

Thyroid Disease and Nutrition

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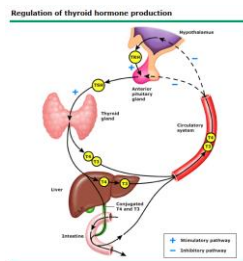
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Outline

- Thyroid Anatomy & Function
- Nutrition-Focused Physical Exam
- Thyroid pathology & statistics
- Basic lab interpretation
- Thyroid and Diet
- Thyroid and Weight
- Taking thyroid hormone
- DDx of symptoms common in thyroid disease

Thyroid Basics

- Role of thyroid hormone:
 - promote normal fetal and childhood growth
 - CNS development
 - Regulate heart rate, heart contraction & relaxation
 - Affect GI motility, renal water clearance
 - Modulate energy expenditure, heat generation, weight, lipid metabolism



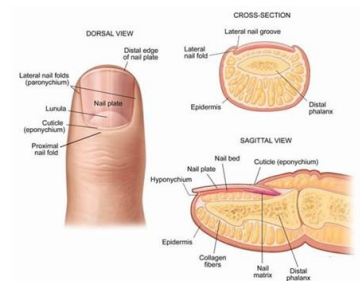
Uptodate.com
Cooper DG, Janderson PW. The Thyroid Gland. In: Gardner DG, Shoback D. eds. Greenspan's Basic & Clinical Endocrinology, 10e.

Nutrition Focused Physical Exam

- Introduce yourself to the patient
- Wash your hands
- Briefly explain to the patient what the examination involves
- Ask the patient to sit down on a chair
- Make sure there is sufficient space so you can access the chair from both front and behind
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- General Examination
- Assess for signs of:
 - Obvious alopecia or vitiligo
 - Signs of abnormal temperature regulation (sweating or shivering)
 - Obvious fine tremor
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The Hands

- Inspect the nail beds and fingertips for thyroid acropachy or onycholysis
- Inspect the palms for palmar erythema
- Assess for fine tremor
- Ask the patient to hold hands outstretched with palms facing downwards and place a piece of paper on top of the hands; look for fine movement of the paper
- Feel both hands and assess their temperature



Hands



Fig 1 – Features of thyroid disease in the hands.
 A) Thyroid acropachy – clubbing and swelling of the digits and toes.
 B) Onycholysis – separation of the nail from the nail bed.



Nails

- Consider selenium and other nutrients impacting nail quality
- <https://ods.od.nih.gov/factsheets/Selenium-HealthProfessional/#h5>

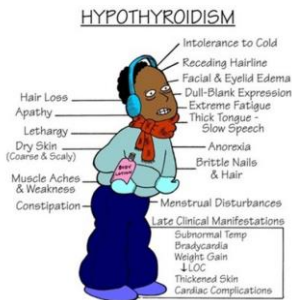


Nail and Hair Changes
 Before and 3 years after beginning hypothyroid treatment



Hair

- Not a thyroid-specific indicator
- Consider genetics, medical Hx, nutrient deficiencies

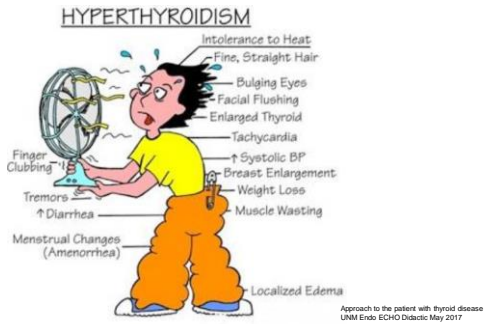


Approach to the patient with thyroid disease
 UNM Endo KCHO Diabetic May 2017

Hypothyroidism

- Affects up to 7% of the population
- #1 global cause → endemic iodine deficiency
- #1 US cause → Hashimoto's/autoimmune
 - + thyroid antibodies, lymphocytic infiltration → cell destruction
- Recommended treatment with levothyroxine
 - Many substances interfere with absorption – take on empty stomach
- Many look to diet for treatment of hypothyroidism or to help with sx
 - Dissatisfied w/ available tx options – want alternative therapies
 - Continued sx despite normal labs

The Thyroid Diet: Is There Such a Thing? - Medscape - Aug 27, 2018.

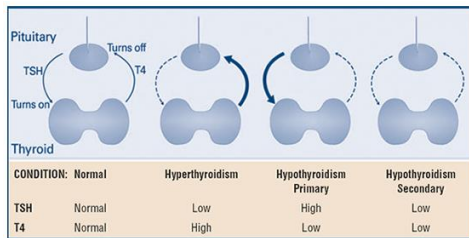


Hyperthyroidism

- Prevalence of 1-3%
- Graves is #1 cause worldwide
- Toxic nodules, thyroiditis also possibilities
- Treatment options: surgery, RAI ablation, anti thyroid meds – depends on underlying cause

The Thyroid Diet: Is There Such a Thing? - Medscape - Aug 27, 2018.

Thyroid Lab Interpretation



<https://www.thyroid.org/thyroid-function-tests/>

Estimated prevalence of antithyroid antibodies (%)

Group	Anti-Tg Ab	Anti-TPO Ab
General population	5 to 20	8 to 27
Graves' disease	50 to 70	50 to 80
Autoimmune thyroiditis	80 to 90	90 to 100
Relatives of patients with autoimmune thyroiditis	30 to 50	30 to 50
Type 1 diabetes	30 to 40	30 to 40
Pregnant women	Approximately 14	Approximately 14

Thyroid and Diet

Case #1

- 61 yo F with autoimmune hypothyroidism and family hx of hypothyroidism presents as new patient
- Taking 2 drops iodine and selenium for thyroid health, asking if she should continue
- Eats only Himalayan sea salt, on keto so no bread and pasta
- Should she stay on iodine and selenium?

Iodine

- Thyroid hormone production requires adequate levels of iodide from the diet as iodide, iodate or iodine
- RDA: 150µg/day in adults
 - 220µg/day & 290µg/day in pregnant & lactating women
- Iodized salt, seafood, some breads and grains
- Not required to be labeled on food packaging - sources may be difficult to identify
- Most in US eating a regular diet have adequate levels, but those on restricted diets – especially vegetarians and vegans – are at more risk as vegetables are not a rich source

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Dietitian's View

- Exercise regimen?
- Sleep hygiene?
- What are the supplement dose and quality?
- Is the patient adhering to keto diet? In ketosis?
 - Adherence is poor after 1-3 months and in uncontrolled environments

Iodine, continued

- Many OTC “iodine for thyroid health” and “thyroid support” supplements are available
- May contain many more times the RDA in a single dose
- Taking these supplements is unlikely to help thyroid health, and may be harmful.
- Excess iodine can induce hyper or hypothyroidism
- Chronic excess iodine can induce autoimmune thyroiditis
- ATA recommends avoiding supplements with >500µg/day of iodine

The Thyroid Diet: Is There Such a Thing? - Medscape - Aug 27, 2018.



What is a goitrogen?

- Anything that can produce thyroid enlargement
- Usually accomplished through effects that decrease thyroidal iodine
- Can also act by inhibiting any of the other components of normal thyroid hormone production
- Cruciferous vegetables, soy are most common examples

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Cruciferous Vegetables

- Broccoli, cabbage, brussels sprouts, kale, turnips, cauliflower, collard greens, bok choy
- Rich in glucosinolates → a/w anticancer properties
- Glucosinolates include the metabolite thiocyanate, which inhibits thyroid hormone synthesis.
- Levels of thiocyanates vary substantially, even in different varieties of a single food
 - Amount in broccoli, cabbage, and kale in a usual diet is considered minimal risk



<https://www.eatright.org/food/vitamins-and-supplements/nutrient-rich-foods/the-beginners-guide-to-cruciferous-vegetables>

Dietitian's View

- Cooking reduces goitrogenic compounds
- Fermentation increases goitrogenic compounds
- Look out for concentrated foods such as juicing, spirulina, kelp

Cruciferous Vegetables



- Data on the amount of consumption needed to adversely affect thyroid function is limited.
 - 5 euthyroid volunteers drank 15 oz of a commercial kale juice BID x 1 week
 - 6-hour thyroid radioiodine uptake decreased by 2.52%
 - Thyroid labs were unchanged
 - No adverse effect on thyroid function with 5 oz of cooked Brussels sprouts daily x 4 weeks
- Case report of myxedema coma in an 88-year-old Chinese woman who consumed 1.0-1.5 kg of raw bok choy daily for several months in an attempt to improve her diabetes control.

<https://www.endocrineweb.com/conditions/thyroid/thyroid-diet-how-to-eat-with-a-thyroid-disorder>
<https://www.eatright.org/food/sterains-and-supplements/nutrient-rich-foods/the-beginners-guide-to-cruciferous-vegetables>

What to tell patients about cruciferous vegetable intake

- Data suggests that frequent intake of large amounts of cruciferous vegetables **may** decrease thyroid hormone production
- But no rigorous studies exist to support the need to stop eating them.
- Avoiding cruciferous vegetables will do little to fix your underactive thyroid, and may deprive you of benefits such as fiber, and anti-inflammatory, cancer-fighting antioxidants.
- Recommend a well-balanced diet with cruciferous vegetables in reasonable amounts (despite not really knowing what reasonable is)



<https://www.endocrineweb.com/conditions/thyroid/thyroid-diet-how-to-eat-with-a-thyroid-disorder>

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Soy and the Thyroid

- Dietary soy products (soy milk, tofu, soy sauce, tempeh, miso) contain isoflavones.
- Isoflavones can inhibit the action of thyroid peroxidase, which is required for thyroid hormone synthesis
- Proposed that dietary soy intake **may** increase risk of hypothyroidism or that a higher dose of thyroid hormone may be needed in those being treated for hypothyroidism.

Soy and the Thyroid

- Available literature shows that in euthyroid individuals living in iodine-replete areas, consuming soy probably has no adverse effects on thyroid function
- Exception:
 - when soy-based infant formula is used for congenital hypothyroidism, an increased levothyroxine dose may be needed
- A reasonable, normal amount of soy is generally safe.
- No reason to avoid soy in patients with known hypothyroidism being treated with thyroid hormone

The Thyroid Diet: Is There Such a Thing? - Medscape - Aug 27, 2018.

Selenium

- Micronutrient important for thyroid hormone metabolism.
- RDA in men & nonpregnant, nonlactating women: 55 µg
- Richest dietary sources → seafood, organ meats
- Typical US sources → breads, grains, meat, poultry, fish, eggs
- A single brazil nut has up to 90 µg!
- Tolerable upper intake level = 400 µg/day.
- Toxicity is rare
 - Nausea, brittle/discoleored nails, hair loss, fatigue, irritability, foul breath

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Selenium

- Some studies have shown benefit from selenium supplementation in individuals with autoimmune thyroid disease
- Low levels associated with increased risk for goiter and thyroid nodules in European women
- In areas of severe deficiency, supplementation up to 100 µg/day may be beneficial.

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Selenium

- **Supplementation in individuals following unrestricted diets for the purpose of treating Graves disease, decreasing serum thyroid antibody titers, or maintaining normal thyroid function is mostly unsupported.**
- Best evidence for supplementation is in patients with mild Graves ophthalmopathy → shown to improve quality of life and course of ocular disease.

<https://www.eatright.org/food/etamins-and-supplements/nutrient-rich-foods/the-beginners-guide-to-cruciferous-vegetables>

RDA and Upper Tolerable Upper Intake Levels

Nutrient	RDA	UL
Iodine	150	500
• pregnant	220	1,100
• lactating	290	1,100
selenium	55	400

Spirulina - one serving 16 – 15,000 mg iodine

brazil nuts – 1 oz contains 544 mcg selenium

https://ods.od.nih.gov/Health_Information/Dietary_Reference_Intakes.aspx

Zinc, Copper, Magnesium

- The roles of these minerals in thyroid hormone synthesis and metabolism are not well defined.
- Given the available evidence, supplementation of these minerals solely for the purpose of promoting thyroid function is not generally supported.

The Thyroid Diet: Is There Such a Thing? - Medscape - Aug 27, 2018.

Other Dietary Considerations

- Many things promoted as affecting thyroid health in popular press
- Coffee, tea, & alcohol → appear to have no effect on thyroid cancer risk
 - Coffee does decrease absorption of thyroid hormone
- Potential benefit of vitamin D for various thyroid diseases is unclear
- Gluten-free diets, sugar-free diets, and probiotics → often advocated for thyroid health
- 1 small study → decreased thyroid antibody titers in 34 women on a gluten-free diet x 6 months
 - Lack of data on effects of these interventions on thyroid health
- Much remains unknown about thyroid disease → these are areas of uncertainty in modern medicine for which continued research is needed.

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Pearls for Patient Care

- Much more important to focus on eating for your general well-being rather than following a diet that won't necessarily support a healthy thyroid.
- There is a lack of strong scientific data supporting the association of many of these popular diets with thyroid disease
- Patients should be reassured that eating a well-rounded, balanced diet, and avoiding any unnecessary dietary restrictions offers the best strategy for overall health

<https://www.endocrineweb.com/conditions/thyroid/thyroid-diet-how-to-eat-with-a-thyroid-disorder>

Thyroid & Weight

How much weight will I lose when my hypothyroidism is treated?

- Since much of the weight is 2/2 accumulation of salt and water, when the hypothyroidism is treated one can expect a small (usually < 10%) weight loss.
- Treatment with thyroid hormone should result in a return of weight to what it was prior to development of hypothyroidism.
 - However, this usually develops over a long period of time, so fairly common to have no significant weight loss after treatment with thyroid hormone.
- If all symptoms of hypothyroidism, except weight gain, resolve with thyroid hormone, it is less likely that weight gain is solely due to the thyroid.
- Once hypothyroidism is treated and labs are normal, the ability to gain or lose weight is the same as in euthyroid individuals

<https://www.thyroid.org/thyroid-and-weight/>

Hyperthyroidism and Weight

- BMR is elevated, so many patients do experience some weight loss
- More severe hyperthyroidism is generally associated with more weight loss
- The factors that control our appetite, metabolism, and activity are very complex -- thyroid hormone is only one factor in this system
- Appetite is also increased -- so some patients may not lose and may actually gain weight, depending on how much they increase their caloric intake.

<https://www.thyroid.org/thyroid-and-weight/>

Hypothyroidism and Weight

- Hypothyroidism generally associated with weight gain - BMR is decreased
- Weight gain often greater in more severe hypothyroidism
- Most of the weight due to excess accumulation of salt and water.
- Massive weight gain rarely associated with hypothyroidism.
- In general, **5-10 pounds** of body weight may be attributable to the thyroid, depending on the severity
- If weight gain is the only symptom of hypothyroidism, it is less likely that the weight gain is solely due to the thyroid.

<https://www.thyroid.org/thyroid-and-weight/>

Can Thyroid Hormone Help Me Lose Weight?

- Thyroid hormones have been used as a weight loss tool - many studies have shown that excess thyroid hormone can lead to more weight loss than just dieting alone.
 - But once the excess thyroid hormone is stopped, weight is usually regained
- Potentially negative consequences → often you lose muscle + fat
- Iatrogenic hyperthyroidism → unlikely to significantly change weight and may result in other problems, like A Fib, osteoporosis
- Risk outweighs benefit

<https://www.thyroid.org/thyroid-and-weight/>

Why do I gain weight when hyperthyroidism is treated?

- Hyperthyroidism is an abnormal state, so any weight loss caused by this state will not be maintained when the abnormal state is reversed.
- On average, any weight lost during the hyperthyroid state is regained when the hyperthyroidism is treated.

<https://www.thyroid.org/thyroid-and-weight/>

Hypothyroid Weight Loss Diet?

Articles linking high protein diets with hypothyroid weight loss interventions: no RCTs, protein recommendations are vague

"In general, increased satiety has been observed after meals with a protein content in the range of 25% to 81%."

Example:

60% protein diet
72kg patient (25 kcal/kg = 1800 cal)
1800 calories per day
= 270 grams of protein = 3.75g/kg !

Thyroid Hormone Administration

Case #2

- 35 yo F with hypothyroidism x 10 years, comes to you because labs are "all over the place" and can't get regulated
- Weight: 175 lbs
- Current regimen: LT4 250mcg daily – doses have ranged from 125-300mcg daily over the last few years
- TSH levels (nl 0.5-5) have ranged from < 0.05 to 45 the last few years, doses adjusted frequently
- Takes it first thing in the AM w/ all other meds (MVT, OCP) then eats shortly thereafter

Case #2, continued

- Thyroid hormone is long acting
- Estrogen can affect requirements
- Iron and calcium can prevent absorption of thyroid hormone
- Weight based estimate: 175 lbs = 80 kg x 1.6 = 128mcg daily
- Take in AM on empty stomach for consistent absorption!

Hypothyroid Symptoms, Normal Thyroid Labs

Case #3

- 65 yo F here to discuss fatigue and weight gain
- Recently widowed
- Has been told she snores loudly
- No regular exercise or diet
- TSH 4.9 (0.5-5.0), asking about thyroid hormone to fix her symptoms

Differential of Fatigue, Weight gain

- Depression
 - Vit D deficiency
 - Anemia
 - Sleep apnea/poor sleep quality
 - Deconditioning
 - Heart/liver/kidney failure
 - Diabetes
 - Medication Side Effect
- Several studies have looked at whether T4 would benefit patients with hypothyroid symptoms but normal thyroid labs. In all cases, there was no difference between T4 and placebo in improving symptoms.
 - The thyroid is an easy target
 - Easy to convince yourself you have a condition easily treated by 1 pill/day – often need to cast a wider net – focusing on thyroid alone often does the patient a disservice and delays another diagnosis

<https://www.thyroid.org/thyroid-hormone-treatment/>

Thank you!

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