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Astashine capsules: An excellent choice for cardiovascular health

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ABSTRACT

Astaxanthin is a xanthophyll carotenoid present in microalgae, fungi, complex plants, seafood, flamingos and quail. It is an antioxidant with anti-inflammatory properties and as such has potential as a therapeutic agent in atherosclerotic cardiovascular disease. Experimental studies demonstrated that astaxanthin protects the myocardium. In a randomized, double blind study on humans it was shown that astaxanthin decreased the low-chronic inflammation by reducing oxidative stress. Earlier studies have confirmed that astaxanthin reduces inflammation by inhibiting activation on the transcription factor NF-kB . Due to astaxanthin's ability to protect cells from oxidation and its anti-inflammatory capacity, astaxanthin has potential to prevent the development of metabolic diseases. This article reviews the current available scientific literature regarding the effect of astaxanthin from the algae Haematoccus pluvialis on the cardiovascular health.

INTRODUCTION

Oxidative stress is a condition in which there is an imbalance between reactive free radicals and antioxidants. It is found that people with metabolic syndrome has a poor antioxidant status compared to those without metabolic syndrome [1, 3]. Oxidative stress will trigger inflammation by activating the transcription factor NF-kB that will turn on pro-inflammatory.

Fig.1

Increased amount of reactive oxygen species (ROS) followed by inflammation is described as an underlying cause in the progress of metabolic diseases. ROS and inflammation trigger fat accumulation in the liver (NAFLD) which will increase blood lipids and enhance the risk for developing atherosclerosis plaque. ROS and inflammation will further reduce nitric oxide (NO) and increase the amount of oxidized nitric oxide (NOx) which leads to hypertension. Finally, oxidative stress and inflammation have a negative effect on insulin resistance (IR) which causes hyperglycemia. Research studies have shown that astaxanthin has positive effects on metabolic abnormalities by reducing ROS and inflammation.

Composition

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

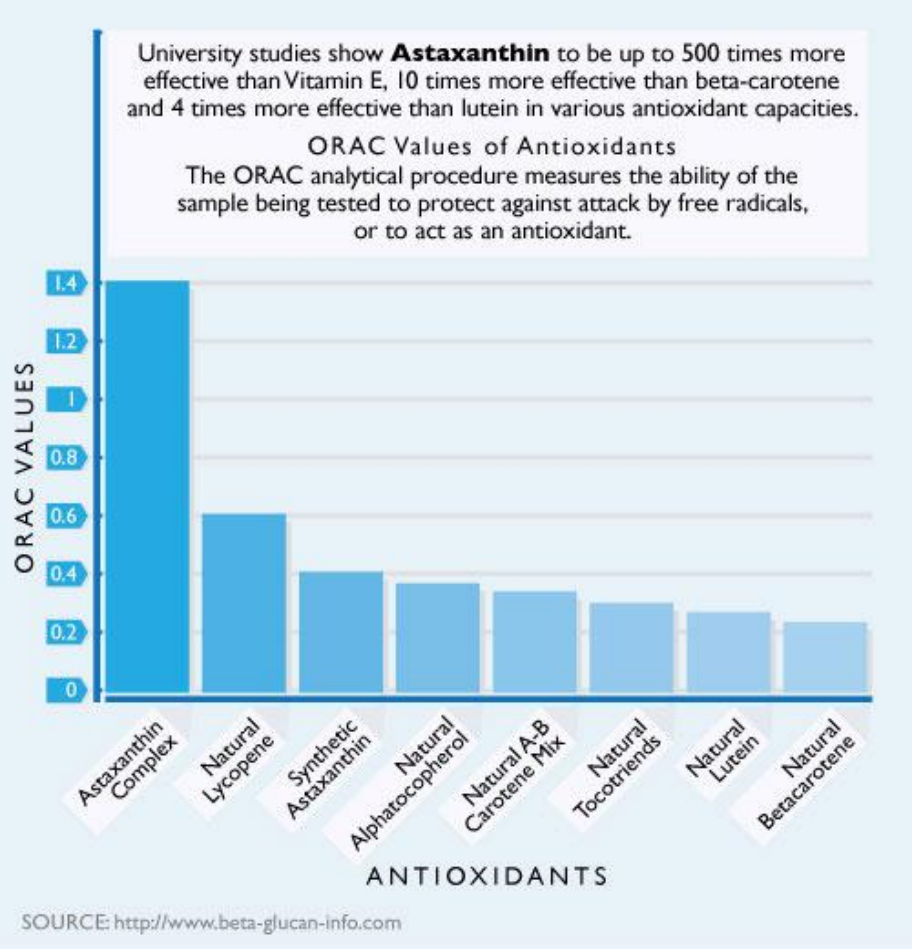

Fig 2

Fig3

Several studies are confirming that people suffering from a metabolic disease also has a state of a low-chronic inflammation [2].

In a randomized, double blind study on humans it was shown that astaxanthin decreased the low-chronic inflammation by reducing oxidative stress [4]. Earlier studies have confirmed that astaxanthin reduces inflammation by inhibiting activation on the transcription factor NF-kB [5]. Due to astaxanthin's ability to protect cells from oxidation and its anti-inflammatory capacity, astaxanthin has potential to prevent the development of metabolic diseases.

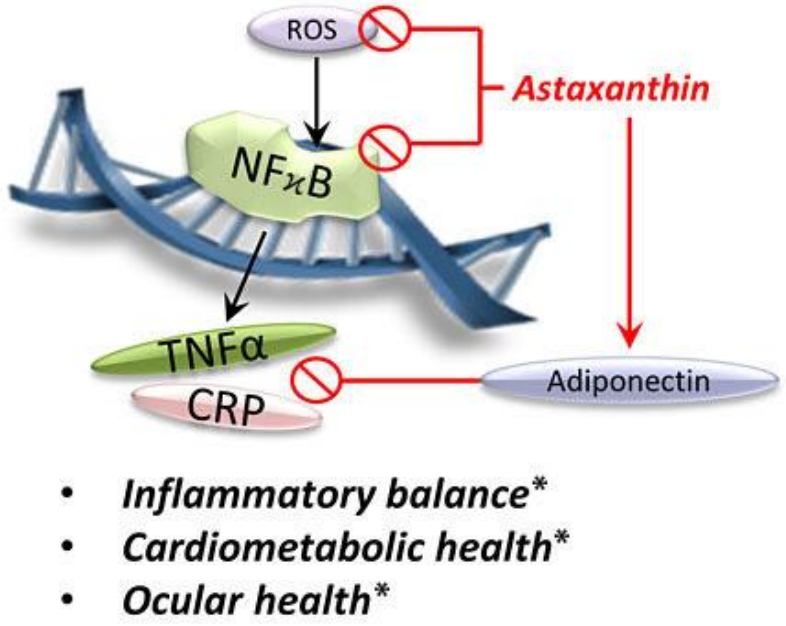

Fig 4

Astashine capsules improves blood lipids and increases adiponectin

Individuals with low levels of the "healthy" HDL-cholesterol and high levels of the "bad" LDL-cholesterol who also have high triglycerides level are more likely to develop cardiovascular disease.

A recent study found that supplementation of astaxanthin to humans had positive effects on blood lipids [6]. 61 subjects with mild hyperlipidemia were recruited in a randomized double-blind placebo-controlled study investigating the effect of 0, 6, 12 and 18 mg of astaxanthin per day for 12 weeks. Results showed significant improvements of up to 25% reduction of triglyceride levels at 12 and 18 mg/day of astaxanthin intake and up to 15% HDL increase at 6 and 12 mg/day of astaxanthin daily. Furthermore, the healthy and anti-inflammatory cytokine adiponectin increased up to 25% at 12 and 18 mg/day of astaxanthin intake. Studies have shown that obesity, insulin resistance and atherosclerosis are accompanied by decreased adiponectin levels in adults. These results suggest that astaxanthin sustains cardiovascular health by improving blood lipids and increasing adiponectin.

The effect of astaxanthin on blood lipids can be explained by its ability to prevent fat liver since fat accumulation in the liver increases blood lipids. In addition, fat accumulation in the liver will trigger free radicals production which enhances inflammatory injuries like statosis, fibrosis and necrosis.

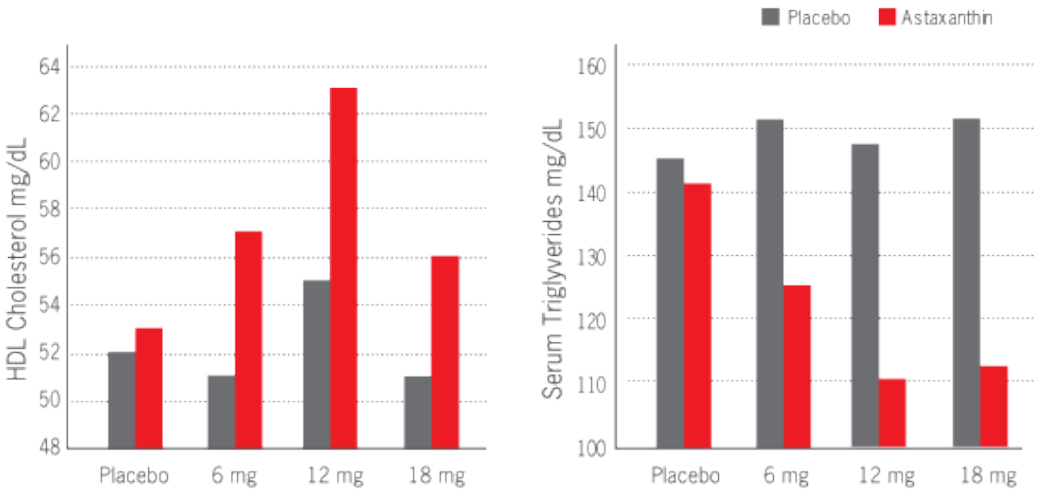

Fig5

In a recent published study in rats, it was shown that astaxanthin reduced fats in the liver [7]. The study evaluated the effects of astaxanthin in mice by feeding an unbalanced diet. Mice were fed either normal or a high fat-high fructose diet (HFFD).

HFFD-fed mice registered significant increase in liver weight as a consequence of a higher level of fat. However, mice fed with HFFD and astaxanthin had reduced amount of fats in the liver and the liver weight was lower. In addition, animals that were fed with astaxanthin also reduced several biomarkers for oxidative stress. Percentage increase of HDL in response to astaxanthin administrations in 61 subjects with mild hyperlipidemia (Oxidation of the blood lipids, especially on the LDL-cholesterol, is the main cause of atherosclerotic plaques. Oxidized LDL-cholesterol attracts macrophages and cause inflammation which finally will result in the formation of foam cells and plaque. Atherosclerotic plaques may cause heart attack, stroke and other life threaten symptoms. Supplementation of astaxanthin has demonstrated in several human studies to reduce the oxidation on lipids in the plasma. In one human study, the oxidation of LDL was reduced dose dependently during two weeks of supplementation. A protective effect was seen even at a dose of 1.8 mg astaxanthin/day [9]. This finding has further been supported by another randomized, double-blind study in humans including 40 healthy volunteers that were supplemented with astaxanthin during 8 weeks [10].

The astaxanthin supplementation significantly reduced oxidation of the most easily oxidized fatty acids in the plasma. In addition, a recent randomized, double blind study including 30 subjects has shown that astaxanthin reduced oxidation of the red blood cells in the plasma significantly compared to placebo [11]. These three human studies clearly indicate that astaxanthin reduces oxidation in the human plasma and by so may reduce the risk for developing atherosclerosis. Studies have also shown that astaxanthin reduces plaques and inflammation in the arterial wall. Astaxanthin supplementation to rabbits that spontaneously developed atherosclerosis resulted in more stable plaques and less ruptured plaques than in the control group. This was explained by reduced inflammation in the arterial wall measured by less invading macrophages [12].

Astashine capsules Lowers hypertension by improving vascular tone

Oxidation and inflammation in the arterial wall leads to increase the vascular tone followed by higher blood pressure. Studies have showed that high blood pressure is associated with increased level of oxidative stress. The reason is that oxidative stress decreases the bioavailability on nitric oxide (NO) and increases oxidized nitric oxide (NOx). NO is important in the regulation of the vascular tone and a declined level of NO will therefore reduce the flexibility and the elasticity of the arterial wall and by so cause hypertension.

Several studies suggest that astaxanthin decreases high blood pressure by improving vascular tone and the bioavailability of NO.

In an open human study, High fat and fructose diet (HFFD) increased fat vacuoles in the liver compared to normal diet (CON). However, mice that had HFFD diet and astaxanthin reduced fat accumulation in the liver and had therefore fewer fatty vacuoles [7]. The amount of oxidized fatty acids (Lipidperoxidation) in humans treated with 8 mg of astaxanthin or placebo during 12 weeks (10). Before After Placebo. Lipid peroxidation (μ mol/l) *p < 0.05 * Before and After Astaxanthin healthy post-menopausal women ingested 12 mg of astaxanthin every day for eight weeks and their systolic and diastolic blood pressure significantly decreased [13]. In addition, astaxanthin has shown beneficial effects on blood pressure in spontaneously hypertensive rats in four different studies [14 – 17]. The effects are clarified by an improved vascular tone due to increased amount of NO followed by fewer and straighter elastin features in the arterial wall.

Astaxanthin was given to the diet of type 2 diabetic mice. The mice were injected with high concentration of glucose and the blood glucose was than measured. Astaxanthin significantly decreased blood glucose levels compared to placebo group which demonstrate a better insulin sensitivity with astaxanthin . Furthermore, the group treated with astaxanthin had better insulin production in the pancreas compared to the placebo group. Two recent published studies are confirming the effect of astaxanthin on insulin sensitivity [14, 17]. In one of the study, astaxanthin had similar effects on insulin sensitivity like the prescription diabetic drug piaglitazone [17]. Poor insulin sensitivity results in difficulties to transport glucose from the blood out to the glycogen and tissues. The result will be an increased blood glucose followed by hyperglycemia which can result in toxic conditions. Moreover, high glucose levels induces oxidative stress which triggers inflammatory reaction and by time damage the producing of insulin in pancreas.

Researches on mice have shown that astaxanthin reduces blood glucose, improves insulin sensitivity and then protects the progression of kidney damage in type 2 diabetic mice [19]. The treated mice showed significant improvements of renal insufficiency and preserved the function of the mesengial cells in the kidney glomerulus probably by enhancing the capacity of the mitochondria. The power of astaxanthin lays in its molecular structure. Serum insulin level after glucose intolerance tests in diabetic mice. Astaxanthin significantly increased insulin production in pancreas [18].

Research results indicate that astaxanthin has ability to prevent metabolic diseases thanks of its strong antioxidant and anti-inflammatory capacity. Astaxanthin is a fat-soluble antioxidant and has been referred as the “king of the carotenoids” due to its strong antioxidant power. Astaxanthin has shown to be up to 500 times more efficient than vitamin E and 10 times stronger than β-carotene [20]. The power of astaxanthin is described by its unique molecular structure which enables it to stretch through the membrane and protect the cells and membranes [21].

Astaxanthins unique molecular structure enables it to stay both in and outside the cell membrane which gives better protection as compared to β-carotene and vitamin C which respectively can only be positioned inside or outside the lipid bilayer [21].

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 prevents lipid peroxidation and inflammation in the arterial wall and enhances the capacity of the mitochondria. As a result, astaxanthin improves blood lipids, prevents fatty liver disease, reduces the risk for atherosclerosis, lowers hypertension, improves insulin sensitivity and prevents renal damage. So, astaxanthin gives potential to help thousands of people suffering of the metabolic syndrome with high risk to develop cardiovascular disease.

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