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Natural astaxanthin, antioxidant protection power for healthy eyes

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Abstract Astaxanthin, strong free radical scavenging activity carotenoid, protects cells structures, such as lipid membrane and mitochondria against lipid peroxidation. Experimental studies and abundant clinical trial results have shown that the oral supplementation of natural astaxanthin from *Haematococcus pluvialis* has a health benefits on heart, liver, kidney, stomach and also on eye function. In this paper some of the most important clinical study results are shown, these studies supported Astaxanthin's protective action and efficacy on eyes from free radicals.

INTRODUCTION

Carotenoids is a family of over 600-lipid soluble plant pigments, which are responsible for the red color of tomatoes, the orange color of carrots and yellow color of mangoes.

The carotenoid pigment, astaxanthin (3,3-dihydroxy-β-carotene-4,4'-dione) is the main pigment found in aquatic animals, and is also present in crabs, crayfish, krill, lobster, salmon, shrimp, and trout; astaxanthin is also the responsible for the beautiful red pigmentation to flamingo feathers and retinas of quail (1).

Astaxanthin is commonly harvested and commercially grown from the microalgae *Haematococcus pluvialis*, and also is well-known because its strong free radical scavenging activity. Astaxanthin protects cell membranes, and tissues against lipid peroxidation and oxidative damage caused by Reactive Oxygen Species (ROS). Epidemiological and clinical studies have demonstrated that natural astaxanthin can alleviate symptoms related

to computer vision syndrome (CVS); relieve eye fatigue (2, 3), improve quality of vision (4); reduce eye irritation and blurred vision (5); and also minimize the oxidative damage induced by ROS in aqueous humor (6).

Recent experimental studies have revealed the novel biological functions of astaxanthin, as a light polarizer in marine crustaceans and birds (7). The above reports explored the wide range of astaxanthin, functions, which include not only, eye protection against free radicals, but also how natural astaxanthin safeguards in the human eye.

VISUAL DISPLAY TERMINALS INCREASE COMPUTER VISION SYNDROME (CVS)

In 2002, the World Health Organization (WHO) estimated that globally 37 million people suffered from blindness and 124 million from low vision worldwide (8). Advances in high-resolution visual display terminal (VDT) technology and the increased number of personal computers in the workplace are fueling increased eye health concerns. One of the most worrying and frequently reported conditions is computer vision syndrome (CVS). The American Optometric Association (AOA) has defined CVS as a the complex of "eye and vision problems related to near work which are experienced during or related to computer use" (9). The most common symptoms are eye fatigue or asthenopia, blurred vision, itchy eyes, headaches, and back, neck or shoulder pain (10) (Figure 1). The AOA has estimated 90% of all computer users have experienced CVS; statistics indicate more than 60 million Americans (11) and more than 13 million Japanese adults suffer CVS symptoms. One of the most well-known names in eye research is Dr. Tatemichi, from Toho University School of Medicine, who published in

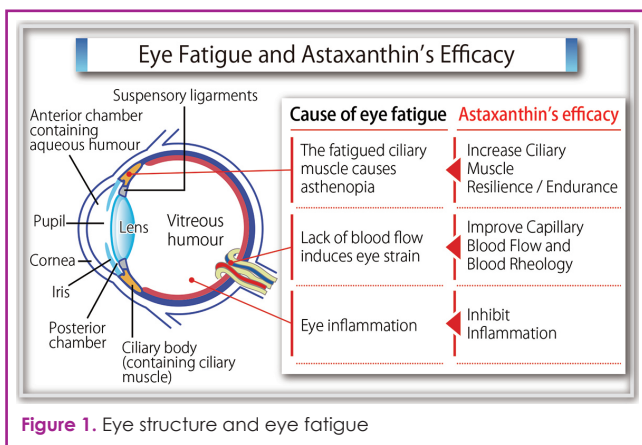


Figure 1. Eye structure and eye fatigue