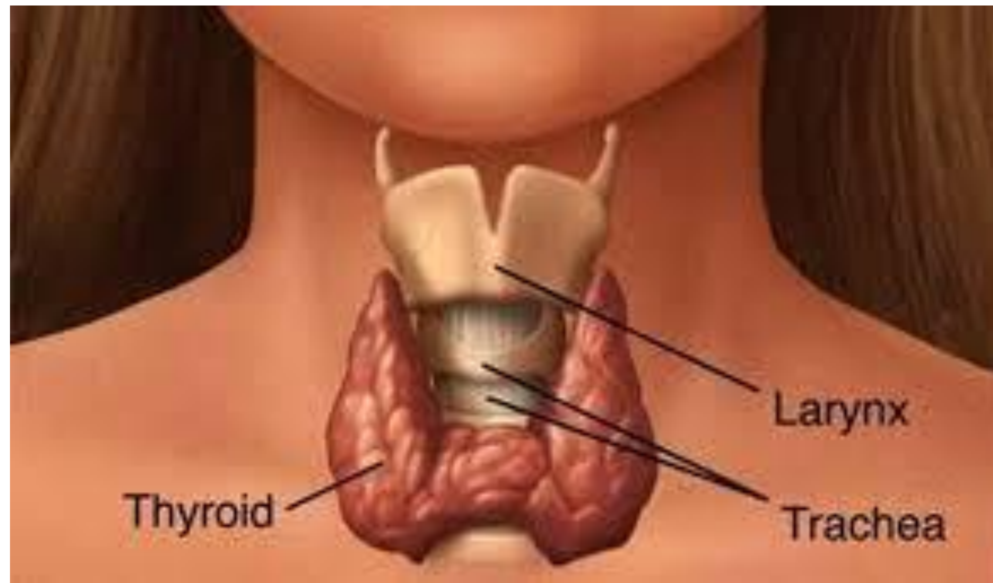

HYPOTHYROIDISM

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Why this topic?

1. It’s common

Why this topic?

2. It’s very, very common

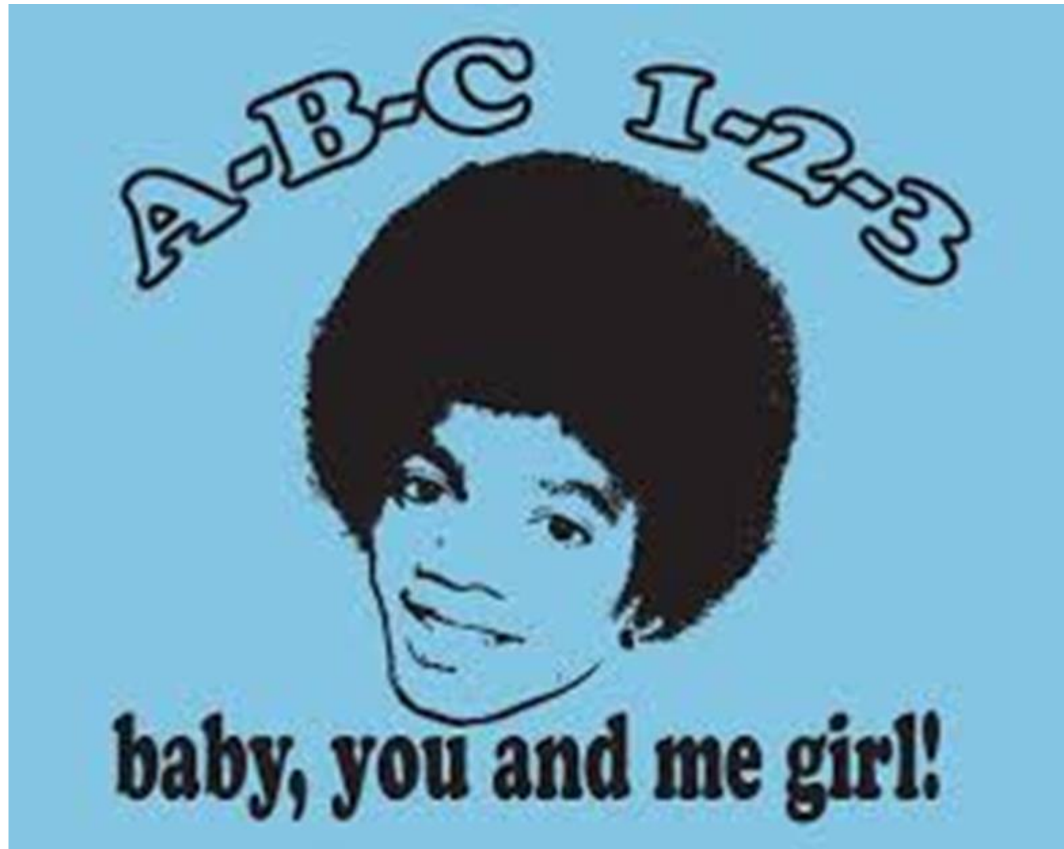
Why this topic?

3. I just want to do it.

"Hypothyroidism is so easy..."

Jackson 5

"It's easy as ABC, 123…"



IT'S EASY AS

1,2,3

1. Patient has symptoms
2. Check TSH—If high,
3. Start levothyroxine

Is this really all there is?

- If you know 1, 2, 3, probably all you need to know to manage half the issues regarding hypothyroidism.

But what about?...

1. When to screen for hypothyroidism, if ever?
2. What symptoms would prompt checking for hypothyroidism?
3. What thyroid tests to check and when?
4. What dose to start?
5. Give generics vs brand thyroid medicine?
6. What about Armour thyroid?
7. What about subclinical hypothyroidism?
8. When to follow TSH and/or FT4?
9. When to take the med?
10. What about drug interactions?
11. What if the patient misses a dose or two or more?
12. What level of TSH to shoot for?
13. What about pregnant women with hypothyroid?
14. What about the elderly with hypothyroid?

- If you know the answers to all these previous questions, then…

Take a nap

Take a smoke break

Learn the answers to these questions and more

1. When to screen for hypothyroidism if ever?
2. What symptoms would prompt checking for hypothyroidism?
3. What thyroid tests to check and when?
4. What dose to start?
5. Give generics vs brand thyroid?
6. What about Armour thyroid?
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Case 1

- 25 year old female has TSH of 8.
- What do you do?

Case 2

- 25 year old female with hypothyroidism on levothyroxine just got pregnant.
- Her TSH is 4.5.
- What do you do?

Case 3

- 80 year old nursing home patient with mild cognitive impairment and history of CAD has TSH of 15.
- What do you do?

Symptoms of Hypothyroidism?

Many Different Symptoms

The 69 Most Commonly Reported Symtpoms of Hypothyroidism

- Fatigue
- Swelling of eyelids
- Emotional instability
- Lethargy
- Dry skin
- Choking sensation
- Low endurance
- Dry mucous membranes
- Fineness of hair
- Slow speech
- Constipation
- Hair loss
- Slow thinking
- Weight gain
- Blueness of skin
- Poor memory
- Paleness of lips
- Dry, thick, scaling skin
- Poor concentration
- Shortness of breath
- Dry, coarse, brittle hair
- Depression
- Swelling
- Paleness of skin
- Nervousness
- Hoarseness
- Puffy skin
- Anxiety
- Loss of appetite
- Puffy face or eyelids
- Worrying
- Prolonged menstrual bleeding
- Swelling of ankles
- Easy emotional upset
- Heavy menstrual bleeding
- Coarse skin
- Obsessive thinking
- Painful menstruation
- Brittle or thin nails
- Low motivation
- Low sex drive
- Dry ridges down nails
- Dizziness
- Impotence
- Difficulty in swallowing
- Sensation of cold
- Hearing loss
- Weakness
- Cold skin
- Rapid heart rate
- Vague body aches & pains
- Decreased sweating
- Pounding heart beat
- Muscle pain
- Heat intolerance
- Slow pulse rate
- Joint pain
- Non-restful sleep
- Pain at front of chest
- Numbness or tingling
- Insomnia
- Poor vision
- Protrusion of one or both eyeballs
- Thick tongue
- Weight loss
- Sparse eyebrows
- Swelling of face
- Wasting of tongue

Most Common Symptoms:

- Dry skin
- Cold sensitivity
- Fatigue
- Muscle cramps
- Voice changes
- Constipation

Misunderstanding #1

- *“My low thyroid made me obese”.*

S.A.D. Diet

Misunderstanding #1

- Hypothyroidism can cause weight gain but generally mild.
- The decrease in metabolic rate is offset by the decrease in appetite.
- Hypothyroidism not more common in the obese population than in the general population

Prevalence of Hypothyroidism

- **Overt**—2-7% (TSH>10)
- **Subclinical**—10-15% (TSH 5-10 with normal FT4)
- Female > Male 5-10:1

Causes of hypothyroidism?

- More than 90% of hypothyroidism in iodine sufficient locations is caused by chronic autoimmune (Hashimoto's) thyroiditis.

Answer: True

Misunderstanding #2

- *"Hashimoto's is not common"*

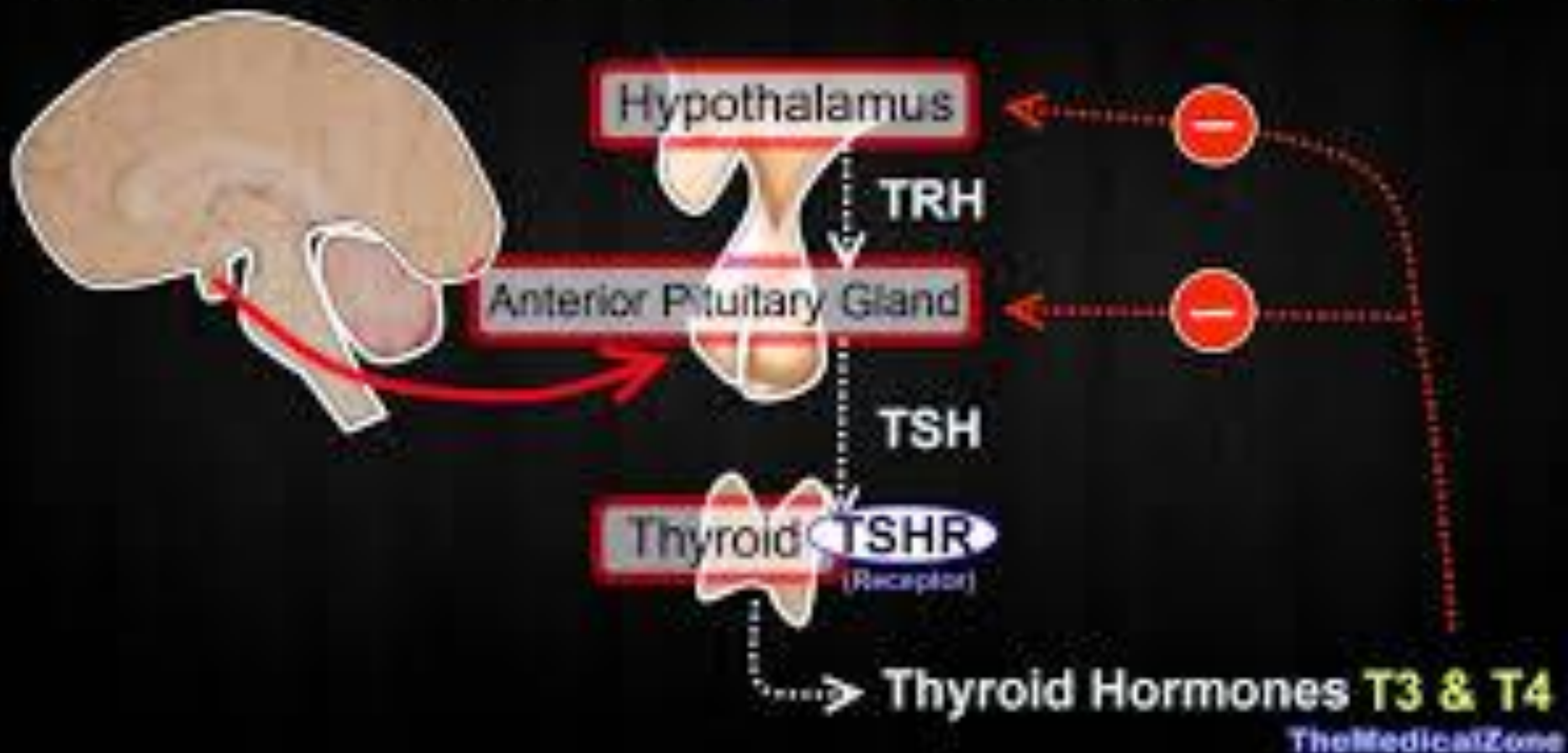
- The fact is the vast majority of hypothyroidism is due to Hashimoto's (autoimmune thyroiditis)
- Typically, the condition is expected to be lifelong. (Analogous to Type 1DM)

Other Causes of Hypothyroidism

- **Iatrogenic**
  - Thyroidectomy
  - Radioiodine ablation
  - External neck irradiation
  - Drugs
    - Lithium
    - Amiodarone
    - Chemo drugs/Immune checkpoint inhibitors
- **Infiltrative diseases**
  - Hemochromatosis, Scleroderma, Leukemia, Fibrous thyroiditis, Sarcoidosis, Amyloid, TB

Other causes of hypothyroidism

- **Transient hypothyroidism**
  - Postpartum thyroiditis
  - Subacute (granulomatous) thyroiditis
- **Central hypothyroidism—low TSH and low FT4**
  - Secondary hypothyroidism
    - Pituitary tumors
    - Postpartum pituitary necrosis (Sheehan's syndrome)
    - Trauma
  - Tertiary hypothyroidism—low TRH
    - Hypothalamus damage from tumors, trauma, RTX, infiltrative diseases


Thyroid Hormone - Feedback Loop
Hypothalamus
TRH
Anterior Pituitary Gland
TSH
Thyroid
TSHR
(Receptor)
Thyroid Hormones T3 & T4
TheMedicalZone

Screening for Hypothyroidism

- **American Thyroid Assoc. (ATA)**—Screen all adults at 35 yo and every 5 years
- **American Assoc. of Clinical Endocrinologists**—
  Older patients, especially women
- **AAFP**—60 yo and older
- **USPSTF**—Insufficient evidence for or against screening

Check for hypothyroidism in these patients:

- Those with autoimmune diseases: Type 1DM, RA, SLE, Celiac disease, Addison's
- First degree relative with autoimmune thyroid disease
- Abnormal thyroid exam
- Psychiatric disorders
- Anemia, Dyslipidemia
- HTN
- Down's, Turner's syndrome
- History of neck irradiation
- Taking amiodarone or lithium
- ***Anyone with hypothyroid symptoms***

What tests to check for hypothyroidism?

1). TSH—most sensitive and specific

- TSH may not be accurate:
  - If pituitary or hypothalamic disease
  - Acute or chronically sick/hospitalized patients
  - Patients receiving certain drugs
    - Dopamine, glucocorticoids, octreotide can decrease TSH
    - Metoclopramide, amiodarone can increase TSH secretion

2). FT4

How to Evaluate the TSH level:

- TSH normal range (0.3 - 4.7) mcIU/mL
- TSH is 20. Not controversial.
- But what if the TSH is 12?
- But what if the TSH is 8?
- But what if the TSH is 4?

TSH is 12

- Most experts agree should treat if TSH >10
- Even if the patient is “asymptomatic”
- Patient doesn’t realize she has symptoms
- May improve morbidity/mortality, most notably CV disease and heart failure

TSH is 8

- Check FT4. Normal range (0.8 – 1.6) ng/dl
- If FT4 is low, treat
- If FT4 is normal, falls into category of subclinical hypothyroidism (elevated TSH but normal FT4).
- Start treatment if the patient has:
  - Symptoms of hypothyroidism
  - Has CVD
  - CVD risks factors
  - Goiter

TSH is 8

- If the patient is asymptomatic, can check Thyroid Peroxidase antibodies (TPO Ab).
- If negative, can watch
- If positive, treat. (Has about a 4-5% yearly progression to overt hypothyroidism and 33-55% cumulative incidence in 10-20 years)
- Of course, use shared decision making with the patient

TSH is 8

- If patient over 70 y.o., consider watching

Misunderstanding #3

- *“using the same TSH values for the elderly”*

- Mild TSH elevations may be a normal manifestation of aging.

TSH is 8

- >80 years old-- 23.9% have TSH between 2.5-4.5.
- 12% have TSH >4.5 and this may be physiologic.
- The upper limit of normal may be as high as 6-10 in healthy patients >80 y.o.
- So treating TSH's between 5-10 in the elderly may cause more harm than good, especially concerned for cardiac arrhythmias.

TSH is 4

- Depends which expert you listen to and depends what patient
- National Academy of Clinical Biochemists indicate that 95% of individuals without thyroid disease have TSH below 2.5 mU/L.
- The mean TSH is 1.4 in the general non-elderly population.

TSH is 4

- Absolutely fine to do nothing
- Some may check FT4 and TPOAb, looking at a TSH of 4 like they would subclinical hypothyroidism.
- Caveat: Look at pregnant women differently

Misunderstanding #4

- *"Using the traditional TSH ranges for pregnant women"*
- Need to evaluate pregnant women using lower TSH thresholds

Hypothyroidism in Pregnancy

- Pregnant women need 1.5 fold higher T3 and T4 levels to meet their increased metabolic needs during pregnancy.

Hypothyroidism in pregnancy associated with:

- Spontaneous miscarriage
- Preeclampsia and gestational hypertension
- Placental abruption
- Nonreassuring fetal heart rate tracing
- Preterm delivery
- Low birth weight
- Increased C/S rate
- Postpartum hemorrhage
- Neuropsychological and cognitive impairment (mother and infant)
- Postpartum depression and hypertension

Use These TSH Values in Pregnancy

- 1st Trimester—TSH <2.5 (upper limit of normal)
- 2nd Trimester—TSH <3.0
- 3rd Trimester—TSH <3.0-3.5

- If TSH elevated above the trimester thresholds, check FT4 and TPOAb (unless TSH >10).
- If FT4 low or TPOAb is positive, treat
- If FT4 is normal and TPOAb is negative, may treat or monitor TSH closely.

So What to Do?

- Universal screening of pregnant women is controversial and usually not endorsed.
- Most recommend a target based screening.
  - Symptoms of hypothyroidism
  - Family history of thyroid disease
  - H/O +TPO Ab
  - Type 1 DM
  - H/O Head/Neck RTX
  - H/O recurrent miscarriage
  - Morbid obesity
  - Infertility
  - Age >30

Hypothyroid Women Who Get Pregnant

- Check TSH right away, then every 4 weeks and adjust
- About 80% with preexisting hypothyroidism will need dose increase during the pregnancy.
- Increase the Levothyroxine dose by 30% preemptively
- Double the daily dose two days a week preemptively (take 9 doses per week)
- Median onset of dose modification occurs at 8 weeks with a plateau at 16 weeks.
- Monitor TSH every 4 weeks during the first half of the pregnancy and at least once between 26-32 weeks.

Post-Pregnancy

- The majority of women who were started on levothyroxine for TSH between 2.5-4.5 do not need to continue levothyroxine after delivery.
- In one study, 75% of women with subclinical hypothyroidism during pregnancy had normal thyroid function 5 years postpartum.
- Because hypothyroidism may interfere with milk production, it may be prudent to delay assessment until the completion of nursing.

Let's Talk About Treatment

Treatment Options

1). T4--Synthetic L-thyroxine

2). Combo T4 and T3--From desiccated thyroid preparations from porcine or bovine origin—Armour thyroid, Westhroid, Nature-Throid and Thyrolar

3). T3—Cytomel

Treatment Dosing: Not One Size Fits All

- The average replacement dose of T4 in adults is 1.6mcg/kg/day.
- (112 mcg/day in a 70-kg adult).
- Use the mcg instead of the mg
- Easier to deal with whole numbers than decimal points
- 25mcg becomes 0.025mg

Misunderstanding #5

"Not individualizing the starting doses for patients"

- Larger patients need more than smaller
- T4 requirements correlate better with lean body mass than total body weight.
- Elderly patients need less
- Total thyroidectomy patients typically need more than Hashimoto's
- Pregnant patients need more
- Those with CVD should start at lower doses
- The closer your TSH is to normal, the less you will need

Can also use the TSH level as a guide to initial dosing:

- TSH 4-8 = 25mcg
- TSH 8-12 = 50mcg
- TSH >12 = 75mcg
- May raise the starting dose in proportion to the level of TSH and/or larger lean body mass
- Start lower in the elderly and those with CVD.

Monitoring and Dose Adjustments

- Symptom improvement may occur in 2 weeks
- Most symptoms fully improve in several months
- Some symptoms may take 6 months such as chronic skin changes.
- Check TSH about 6 weeks after starting.

- What about those symptoms that don’t improve after getting their TSH therapeutic?

What TSH level to shoot for:

What TSH level to shoot for:

- Simple: Target range is normal TSH levels (0.3 - 4.7)
- Some feel should shoot for the lower half of the TSH normal range since most non-hypothyroid patients are below 2.5
- So goal of (0.4-2.5)
- I individualize based on patient symptoms.

What TSH level to shoot for:

- Treatment goals for Pregnancy:
  - 1st Trimester—TSH (0.1-2.5)
  - 2nd Trimester—TSH (0.2-3.0)
  - 3rd Trimester—TSH (0.3-3.0/3.5)
- Some who had thyroidectomy due to cancer, should shoot for the very low range of TSH to prevent recurrence of thyroid cancer.
- In the elderly, >70 yo, shoot for TSH level between 3-10.

Beware of Over-replacement:

- Increase risk of accelerated bone loss/osteoporosis leading to increased fracture risk.
- Increase risk of arrhythmias, especially atrial fibrillation.
- Cause hyperthyroid symptoms

- ***Don't use thyroid medications to help patients lose weight in euthyroid patients.

When and how to take T4:

- Traditionally, take L-thyroxine with water 30-60 minutes before breakfast.
- Can take at bedtime 4 hours after the last meal.
- Key is try to be consistent with timing of intake
- Analogous to Warfarin dosing

What about missing doses?

Misunderstanding #6

"Can't make up missing doses"

- While you can't do this with HTN, DM, Chol meds, Abx, you can do this with L-thyroxine.
- Because of the long half life, you make up doses up to a week.

Be aware of drug interactions:

- Coffee
- PPI’s
- H2-Blockers
- Calcium supplements
- Ferrous sulfate
- Aluminum hydroxide gels
- Sertraline
- Bisphosphonates
- Sucralfate
- Bile acid sequestrants: cholestyramine, colesevelam, colestipol
- Orlistat (Xenical)

Drugs that increase catabolism/increase T4 clearance

- Rifampin
- Carbamazepine
- Phenytoin
- Phenobarbital

- Estrogen

- Anytime there are medication changes, think about checking TSH several months later.

Brand vs. Generic Levothyroxine

- Synthroid
- Levoxyl (lactose free)
- Levothroid
- Unithroid
- Euthyrox
- Tirosint (soft gel capsule) (lactose free)

Versus

- Generic Levothyroxine

What about those that insist on combo T4 and T3?

IT'S EASY AS 1, 2, 3

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2. Check TSH—If high,
3. Start levothyroxine

Learn the answers to these questions and more

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Case 1

- 25 year old female has TSH of 8.
- What do you do?

Case 1

- Check FT4
- If low. Start treatment

- If Normal. Ask about symptoms.

- If symptoms. Start treatment

- If no symptoms. Check TPOAb

- If TPOAb positive. Start treatment.
- If TPOAb negative. Watchful waiting.   ***Elderly

Case 2

- 25 year old female with hypothyroidism on levothyroxine just got pregnant.
- Her TSH is 4.5.
- What do you do?

Case 2

- TSH is goal <2.5 (1st Trimester)
- Increase dose of Levothyroxine by 25-30% or take an extra dose 2 times a week
- Follow the TSH closely by checking every 4 weeks in the first half of pregnancy and then once or twice in the second half of pregnancy.

Case 3

- 80 year old nursing home patient with mild cognitive impairment and history of CAD has TSH of 15.
- What do you do?

Case 3

- Elderly need special consideration
- Ok to follow if TSH is 5-8 range.
- Since TSH is above 10, start treatment with L-thyroxine but start low and go slow. Start 25mcg. Or even ½ tab.
- Shoot for target TSH goal of 3-10.

QUESTIONS?

References

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