

Understanding Thyroid Disease: An Integrative Approach to Optimizing Thyroid Health

A webinar with Integrative Endocrinologist and Thyroid Expert
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FAAMFM, ECNU

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Disclosure to Participants

Notice of Requirements For Successful Completion

Please refer to learning goals and objectives

Learners must attend the full activity and complete the evaluation in order to claim continuing education credit/hours

Conflict of Interest (COI) and Financial Relationship Disclosures

No conflicts to disclose



Angela D. Mazza, DO, ABAARM, FAAMFM, ECNU

Angela D. Mazza is triple board-certified in Endocrinology, Diabetes and Metabolism, Internal Medicine, and Anti-aging and Regenerative Medicine. She completed her fellowship in Anti-aging and Metabolic and Functional Medicine through American Academy of Anti-Aging Medicine (A4M). She is also certified by the American Association of Clinical Endocrinologists (AACE) in neck ultrasounds and diagnostic biopsies. Dr. Mazza is a thyroid specialist who earned her ECNU (Endocrine Certification in Neck Ultrasound) certification and specializes in radiofrequency ablation (RFA) procedures for thyroid nodules.

Dr. Mazza's broad medical background includes significant research in both basic and clinical realms of endocrinology. She has served as the principal investigator and sub-investigator on multiple, large-scale diabetes therapy and device trials. This expertise led to numerous publications and national and international conference presentations. In addition to working on her podcast "Thyroid Talk with Dr. Angela Mazza," she is the author of [Thyroid Talk: An Integrative Guide to Thyroid Health](#).

Dr. Mazza is the founder of Metabolic Center for Wellness in Oviedo, FL, where she spends a great majority of her time caring for persons with autoimmune thyroid disease, thyroid nodules, and thyroid cancer. Metabolic Center for Wellness is the only center in Central Florida providing the thyroid saving procedure, RFA, for thyroid nodules. Highly regarded for her individualized approach to patient care, Dr. Mazza empowers each person to achieve their unique goals by providing education, lifestyle management and support.

Dr. Mazza believes that hormonal changes that happen in women and men as they age play a huge part in their overall health, longevity, and quality of life. Her passion is helping her patients achieve metabolic as well as hormonal balance.



Learning Objectives

At the conclusion of this webinar, the learner will be able to:

1. State four symptoms of hypothyroidism
2. Identify the significance of the four main thyroid labs
3. State the importance of at least three micronutrients necessary for optimal thyroid function
4. State three factors that can contribute to the development of Hashimoto's thyroiditis
5. Identify three common thyroid disruptors
6. State two causes of gut dysbiosis
7. Describe the dietary approaches used to heal gut permeability and the thyroid and prevent autoimmune thyroid disease such as Hashimoto's thyroiditis
8. State the relationship between vitamin D and autoimmune thyroid disease

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Part 1:

Thyroid Function, Disease and Assessment

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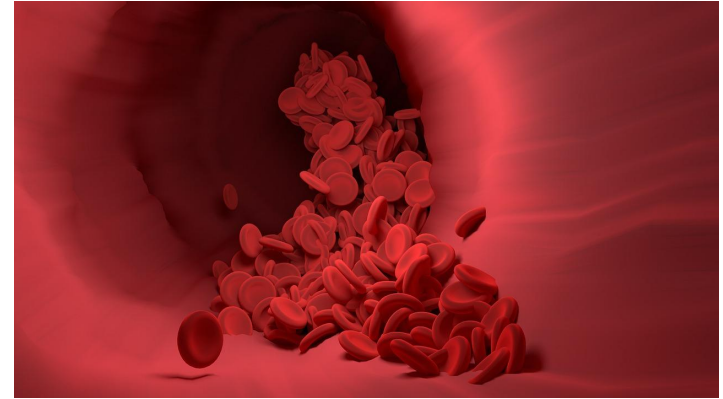
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Thyroid Function

Thyroid makes thyroid hormone, which is essential for metabolism on all levels of the body's systems

Thyroid hormones:

- Control how fat is burned & energy created
- Influence how the liver metabolizes glucose through gluconeogenesis & glycogenolysis
- Impacts mood
- Regulates internal thermostat
- ↑ production of erythropoietin & RBC production & turnover
- Affects gut motility
- Affects protein turnover



(Accorroni A et al., 2017; Ahmed & Ahmed, 2005; Rivas & Naranjo, 2007)

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Thyroid Hormone Production

- Hypothalamus senses \uparrow need for thyroid hormone
 - releases thyrotropin-releasing hormone (TRH)
 - stimulates anterior pituitary gland
 - Pituitary gland plays vital role in sensing the need for more thyroid hormone
 - → secretes thyroid-stimulating hormone (TSH) in response to TRH
 - TSH stimulates thyroid to \uparrow production & release of thyroid hormone
 - → regulates metabolism & other bodily processes



(Accorroni A et al., 2017; Ahmed & Ahmed, 2005)

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Thyroid Hormones

- Two main circulating hormones:
 - Thyroxine, T4
 - Triiodothyronine, T3
- Thyroglobulin: thyroid substance that is the template for combining tyrosine & iodine into thyroid hormones
- Thyroid binding globulin (TBG): protein that binds the hormones secreted from the thyroid & transports them in the blood
 - Only unbound (free) thyroid hormone is available for the body's use



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Thyroid Disease

- Three states:
 - Hyperthyroidism
 - Hypothyroidism
 - Normal thyroid function
- 1 in 3 will have a thyroid issue at some time in their lives
- Autoimmune thyroiditis is on the rise
 - Graves' disease
 - Hashimoto's thyroiditis



(Accorroni A et al., 2017;
Ahmed & Ahmed, 2005)

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Hyperthyroidism/ Thyrotoxicosis

- Thyroid gland produces too many hormones/ is overactive
 - Wt loss & ↑ appetite, rapid heartbeat, sweating, tremors, anxiety, insomnia, diarrhea or frequent BMs, bone loss, irregular heartbeats
- Potential diagnoses:
 - Autoimmune disease: Graves' disease
 - Toxic nodular goiter
 - Subacute thyroiditis
 - Pituitary gland dysfunction
 - Thyroid cancer
 - Iodine excess
 - Meds: lithium, amiodarone



(Bartalena L., 2000-2018; Accorroni A et al., 2017; Ahmed & Ahmed, 2005; Cooper DS, 2003; De Leo S et al., 2016; Frohlich & Wahl, 2017; Kitahara C et al., 2019)

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Hypothyroidism

- Thyroid gland does not produce enough hormones/ is underactive
 - ↓ metabolism, fatigue, weakness, wt gain, constipation, dry skin, hair loss, cold intolerance, depression, difficulty concentrating, hoarseness/ voice changes, ↑ chol, depression, anxiety
- Potential diagnoses:
 - Autoimmune disease: Hashimoto's thyroiditis
 - Congenital hypothyroidism
 - Iodine def or excess
 - Pituitary gland dysfunction
 - Radiation therapy
 - Meds: lithium, amiodarone



(Accorroni A et al., 2017; Ahmed & Ahmed, 2005; Cooke GE et al., 2014; Hiromatsu et al., 2013; Kitahara C et al., 2019; Rivas & Naranjo, 2007; Virili C et al., 2018; Xinhuan Su et al., 2020)

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Thyroid Assessment

- Blood test for a complete clinical picture:
 - Thyroid-stimulating hormone (TSH)
 - Thyroxine, T4
 - Triiodothyronine, T3
 - Reverse T3
- Additional blood tests:
 - Thyroid antibodies
 - Anti-thyroid peroxidase antibody (anti-TPO)
 - Thyroglobulin antibody levels (TgAB)
- Physical examination
- Review of symptoms



Thyroid Lab Values

Lab	Description	General laboratory range	Optimal range
TSH	Measures thyroid function indirectly	0.40-4.50 mIU/L	1.00-2.00 mIU/L
Free T4 (FT4)	Main thyroid hormone produced, must be converted to T3 to be active	0.8-1.8 ng/dL	1.0-1.2 ng/dL
Free T3 (FT3)	Active thyroid hormone mainly activated from T4 conversion, activates thyroid receptors in cells	2.3-4.2 pg/mL	3.5-4.0 pg/mL
Reverse T3	Inactive thyroid hormone, can prevent T3 from performing its functions	8-25 ng/dL	<15 ng/dL

Hashimoto's Thyroiditis

- Most common cause of hypothyroidism in the US
- Immune system is triggered to attack & destroy the thyroid → impacts thyroid's ability to produce necessary thyroid hormone
- Thyroid antibodies detected in circulation:
 - Anti-thyroid peroxidase antibody (anti-TPO)
 - Targets the enzyme responsible for thyroid hormone production
 - Anti-thyroglobulin antibody (TgAB)
 - targets thyroglobulin (protein precursor of thyroid hormones)



(Danailova Y et al., 2022; Frohlich & Wahl, 2017; Hiromatsu Y et al., 2013; Virili C et al., 2018; Xinhuan Su et al., 2020)

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Part 2:

Thyroid Health Factors

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Thyroid Function and Micronutrients

- Iodine
- Selenium
- Iron
- Zinc
- Magnesium



(Chung HR., 2014; Danailova Y et al., 2022; Mezzomo & Nadal, 2016; Ventura M. et al., 2017; Wang K et al., 2018)

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Iodine and Thyroid Hormones

- Essential building block for T4 & T3 hormones
- Taken into the thyroid & goes through series of reactions to synthesize active thyroid hormones:
 - Iodide undergoes oxidation mediated by enzyme thyroid peroxidase (TPO)
 - Iodide is incorporated into precursor molecules of T4 & T3
 - TPO catalyzes these molecules to form T4 & T3



(Chung HR., 2014; Danailova Y et al., 2022; Mezzomo & Nadal, 2016)

Selenium and Thyroid Hormones

- Essential component of enzymes that regulate thyroid hormone activity by activating or deactivating thyroid hormones
- Production of thyroid hormones is an oxidative process that can cause thyroid damage
 - Se is protective by enabling production of active thyroid hormones & minimizing damage from reactive O₂ byproducts produced during the synthesis process
 - Helps protect thyroid from autoimmune damage



(Danailova Y et al., 2022; Hiromatsu Y et al., 2013; Mezzomo & Nadal, 2016; Stazi & Trinti, 2010; Ventura M. et al., 2017)

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Iron and Thyroid Hormones

- Contributes to thyroid hormone production
- Important component in the TPO enzyme
- TPO activity ↓ when Fe levels are insufficient
 - → ↓ production of T4 & T3
 - Low energy levels
- Common def symptoms:
 - Fatigue, hair loss, feeling cold
 - Def esp common in women



(Danailova Y et al., 2022; Mezzomo & Nadal, 2016)

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Zinc and Thyroid Hormones

- Critical for the enzyme deiodinase that converts T4 into active T3 or reverse T3 in the circulation
 - → T3 available to the body's tissues
- ↓ levels are associated with ↑ levels of autoimmunity
 - High amounts of antithyroid antibodies in Hashimoto's thyroiditis



(Danailova Y et al., 2022;
Mezzomo & Nadal, 2016;
Xinhuan Su et al., 2020)

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Magnesium and Thyroid Function

- Studies show relationship b/w magnesium & changes in the thyroid's blood flow
- High doses ↑ activity of the thyroid
- Deficiency influences the bioavailability & tissue distribution of micronutrients like selenium
- PPIs can deplete body's supply of magnesium



(Danailova Y et al., 2022;
Mezzomo & Nadal, 2016; Wang
K et al., 2018)

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Poll Question

Doing which of the following can potentially suppress production of T4 and T3 hormones?

- a) Eating brazil nuts
- b) Drinking tap water
- c) Sleeping on your back
- d) Cooking with butter

Common Thyroid Disruptors

- Endocrine-disrupting chemicals (EDCs): group of compounds that interfere with hormones' functions:
 - Can impede ability to absorb iodine
 - Inhibit production of T4 & T3 in the thyroid
 - Interfere with conversion of T3 to T4
- Common disruptors:
 - Bisphenol A (BPAs)
 - Per- and polyfluoroalkyl substances (PFAs) & perfluorooctane sulfonate (PFOs)
 - Fluoride
 - Polychlorinated Biphenyls (PCBs)
 - Polybrominated diphenyl ethers (PBDEs)
 - Cadmium
 - Pesticides & herbicides
 - Lead, Mercury, Aluminum



(Ashley J. et al., 2018; Buha A et al., 2018; Gore et al., 2015; Kheradpisheh Z. et al., 2018; Kim & Park, 2019; Gore et al., 2015; Maaik van Gerwen a b., et al., 2023; Orihuela D, 2011; Pamphlett R et al., 2021; Peckham S et al., 2015; Ramadan & Saif Eldin, 2022; Rivera-Buse JE et al., 2023; Sirikul & Sapbamrer, 2023; Turyk ME et al., 2007; Zuo Y et al., 2021))

BPA, PFAs, PFOs, and Fluoride

- Bisphenol A (BPA)
 - Used in the production of polycarbonate plastics & epoxy resins
 - Can alter thyroid hormone-directed gene transcription & influence how thyroid hormone performs its metabolic job
- Per- and polyfluoroalkyl substances (PFAs) & perfluorooctane sulfonate (PFOs)
 - PFAs found in non-stick cookware; PFOs used in stain-resistance carpet & fabric coatings
 - Can ↓ T4 production
- Fluoride
 - Found in dental treatments & fluoridated water
 - Can suppress production of T4 & T3 hormones



(Ashley J. et al., 2018; Buha A et al., 2018; Gore et al., 2015; Kheradpisheh Z. et al., 2018; Kim & Park, 2019; Buha A et al., 2018; Gore et al., 2015; Maaik van Gerwen a b., et al., 2023; Orihuela D, 2011; Pamphlett R et al., 2021; Peckham S et al., 2015; Ramadan & Saif Eldin, 2022; Rivera-Buse JE et al., 2023; Sirikul & Sapbamrer, 2023; Turyk ME et al., 2007; Zuo Y et al., 2021)

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The Thyroid-Gut Connection

Factors that precede antibody appearance & contribute to autoimmune disease development & Hashimoto's thyroiditis:

- Genetics (accounts for 30% of all autoimmune conditions)
- Environmental factors
- Gut dysfunction
 - Compromised protective gastrointestinal lining can expose internal body environment & immune system to bacteria, viruses, toxins, undigested food



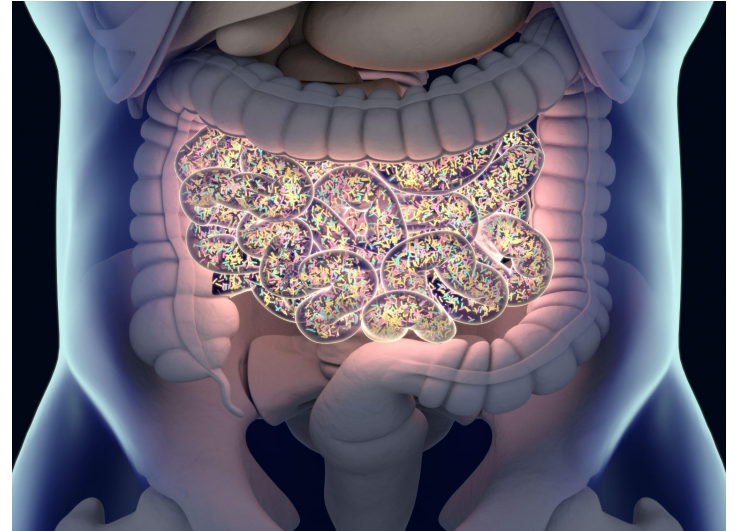
(Campbell AW., 2014; Danailova Y et al., 2022; Fasano A, 2012; Freeman HJ, 2016; Frommer & Kahaly, 2021; Hadithi M et al., 2007; Hui-xian Yan et al., 2020; Kasumagic-Halilovic E et al., 2011, 2017; Kinoshita-Ise M et al., 2019; Knezevic J et al., 2020; Mezzomo & Nadal, 2016; Virili C et al., 2018; Vojdani A et al., 2014; Xinhuan Su et al., 2020)

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'Leaky Gut' and Inflammation

- Zonulin: regulates opening & closing of tight epithelial cell junctions
 - ↑ zonulin levels = more permeable tight junctions, "leaky gut"
 - → gut-related issues from ↑ permeability, immune system inflammation & activation
 - Can trigger autoimmune disorders
 - Poor absorption of essential micronutrients
- Lipopolysaccharide (LPS): naturally occurring endotoxin of the gut
 - Helps to identify the degree of intestinal barrier permeability



(Campbell AW., 2014; Danailova Y et al., 2022; Fasano A, 2012; Freeman HJ, 2016; Frommer & Kahaly, 2021; Hadithi M et al., 2007; Hui-xian Yan et al., 2020; Kasumagic-Halilovic E et al., 2011, 2017; Kinoshita-Ise M et al., 2019; Knezevic J et al., 2020; Mezzomo & Nadal, 2016; Virili C et al., 2018; Vojdani A et al., 2014; Xinhuan Su et al., 2020)

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Hypothyroidism and Other Conditions

- Thyroid hormone affects overall movement/ motility of the gut
 - Hypothyroidism may cause constipation, heartburn, bacterial overgrowth in the gut
- Hashimoto's thyroiditis can be associated with hypochlorhydria
 - → poor micronutrient absorption (iron, vit B12)
 - → malabsorption of thyroid hormone replacement medication
- Hypothyroidism can be associated with exocrine pancreatic insufficiency (EPI)
 - → may require enzyme replacement & lifestyle changes
- Hypothyroidism can impair gallbladder motility & formation of gallstones



(Campbell AW., 2014; Cellini M et al., 2017; Chen C et al., 2018; Danailova Y et al., 2022; Gullo L et al., 1991; Hiromatsu Y et al., 2013; Knezevic J et al., 2020; Kulkarni V et al., 2022; Mezzomo & Nadal, 2016; Virili C et al., 2018; Xinhuan Su et al., 2020)

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Part 3:

Reclaiming Thyroid Health

Causes of Gut Dysbiosis

- Genetics
 - Early colonization
 - Birth in hospitals
 - Childhood exposure to microbes
- Lifestyle
 - Diet
 - Stress
- Medical Practices
 - Vaccinations
 - Antibiotic use
 - Hygiene



(Campbell AW., 2014; Danailova Y et al., 2022; Frommer & Kahaly, 2021; Guo J et al., 2020; Hao W et al., 2021; Hazan S et al., 2022; Knezevic J et al., 2020; Mezzomo & Nadal, 2016; Seong H et al., 2023)

Poll Question

Approximately half of people who are sensitive to gluten are also sensitive to which of the following?

- a) Soy
- b) Nuts
- c) Egg
- d) Fermented foods

Gut-Health Supporting Tools

- Probiotics 10-100 billion CFU
- Glutamine
- Aloe vera
- Vitamin A
- Zinc
- Quercetin
- Fiber
- Colostrum
- Collagen
- Prebiotics



(Campbell AW., 2014; Danailova Y et al., 2022; Knezevic J et al., 2020; Mezzomo & Nadal, 2016; Virili C et al., 2018; Xinhuan Su et al., 2020)

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Vitamin D and Autoimmune Thyroid Disease

- Vitamin D receptors are present on immune cells & most body tissues
- Vitamin D def linked to ↑ susceptibility to various autoimmune conditions
 - Strong association b/w ↓ vit D status & autoimmune thyroid disease (Hashimoto's & Graves)
 - Hashimoto's: ↓ vit D correlate with levels of thyroid antibodies
- 25OHD: good indicator of vitamin D stores
- Optimal levels are controversial
 - Most labs consider 30 ng/dL as acceptable
 - 50-70 ng/dL is best for immune support, bone health, mood effects, & other benefits



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(Aranow C., 2011; Danailova Y et al., 2022; De Leo S et al., 2016; Frohlich & Wahl, 2017; Hiromatsu Y et al., 2013; Mezzomo & Nadal, 2016; Nettore IC et al., 2017; Xu MY et al., 2015)

Micronutrient Testing and Supplementation

- Consider micronutrient testing
 - Routine blood tests
 - Advanced micronutrient testing
- ↑ food sources and/or supplementation if necessary
- Pharmaceutical or medical-grade supplements
 - Avoid unnecessary fillers in supplements
 - Dye, gluten, soy, dairy
- Test levels before supplementing
 - Iodine: only if urinary iodine/creatinine levels are low



(Chung HR., 2014; Danailova Y et al., 2022; Krysiak R et al., 2019; Mezzomo & Nadal, 2016; Wang K et al., 2018)

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Micronutrients for Optimal Thyroid Function

- Iodine
 - pregnant/breastfeeding women have ↑ needs
- Selenium
 - Daily recommended amount for those with autoimmune thyroid disease: 200 mcg daily
- Iron
 - Blood test for ferritin evaluates iron storage levels, optimal ferritin for thyroid function: at least 50 ng/mL
- Zinc
- Magnesium
 - Blood test to assess: magnesium red blood cell count (RBC), optimal level 6.0 mg/dL
- Keeping key thyroid micronutrients (like iodine & selenium) optimal helps to ↓ some of thyroid disruptor effects



(Chung HR., 2014; Danailova Y et al., 2022; Mezzomo & Nadal, 2016; Ventura M. et al., 2017; Wang K et al., 2018)

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Limit Exposure to Thyroid Disruptors

- Organic foods when possible
- Limit BPA: glass bottles or containers over plastic bottles & cans
- PFO-free cookware (ceramic, ceramic-coated, carbon steel)
- PFO-free clothing fabrics
 - PFAS Central website: pfascentral.org
- Consider avoiding fluoride dental treatments
- Avoid fluoridated water
 - Use water filter, spring water, distilled water
 - Fluoride Action Network, fluoridealert.org
- Environmental Working Guide, [EWG.org](https://www.ewg.org)

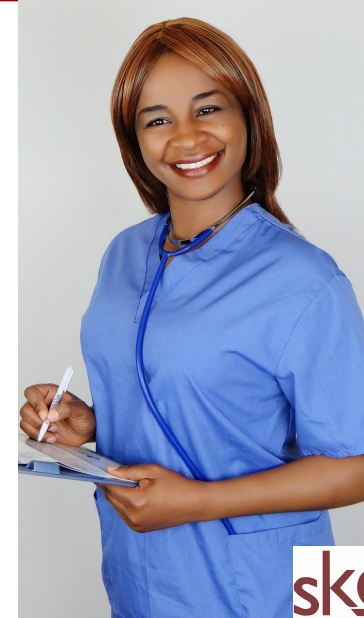


(Ashley J. et al., 2018; Buha A et al., 2018; Gore et al., 2015; Kheradpisheh Z. et al., 2018; Maaik van Gerwen a b., et al., 2023; Orihuela D, 2011; Pamphlett R et al., 2021; Peckham S et al., 2015; Ramadan & Saif Eldin, 2022; Rivera-Buse JE et al., 2023; Sirikul & Sapbamrer, 2023; Turyk ME et al., 2007; Zuo Y et al., 2021)

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Monitoring Hashimoto's Thyroiditis

- Re-evaluation of symptoms & thorough lab assessment
- Elevation in thyroid antibodies indicates a triggered immune system
 - If they continue to ↑ or fail to ↓, further investigation is needed
 - Gut permeability issues?
 - Unrecognized infection or toxin exposure?
 - Inflammatory diet?



(Campbell AW., 2014; Danailova Y et al., 2022; Fasano A, 2012; Frohlich & Wahl, 2017; Knezevic J et al., 2020; Krysiak R et al., 2019; Virili C et al., 2018; Xinhuan Su et al., 2020)

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Case Study

- RR is an 18 yr old female who presents for consultation with her mother.
- Found to have abnormal TFTs & antibodies in 2014.
- Mother notes severe colds & ear infections as toddler treated with abx.
- Pt notes some fatigue but has busy schedule. Also notes “upset stomach” & abdominal bloating that seems to worsen with dairy.
- Has mostly GF meal plan.
- Mother very reluctant to start any prescription meds.

Case Study (continued)

- PMedHx: pertinent for HPI
 - PSxHx: none
 - Meds: MVI, vitamin D3 2000 IU daily, probiotic
 - FamHx: Hashimoto's thyroiditis - mother & sister
 - SocHx: high school student; Denies EtOH or tobacco
 - ROS: pertinent for HPI
-
- Physical exam
 - Vitals: BP 116/64; P 72; R 12; T 97.8°F
 - Height: 5'7" Weight: 120 lbs
 - Neck: *non-tender symmetric thyromegaly* without palpable nodularity or lymphadenopathy

Case Study (continued)

Recent labs available for review:

- TSH **4.710 uIU/mL** (0.450-4.500 uIU/mL)
- FT4 **1.15 ng/dL** (0.93-1.60 ng/dL)
- antiTPO **207 IU/mL** (0-26 IU/mL)
- TgAB **13.1 IU/mL** (0.0-0.9 IU/mL)
- 250HD **20.3 ng/mL** (30.0-100.0 ng/mL)

Case Study (continued)

- Assessment
 - Autoimmune thyroiditis
 - Hypovitaminosis D
- Care Plan
 - Start gluten/soy/dairy free meal plan
 - Discuss adequate sleep
 - Change to 12.5 billion CFU probiotic
 - Start Digestive Enzymes with larger meals
 - Start Selenium 200 mcg daily
 - Increase Vitamin D3 to 5000 IU daily
 - Test for intestinal permeability

Case Study (continued)

Follow up 6 weeks

- Feeling better overall.
- Notes less GI upset and abdominal bloating.
- Trying to keep with meal planning and adequate sleep.

- Physical exam
 - Slight decrease in thyromegaly

Case Study (continued)

Follow up labs

- TSH 2.060 (0.450-4.500 uIU/mL) {4.710}
- FT4 1.20 ng/dL (0.93-1.60 ng/dL) {1.15}
- FT3 3.8 pg/mL (3.0-4.7 pg/dL)
- antiTPO 180 (0-26 IU/mL) {207}
- TgAB 7 IU/mL (0.0-0.9 IU/mL) {13.1}
- RT3 12 mg/dL (3-25 mg/dL)
- 250HD 63 (30.0-100.0 ng/mL) {40.3}
- Celiac diagnostic panel negative

Questions?

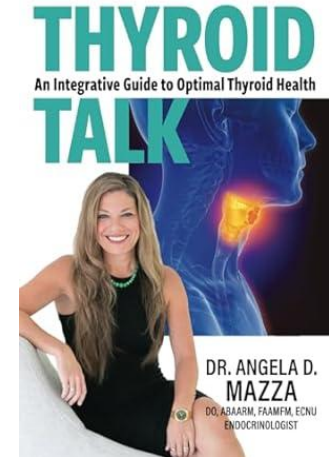


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For Your Continued Learning

Thank you for attending!

- Learn more with [Thyroid Talk: An Integrative Guide to Optimal Thyroid Health \(18.75 CPEUs\)](#), at [SkellySkills.com](#)
- Live attendees: You'll get a link to the feedback survey in one hour/CE Cert tomorrow
- Learn more about Dr. Angela D. Mazza, DO, ABAARM, FAAMFM, ECNU and her practice at [metaboliccenterforwellness.com](#)
- Free masterclass: [Thrive Through Thyroid](#): Increase Energy, Beat Brain Fog, Optimize Weight, based on Dr. Angela's book
 - <https://www.thrivethyroid.com>



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