

Blood Chem Thyroid Hypofunction Part II and Hyperfunction Review

THYROID HYPOFUNCTION TREATMENT

Overt Hypothyroidism

- High TSH and Low T4/T3
- Treat with replacement hormone and address other pathologies

Subclinical hypothyroidism

- TSH > 10
 - Treat with replacement hormone and address other pathologies
- TSH < 10
 - Address other pathologies first; retest TSH >> if still elevated use THEA score to further evaluate

Euthyroid with high antibodies

- Address immune dysregulation and other pathologies; use THEA score to further evaluate

If a patient only has high TSH and/or high thyroid antibodies, you can use the THEA, Thyroid Events Amsterdam, to predict the progression of overt hypothyroidism. THEA is based on TSH, TPO antibodies, and family history of autoimmune thyroid disease

ADDRESS UNDERLYING CAUSE OF HASHIMOTO'S

- Treatment should consider mechanisms such as environmental toxins, GI dysfunction, HPA axis dysregulation, blood sugar dysregulation, reduced oxygen deliverability or anemia, nutrient imbalance, immune dysregulation, and chronic infections.
- Also, addressing things like sleep deprivation, chronic stress, inappropriate physical activity, lack of social connection, and not enough pleasure or play are key and lead to improvement in autoimmune conditions. These factors may be the most important things for people with autoimmunity to address along with diet.

DIETARY NUTRIENTS AND THEIR SOURCES FOR THYROID HEALTH

Nutrient	Sources
Iodine	Sea vegetables, dairy products, iodized salt
Selenium	Ocean fish, Brazil nuts, ham
Iron	Oysters, clams, liver, venison, beef
Zinc	Oysters, liver, crab, lobster, beef
B12	Clam, liver, oyster, mackerel, sardine
B2	Liver, mushrooms, seaweed, spinach
Vitamin C	Red pepper, kiwi, broccoli, citrus
Vitamin A	Organ meats, CLO, seafood, grass-fed dairy
Vitamin D	CLO, cold-water fatty fish, UV exposure
Magnesium	Clams, Swiss chard, spinach, beet greens, kelp

HIGHEST FOOD SOURCES OF IODINE

Food	Iodine (mcg/serving)	Iodine (percent DV)
Kelp, 1 gram	1,542	10,280%
Kombu, 1 gram	1,350	900%
Hijiki, 1 gram	629	419%
Arame, 1 gram	586	391%
Cod, baked, 3 ounces	99	66%
Dulse, 1 gram	72	48%
Iodized salt, 1/4 teaspoon	71	47%
Wakame, 1 gram	42	28%
Shrimp, 3 ounces	35	23%
Egg, 1 large	24	16%
Tuna, canned in oil, 3 ounces	17	11%
Nori, 1 gram	16	11%
Prunes, dried, 5 prunes	13	9%
Banana, 1 medium	3	2%

Using kelp flakes in place of or in addition to sea salt just a few times a week should provide about 100 to 200 mcg a day, which is a sufficient level of iodine intake for most people and probably not enough to trigger or exacerbate autoimmunity in most patients.

Iodine is also present in dairy because iodine is in the cleansers that are used to sterilize the tanks that dairy products are stored in.

HIGHEST FOOD SOURCES OF SELENIUM

Food	Se (mcg/serving)	Se (percent DV)
Brazil nuts, 1/2 ounce (3–4 nuts)	277	389%
Tuna, yellowfin, cooked, 3 ounces	92	131%
Halibut, cooked, 3 ounces	47	67%
Sardines, canned in oil, 3 ounces	45	64%
Ham, roasted, 3 ounces	42	60%
Beef steak, bottom round, roasted, 3 ounces	33	47%
Turkey, boneless, roasted, 3 ounces	31	44%
Chicken, light meat, roasted, 3 ounces	22	31%
Beef, ground, 25% fat, broiled, 3 ounces	18	26%
Egg, hard-boiled, 1 large	15	21%
Spinach, frozen, boiled, 1 cup	11	16%

SELENIUM SUPPLEMENTATION

- Remember that most Americans are not deficient in selenium, but people with autoimmune thyroid disease may benefit from higher dietary intake
- Two to three nuts a day would provide 200 mcg, more than enough selenium, especially if the patient is consuming fish.
- If they can't or won't eat fish or Brazil nuts, they can supplement with 200 mcg per day of selenomethionine.
- Retest two to three months later. Tell the patient to stop supplementing if selenium levels are then sufficient.

AVOIDING SUBSTANCES THAT IMPAIR THYROID FUNCTION, PRIMARILY GIOTROGENS

- Goitrogens are substances that cause goiter, which is swelling of the thyroid gland.
- Goitrogenic foods (see table below) or chemicals have been associated with both hypothyroidism and hyperthyroidism, autoimmune thyroid disease, and thyroid cancer.
- Exposure to large amounts of goitrogens impairs the incorporation of iodine into thyroid hormone itself, which means that even the iodine that gets taken up by the thyroid gland, it can't be properly utilized.

- Examples of goitrogens include; bok choy, brussel sprouts, cauliflower, kale, cabbage, radishes, kale, horseradish, peaches, spinach, yuca
- It is highly unlikely that consuming sauerkraut as a condiment, such as a tablespoon or two, with meals or three to six servings of cooked, not raw, cruciferous veggies or other mildly goitrogenic foods will have a negative impact on the thyroid gland if iodine intake is sufficient.

REGULATE AND BALANCE THE IMMUNE SYSTEM

- Paleo-type or AIP diet
- Nutrients especially important for optimizing immune function are glutathione, curcumin, and vitamin D.
- Vitamin D optimization through diet, UV exposure, and supplements.
- Get adequate EPA and DHA, probiotics, and prebiotics.
- Lifestyle and behavior to balance the immune system: appropriate physical activity, sleep, stress management, play, pleasure, and social connection.
- Low-dose naltrexone LDN dose is 1.5 to 4.5 mg.

THYROID HORMONE REPLACEMENT

- Tirosint, liquid T4, works better than levothyroxine, but it doesn't address conversion issues.
- The best option for T4-T3 combo for most patients is natural desiccated thyroid, or NDT.
 - NDT by prescription is real thyroid hormone that is isolated from several different pigs.
 - NDT does meet the stringent guidelines of the U.S. Pharmacopeia.
 - Desiccated thyroid gives you what your own thyroid would be giving you: T4, T3, T2, T1, and calcitonin. Both prescription and nonprescription options for NDT are available.
 - NDT dosage is 1 to 3 grains; start at 1/2 grain (30 to 32.5 mg).
- Another option is combining synthetic T4 such as levothyroxine or Synthroid with synthetic T3 such as Cytomel.

THYROID HYPERFUNCTION

There are two main forms of hyperthyroidism: overt and subclinical.

1. Overt/primary hyperthyroidism.

- a. Patient has low TSH and high T4 and T3.
 - b. In Graves' disease. Patients have higher levels of T3 than T4, but a subset of patients will have high T4 and normal T3, and this is called T4 toxicosis.
 - c. In patients with inflammatory diseases, that reduce conversion of T4 to T3.
2. Subclinical hyperthyroidism.
- a. Patient has low TSH but normal T4 and T3 levels.

ETIOLOGY

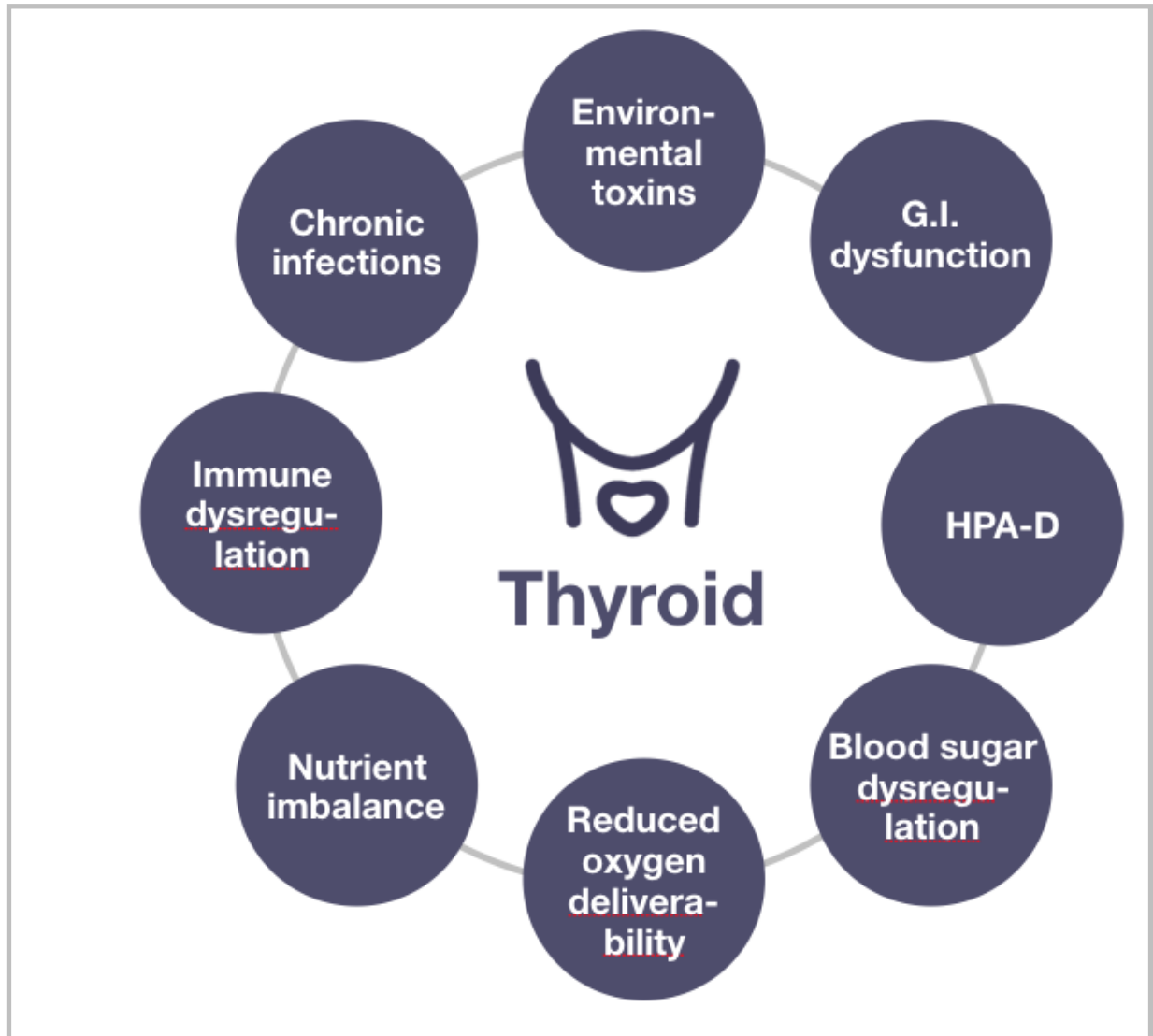
- Graves disease is an autoimmune disorder that results in the production of TSH receptor antibodies, which stimulate thyroid growth and release thyroid hormone.
 - Primarily women age 20 to 40.
 - Signs and symptoms of Graves' include anxiety, nervousness, weariness, hair/nail changes, weight loss, increased heart rate, increased systolic blood pressure, heat intolerance, tremors, change in libido, increased temperature, sweating, frequent bowel movements, headaches, hives, nausea, vomiting, muscle weakness, fatigue, swollen lymph nodes, and increased appetite.
 - There is an association between H. pylori and Graves' in scientific literature.
 - Graves' is associated with both hyperglycemia and hypoglycemia.
- Hashitoxicosis is present with TSH receptor antibodies, high radioiodine uptake, and low TSH and high T4 or T3.
- Toxic adenoma
- Toxic multinodular goiter
- Other rare causes

TREATMENT FOR GRAVES DISEASE

Conventional approach: PTU or methimazole, radioactive ablation, or surgical removal.

Note: Do not take patients off these medications without close supervision to prevent a thyroid storm, which includes a high T3 leading to risk of heart attack, stroke, and even death.

FUNCTIONAL APPROACH TO THYROID DYSFUNCTION



CORE MARKERS

TSH	Reverse T3
Total T4	Free Thyroxine Index
Free T4	T3 Uptake
Total T3	TPO and Thyroglobulin antibodies
Free T3	TSI / TSH receptor antibodies

It is crucial to add TSI, also known as TSH receptor antibodies. TSI is used to distinguish Graves' from thyroiditis, Hashimoto's, and other causes of hyperthyroidism.

ADJUNCT MARKERS

- ALT and AST may be elevated in Graves' disease.
- Urine iodine and hair iodine in patients who have been supplementing with it to rule out excess iodine as a potential cause.

FUNCTIONAL RANGES FOR CORE THYROID MARKERS

Marker	Functional range
TSH	0.5–2.0 mU/L
Total T4	6.0–12 ug/dL
Total T3	100–180 ng/dL
Free T4	1.0–1.5 ng/dL
Free T3	2.5–4.0 pg/mL

REFERENCE RANGES FOR THYROID ANTIBODIES (JUST USE THE LAB RANGES)

Marker	Range (IU/mL)
Thyroid peroxidase (TPO) Ab	0–34
Thyroglobulin (TG) Ab	0.0–0.9
TSH receptor Ab (TSI)	0–139

Beware of falsely low TSH with thyroid hormone replacement.

TREATMENT OF THYROID HYPERFUNCTION

If only TSH is low, and free T4 and T3 are normal, address underlying causes and retest every two to three months, or sooner if hyperthyroid symptoms increase. Up to 25 percent of Graves' disease cases spontaneously remit.

If free T4 is high and/or free T3 is normal or high, that could be hashitoxicosis, especially if the free T3 is very high. You want to refer out for additional workup.

Treatment options if free T4 and/or free T3 are significantly elevated, and the patient has tachycardia and other concerning symptoms:

- Currently, antithyroid drugs such as PTU or methimazole are favored because they can actually reduce TSI production and help the immune system to recover.
- Surgery and radioiodine are not recommended. Refer to the presentation for more details.
- I highly recommend you refer to an endocrinologist. You can continue helping the patient with the underlying conditions.

HIGH-DOSE IODINE

- Can lead to a temporary inhibition of iodine organification in the thyroid gland and reduce the output of thyroid hormone, called the Wolff-Chaikoff effect.
- However, some studies have shown that high doses of iodine can induce hyperthyroidism.
- I think treatment of hyperthyroidism with high doses of iodine is best left to an endocrinologist or someone who does that regularly.

One note with LDN: You need to warn patients they can become hypothyroid as they start to implement the treatment because LDN helps regulate the immune system. Also ask them to let their endocrinologist know to expect that so that they are ready to adjust the dose unless you are the one who is prescribing the PTU or the methimazole.

NATURAL AGENTS THAT CAN BE HELPFUL IN HYPERTHYROIDISM

- L-carnitine. In high doses of 2 to 4 g per day, it inhibits the entry of both thyroxine, T4, and triiodothyronine, T3, into the cell nucleus, which reduces the effects of hyperthyroidism.
- High doses of L-carnitine such as 4 g daily are not associated with toxicity.
- Best supplement form is acetyl-L-carnitine.
- Botanicals that have shown efficacy in treating hyperthyroidism:
 - Bugleweed, or gypsywort
 - Lemon balm
 - Herb Pharm has a formula called Thyroid Calming with both bugleweed and lemon balm. It also has motherwort and cactus, both of which are used in traditional medicine for hyperthyroidism, anxiety, and related symptoms. Dose is one full squeeze of the dropper bulb in two ounces of water two to four times a day, best taken between meals.

SUMMARY OF TREATMENT RECOMMENDATIONS

TSH	Free T4/T3	Comments
Low	Normal / high-normal (high in functional range)	Address underlying mechanisms and re-test in 3 months; if TSI high, focus on immune balancing
Low	Slightly above lab reference range	Address underlying mechanisms and use 2-4 g L-acetyl-carnitine + Thyroid Calming daily; if TSI +, focus on immune balancing and consider LDN
Low	Significantly above lab reference range	Refer to endocrinologist for further workup (esp. if TSI -) and ATD if necessary; continue addressing underlying mechanisms and focus on immune balancing (inc. LDN) if TSI +