

INTRODUCTION

Carotenoids are phytonutrients, the nutritional elements that give fruits and vegetables their distinctive colors, odors and tastes. Although **beta**-carotene may be the best-known and most abundant dietary carotenoid, approximately 500 carotenoids have been identified and their health benefits are beginning to be recognized. Carotenoids act as antioxidants, popularly thought of as anti-disease and anti-aging nutrients.

Antioxidants help form the body's defense against free radicals. Free radicals are not inherently bad (they help us generate energy and fight infections), but too many free radicals cause cells to age prematurely. Our bodies are being exposed to more and more free radicals, as they are dangerous byproducts of our environment-air pollution, cigarette smoke and dietary fats.

While free radicals can cause or complicate many diseases-including cancer, arthritis, cataracts and heart disease-antioxidants can help protect the body from these chronic disorders. They also enhance the body's immune system.

It is also becoming clear that the best-known antioxidants (vitamins C and E and beta-carotene) do not provide a complete defense against free radicals. A combination of antioxidants works better than single antioxidants to enhance the body's defense against free radicals.

Increased amounts of carotenoids do not cause any toxic side effects, because excess carotenoids are used only as antioxidants, to help the body maintain health. Thus, individuals can increase their protection against certain diseases without risk by increasing their intake of carotenoids.

The following information has been compiled to answer your questions about these important nutrients.

CAROTENOIDS: INFORMATION and FACTS

What are carotenoids?

Carotenoids are the substance that give fruits and vegetables their orange, yellow and red colors. Green leafy vegetables are also high in carotenoids, but the color is masked by chlorophyll.

For many years the benefits of carotenoids were not known. However, recent research suggests that carotenoids offer an array of health benefits, such as lowering the risk for heart disease and certain types of cancer, enhancing the immune system and protecting us from age-related macular degeneration, the leading cause of irreversible blindness among adults.

In addition to beta-carotene, a number of other carotenoids have been identified for their important roles as antioxidants in the body. **Alpha**-carotene, for example, may be **10** times more powerful than beta-carotene in protecting the body from skin, eye, liver and lung damage. And the emerging body of scientific evidence shows that other types of carotenoids such as lutein, cryptoxanthin and zeaxanthin, may help protect individuals from certain types of cancer. Another carotenoid that has been identified for its health benefits is lycopene, a red carotenoid found in tomatoes and berries.

How do carotenoids help to maintain health?

Carotenoids act as antioxidants that protect healthy cells from free radical damage. Free radicals are unstable chemicals formed in the body during metabolism and from exposure to environmental sources, such as pollution and cigarette smoke. When there is an excessive number of free radicals in the body, they can attack healthy cells and can contribute to a number of degenerative diseases, such as cancer. Fortunately, antioxidants quench free radicals before they have a chance to attack healthy cells.

As antioxidants, carotenoids have been shown in the majority of studies to lower the risk for certain cancers, such as lung, stomach, cervix, breast, bladder and oral cancers. Other health benefits include protection against heart disease, cataracts and age-related macular degeneration.

In addition to their antioxidant properties, it's believed that carotenoids reduce cancer risk early on by their ability to enhance communication between premalignant cells and normal cells. The presence of carotenoids appears to result in normal cells sending growth-regulating signals to premalignant cells.