

# BioThy™

## Supports Healthy Thyroid Function

### Recommended Use:

- ▶ Thyroid Dysfunction
- ▶ Weight management
- ▶ Fatigue, exhaustion
- ▶ Cold sensitivity
- ▶ Fatigue due to stress

BioThy™ is a well-balanced formulation for thyroid support. The combination of an amino acid (L-tyrosine), trace minerals (iodine, selenium and zinc) and protein hydrolysate are clinically identified for addressing symptoms associated with thyroid dysfunction, including chronic fatigue, depression, menstrual dysfunction, recurrent infections, difficulty losing weight, cold sensitivity, and osteoporosis.

The release of T3 and T4 is controlled by the HPT (hypothalamus-pituitary-thyroid) axis. In response to TSH(released from the pituitary) the thyroid gland produces two major hormones, triiodothyronine (T3) and thyroxine (T4). T4 represents about 93% of the hormone produced by the thyroid and only 7% of what is produced is T3.

T3 and T4 control the metabolic rate of the body, protein synthesis, energy release from carbohydrates, the rate of growth in the young, sexual maturity, early maturation of the nervous system, bone and skeletal muscle development.

T3 is the more biologically active thyroid hormone. Under healthy conditions the body is able to convert most T4 to T3 (via deiodinase enzymes). Some deiodinases are located in the thyroid itself but most of the T4 is converted peripherally. Subtypes of the enzymes (D1 and D2), are present in the kidney, liver, thyroid, brain, pituitary and skeletal muscles and poor peripheral conversion is often part of the picture when it comes to hypothyroid states.

Ingredient	Mode of Action:
L-tyrosine	Thyroid hormone precursor and neurotransmitter of dopamine, norepinephrine and epinephrine.
Iodine (kelp)	Basic substance of the thyroid gland used to produce thyroxine.
Selenium (selenomethionine)	Increases calcium absorption. Required for peripheral conversion of T4 → T3
Protein hydrolysate	Balances plasma thyroxine concentration.
Zinc (citrate)	Required for T4 to T3 conversion; immune system stimulant.

Another hormone produced by the thyroid is calcitonin. It is responsible for regulating calcium levels in the blood by inhibiting the rate at which calcium leaves bone tissue. This is why people with advanced hypothyroidism often present with osteoporosis.

### Iodine

The thyroid gland requires approximately 150 micrograms of iodine per day for thyroid hormone synthesis.<sup>10</sup> Sixty percent of the body's iodine intake is stored in the thyroid gland and is used for the production of T3 and T4. Although iodine deficiencies are thought to be uncommon in developed countries, a 2001 study, from New Zealand, found that there was a rise of the population that were low in iodine and low enough to exhibit clinical measures of low thyroid activity (enlarged thyroid and elevated thyroglobulin).<sup>1</sup> Most peoples daily iodine comes from iodinated salt, therefore, with health campaigns trying to lower our salt intake there is a consequential drop in iodine intake. Having iodine in BioThy ensures that sufficient daily requirements are met.



#### Medicinal Ingredients:

Each capsule contains:

L-Tyrosine (Anas falcata, feather)	200 mg
Iodine (kelp)	100 mcg
Selenium (selenomethionine)	100 mcg
Zinc (zinc citrate)	10 mg

**Non-medicinal Ingredients:** Microcrystalline cellulose, gelatin (capsule), animal protein hydrolysate and powder, magnesium stearate.

**Recommended Dose (adults):** Take 1 capsule 2 times a day with food or as directed by a health care practitioner. Take a few hours before or after taking other medications.

**Caution/Warnings:** Zinc supplementation can cause a copper deficiency.

**Contraindications:** Consult a health care practitioner if you are pregnant or breastfeeding. Consult a health care practitioner prior to use if you are following a low protein diet or if you have a history of non-melanoma skin cancer.

NPN 80045509 • 60 Capsules.



## Selenium

The thyroid is the organ with the highest selenium content per gram of tissue. This is due to the high amount of selenium requiring enzymes needed for proper thyroid function. Outside of the thyroid, selenium is a constituent of the D1 enzyme, responsible for the peripheral conversion of T4 to T3 in the liver and kidneys. This enzyme is markedly reduced in selenium deficiency and poor peripheral conversion can occur as a result. Due to its association with the conversion of T4 to active T3, it's no surprise selenium deficiency can contribute to hypothyroidism.<sup>2, 10</sup> One study on children with congenital hypothyroidism showed that supplementing with 20-60mg/day of selenium caused a 74% increase in plasma selenium, normalized the levels of TSH and improved the conversion of T4 to active T3.<sup>3</sup> Other studies have yielded similar results.<sup>4</sup>

Selenium is also a major component of the enzyme glutathione peroxidase.<sup>9</sup> This enzyme is required to balance the H2O2 levels in the thyroid, thus preventing oxidative damage and apoptosis of the thyroid cells.

## Zinc

The relationship between zinc and the thyroid is bidirectional. Thyroid hormone influences the absorption and excretion of zinc and zinc influences the function of the thyroid.<sup>11</sup> More specifically Zinc helps stimulate the secretion of TSH from the pituitary and is required for thyroid transcription factors.<sup>11</sup>

In addition to improving the production of thyroid hormones, zinc (much like selenium) is needed for the peripheral conversion of T4. Studies have revealed that zinc deficiency reduced the concentration of T3 and T4 in serum by approx. 30% and the D1 enzyme by 67%.<sup>6</sup>

In general, zinc homeostasis is distributed in people with thyroid dysfunction. Those with hypothyroidism often will present with low zinc status.<sup>5</sup>

Unsurprisingly, when zinc is supplemented, in these zinc deficient populations, you see an increase in free T3 and an increase in their resting metabolic rate.<sup>11</sup>

## L-tyrosine

L-tyrosine is a direct precursor to T3/T4 and is a necessary amino acid in the production of neurotransmitters, including epinephrine, norepinephrine, and dopamine. L-tyrosine is the only metabolically active form of this amino acid, in humans, and therefore is superior to simple protein formulas.<sup>14</sup> L-tyrosine has been found to help optimize thyroid hormone levels and increase their concentration and productivity. Supplementation with L-tyrosine can assist a sluggish thyroid and play a role in achieving weight loss.

## Protein hydrolysate

Protein hydrolysate assists to balance plasma thyroxine concentrations, which increase the metabolic rate and lowers the plasma cholesterol concentration.<sup>7, 8</sup> Low protein consumption will also inhibit peripheral conversion of T4 to T3, thus a complete protein profile will aid in more active thyroid hormone. Also, studies have shown giving metabolites and analogues of thyroid components, inevitably present in bovine hydrolysates, has the potential to mitigate some of the biochemical barriers to treating resistance to thyroid hormone (RTH) syndromes.<sup>13</sup>

**Clinical pearls:** Hypothyroidism can cause a wide variety of anemic disorders and all types of anemia (normochromic normocytic, hypochromic microcytic and macrocytic) are more prevalent in hypothyroid population.<sup>12</sup> Improving iron status, in iron deficient populations, results in improved thyroid metabolism, more conversion of T4 to T3 and decreases circulating TSH.<sup>13</sup>

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