Functional Medicine Approach to Diagnosis and Treatment of Subclinical Hypothyroidism

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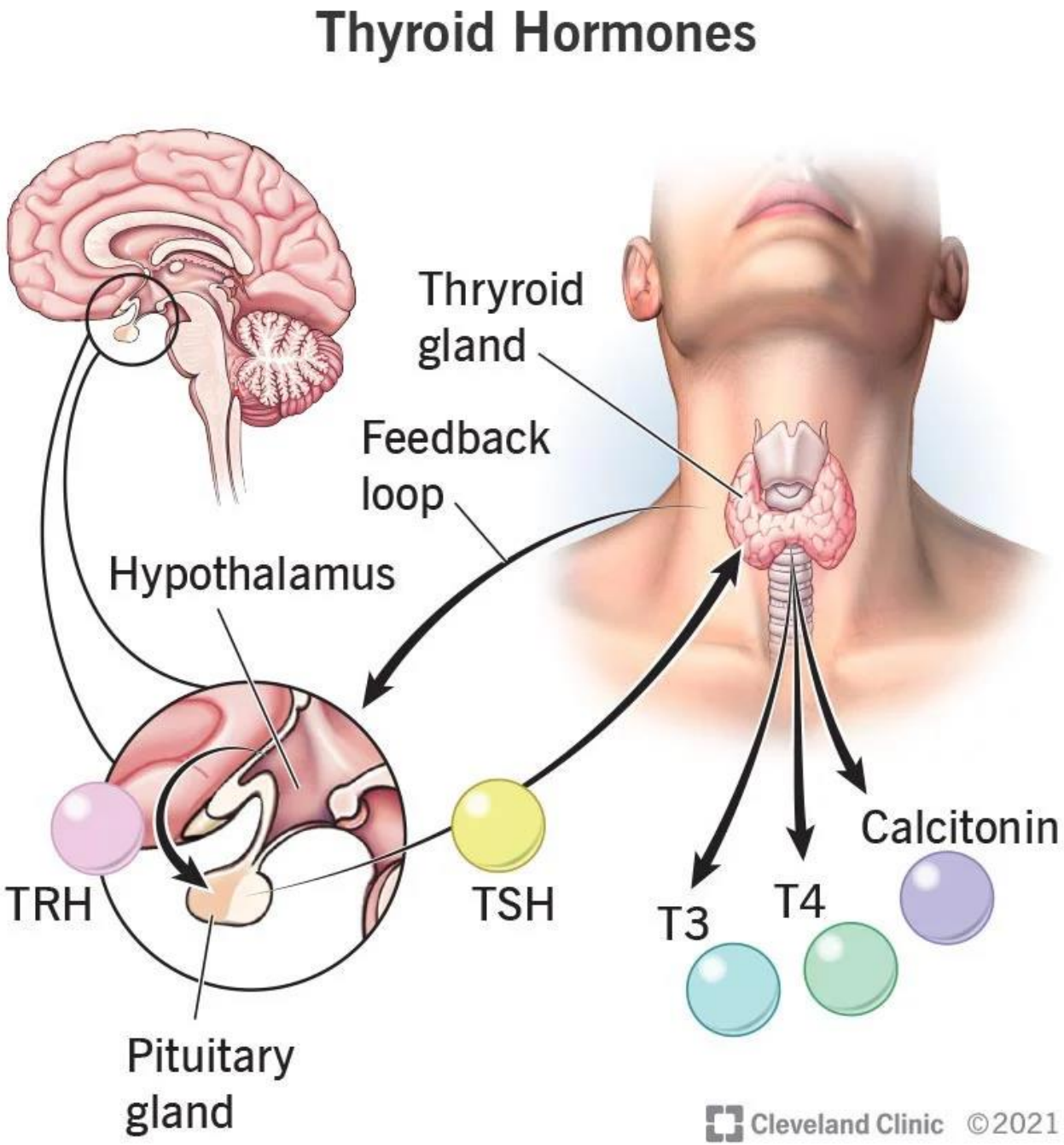
Disclosures

- I have no financial or commercial conflicts of interest to disclose

Normal Thyroid Physiology



What is Functional Medicine?

Organ Systems Involved

- Cardiovascular
- Basal metabolic rate
- Resting respiratory rate
- Fetal growth/bone remodeling
- Nervous system
- Reproductive health

What is hypothyroidism?

Underproduction of thyroid hormone (traditional paradigm)

Inability of thyroid hormone to enter the cell? (functional approach)

Symptoms of Hypothyroidism

- Fatigue
- Weight gain
- Bradycardia
- Intolerance to cold
- Fertility problems
- Muscle pain/weakness/cramps
- Hair loss (eye brows too)/dry skin
- Constipation
- Poor focus/problems with concentration/brain fog

Statistics

In the early 2000's hypothyroidism was affecting 13M people in the US, and 90% were women.

Today, 52 million people have symptoms of hypothyroidism!

Women ages 30-50 are most prone to hypothyroidism.

~1 in 8 women will develop hypothyroidism during their lifetime.

Suspected Causes of Hypothyroidism

Poor diet

Fluoride in water/tooth paste

Excessive consumption of unsaturated fats

Excessive exercise

Pesticide exposure (wash your fruits and veggies!)

Radiation

What is Subclinical Hypothyroidism (SCH)?

TSH is elevated but free T4 is in the normal range

SCH: The Controversy and Testing Challenges

90% of those with SCH have TSH levels 4-10 mIU/L

What is the upper limit of TSH range to start levothyroxine?

Is conventional thyroid hormone therapy effective?

Timing of Blood Collection

For those with intact thyroid function:

- TSH – highest 10pm-4am; lowest 10am-6pm
- T3 levels peak at 3am

For those receiving exogenous thyroid hormone (TH):

- TSH is lowest 14 hrs after ingestion of TH
- Free T4 peaks 4-6 hrs after ingestion
- Free T3 peaks 2-4 hrs after ingestion

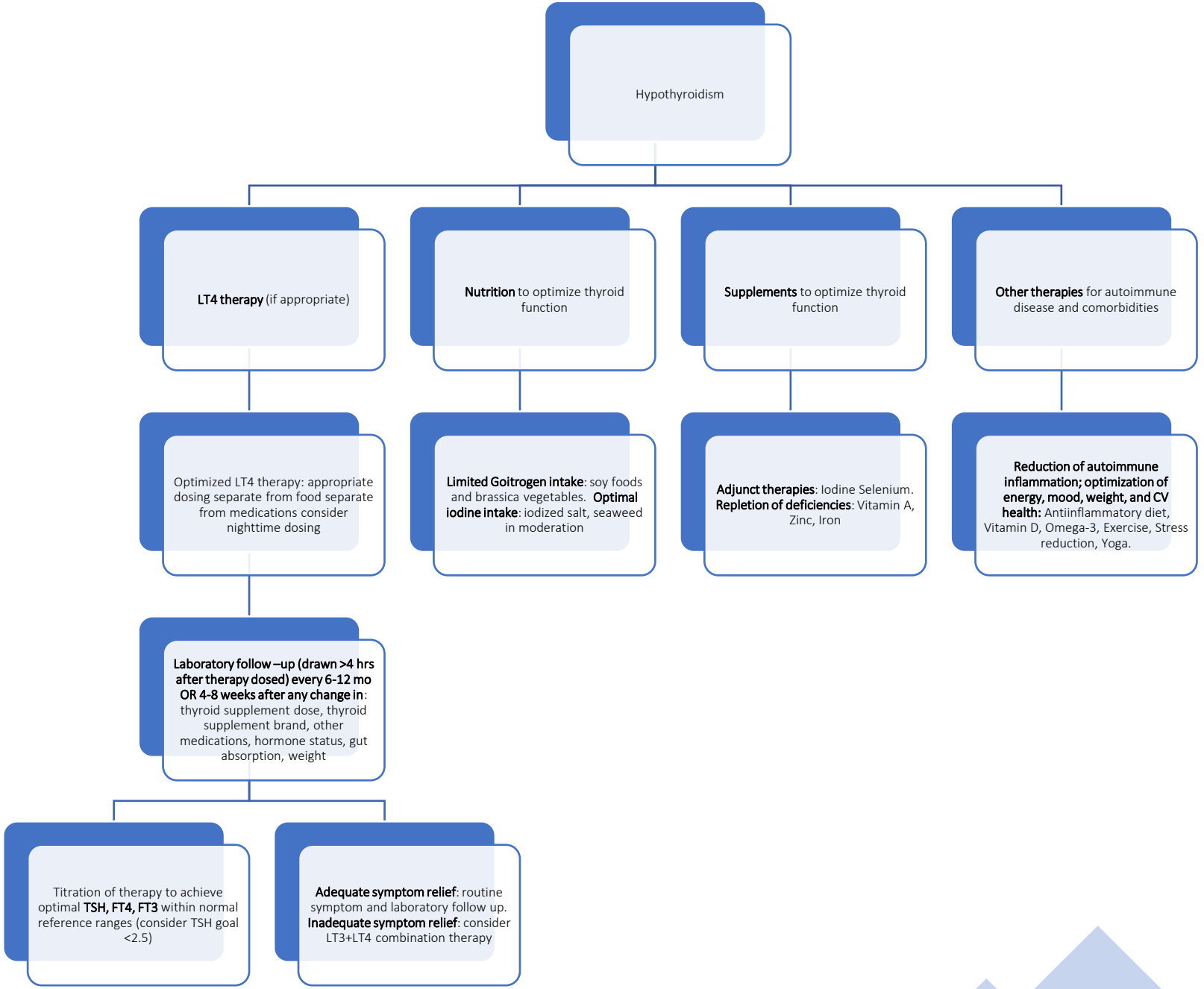
(Rakel, 2018)

Normal TSH and FT3 range is ….controversial:

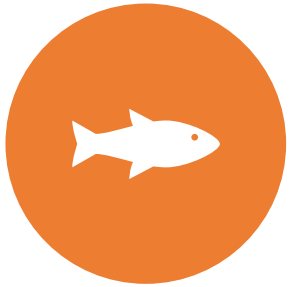
- Per AACE and ATA, TSH: 0.4-4.0mIU/L
  FT3: 2.3-4.2
- Per FM clinicians, TSH: 0.4-2mIU/L, optimal 0.4
  FT3: 4.0-4.3

Traditional Optimal Lab Values & Treatment Targets

- SCH: levothyroxine (LT4) supplementation if TSH>10
- If symptoms suggestive of hypothyroidism and TSH >4 but <10
- TSH normalization is usually the goal of thyroid replacement therapy, with improvement of the patient's symptoms being paramount.


Hypothyroidism
LT4 therapy (if appropriate)
Nutrition to optimize thyroid function
Supplements to optimize thyroid function
Other therapies for autoimmune disease and comorbidities
Optimized LT4 therapy: appropriate dosing separate from food separate from medications consider nighttime dosing
Limited Goitrogen intake: soy foods and brassica vegetables. Optimal iodine intake: iodized salt, seaweed in moderation
Adjunct therapies: Iodine Selenium. Repletion of deficiencies: Vitamin A, Zinc, Iron
Reduction of autoimmune inflammation; optimization of energy, mood, weight, and CV health: Antiinflammatory diet, Vitamin D, Omega-3, Exercise, Stress reduction, Yoga.
Laboratory follow –up (drawn >4 hrs after therapy dosed) every 6-12 mo OR 4-8 weeks after any change in: thyroid supplement dose, thyroid supplement brand, other medications, hormone status, gut absorption, weight
Titration of therapy to achieve optimal TSH, FT4, FT3 within normal reference ranges (consider TSH goal <2.5)
Adequate symptom relief: routine symptom and laboratory follow up. Inadequate symptom relief: consider LT3+LT4 combination therapy

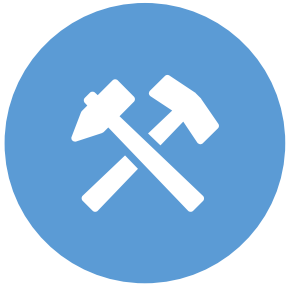
Environmental Toxins and Endocrine Disruptors



Low-salt/low seafood diet

High goitrogen* consumption

Chlorine, bromine, fluoride, mercury, perchlorite



Heavy metals

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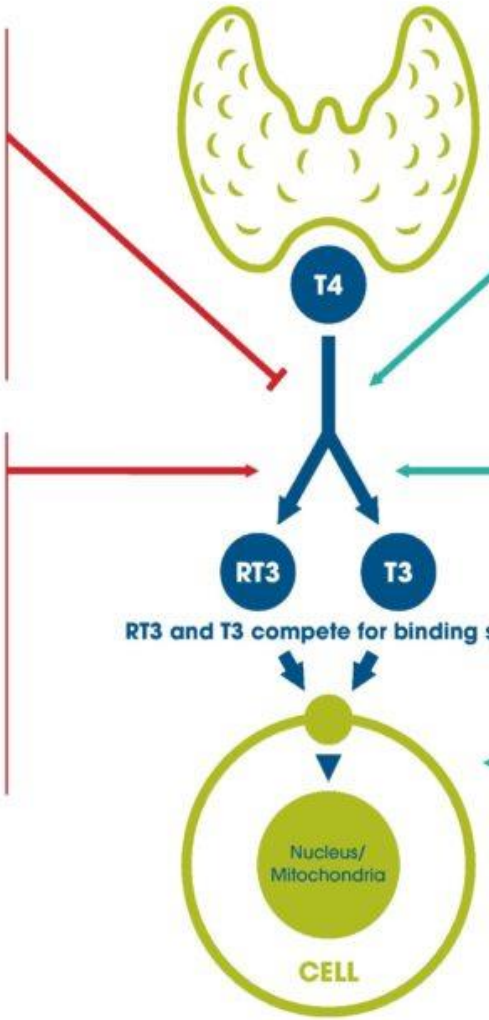
Factors that Affect Thyroid Function



Factors that inhibit proper production of thyroid hormones

- Stress
- Infection, trauma, radiation, medications
- Fluoride (antagonist to iodine)
- Toxins: pesticides, mercury, cadmium, lead
- Autoimmune disease: Celiac

Factors that increase conversion of T4 to RT3

- Stress
- Trauma
- Low-calorie diet
- Inflammation (cytokines, etc.)
- Toxins
- Infections
- Liver/kidney dysfunction
- Certain medications

Factors that contribute to proper production of thyroid hormones

- Nutrients: iron, iodine, tyrosine, zinc, selenium vitamin E, B2, B3, B6, C, D

Factors that increase conversion of T4 to T3

- Selenium
- Zinc

Factors that improve cellular sensitivity to thyroid hormones

- Vitamin A
- Exercise
- Zinc

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Integrative/Functional Medicine Approach

- Exercise
- Nutrition
- Supplements
- Pharmaceuticals
- Other therapies

Goitrogen-Rich Foods That May Affect Thyroid Function

broccoli

kale

peaches

mustard

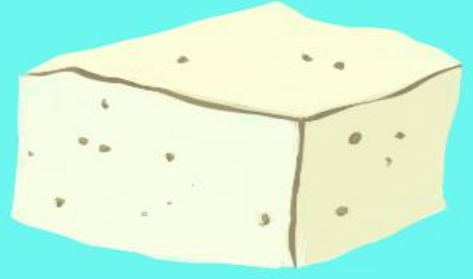
cauliflower

peanuts

teas

red wine

strawberries



soy products

verywell

Supplements

Use only those with FDA-required cGMPs!

- Iodine – 150-1,100 mcg/day
- Selenium – 55-400 mcg/day
- Vitamin A – 2,300-10,000 IU/day
- Zinc – 8-40mg/day
- Iron – 8-45 mg/day
- Vitamin D – 1,000-2,000 IU/day

Supplements: Iodine

150-1,100 mcg/day

fresh ocean fish, seaweed and unrefined sea salt

Lugol solution: two drops PO daily for 1-3 months, then retest

Iodoral tablet: 6.25-12.5mg PO daily for 1-3 months, then retest

Iodine Testing

24-hour urine iodine test – the standard for iodine status, but cumbersome

Iodine loading test (less than 75% urine excretion=**deficiency**)

Serum iodine levels (normal 51-109mcg/L)

Supplements: Selenium

- Required in deiodination of T4 into T3 hormone
- Recommended daily dose: 55 mcg-400 mcg

Foods containing selenium:

- Brazil nuts (3-4 nuts = 275 mcg)
- Halibut (½ fillet, 159 g weight = 88 mcg)
- Barley, raw (1 cup = 75 mcg)
- Wheat flour, whole grain (1 cup = 74 mcg)
- Lobster (3 oz = 62 mcg)
- Sardines, Atlantic (3 oz = 45 mcg)
- Couscous (1 cup = 43 mcg)

Supplements: Vitamin A

Vitamin A is involved in T4 manufacture and intracellular receptor formation for T3.

1 mcg retinol = 3.33 IU vitamin A = 12mg beta-carotene (from food)

Recommended daily dose: 700-3,000 mcg (2,300-10,000 IU) pre-formed vitamin A

Supplements: Zinc

Involved in conversion of T4 to T3

Is an important factor in T3 binding to intracellular receptors in body

Recommended daily dose: 8-40mg

Supplements: Iron

Iron deficiency impairs thyroid hormone synthesis

Animal sources of iron: liver, seafood, organ meats and poultry

Vegetarian sources: dried beans, iron-fortified cereal/bread, molasses, spinach, peas, and dry apricots.

Recommended daily dosage: 8-45 mg/day

Supplements: Vitamin D

vitamin D deficiency plays a known role in the onset and progression of several autoimmune diseases

Recommended daily dose: 400-4,000 IU to achieve serum 25-OH D level of 30-50-ng/mL

Pharmaceuticals

Conventional treatment – levothyroxin (LT4)

- Initial dose 1.6mcg/kg/day
- 50mcg/day in patient >50 or those with CV disease
- Ingestion in the morning should be at least 1 hour before food, or ingestion at night at least 3 hours after food.
- LT4 should be separated from other medications and supplements by at least 4 hours.

Pharmaceuticals: LT4+LT3

- If with LT4 alone TSH is optimal, but still symptomatic, use LT4+LT3
- Note! Combination therapy is not appropriate in pregnancy
- Dosing ratio T4:T3 between 13:1 and 20:1
- LT4 dose given one daily; LT3 given at morning and bedtime
- combination therapy is best given as isolated LT4 with isolated LT3
- If on 110mcg total thyroid: T4 100 mcg @ noc + T3 5mcg in am and @ noc

Pharmaceuticals: LT4+LT3 (cont.)

Desiccated porcine thyroid:

- Armour Thyroid
- Nature Thyroid
- NP Thyroid
- WP Thyroid

Dosing: 1 grain (60mg) desiccated thyroid = 100mcg T4 and 25mcg T3

Note! The T4:T3 ratio is 4.2:1 – not physiological as 13:1 or 20:1!

Patients should be instructed to monitor for symptoms of hyperthyroidism during combination therapy!

What if the patient is asymptomatic, but thyroid hormones are suboptimal?

- T3 is needed for fat loss, and 40% of Americans are obese

- T3 protects against arrhythmias and heart disease

- T3 decreases with stress or dieting, prolonged hypothyroidism results in elevated cortisol levels leading to further decreased conversion of T4 to T3 and increases RT3

- Increased risk for anemia and other immunologic changes with low thyroid

Other Nutrients for Optimal Thyroid Function

- Kelp – contains iodine
- L-Tyrosine (500mg bid) - supports thyroid function
- Vitamin B complex

Prevention Prescription

Consume a diet with adequate amounts of iodine, selenium, iron, vitamin A, vitamin D and zinc.

Do not consume excessive amounts of iodine for long periods of time.

Avoid substances that block thyroid hormone synthesis, such as chlorine, bromine, perchlorate, mercury, certain medications, and radiation to the head and neck area whenever possible.

Considerations

Besides the typical symptoms, an underactive thyroid may increase a risk of a heart attack

Wilson’s syndrome - a condition resulting from an impaired conversion of T4 into T3, which produces symptoms of hypothyroidism (triggered by significant physical or emotional stress)

Clinical Pearls

Do not consider treating SCH unless patient is symptomatic, has underlying heart disease, or the TSH is >10mIU/L.

Statin-induced myopathy may be associated with mild thyroid insufficiency , so TH may be useful for high-risk CV patients starting statin medication, especially if TSH is elevated.

Clinical Pearls

- When iodine supplements are started, you will see TSH elevate as the body produces more symporters to move iodine into the cell
- Higher serum FT3 is associated with lower risk of Alzheimer's disease
- TH lowers CRP and homocysteine
- TH decreases the risk of heart disease
- Thyroid replacement does not cause osteoporosis

Clinical Pearls

- Remember, TSH may not correlate to cellular levels of TH!
- When replacing/supplementing thyroid hormone, monitor lab tests and symptoms every 8-12 weeks until optimal
- Draw blood 5-6 hours after taking the AM dose of TH

Clinical case

- Mona is a 34-year-old woman presenting with symptoms of fatigue, poor focus, constipation, dry skin, intolerance to cold, undesired weight gain and inability to lose weight. She states she has not felt well for 3 years. No prior diagnosis of hypothyroidism. She has 2 healthy children, ages 3 and 5. Mona has a stressful job, but reports she is applying elsewhere and has a great support from her husband. She wants to feel well again.

What is your plan?

Clinical Case (cont.)

CBC with diff – unremarkable

Thyroid panel: TSH 6.2; FT4 0.89; FT3 1.75; RT3 18

Serum Iodine: 32mcg/L

Vitamin B12: 236pg/mL

Vitamin D: 25ng/mL

What is your plan?

Questions?

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