

## **High T® (All Natural Testosterone Booster)**

### **Overview**

High T® provides a select combination of nutrients to naturally benefit testosterone production, sexual function, muscle health, and energy. These nutrients include Arginine Alpha-Ketoglutarate, Eurycoma Longifolia, Fenugreek, Rhodiola Rosea, Testofen™, vitamins B6, B12, and E, and Zinc.

### **Description**

In a man's brain, there is a complex chain of signals called the hypothalamic-pituitary-gonadal axis. The testosterone produced in the testes is regulated by this chain. At the onset of puberty, there is a rapid increase in the production of testosterone. But just as rapidly as it increases at puberty, testosterone production begins to slow from the age of thirty. Key ingredients in High T® have been clinically proven to boost free testosterone levels leading to increased sexual libido, muscle mass and energy levels.

### **Research**

#### **Arginine Alpha-Ketoglutarate**

Arginine Alpha-Ketoglutarate (AAKG) is a compound that is composed of L-arginine and alpha-ketoglutarate. As a precursor to nitric oxide production, Arginine Alpha-Ketoglutarate (AAKG) increases blood flow and transports nutrients to the skeletal muscles to improve athletic performance.

Researchers recruited 35 adult men that participated in resistance training to take AAKG (4,000 mg), or a placebo, for eight weeks. Muscle endurance, anaerobic power, aerobic capacity, and body composition were analyzed to determine AAKG's effect on trained male athletes. Other studies have found AAKG increased some measures of strength training, including maximum bench press repetition and power performance.<sup>1,2</sup>

Nitric oxide is suggested to improve exercise capacity by relaxing vascular smooth muscles. An L-arginine and antioxidant supplement was given to aged male cyclists to find that it improved their anaerobic threshold.<sup>3</sup>

#### **Eurycoma Longifolia**

Eurycoma Longifolia is a flowering plant that is native to Indonesia and Malaysia. Researchers found eurycoma longifolia has androgenic effects, which has traditionally been used as an aphrodisiac and observed to increase male virility, sexual desire, and well-being.<sup>4,5</sup> Various animal studies have also found the herb improves sexual characteristics and libido.<sup>6,7,8</sup> Testosterone levels have also been shown to increase in rats taking eurycoma longifolia.<sup>9</sup>

#### **Rhodiola Rosea**

Rhodiola rosea is a plant that grows in cold regions around the world, such as Siberia, the Arctic, and Northwestern China. It is considered an adaptogen, as it contains properties (rosavins) that strengthen the body's resistance to mental and physical fatigue. It has been shown to alleviate stress and oxidative stress in the body, while it improves immunity, energy, and sexual function. A three month study gave 35 men with

libido ailments rhodiola rosea to find it improved sexual function.<sup>10</sup> A twelve week study found that rhodiola rosea extract, in combination with vitamins and minerals, improved physical and mental deficiencies in 120 adults. These physical disturbances included fatigue, decreased motivation, and low libido. Eighty-one percent of the patients reported that supplementation was very beneficial at alleviating physical and cognitive deficiencies.<sup>11</sup>

### **Testofen™ Fenugreek Extract**

Fenugreek is an herb that has been used in traditional Indian medicine for many years. This aromatic spice contains a variety of active compounds, including over 100 phytochemical constituents. Its properties have been shown to support libido and testosterone function. These key constituents include various types of saponins or saponin glycosides. Fenuside is a type of saponin glycoside that has libido supporting properties. Testofen™ is composed of this active ingredient, which is extracted and standardized to provide significant benefits. Testofen helps promote healthy testosterone levels.

Testofen™ (600 mg/day) or a placebo was given to 60 healthy males (ages 25 to 52) for six weeks to determine the effects on libido. Researchers found that the extract had positive effects on libido, as well as muscle strength, energy, and well-being.<sup>12</sup> Fenugreek (500 mg) was given to 49 resistance-training males for eight weeks to determine the effects on body composition and strength. Researchers found that the extract significantly influenced upper and lower body strength, as well as body composition.<sup>13</sup> The anabolic and androgenic activity of fenugreek's glycosides were evaluated in an animal study to find that the compound supported healthy erectile function, testosterone function, and muscle mass.<sup>14</sup>

### **Trigonella Foenum-graecum (Fenugreek)**

Trigonella Foenum-graecum, also known as fenugreek, has been shown to have anti-inflammatory and analgesic properties, as well as positive effects on muscle health.<sup>15</sup> Trigonella Foenum-graecum was shown to have a beneficial influence on muscle tissue growth in male broiler chicks that were given the extract.<sup>16</sup>

Trained male cyclists consumed a fenugreek supplement with a glucose beverage to understand the effect on post-exercise muscle glycogen resynthesis. After an overnight fast, participants completed a 90-minute glycogen-depleting ride. A muscle biopsy was taken to find that adding fenugreek to a glucose beverage improved post-exercise glycogen resynthesis better than a glucose beverage without fenugreek.<sup>17</sup>

### **Vitamin B6**

Vitamin B6 helps to relieve stress and sustain healthy hormone levels. Vitamin B6 has been shown to act as a modulator of steroid hormones and gene expression.<sup>18</sup> Furthermore, it is essential to protein metabolism and muscle health.<sup>19</sup> A supplement that contained zinc, vitamin B6, and magnesium was given to athletes to find the supplement combination improved testosterone levels and muscle function.<sup>20</sup>

### **Vitamin B12**

A vitamin B12 deficiency can cause fatigue, lack of motivation, raised homocysteine levels, mood imbalances, and muscle weakness.<sup>21,22</sup> Vitamin B12 is imperative to healthy neurological function and overall health.<sup>23</sup>

### **Vitamin E**

Vitamin E is a benefit to testosterone production and blood circulation. As a strong antioxidant, vitamin E reduces oxidative stress and benefits gene expression in the male reproductive organs.<sup>24</sup> One study found a combination of vitamin E and C protected the testes from reactive oxygen species.<sup>25</sup> It also protects the organs from lipid peroxidation.<sup>26</sup>

Vitamin E has been shown to lower inflammation and oxidative stress in the hypothalamic-pituitary-gonadal (HPG) axis. Researchers found that this vitamin's effects on protecting the HPG helped to stabilize testosterone and other hormone levels that were altered by HPG inflammation.<sup>27</sup> Additionally, an animal study found that vitamin E inhibited a decrease in testosterone levels that was on the decline after a dioxin treatment.<sup>28</sup>

## **Zinc**

Moderate levels of zinc are needed to help the body sustain healthy testosterone levels. Normal testosterone levels are associated with sufficient levels of zinc in the body.<sup>29</sup> The essential trace element also improves sperm count and sex drive.<sup>30</sup>

Zinc supplementation was shown to inhibit the decline in testosterone and thyroid hormones that is associated with exhaustive exercise in male wrestlers.<sup>31</sup> A six-week study recruited 100 male patients with kidney ailments to take a zinc supplement as a means to determine if zinc would increase sex hormone levels. Researchers found that the supplement did increase serum testosterone, luteinizing hormone, and zinc levels to help improve sexual function.<sup>32</sup>

## **Additional Information – Dosage, Precautions, Interactions**

### **Suggested Use**

As a dietary supplement, take 4 capsules daily with water. For best results, exercise, proper hydration, and a sensible diet are required. Use this product for no less than 8 weeks for maximum results.

### **Dosage**

**Arginine Alpha-Ketoglutarate** – Up to 20 grams per day

**Eurycoma Longifolia** – Up to 3,000 mg per day

**Rhodiola rosea** - Up to 300 mg per day (6 mg rosavins, 3 mg salidroside)

**Testofen™** - Up to 90 grams per day; or 3 to 4 mL of a tincture can be taken up to three times each day.

**Trigonella Foenum-graecum** - Up to 90 grams per day; or 3 to 4 mL of a tincture can be taken up to three times each day.

**Vitamin B6** – 2 mg to 20 mg per day

**Vitamin B12** – Up to 5,000 mcg per day

**Vitamin E** - 100 to 400 mg per day (149 to 596 IU per day)

**Zinc** – Up to 30 mg per day

### **Precautions**

The maximum safe dosage of this supplement has not been determined for children, pregnant or nursing women, or those with severe liver or kidney disease. As with all supplement regimens, please consult your physician prior to use.

**Arginine Alpha-Ketoglutarate** - There are no known adverse reactions with proper supplementation.

**Eurycoma Longifolia** - There are no known adverse reactions with proper supplementation.

**Rhodiola Rosea** – There are no known adverse reactions with proper supplementation.

**Testofen™** - More than 100 grams per day can cause stomach upset and nausea.

**Trigonella Foenum-graecum** – More than 100 grams per day can cause stomach upset and nausea.

**Vitamin B6** – High doses of vitamin B6 can cause nausea, abdominal pain, vomiting, loss of appetite, and breast soreness.

**Vitamin B12** – Individuals with Leber's disease (eye problems) should not use.

**Vitamin E** - Individuals with blood clotting or blood pressure problems should consult their physician prior to supplementation. Excessive amounts of vitamin E may cause an upset stomach, headache, fatigue, or blurred vision.

**Zinc** – High doses of zinc can lead to copper deficiency or cause stomach upset.

### **Drug Interactions**

If you are taking the following medications, consult your physician before taking High T.

**Arginine Alpha-Ketoglutarate** - There are no known interactions with proper supplementation.

**Eurycoma Longifolia** - There are no known interactions with proper supplementation.

**Rhodiola Rosea** – There are no known interactions with proper supplementation.

**Testofen™** - Glipizide, Heparin, Ticlopidine, Warfarin.

**Trigonella Foenum-graecum** – Glipizide, Heparin, Insulin, Ticlopidine, Warfarin.

**Vitamin B6** – Amiodarone, Carbamazepine, Cycloserine, Ethionamide, Fosphenytoin, Hydralazine, Isoniazid, Levodopa, Oral Contraceptives, Penicillamine, Phenytoin, Phenobarbital, Theophylline, Valproic acid.

**Vitamin B12** – Antibiotics, H2 blockers, Aminosalicylic Acid, Metformin, Nitrous oxide, Proton pump inhibitors (omeprazole, etc.) may all decrease vitamin B12 absorption.

**Vitamin E** - Anticoagulants (Warfarin), Amiodarone, Anticonvulsants, Colestipol, Cyclosporine, Isoniazid, Neomycin, Orlistat, Sucralfate, Zivudine.

**Zinc** – Antibiotics block zinc absorption.

\* These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

- <sup>1</sup> Campbell B, Roberts M, Kerksick C, Wilborn C, et al. Pharmacokinetics, safety, and effects on exercise performance of L-arginine alpha-ketoglutarate in trained adult men. *Nutrition*. 2006 Sep; 22(9):872-881.
- <sup>2</sup> Campbell B, Baer J, Roberts M, et al. Effects of arginine alpha-ketoglutarate supplementation on body composition and training adaptations. *Sports Nutr Rev J* 2004;1:S10.
- <sup>3</sup> Chen S, Kim W, Henning SM, Carpenter CL, Li Z. Arginine and antioxidant supplement on performance in elderly male cyclists: a randomized controlled trial. *J Int Soc Sports Nutr*. 2010 Mar;7:13.
- <sup>4</sup> Ang HH, Cheang HS. Effects of Eurycoma longifolia jack on laevator ani muscle in both uncastrated and testosterone-stimulated castrated intact male rats. *Archives of pharmacal research*. 2001;24(5):437-440.
- <sup>5</sup> Cyranoski D. Malaysian researchers bet big on home-grown Viagra. 2005 *Nature Medicine*. 2005;11(9):912.
- <sup>6</sup> Ang HH, Ngai TH, Tan TH. Effects of Jack on sexual qualities in middle aged male rats". *Phytomedicine*. 2003;10(6-7):590-593.
- <sup>7</sup> Ang H, Cheang HS, Yusof AP. Effects of Eurycoma longifolia Jack (Tongkat Ali) on the Initiation of Sexual Performance of Inexperienced Castrated Male Rats. *Experimental Animals*. 2000;49(1):35-38.
- <sup>8</sup> Ang HH, Lee KL, Kiyoshi M. Sexual arousal in sexually sluggish old male rats after oral administration of Eurycoma longifolia Jack. *J of basic and clin physio& pharma*. 2000;15 (3-4):303-309.
- <sup>9</sup> Zanolli P, Zavatti M, Montanari C, Baraldi M. Influence of Eurycoma longifolia on the copulatory activity of sexually sluggish and impotent male rats. *J Ethnopharmacol*. 2009 Nov;126(2):308-313.
- <sup>10</sup> Khanum F, Bawa AS, Singh B. Rhodiola rosea: a versatile adaptogen. *Comprehensive Rev*. 2005 Jul;4(3):55-62.
- <sup>11</sup> Fintelmann V, Gruenwald J. Efficacy and tolerability of a Rhodiola rosea extract in adults with physical and cognitive deficiencies. *Adv Ther*. 2007 Jul;24(4):929-939.
- <sup>12</sup> Steels E, Rao A, Vitetta L. Physiological Aspects of Male Libido Enhanced by Standardized Trigonella foenum-graecum Extract and Mineral Formulation. *Phytother Res*. 2011 Feb 10.
- <sup>13</sup> Poole C, Bushey B, Foster C, Campbell B, et al. The effects of a commercially available botanical supplement on strength, body composition, power output, and hormonal profiles in resistance-trained males. *J Int Soc Sports Nutr*. 2010;7:34.
- <sup>14</sup> Aswar U, Bodhankar SL, Mohan V, Thakurdesain PA. Effect of Furostanol Glycosides from Trigonella foenum-graecum on the reproductive system of Male Albino Rats. *Phytother Res*. 2012;24:1482-1488.
- <sup>15</sup> Vyas S, Agrawal RP, Solanki P, Trivedi P. Analgesic and anti-inflammatory activities of Trigonella foenum-graecum (seed) extract. *Acta Pol Pharm*. 2008 Jul-Aug;65(4):473-476.
- <sup>16</sup> Khan FU, Ullah A, Rahman SU, Naz S. Fenugreek (Trigonella foenum-graecum L.) effect on muscle growth of broiler chicks *Research Opinions & Vetern Scien*. 2011;1(1):1-3.
- <sup>17</sup> Ruby BC, Gaskill SE, Slivka D, Harger SG. The addition of fenugreek extract (Trigonella foenum-graecum) to glucose feeding increases muscle glycogen resynthesis after exercise. *Amino Acids*. 2005 Feb; 28(1):71-76.

- <sup>18</sup> Oka T. Modulation of gene expression by vitamin B6. *Nutr Res Rev*. 2001 Dec;14(2):257-266.
- <sup>19</sup> Mooney S, Leuendorf J, Hendrickson C, Hellman H. Vitamin B6: A long known compound of surprising complexity. *Molecules*. 2009;14(1):329-351.
- <sup>20</sup> Brilla LR, Conte V. Effects of a novel zinc-magnesium formulation on hormones and strength. *J of Exerc Physiol*. 2000;3(4):26-36.
- <sup>21</sup> Neilsen MJ, Rasmussen MR, Andersen CB, et al. Vitamin B12 transport from food to the body's cells--a sophisticated, multistep pathway. *Nat Rev Gastroenterol Hepatol*. 2012;9(6):345-354.
- <sup>22</sup> Tiemeier H, van Tuijl HR, Hofman A, Meijer J, et al. Vitamin B12, folate, and homocysteine in depression: the Rotterdam Study. *Am J Psychiatry*. 2002 Dec;159(12):2099-2101.
- <sup>23</sup> Cadogan MP. Functional implications of vitamin B(12) deficiency. *J Gerontol Nurs*. 2010 Jun;36(6):16-21.
- <sup>24</sup> Rota C, Barella L, Minihane AM, Stocklin E, Rimbach G. Dietary alpha-tocopherol affects differential gene expression in rat testes. *IUBMB Life*. 2004 May;56(5):277-280.
- <sup>25</sup> Sen Gupta R, Sen Gupta E, Dhakal BK, Thakur AR, Ahnn J. Vitamin C and vitamin E protect the rat testes from cadmium-induced reactive oxygen species. *Mol Cells*. 2004 Feb 29;17(1):132-139.
- <sup>26</sup> Aydilek N, Aksakal M, Karakilcik AZ. Effects of testosterone and vitamin E on the antioxidant system in rabbit testis. *Andrologia*. 2004 Oct;36(5):277-281.
- <sup>27</sup> Zhu Q, Emanuele MA, LaPaglia N, Kovacs EJ, Emanuele NV. Vitamin E prevents ethanol-induced inflammatory, hormonal, and cytotoxic changes in reproductive tissues. *Endocrine*. 2007 Aug;32(1):59-68.
- <sup>28</sup> Yin HP, Xu JP, Zhou XQ, Wang Y. Effects of vitamin E on reproductive hormones and testis structure in chronic dioxin-treated mice. *Toxicol Ind Health*. 2012 Mar;28(2):152-161.
- <sup>29</sup> Chang CS, Choi JB, Kim HJ, Park SB. Correlation between serum testosterone level and concentrations of copper and zinc in hair tissue. *Biol Trace Elem Res*. 2011 Dec;144(1-3):264-271.
- <sup>30</sup> Croxford TP, McCormick NH, Kelleher SL. Moderate zinc deficiency reduces testicular Zip6 and Zip10 abundance and impairs spermatogenesis in mice. *J Nutr*. 2011 Mar;141(3):359-65.
- <sup>31</sup> Kilic M, Baltaci AK, Gunay M, Gokbel H, et al. The effect of exhaustion exercise on thyroid hormones and testosterone levels of elite athletes receiving oral zinc. *Neuro Endocrinol Lett*. 2006 Feb;27(1-2):247-252.
- <sup>32</sup> Jalali GR, Roozbeh J, Mohammadzadeh A, Sharifian M, et al. Impact of oral zinc therapy on the level of sex hormones in male patients on hemodialysis. *Ren Fail*. 2010 May;32(4):417-419.