Nature's Super Antioxidant

What do a pink flamingo, tomato, Atlantic salmon and carrot have in common? No, it is not a trick question, there really is a significant feature that each of these share. The bright pink, red and orange colors are all derived from carotenoids, natural substances that are known for more than just their beauty. These substances are powerful antioxidants that can help prevent illness and promote vitality and longevity. Salmon, for example, selectively accumulate a specific carotenoid from their diet and store it in their flesh for added protection.

Researchers have identified more than 700 different natural carotenoids with beta carotene being the most well-known. Antioxidants first became popular when scientists discovered that these substances help reduce free radical damage. Free radicals are highly unstable oxygen molecules that contribute to illness and accelerated aging. We normally have a balance of free radicals and an arsenal of antioxidants to conquer them, however, poor nutrition or disease can upset this equilibrium. Many theories suggest that an upset of this balance can be a contributing factor in such conditions as rheumatoid arthritis, heart disease, Parkinson’s disease, Alzheimer's disease, cancer and stroke.

Since researchers have discovered the health benefits of antioxidant substances, they have enhanced their efforts in determining exactly what these substances can do and which ones are the most effective. Exciting new research involving a specific carotenoid shows great promise in the prevention and treatment of many chronic illnesses.

More power
Astaxanthin is a member of an elite class of carotenoids known as xanthophylls. Astaxanthin is believed to be the most active of these carotenoids. This fat-soluble nutrient is abundant in nature and is found in red yeast, krill (e.g., seafoods such as salmon, trout and lobster) and microalgae. Researchers have discovered that the most abundant and concentrated form of astaxanthin is found in the natural, renewable material extracted from microalgae.

Because of its unique molecular structure, astaxanthin is unlike any other antioxidant in that it can perform a wide variety of tasks including:
• Increasing HDL good cholesterol
• Increasing strength and endurance
• Stimulating the immune system
• Protecting and enhancing eye health.

While this may seem too good to be true, biochemically it makes sense. Astaxanthin has demonstrated antioxidant properties beyond other carotenoids. A growing body of scientific literature indicates that astaxanthin surpasses the antioxidant benefits of beta carotene, zeaxanthin, canthaxanthin, vitamin C and vitamin E. Astaxanthin has been shown to effectively perform the three key tasks of an antioxidant: quenching, scavenging and trapping free radicals.

Numerous studies show the potent free radical scavenging and singlet oxygen quenching properties of astaxanthin. It has been demonstrated that astaxanthin is significantly more effective in neutralizing free radicals better than beta carotene and protects against peroxidation of unsaturated fatty acid methyl esters better than canthaxanthin, beta carotene or zeaxanthin. In fact the antioxidant activities of astaxanthin have been shown to be approximately ten times stronger than other carotenoids such as zeaxanthin, lutein, canthaxanthin and beta carotene. It is believed to be 100 to 500 times more effective in inhibiting lipid peroxidation than vitamin E. The unique structure of astaxanthin scavenges lipid radicals and effectively breaks peroxide chain reactions.

In addition, astaxanthin is more powerful because:
• Its low molecular weight allows it to actually cross the blood-brain barrier, making it available to the eye, brain and central nervous system
• It is more resistant to damage, allowing it to scavenge longer and trap more types of free radicals
• It acts like a bridge, transporting free radicals along its long chain to watersoluble antioxidants like vitamin C inside and outside of the cell.

In addition to extensive evaluation of the astaxanthin molecule, it is supported by strong preliminary clinical studies, with more clinical trials expected to be completed this year.

Scientific validation
Positive outcomes in cancer deterrence, immune enhancement and macular degeneration are likely related to the already identified antioxidant properties of astaxanthin, as well as yet unknown mechanisms.

A synopsis of past studies has provided strong evidence that orally-administered carotenoids can directly affect the immune response to cancerous tumors and lead to a lower tumor burden. These studies demonstrate that carotenoids increase the number of circulating lymphocytes (T-helper cells), enhance T and B lymphocyte growth and activity, improve rejection of foreign tissue, increase killer cell destruction of tumor cells and fungi like Candida albicans.

In 1995 researchers reported in the
journal, *Carcinogenesis*, that astaxanthin specifically acted as a preventative agent against bladder, colon and oral cancers in animals. The researchers concluded that astaxanthin inhibited cell proliferation (i.e., rapidly dividing and growing). In other animal studies, astaxanthin was found to have a significant influence on the reduction and size of cancerous lesions on the liver.

In addition to cancer prevention, astaxanthin has been shown to enhance the immune system to help prevent and treat other immune-compromised conditions such as viral infection. Researchers have found that astaxanthin enhances T-helper cell activity as well as promotes specific antibody responses.

As mentioned previously, because astaxanthin can cross the blood-brain barrier, it can help prevent ocular and neurological illnesses. Studies have shown that astaxanthin protects neurons of the retina, as well as photoreceptors in the eye. Age-related macular degeneration is the leading cause of irreversible blindness among older Americans. These same individuals have decreased levels of carotenoids in their eyes as well as a gradual loss of photoreceptor cells.

Animal studies have also shown that astaxanthin:

- reduces plaque formation and prevents the oxidation of low-density lipoprotein (LDL), which could have profound cardiovascular benefits
- acts synergistically with anti-inflammatory agents such as aspirin and can actually increase their effectiveness
- protects from UVA and UVB radiation, which can damage the skin and eyes
- reduces symptoms of H. pylori infections.

It appears that astaxanthin’s unique molecular structure allows it to do more than any other antioxidant, to do it more effectively, and to enhance the activity of other antioxidant nutrients.

**Safety and dosage**

Astaxanthin from microalgae is considered very safe. It has never been associated with any toxicity in the reported literature or in field studies and there are no known contraindications. A number of standard toxicity and safety studies have been conducted. Hematology, blood chemistry, urinalysis, organ weight and gross pathology were all clinically normal. Higher dosage studies of acute oral toxicity have been conducted in animals with no mortalities or abnormalities observed. Mutagenicity tests under standard conditions were also negative.

Astaxanthin is available in a standardized dosage as an ingredient in nutritional supplements, sports bars or drinks. The recommended dosage is 1 mg twice daily. Standardization of the material ensures consistency and potency within each dosage; however, the synergistic elements of this natural extract are maintained. In fact, the extract also includes naturally occurring beta carotene, lutein, canthaxanthin and its own natural oil containing omega-3 and -6 essential fatty acids.

**Final thoughts**

Carotenoids are all around us. From the fleshy red meat of the rainbow trout to the pretty peppers in your garden, carotenoids are powerful medicines direct from nature. Sophisticated scientific research has discovered the varying potencies and strengths of many of these carotenoid substances. The newest superstar in this colorful family appears to be astaxanthin. Both safe and natural, astaxanthin has been shown to have excellent antioxidant properties beyond other carotenoids. These extensive antioxidant properties make astaxanthin important for the eyes, brain and immune system.