

Give your Immune System a Boost with AstaReal®

Benefits of natural astaxanthin for the immune system



Natural astaxanthin possesses potent anti-inflammatory properties

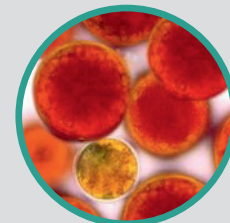
Inflammation is the body's biological response to harmful stimuli. Acute inflammation is the initial response to such stimuli and in most cases it can be visually identified. The other form of inflammation is "chronic inflammation"; it is often called the silent killer since there are very few, if any,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

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- α (TNF- α), C-reactive protein (CRP) and others. Luckily, we can test for inflammation by measuring these different biological markers in the blood which will give an indication of inflammation levels.

Natural astaxanthin has been shown to help significantly decrease the expression of pro-inflammatory markers and mediators, thus providing a 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).

What is Natural Astaxanthin?

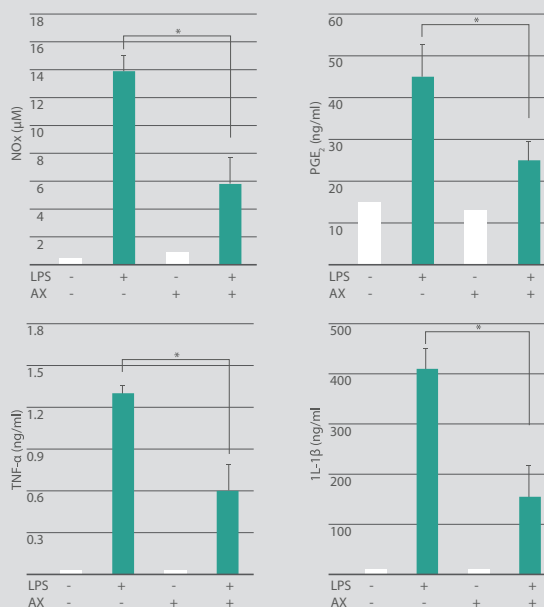
It is a naturally occurring carotenoid which is derived from the microalgae *Haematococcus pluvialis*. As well as being the most powerful antioxidant known to science, it also



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.

Research & Key Findings

Research has shown that natural astaxanthin is 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 1).



LPS=Lipopolysaccharide AX=Astaxanthin

Figure 1. LPS-induced inflammation showing significant decrease in plasma levels of pro-inflammatory markers NO, PGE₂, TNF- α , and IL-1 β .

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 2).



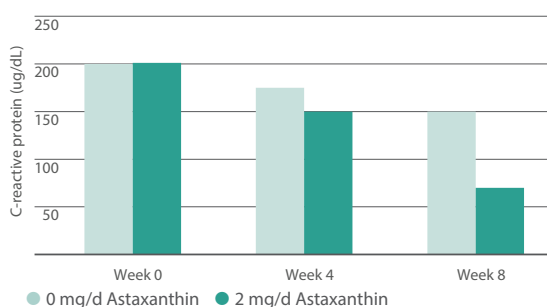


Figure 2. 8 weeks of supplementation with 2mg/d natural astaxanthin significantly reduced the expression of the pro-inflammatory marker C-reactive protein (CRP).

AstaReal® – The Most Studied Brand

There are over 400 peer-reviewed studies on astaxanthin and AstaReal® has been featured in the vast majority of these studies. The clinical database for AstaReal® contains over 50 human studies including 23 double-blind, placebo-controlled trials with more than 1,400 participants undergoing treatments lasting from 2 weeks to 6 months.

Superior Product Range

AstaReal AB offers a range of bulk products to fit different formats, allowing for the development of innovative products that add astaxanthin's unsurpassed antioxidant power.

In addition, AstaReal AB has developed a range of finished formulations containing AstaReal® natural astaxanthin, each expertly developed to support a number of health areas.



Enhance Immune Response with Natural Astaxanthin

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 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 benefit 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 3).

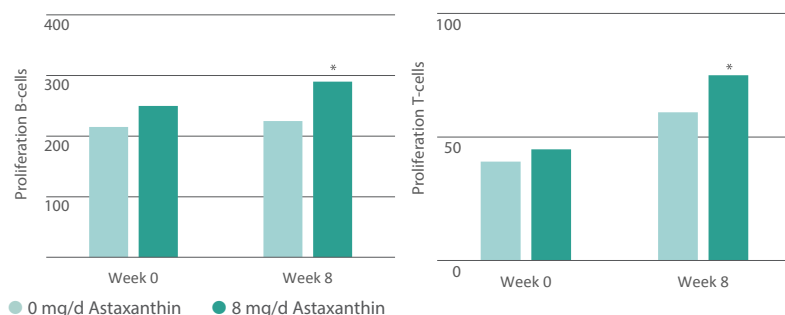


Figure 3.

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 (2). *p<0.05 compared with control.

References & Selected Publications

1. Chew, B.P. *et al.*, 2011. Dietary astaxanthin enhances immune response in dogs. *Vet Immunol and Immunopathol.* 140 (2011) 199-206.
2. Park, J.S., Chyun, J.H., Kim, Y.K., Line, L.L., 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 RC *et al.*, Astaxanthin addition improves human neutrophils function: in vitro study. *Eur J Nutr.* 2010;49:447-457.
5. Seon-Jin L. *et al.* 2003. Astaxanthin Inhibits Nitric Oxide Production and Inflammatory Gene Expression by Suppressing IκB Kinase-dependent NF-κB Activation. *Mol. Cells*, Vol. 16, No. 1, pp. 97-105.

Benefits of Natural Astaxanthin for the Immune System:

- 1 Potent anti-inflammatory properties
- 2 Faster immune response
- 3 Strengthens and balances the immune system
- 4 Protects immune cells against oxidative stress