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Research Article

Astashine capsules: an excellent choice for eye fatique relieve.

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ABSTRACT

Scientists long ago discovered that a class of naturally-occurring pigments called carotenoids held powerful antioxidant properties that are crucial for eye health. This carotenoid is called astaxanthin. Astaxanthin is produced by the microalgae *Haematococcus pluvialis* when its water supply dries up, forcing it to protect itself from ultraviolet radiation. Astaxanthin is leaps and bounds more powerful than beta-carotene, alpha-tocopherol, lycopene, and lutein--other members of its chemical family. Astaxanthin exhibits very strong free radical scavenging activity, and protects eyes from oxidative damage. Astaxanthin is by far the most powerful carotenoid antioxidant when it comes to free radical scavenging: it is 65 times more powerful than vitamin C, 54 times more powerful than beta-carotene, and 14 times more powerful than vitamin E. Astaxanthin is far more effective than other carotenoids at "singlet oxygen quenching," which is a particular type of oxidation. The damaging effects of sunlight and various organic materials are caused by this less-stable form of oxygen. Astaxanthin is 550 times more powerful than vitamin E and 11 times more powerful than beta-carotene at neutralizing this singlet oxygen. Astaxanthin crosses the blood-brain barrier and the blood-retinal barrier which has huge implications for the health of eyes.

INTRODUCTION

It is similar to beta-carotene but a slight difference in the structure, and causes a radical difference in biological activity. It is ten times stronger than beta-carotene and up to 500 times stronger than vitamin E as an antioxidant. Unique aspects of the astaxanthin structure allow it to pass the "blood brain barrier", meaning it can deliver antioxidant activity benefits directly to the brain, eyes and nervous system.

Astaxanthin kills free radicals, staving off age related diseases like macular degeneration, by preventing these unstable molecules from damaging cells. It also boosts the functioning of your immune system by increasing the number and activity of T cells and macrophages, two kinds of protective cells that fight infection. Unlike other antioxidants, astaxanthin is available both within and without the cell wall which allows it to fight free radicals both inside and outside the cell wall.

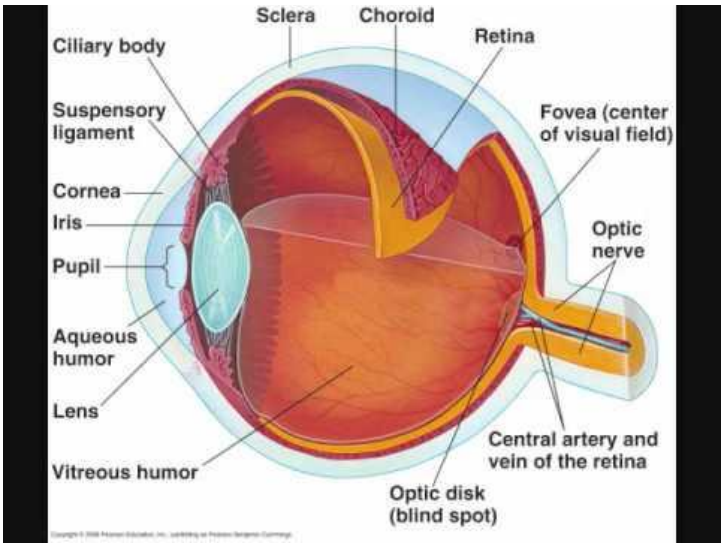

Figure 1

Mechanism of action of Astashine on Eye health

Certain carotenoids have been shown to help protect the retina of the eye from oxidative damage. The lens of the eye focuses incoming light onto the photosensitive retina, which then transmits visual signals to the brain. In the central area of the retina lies the macula, which has the highest density of photoreceptors that provides visual acuity. Oxidation, as from sunlight exposure, degrades the retinal membranes and likely leads to damage or destruction of photoreceptor cells.

A recent study indicates that astaxanthin is able to cross the blood retinal barrier and exert antioxidant effects to stop retinal destruction by staving off light induced oxidation and protect photoreceptors from degeneration.

Astaxanthin's ability to protect the eye from

- Light-induced damage
- Photoreceptor cell damage
- Ganglion cell damage
- Neuronal damage

Composition of Astashine capsule

Astaxanthin - 2mg (Naturally derived from Haematococcus pulvialis algae extract, which is microencapsulated)

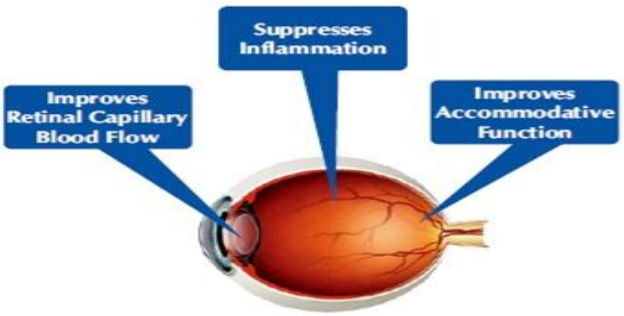

Figure 2

CLINICAL STUDY REPORTS ON ASTASHINE CAPSULES

The possible role of antioxidants in alleviating oxidation stress and other oxidative damages to the eye has been extensively reviewed [1].

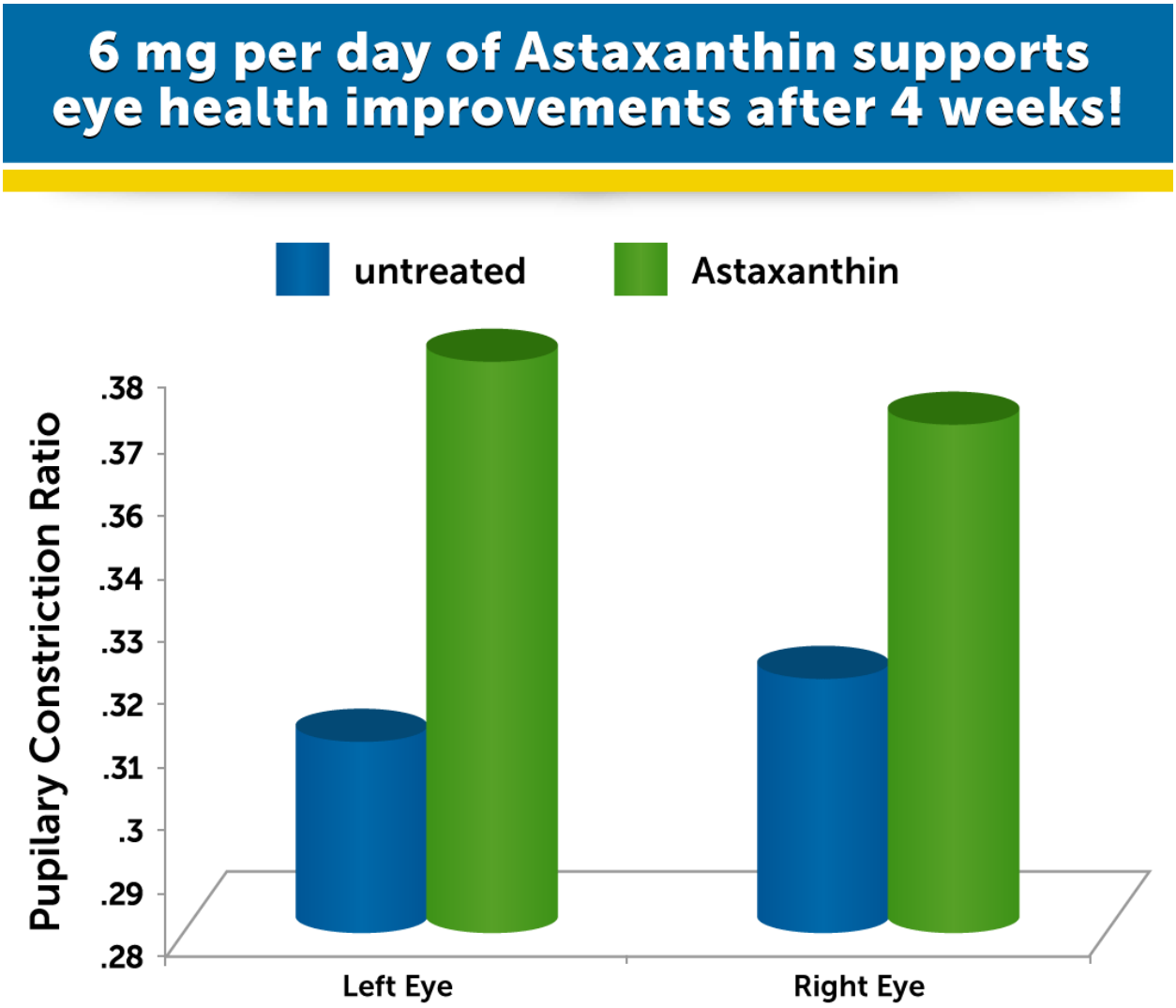

Figure 3

- A 2011 review of previous and on-going research points to the wide range of benefits of this potent antioxidant with excellent tolerability and safety factors as well. It has been found to lower levels of free radicals in people who are smokers or overweight; blocked oxidative damage to DNA, acted as an anti-inflammatory agent, supported tuberculin immunity, lowered triglycerides, increased blood flow and good HDL cholesterol, supported brain functioning with improved cognition and nerve stem cell growth, improved visual acuity, reproductive health and more.
- As one of nature's most effective antioxidants with the ability to cross the blood-brain barrier, astaxanthin's potential benefits for the health of the eye and the nervous system are very promising.
- The eye is potentially one of the organs that is the most exposed to oxidation, because it is exposed to air and UV-light as well as being fed by a very large number of small capillaries capable of bringing many of the metabolic oxidative residues through the blood.
- The eye also contains high levels of polyunsaturated fatty acids and pigments that are sensitive to oxidation. Recently, a research group demonstrated increased superoxide and peroxide formation following UV irradiation of a lens protein. Photoxidation of the lens proteins have been associated to the development of cataracts.

- Lutein and zeaxanthin, the carotenoids naturally found in the human retina, are closely related to astaxanthin. There is abundant evidence that certain carotenoids can help protect the retina from oxidative damage.
- Investigations of the antioxidant effectiveness of astaxanthin in the eye are just beginning but are already very promising. A recent study with rats indicates that astaxanthin can be effective at ameliorating retinal injury, and that it is also effective at protecting photoreceptors from degeneration.

Other carotenoids have begun to attain a certain level of fame for having beneficial properties for the eyes. There is no doubt that lutein and zeaxanthin are wonderful products to support and protect the eyes, and there is credible evidence that they can help prevent age related macular degeneration and other degenerative conditions. But due to Natural Astaxanthin's superior antioxidant and anti-inflammatory properties, indications are that it will prove to be superior to all other nutraceuticals for eye and brain health. Scientists believe that something may cause people's internal antioxidant defense system to malfunction or wear out as we age. Our bodies may lose the ability to produce high levels of the antioxidants that are normally produced internally such as superoxide dismutase, catalase and glutathione peroxidase. Also, our bodies are now subjected to unprecedented levels of oxidation caused by environmental factors such as pollution, containments, processed food and the high levels of stress in modern life. All of these lead to an assault on our vital organs as we age, particularly our brains and eyes. The eye, in particular is now subjected to much higher levels of oxidation than our ancestors' experienced. The depletion of the ozone layer is causing more intense sunlight than ever before, which directly affects the eyes and skin. Excessive exposures to sunlight and to the highly oxygenated environment cause free radicals to be generated in the eye. A condition called "ischemia" which is a type of blockage that deprives the eye of nutrition and oxygen is a common cause of increased oxidation in the eye. Another cause of increased oxidation in the eye happens when the ischemic blockages are removed. The reoxygenation of the tissue after blockage is called "reperfusion," and the end result is another attack on the eye's normal oxidative balance. Even normal enzymatic processes cause increased generation of free radicals and singlet oxygen such as hydrogen peroxide, superoxide and hydroxyl in the eyes. Free radicals and singlet oxygen oxidize the polyunsaturated fatty acids in the retina which leads to functional impairment of the retinal cell membranes, causing temporary and permanent damage to the retinal cells. Once the retina is damaged, it cannot be replaced. Antioxidants that can reach the inner eye by crossing the blood-brain and blood-retinal barriers are essential because they protect the eye from these damaging conditions. The carotenoids lutein and zeaxanthin are normally found in the eyes.

Dr. Mark Tso of the University of Illinois extensively worked on Astaxanthin's benefits on the eyes. Dr. Tso was the first person who proved that Astaxanthin could cross the blood-brain and blood-retinal barriers. He took laboratory rats and tested their eyes for Astaxanthin. He fed the rats Astaxanthin and proved that Astaxanthin could cross first the blood-brain barrier and get into the brain, and then once in the brain it could reach the retina and the macula by crossing through the blood-retinal barrier. Through an extensive series of tests, Dr. Tso went on to prove that Astaxanthin has many protective properties once it reaches the eyes.

In a double blind study performed in Japan, after four weeks of supplementation with 5 mg of Astaxanthin per day (extracted from Haematococcus algae meal) the authors reported a 46% reduction in the number of eye strain subjects. They also found higher accommodation amplitude (the adjustment in the lens of the eye that allows it to focus) in subjects who used visual display terminals. The mechanism of action is most likely due to Astaxanthin's potent antioxidant properties [3].

Additional research in the area of eye fatigue has been carried out. In fact, there are now nine different positive human clinical studies that have been published in this area. Two different dosage levels were tested for eye fatigue by a group led by Dr. Nakamura in 2004. They found positive effects at 4 mg per day, but found a better result at 12 mg per day [4].

Another group of Japanese researchers found similar results in another human clinical study. This double blind study was done to evaluate Astaxanthin's effect on eye fatigue and visual accommodation. Forty subjects were divided into placebo and treatment groups, with the treatment group receiving 6 mg of Astaxanthin for four weeks. The results were that three separate visual parameters were found to have statistically significant benefits from Astaxanthin supplementation. This research established an optimum daily dose for eye fatigue at 6 mg per day [5].

Additional studies showing that 6 mg per day of Natural Astaxanthin supplementation for four weeks can reduce eye soreness, dryness, tiredness and blurred vision [2].

Astaxanthin may work in a preventative role for eye fatigue as compared to a curative one that has already been established. The other studies all centered on the use of Astaxanthin to cure eye fatigue. A clinical study was done on subjects whose eyes were healthy, with no signs of fatigue or strain. Both the treatment and the placebo groups were subjected to heavy visual stimuli to induce eye fatigue, and it was found that the treatment group recovered more quickly. This clearly indicates that Natural Astaxanthin may serve to prevent eye fatigue from occurring in healthy people [10].

It is very important to have sufficient blood flow to the eyes and the retina. A human clinical study examined the ability of Astaxanthin to improve retinal capillary blood flow. Eighteen subjects were given 6 mg per day of Natural Astaxanthin and another eighteen people were given a placebo. After four weeks it was found that the treatment group had improved retinal capillary blood flow as compared to the placebo group [14].

The mechanisms of action thought to enable Astaxanthin to reduce or prevent eye fatigue are diverse. Of course, Astaxanthin's role as an antioxidant and anti-inflammatory must play a part. A study conducted at the Hokkaido University Graduate School of Medicine determined that Astaxanthin inhibited inflammation in the eye by blocking nitric oxide synthase [6]. Astaxanthin was also found to have potent antioxidant effects in the prevention of cataracts in rats' eyes [13].

Human clinical studies on Natural Astaxanthin's effects on the eyes has also yielded positive results. This study was done in Japan with subjects comprised of twenty year old men. The treatment group was given 6 mg of Natural Astaxanthin per day for four weeks. Different visual parameters were measured, with statistically significant improvement found in two different parameters for visual acuity. The greatest enhancement was seen in depth perception which improved by 46% in the group supplementing with Natural Astaxanthin [7].

(Pre-clinical animal studies and in-vitro experiments on Astaxanthin and eye health. One such study took the lens from the eyes of pigs and tested the ability of Astaxanthin to protect them from induced oxidative damage. This experiment found that Astaxanthin was capable of protecting the lens proteins from oxidative damage. In fact, Astaxanthin performed better than the antioxidant glutathione which is produced by the pig's own body [12].

A study done in rats was very helpful in that it measured the effect of Astaxanthin on three important inflammatory markers in the uvea (the middle layer of the eye including the iris). Inflammation in the uvea was induced, after which nitric oxide; tumor necrosis factor alpha and prostaglandin E-2 were measured. The rats that had been injected with Astaxanthin had lower levels of all three inflammatory markers. The researchers concluded that Astaxanthin is effective in reducing ocular inflammation [9].

A previous study done on inflammation of the eye of rats yielded similar results, but also demonstrated that the effects of Astaxanthin worked in a dose- dependent fashion. Additionally, this study proved these anti-inflammatory mechanisms in-vitro [6].

SAFETY OF ASTASHINE CAPSULES

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 normal range. Also, astaxanthin significantly lowered the liver enzyme gamma-glutamyl transpeptidase (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.

Suggested Dosage

The doses of astaxanthin used in clinical trials have ranged from 1 mg/day to 40 mg/day (with the majority in the 6-12 mg range); single-dose pharmacokinetic studies used up to 100 mg per dose. As a dietary supplement, astaxanthin should be taken along with fats, with or immediately prior to meals, to ensure its optimal absorption.

CONCLUSION

Astaxanthin may work in a preventative role for eye fatigue as compared to a curative one that has already been established. The studies all centered on the use of Astaxanthin to cure eye fatigue. Both the treatment and the placebo groups were subjected to heavy visual stimuli to induce eye fatigue, and it was found that the treatment group recovered more quickly. This clearly indicates that Natural Astaxanthin may serve to prevent eye fatigue from occurring in healthy people Astaxanthin has great benefits for the eyes, and in fact, may be the best choice for eye health among all nutraceutical products.

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