Undertanding

THYROID FUNCTION

for competitors

WITH **ANGEL COMPETITION BIKINIS**

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01 Introduction to the thyroid gland

The thyroid gland, shaped like a butterfly and located at the base of the neck, might be small, but its influence on your health is significant. It plays a crucial role in regulating your metabolic rate, energy levels, and numerous bodily functions. When your thyroid is functioning well, you experience enhanced vitality, mental clarity, and well-being. Conversely, thyroid dysfunction can lead to decreased energy, mood swings, sluggish digestion, weight loss resistance, and issues with hair, skin, and nails. In addressing thyroid health, the functional nutrition and medicine approach emphasizes that most thyroid conditions arise from underlying issues within the body. Micronutrient deficiencies, gut imbalances, chronic stress, and liver or kidney problems are all potential triggers for thyroid dysfunction. For bodybuilders, especially during intense competition prep, maintaining thyroid health is vital. The stress and rigorous demands of training and dieting can impair thyroid function, making it essential to know and recognize warning signs of down regulation and support the thyroid effectively to optimize your performance and health.

How does the thyroid work?

The thyroid functions in tandem with the hypothalamus and pituitary gland to produce thyroid hormones. The hypothalamus releases thyroid-releasing hormone (TRH), which signals the pituitary to secrete thyroid-stimulating hormone (TSH). TSH then stimulates the thyroid to produce thyroxine (T4) and triiodothyronine (T3). 90-95% of what the thyroid produces is T4, named for its four iodine atoms. T3, named for its three iodine atoms, makes up the remaining 5-10%. Both hormones circulate through the bloodstream, impacting virtually every cell in the body.

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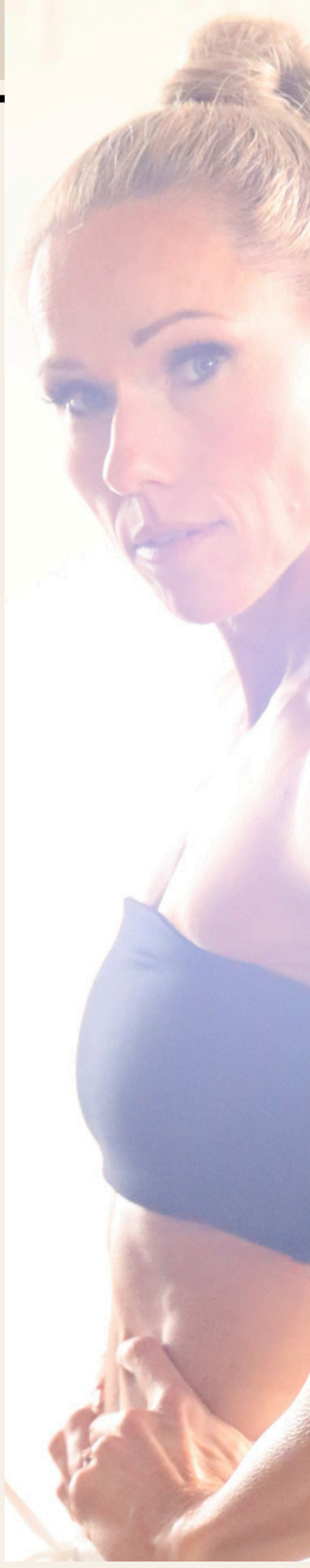

The production of T4 by the thyroid gland is regulated by TSH, which is secreted by the pituitary gland at the base of the brain. The pituitary adjusts TSH levels based on the amount of T4 it detects. When T4 levels are low, the pituitary increases TSH production to stimulate the thyroid to produce more T4. Conversely, when T4 levels rise above a certain threshold, TSH production decreases or stops, signaling the thyroid to reduce T4 production. This system functions much like a heater and thermostat: the thermostat activates the heater when it's too cold and turns it off when the desired temperature is reached. Similarly, the thyroid and pituitary work together to maintain optimal hormone levels.

T4 however is primarily an inactive hormone and needs to be converted into the active hormone T3 for use by the body's cells. This conversion, known as deiodination, involves removing an iodine molecule from T4 through enzymes called deiodinases. This process takes place in the liver, kidneys, brain, and other tissues where T3 exerts its effects.

During prolonged periods of elevated cortisol, the body will increase the production of reverse T3 (rT3), an inactive form of T3. rT3 competes with T3 for cellular receptors but fails to activate them because while rT3 is derived from T4 and contains the same number of iodine atoms, its iodine attachments differ. High levels of rT3 can function as a metabolic brake, slowing down metabolic processes and conserving energy—an adaptive response that was crucial for survival during times of calorie scarcity but not great during a competition prep!

Additionally, it's important to consider the levels of bound versus unbound thyroid hormones. T4 and T3 circulate mainly bound to specific transport proteins and cannot be used by the body while bound. Only the unbound, or "free", forms of T4 and T3 are capable of affecting cells and tissues. Changes in transport protein levels, which can occur during pregnancy or with the use of birth control pills, can affect the amount of bound T4 and T3. Therefore, testing both free and total hormone levels is essential for an accurate assessment of thyroid function.

03 How to test thyroid

A comprehensive thyroid panel via blood labs is the best way to test thyroid. This test should include Thyroid Stimulating Hormone (TSH), Free (FT3), Free (FT4), Total T4, Iodine Serum, Vitamin D and, if possible, selenium, and zinc. From here, if support is needed, lifestyle changes, nutritional strategies and supplementation can be put in place where necessary.

TSH results have an inverse relationship with output. A high TSH level indicates that the thyroid gland is not making enough thyroid hormone (primary hypothyroidism). The opposite situation, in which the TSH level is low, usually indicates that the thyroid is producing too much thyroid hormone (hyperthyroidism). Changes in TSH can serve as an “early warning sign” to dysfunction as changes in this hormones often occur before levels of T4 and T3 in the body become too high or too low.

Occasionally, a low TSH may result from an abnormality in the pituitary gland, which prevents it from making enough TSH to stimulate the thyroid (secondary hypothyroidism). In most healthy individuals, an optimal TSH value means that the thyroid is functioning properly.

What are optimal levels?

It's important to distinguish between normal reference ranges in blood work and what is considered optimal health. These are not the same. Normal reference ranges are established by analyzing data from a large population to determine the average (mean) result and the expected variation from that average (standard deviation). The reference range represents the set of values within which 95% of the population falls, known as the 95% prediction interval. This range is defined by taking two standard deviations on either side of the mean. Three of the main issues with normal ranges include:

1. Individuality - An individual’s abnormal results may still fall within the reference range and thus might not be flagged as problematic. This is why it's important to get baseline lab work while you’re feeling well, for competitors perhaps in improvement season, so you have a personal reference for what is normal for you.

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2. The word "normal" - “Normal" can have multiple meanings, including healthy, non-diseased, or the ‘most common’ result. But just because someting is common, doesn’t mean it’s optimal.

3. Population trends and location - Reference ranges can be skewed by population trends and location, such as an increase in obesity, the prevalence of certain disorders or the area of the country you live in. For example, if a significant portion of the population is experiencing a condition like obesity, the reference range might shift to reflect this altered health status, potentially normalizing values that would otherwise be considered abnormal in a healthier population. This can make it challenging to identify deviations that might indicate underlying health issues, as the reference ranges become adjusted to fit the current health trends rather than representing an optimal state of health.

So while normal reference ranges may change, optimal ranges do not. The following chart is a comparison of normal to optimal lab ranges for reference:

Test	Normal Range	Optimal Range
TSH	0.4-4.5 uU/mL	1.0-2.0 uU/mL
Free T3	2.3-4.2 pg/mL	3-3.5 pg/mL
T3, Total	76-181 ng/dL	90-168 ng/dL
Free T4	0.8-1.8 ng/dL	1-1.5 ng/dL
T4, Total	4.5-12 ug/dL	6-11.9 ug/dL
Vitamin D 25-OH	30-100 ng/mL	60-90 ng/mL
Iodine	52-109 ug/L	52-80 ug/L
Zinc	50-130 ug/dL	99-130 ug/dL
Selenium	63-160 ug/L	70-121 ug/L

05 What affects thyroid function?

Several factors can impact thyroid function, including food sensitivities or allergies, chronic stress, toxins, inflammation, nutrient deficiencies, inadequate sleep, certain medications, trauma, changes in gut bacteria, and adrenal dysfunction. For competitors, chronic stress, nutrient deficiencies, and changes in the gut microbiome are particularly significant.

Chronic stress during prep is often the most common trigger for compromised thyroid function. When the body is under stress, the hypothalamus-pituitary-adrenal (HPA) axis increases cortisol production to manage the situation. During acute stress, cortisol prioritizes energy for essential functions while diverting it away from non-essential functions, including thyroid hormone production. Although this acute response is usually temporary, the HPA axis is not equipped to handle prolonged or chronic stress. Persistent high cortisol levels inhibit the release of TSH from the pituitary gland, reducing the stimulation of the thyroid gland and impairing its hormone production. Over time, excessive cortisol also hampers the conversion of inactive T4 to the active form, T3, and instead promotes the production of reverse T3 (rT3), an inactive form that slows metabolism. Additionally, elevated cortisol decreases the sensitivity of cell receptors to thyroid hormones, making it more difficult for these hormones to enter cells and exert their effects.

Stress can arise from physical sources (such as over-exercising or inadequate recovery) or from mental and emotional sources (such as work, family, or relationship issues). Contest prep often involves significant levels of both types of stress, which can exacerbate their impact on thyroid function.

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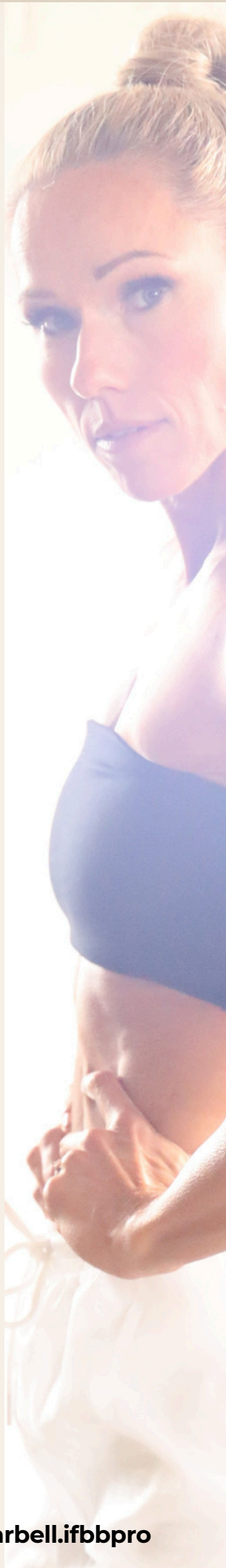
Prolonged or extreme low-calorie diets, also known as low energy availability, create significant physical stress that disrupts pituitary function, impacting TSH release and altering levels of T3 and rT3. Historically, this response was crucial for survival during periods of famine, as the body prioritized energy conservation by slowing the metabolic rate. In today's fast-paced, instant-gratification seeking world, similar stressors arise from crash diets, high-demand work environments, and hectic lifestyles. Despite the different triggers, the body responds similarly by increasing rT3 production and slowing the metabolic rate.

Nutritional deficiencies stemming from low-calorie diets further affect thyroid health. The thyroid needs iodine, iron, selenium, and zinc, as well as vitamins B12, D3, and A to produce hormones effectively. Iodine is essential for synthesizing T4 and T3; inadequate levels (below 150 mcg for adults) can lead to disorders such as goiter and hypothyroidism. Foods rich in iodine include seaweed, saltwater fish, and dairy products. Selenium is also important, as it is a component of deiodinases—enzymes that convert T4 to T3—and helps protect the thyroid from oxidative stress while regulating the balance between T3 and rT3. Good sources of selenium include Brazil nuts, sunflower seeds, animal protein, and eggs. Aim to consume 55 mcg of selenium per day.

Changes in the gut microbiome affect thyroid as well. A balanced gut microbiome helps maintain the integrity of the gut barrier, preventing the leakage of harmful substances that can trigger systemic inflammation. This increased intestinal permeability and inflammation may negatively impact thyroid health by affecting the synthesis and conversion of thyroid hormones as specific gut bacteria are involved in the conversion of T4 to T3. Due to the repetitive nature of prep meal plans, the lack of diet variation can cause these changes in the microbiome. To support balance, make sure to incorporate a variety of fiber-rich foods such as fruits, vegetables, legumes, and whole grains as well as fermented foods into your menu as much as possible and steer clear of processed foods and sugars.



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07 Thyroid warning signs and symptoms

Toxic exposure can also impair thyroid function. Toxins are widespread in today's environment—found in food, packaging, water, and personal care products. Many common chemicals, such as fluoride, disrupt thyroid function. Fluoride, present in toothpaste, mouthwash, drinking water, cleaning agents, pesticides, and products like Teflon, can block the iodine transport necessary for thyroid hormone production. This interference can lead to reduced thyroid hormone levels and elevated TSH levels through a negative feedback loop.

Competitors walk a fine line of over-exercising and extreme dieting to achieve a stage lean physique. To avoid long-term dysfunction, it is essential to carefully manage timeline, nutrition, supplementation, and deloads and refeeds as well as monitor blood work. Warning signs of thyroid issues can manifest through subtle and sometimes interconnected changes in both physical and emotional health. Early recognition of these changes is crucial for effectively addressing thyroid problems and maintaining overall well-being.

Signs of hyperthyroid:

- Anxiety or nervousness
- Hair loss
- Weight loss
- Irregular menstrual cycles
- Shaking
- Hyperactivity
- Feeling hot

Signs of hypothyroid function:

- Fatigue
- Weight gain
- Constipation or other digestive issues
- Dry skin and hair
- Brain fog
- Depression
- Cardiovascular dysfunction (dyslipidemia or atherogenesis)
- Glucose intolerance or insulin resistance

It's important to note that you may not have all of these symptoms for a thyroid condition to be present and you may also have some of these symptoms present without a thyroid issue. Conditions play out differently in everyone. If you feel something is off, it's best to test.

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Is medication forever?

Bodybuilders sometimes receive prescriptions for thyroid hormones to address imbalances or support metabolic function, especially when preparing for competition or dealing with the stresses of intense training and dieting. While thyroid hormone supplementation can be beneficial in managing short-term thyroid dysfunction or optimizing metabolic rates, it's generally not intended for long-term use. The body's natural thyroid function can often recover once the stressors or underlying issues are addressed, such as through adjustments in diet, training, or stress management. Long-term reliance on thyroid hormones can disrupt the body's natural hormone production and balance, potentially leading to dependency. It's crucial to use thyroid hormone prescriptions under the guidance of a healthcare professional and to explore lifestyle and nutritional strategies that also support the thyroid's health naturally.

After the competition, supplementation can typically be phased out, with emphasis shifting to diet and lifestyle changes to restore natural thyroid function. For more information on thyroid function, strategies for thyroid support, or thyroid testing, please contact Laura to schedule a free discovery call. Together, we can optimize your thyroid health to help you achieve your best physique and support your long-term well-being!

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