Thyroid Hypofunction I - Part Six

Nutrients for thyroid health

Iodine	B2
Selenium	Vitamin C
Iron	Vitamin A
Zinc	Vitamin D
B12	Magnesium

So far, we've been talking about hypothyroidism due to immune dysfunction, Hashimoto's; inflammation; or gut imbalances or toxins, but the thyroid needs several nutrients to function properly, including iodine, selenium, iron, zinc, B12, B2, vitamin C, vitamin A, vitamin D, and magnesium. This is again why I constantly come back to the importance of a nutrient-dense diet with organ meats and shellfish because a deficiency, or excess in the case of iron, iodine, or vitamin D, can impair the function of the thyroid gland.

Let's start with iodine. It's an essential nutrient required for reproduction and growth, and it's only known function is the synthesis of thyroid hormone. Globally, iodine deficiency remains a significant issue, but most studies suggest that iodine deficiency is rare in the industrialized world, due in large part to the iodization of salt.

However, there are some important caveats to be aware of. First, analysis of the NHANES data suggests that iodine intake in the U.S. dropped by 50 percent from the 1970s to the late 1990s. Also, certain subpopulations such as women of childbearing age, children, and vegans are at higher risk for iodine deficiency. For example, severe iodine deficiency in women of childbearing age nearly quadrupled during the period I just mentioned, and the most recent NHANES data from 2005 to 2008 indicated that 35 percent of pregnant women had urinary iodine levels below the 100 mcg/L threshold, which indicates mild deficiency. NHANES data also suggests that only 20 percent of pregnant women in the U.S. take an iodine-containing supplement, and only 51 percent of multivitamins contain iodine, and many do not contain the amount of iodine that they say they do.

Reduction in iodine intake is likely due to several factors. The primary dietary sources of iodine in the U.S. are bread, dairy, and iodized salt. Sea vegetables and fish heads are also good sources, but few people outside of Asia consume these foods regularly. Over the past few decades, iodate dough conditioners in commercially produced bread have been removed and replaced with bromide. Intake of iodized salt has declined due to concerns about heart disease. Restaurant and processed foods use salt that isn't iodized, and only 70 percent of table salt is iodized, and the iodine content in dairy products may have declined. Also, both kids and adults are more often following restricted diets that don't include bread or dairy, and they've replaced iodized salt with sea salt. It's estimated that over 60 percent of dietary iodine intake in the U.S. comes from dairy. Iodine is in dairy feed and also in the iodophor disinfectants used in the milking process. This explains why studies have shown that vegans who don't consume dairy are more often iodine deficient and have subclinical hypothyroidism as a result than vegetarians. No similar studies have been done on Paleo dieters, but my guess is that many may be deficient in iodine because they don't consume bread, dairy, or table salt.

One case report of a five-year-old child following a gluten- and casein-free diet presented with fatigue and constipation. His TSH was high, and his T4 and T3 were low. They did a thyroid ultrasound and tested his antibodies, and both were negative. They tested his iodine levels, and they were very low. They put him on 150 mcg of iodine, and both symptoms and lab markers improved dramatically, and he was able to maintain this improvement without the use of thyroid hormone.

Another recent study of 140 women planning to conceive in Washington, D.C., measured iodine levels in the urine. Using a TSH cutoff of 3.0, they found that about 11 percent of women with urine iodine levels below 100 mcg/L had lab markers consistent with subclinical hypothyroidism. So together, this data indicates that iodine deficiency may be a bigger issue in our patient population than conventional wisdom suggests, and this is especially true for the at-risk populations such as kids, women of childbearing age, pregnant and nursing women, African Americans, and people on diets that don't include bread, dairy, iodized salt, sea vegetables, or fish heads.

Thyroid				
TSH	**12.500**	**High**	uIU/mL	0.450 – 4.500
Thyroxine (T4)	6.1		ug/dL	4.5 – 12.0
T3 Uptake	28		%	24 – 39
Free Thyroxine Index	1.7			1.2 – 4.9
Triiodothyronine (T3)	179		ng/dL	71 – 180

DHEA, LC/MS/MS	135	102-1185	ng/dL	NL
Iodine, Serum and Plasma	**47 L**	52-109	mcg/L	AM
Testosterone, Free (Dialysis) and Total (LC/MS/MS)				
Testosterone, Free	1.1*	0.1-6.4	pg/mL	SL
Testosterone, Total, LC/MS/MS	22*	2-45	ng/dL	SL

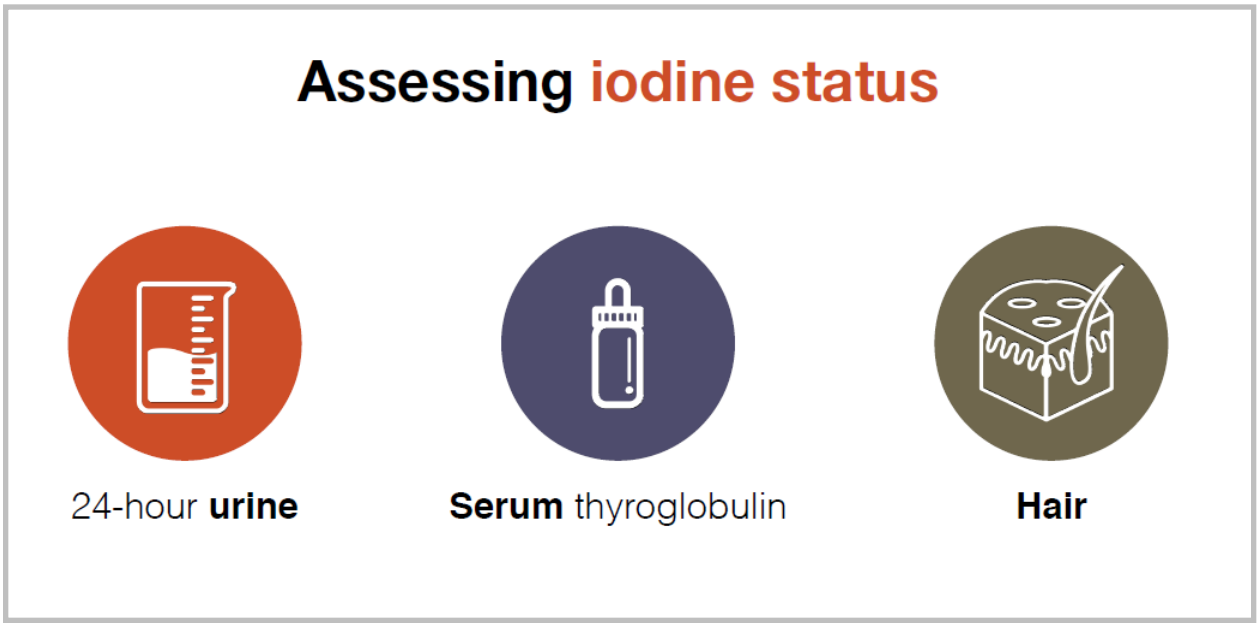
This patient is a 48-year-old female with fatigue, cold hands and feet, restless legs syndrome, heart palpitations, headaches, and constipation. Her TSH was 12.5. T4 and T3 were normal, so this is subclinical hypothyroidism. Her thyroid antibodies were negative on three occasions prior to seeing me, and she also had a thyroid ultrasound, which was negative. She had been on a Paleo diet for four years, strictly dairy-free, only sea salt. Did not eat sea vegetables or fish head soup or cod, which is a relatively good source of iodine. Her doctor ran serum iodine, and I'll talk about testing more shortly, and her levels were low. We started her on iodine supplementation, and her TSH normalized, and many of her symptoms improved.

Let's talk a little bit about testing for iodine. In most population studies, iodine is tested using spot urine, which is convenient, easy, and does correlate fairly well with recent iodine intake. However, studies have shown that urine iodine and even 24-hour urine collections are not accurate for individuals because of significant intraindividual day-to-day variations in iodine intake. It has been shown that about 10 spot urine collections are needed to estimate iodine intake with acceptable precision, and that's clearly not practical in an outpatient setting. Some clinicians have advocated iodine challenge urine testing where a patient takes a large dose of iodine, often 50 mg, and

collects urine for 24 hours afterward. This is based on research showing that 90 percent of ingested iodine should be excreted in the urine when the patient has sufficient iodine intake in the diet. However, this testing hasn't been validated to my knowledge and has been criticized by iodine researchers. A recent study in 2014 indicated that hair iodine may be a better marker of longer-term iodine intake and current iodine status.

What about serum iodine? It's not considered to be a very accurate indicator. However, serum thyroglobulin levels, not thyroglobulin antibodies but thyroglobulin itself, are considered to be a fairly sensitive marker of iodine status. It has an inverse relationship, so high thyroglobulin indicates low iodine status, and levels above 40 mcg/L are suggestive of deficiency.

If you have a patient with hypothyroidism, two to three negative antibody tests, and a negative thyroid ultrasound, you should at least consider iodine deficiency. This is especially true if they are not consuming any iodine-rich foods and if they are a child, a woman of childbearing age, or African American.



You have two options at this point: begin supplementation without testing or test. For testing, given the equivocality of various methods, I'd suggest combining serum thyroglobulin with 24-hour urine and possibly hair as well, and you can run hair iodine with Doctor's Data Essential Toxic Hair Elements profile. Since treatment in any case will simply be to increase iodine intake, you could potentially just skip the testing if patient funds are limited, and we'll talk more about iodine intake in the treatment section.