

## HAPPI GUMMIES ASTAXANTHIN: An Excellent Choice to Boost Immune System

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DOI: <https://doi.org/10.46759/IIJSR.2024.8203>

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Article Received: 09 February 2024

Article Accepted: 21 April 2024

Article Published: 29 April 2024

### ABSTRACT

Gummy bears (German: *Gummibär*) are small, fruit-gum candies, similar to a jelly baby. The candy is roughly 2 cm (0.8 in) long and shaped in the form of a bear. Astaxanthin is a naturally occurring carotenoid that is derived from the microalgae *Haematococcus pluvialis* being the most powerful antioxidant known to science, it also has potent anti-inflammatory properties. Natural astaxanthin's distinct advantage in comparison to other antioxidants is its ability to span the entire lipid bilayer of the cell membrane, thus providing superior protection from the inside out. Natural astaxanthin has a strong ability to both balance and strengthen the immune system.

**Keywords:** Astaxanthin; *Haematococcus pluvialis*; Anti-inflammatory; Antioxidants; Immune system.

### Introduction

The immune system is made up of a network of cells, tissues, and organs that work together to protect the body against infectious microorganisms, such as certain bacteria and viruses; while also working to destroy any infectious microorganisms that manage to invade the body. Phagocytes are cells that destroy invading organisms, while lymphocytes are cells that allow the body to remember and recognize previous invaders and help the body destroy them – the innate immune response. Natural astaxanthin has shown positive effects and substantial benefits in enhancing the capacity of both lymphocytes and phagocytes.

Inflammation is the body's biological response to harmful stimuli. Acute inflammation is the initial response to such stimuli and in most cases it can be visually identified. The other form of inflammation is "chronic inflammation"; it is often called the **silent killer**. Unlike the acute type chronic inflammation builds up in the body as a result of the immune system constantly responding to threats.

### Composition of Astashine Gummies

Figure 1. Nutritional Facts		
Serving Size: 1 Gummy (3.5 g)		Serving per pack: 30
		Amount per Serving
Energy	12.556	Kcal
Total Fat	<0.1	g
- Trans Fat	<0.1	g
- Saturated Fat	0	g
Total Carbohydrates	2.814	g

- Sugar	2.814	g
- Dietary fiber	0	g
Protein	<0.1	g
Salt	<0.001	mg
Cholesterol	0	mg
<b>Astaxanthin</b>	<b>2</b>	<b>mg</b>
<b>Vitamin D</b>	<b>400</b>	<b>IU</b>
<b>Vitamin E (As Alpha Tocopherol)</b>	<b>10</b>	<b>mg</b>
<b>Percent Daily Values are Based on a 2000-calorie Diet.</b>		
<b>*Daily value not established.</b>		

Chronic inflammation is one of the major causes of accelerated aging and many of its associated diseases such as chronic heart disease, arthritis, or allergies. It is characterized by the release of cytokines and pro-inflammatory markers such as tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), C-reactive protein (CRP), and others. Luckily, we can test for inflammation by measuring these different biological markers in the blood which will indicate inflammation levels.

Natural astaxanthin has been shown to help significantly decrease the expression of pro-inflammatory markers and mediators, thus providing potent anti-inflammatory protection in the body. Several studies have been conducted to understand the anti-inflammatory mechanism of astaxanthin and it is thought to be related to the inhibition of the Nf-kB inflammatory pathway [5].

### Nano-Micro Emulsion Technology & Cold Water Soluble Vitamin E

#### Astaxanthin gummies support -

Improved bioavailability

Enhanced solubility

Increased stability

More efficacy

**Nano and micro-emulsions** are both types of colloidal dispersions in which small droplets of one liquid are dispersed throughout another liquid. The droplets in Nanoemulsions are typically between 20-200 nm in diameter, while those in microemulsions are larger, typically between 100-500 nm. Both types of emulsions offer several benefits, including **Astaxanthin gummies benefits in -**

Brain Health

Skin Health & UV Protection

Eye Health

Cardiovascular Health

Immune System

Anti-Aging & Cellular Health

Male Fertility

Bone, Joint, Tendon and Muscle

Athletic Performance & Energy Levels

### ☐ **Pharmacology**

**NEUROVASCULAR PROTECTION:** Decrease the oxidation of Red blood cells, decreases the incidence of ischemic stroke, and improves memory and learning.

**SKIN AGING DEFENCE:** Prevents UV-induced wrinkle formation, skin sagging, and age spots; improves skin elasticity and skin dryness.

**LIVER HEALTH and METABOLIC SYNDROME:** Inhibits progression of fatty liver disease, increases fat burning, and decreases inflammatory markers.

**LOWERING GASTRIC INFLAMMATION:** Reduces Helicobacter pylori inflammation, gastric ulceration, indigestion, acid reflux, heartburn, and stomach pain.

**MUSCLE RESILIENCE:** Enhances power output, endurance, and recovery after exercise; prevents muscle damage and muscle atrophy.

**EYE FATIGUE RELIEVE:** Reduces eye fatigue in subjects suffering from visual display syndrome.

**IMMUNE SYSTEM BOOSTER:** Reduces DNA damage in immune cells and enhances the immune response.

**CARDIOVASCULAR HEALTH:** Fights atherosclerosis by decreasing blood pressure, lipid deposits, lipid peroxidation, and vascular inflammation.

**ANTI-DIABETES:** Improves pancreatic function, insulin resistance, and insulin sensitivity.

**KIDNEY PROTECTION:** Reduces glucose toxicity and kidney inflammation.

**FERTILITY:** Improves sperm parameters and fertility.

**CAPILLARY CIRCULATION:** Improves blood flow and capillary integrity; reduces blood cell oxidation and the risk of thrombosis.

### ☐ **Mechanism of Action**

Astaxanthin's outstanding properties as an anti-inflammatory also play a major role in its ability to enhance immune function. Due to the multitude of ways in which Astaxanthin combats inflammation, it is a very special anti-inflammatory indeed. Both in-vitro and in-vivo research has been done to uncover its mechanism of action as an anti-inflammatory. This mechanism has been further demonstrated in several double-blind, placebo-controlled human clinical trials on various inflammatory conditions.

Astaxanthin works to suppress different inflammatory mediators. Among these mediators are tumor necrosis factor-alpha (TNF-a), prostaglandin E-2 (PGE-2), interleukin 1B (IL-1b), and nitric oxide (NO). In one experiment done with mice and also in-vitro, Astaxanthin was shown to suppress TNF-a, PGE-2, IL-1b, NO as well as the Cox-2 enzyme and nuclear factor kappa-B.

Another study done the same year was led by a researcher from Japan's Hokkaido University Graduate School of Medicine. Here, the researchers found similar results: Astaxanthin was shown in-vitro to decrease the production of NO, PGE-2, and TNF-a. This study also looked at Astaxanthin's anti-inflammatory effect in the eyes of rats. The researchers induced uveitis (inflammation of the inner eye including the iris) and found that Astaxanthin had a "dose-dependent ocular anti-inflammatory effect, by the suppression of NO, PGE-2 and TNF-a production, through directly blocking nitric oxide synthase enzyme activity".

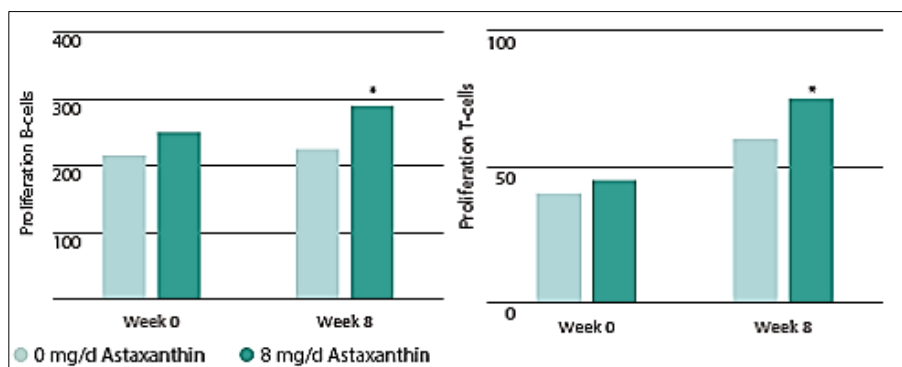
### 🔬 Clinical Study Reports of Astaxanthin in Astashine Gummies

#### ASTASHINE Gummies Enhance Immune Response

The immune system is made up of a network of cells, tissues, and organs that work together to protect the body against infectious microorganisms, such as certain bacteria and viruses; whilst also working to destroy any infectious micro-organisms that manage to invade the body.

Phagocytes are cells that destroy invading organisms, while lymphocytes are cells that allow the body to remember and recognize previous invaders and help the body destroy them – the innate immune response.

Natural astaxanthin in ASTASHINE Gummies has shown positive effects and substantial benefits in enhancing the capacity of both lymphocytes and phagocytes. The first human study to show this effect was published by Park *et al.* in 2010. In this double-blind, placebo-controlled study, 42 individuals received 0 or 8 mg/d astaxanthin (AX) vs. placebo. Lymphocyte count was significantly increased for the AX group. In addition, those receiving AX demonstrated a significant increase in the levels of B and T cells (figure 2).

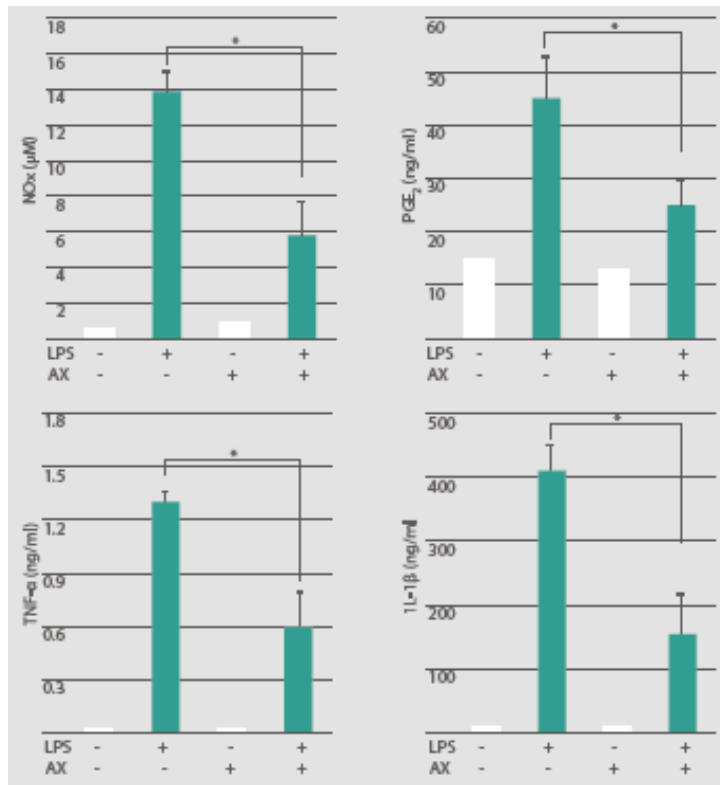


**Figure 2.** The effect of astaxanthin on immune response was measured in a double-blind, randomized study involving 42 subjects. B-cells and T-cells were exposed to high concentrations of mitogens and their capacity to proliferate was measured. \*p<0.05 compared with control immune cells against oxidative

Research has shown that natural astaxanthin is also a potent anti-inflammatory and is particularly effective against chronic inflammation. To test its efficacy, scientists have examined the levels of Pro-inflammatory markers with

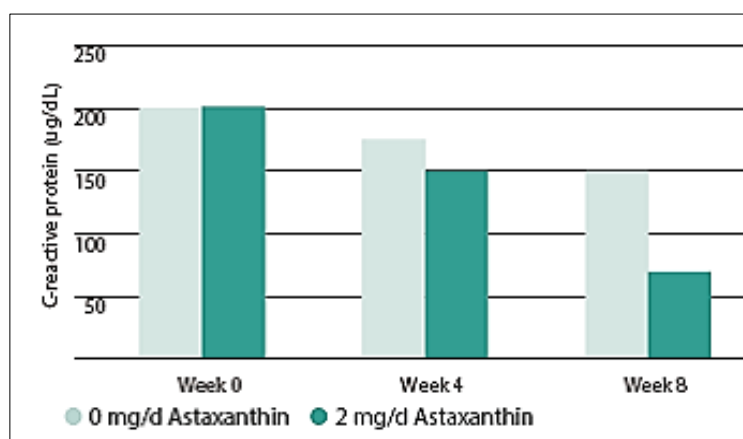
and without the presence of astaxanthin. In a 2003 model study, Seon *et al.* found that astaxanthin significantly decreased the expression of different pro-inflammatory markers in Lipopolysaccharide-induced inflammation (LPS) (Figure 3).

LPS=Lipopolysaccharide AX=Astaxanthin



**Figure 3.** LPS-induced inflammation shows a significant decrease in plasma levels of pro-inflammatory markers NO, PGE<sub>2</sub>, TNF-α, and IL-1β

In another randomized, double-blind placebo-controlled study; Park *et al.* (2010) examined 42 subjects for the pro-inflammatory marker CRP. The astaxanthin group supplemented with 2mg/d for 8 weeks showed that the levels of CRP were significantly reduced.



**Figure 4.** 8 weeks of supplementation with 2mg/d natural astaxanthin significantly reduced the expression of the pro-inflammatory marker C-reactive protein (CRP)

### ☼ Safety of Astashine Gummies

Astaxanthin has demonstrated safety in numerous human clinical trials. In one open-label clinical study on subjects with metabolic syndrome (n=17). Astaxanthin (16 mg/day, for three months) significantly raised blood bilirubin ( $p \leq 0.05$ ), potassium ( $p \leq 0.05$ ), and creatine kinase ( $p \leq 0.01$ ), although all three values remained within the normal range. Also, astaxanthin significantly lowered the liver enzyme gamma-glutamyltranspeptidase (GGTP;  $p \leq 0.05$ ). Since the researchers noted this enzyme was abnormally elevated in 11 of the 17 subjects at baseline, this astaxanthin effect may have been beneficial. Animal experiments have investigated astaxanthin at levels well over 120 mg/day in human equivalents, without causing apparent harm. Hoffman-La Roche confirmed its safety with extensive tests, including acute toxicity, mutagenicity, teratogenicity, embryotoxicity, and reproductive toxicity.

### ☼ Supplement Facts

**Presentation:** Gummies.

**Usage:** As a food supplement combination of antioxidants to improve health and vitality.

**Contra-indications:** The product is contra-indicated in persons with Known hypersensitivity to any component of the product hypersensitivity to any component of the product.

**Recommended usage:** *Adults:* two Gummies per day along with food.

“Do not exceed the recommended daily dose”.

**Administration:** Taken by oral route at any time with food.

**Precautions:** Food Supplements must not be used as a substitute for a varied and balanced diet and a healthy lifestyle. This Product is not intended to diagnose, treat, cure or prevent any diseases.

**Warnings:** If you are taking any prescribed medication or have any medical conditions or have any medical conditions (seizures) under the age group 17 years always consult a doctor or healthcare practitioner before taking supplements.

**Side Effects:** Mild side effects like nausea, headache, and vomiting in some individuals have been reported.

**Storage:** Store in a cool, dry and dark place.

Keep out of reach of children.

### ☼ Summary & Conclusion

Studies demonstrate that astaxanthin in HAPPI Gummies helps to balance the immune system by stimulating its infection, while also helping suppress the overactive immune responses that create needless inflammation [6].

Astaxanthin increases the numbers and activity of white blood cells called lymphocytes and natural killer cells that are responsible for creating the body's innate immune response to invaders [7-9].

Astaxanthin has similar immune-boosting effects in humans, improving the ability of protective white blood cells to surround and destroy infecting organisms, especially fungi such as *Candida albicans* [10]. Astaxanthin also

protects human lymphocytes and neutrophils against the oxidant stresses imposed by the actions of certain white blood cells without reducing the killing effects of white blood cells themselves [11].

Human studies reveal astaxanthin's beneficial actions on the immune system in patients with allergies and asthma. When astaxanthin was given to asthmatic patients, it suppressed reactive cell activation as well as or better than the antihistamine drugs [12].

### **Declarations**

#### **Source of Funding**

This study has not received any funds from any organization.

#### **Conflict of Interest**

The authors declare that they have no conflict of interest.

#### **Consent for Publication**

The authors declare that they consented to the publication of this study.

### **References**

- [1] Chew, B.P., et al. (2011). Dietary astaxanthin enhances immune response in dogs. *Vet Immunol and Immunopathol.*, 140: 199–206.
- [2] Park, J.S., Chyun, J.H., Kim, Y.K., Line, LL., & Chew, B.P. (2010). Astaxanthin decreased oxidative stress and inflammation and enhanced immune response in humans. *Nutr. Metab.*, 5: 7–18.
- [3] Park, J.S., Kim, H.W., Mathison, B.D., Hayek, M.G., Massimino, S., Reinhart, G.A., & Chew, B.P. (2010b). Astaxanthin uptake in domestic dogs and cats. *Nutr. Metab.*, 7: 52–59.
- [4] Macedo, R.C., et al. (2010). Astaxanthin addition improves human neutrophils function: in vitro study. *Eur J Nutr.*, 49: 447–457.
- [5] Seon-Jin, L., et al. (2003). Astaxanthin Inhibits Nitric Oxide Production and Inflammatory Gene Expression by Suppressing I $\kappa$ BKinase-dependent NF- $\kappa$ B Activation. *Mol. Cells*, 16(1): 97–105.
- [6] Chew, B.P., & Park, J.S. (2004). Carotenoid action on the immune response. *J Nutr.*, 134(1): 257S–61S.
- [7] Nakao, R., Nelson, O.L., Park, J.S., Mathison, B.D., Thompson, P.A., & Chew, B.P. (2010). Effect of dietary astaxanthin at different stages of mammary tumor initiation in BALB/c mice. *Anticancer Res.*, 30(6): 2171–5.
- [8] Chew, B.P., Mathison, B.D., Hayek, M.G., Massimino, S., Reinhart, G.A., & Park, J.S. (2011). Dietary astaxanthin enhances immune response in dogs. *Vet Immunol Immunopathol.*, 140(3–4): 199–206.
- [9] Park, J.S., Mathison, B.D., Hayek, M.G., Massimino, S., Reinhart, G.A., & Chew, B.P. (2011). Astaxanthin stimulates cell-mediated and humoral immune responses in cats. *Vet Immunol Immunopathol.*, 144(3–4): 455–61.

- [10] Macedo, R.C., Bolin, A.P., Marin, D.P., & Otton, R. (2010). Astaxanthin addition improves human neutrophils function: in vitro study. *Eur J Nutr.*, 49(8): 447–57.
- [11] Bolin, A.P., Guerra, B.A., Nascimento, S.J., & Otton, R. (2012). Changes in lymphocyte oxidant/antioxidant parameters after carbonyl and antioxidant exposure. *Int Immunopharmacol.*, 14(4): 690–7.
- [12] Mahmoud, F.F., Haines, D.D., Abul, H.T., Abal, A.T., Onadeko, B.O., & Wise, J.A. (2004). In vitro effects of astaxanthin combined with ginkgolide B on T lymphocyte activation in peripheral blood mononuclear cells from asthmatic subjects. *J Pharmacol Sci.*, 94(2): 129–36.