carotene

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Carotene: Publications and Research from SwissMixIt

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PDF Version of the webpage (first pages)

Carotene Botanical Information

Carotenes, which are yellow-orange pigments, are a class of related organic compounds classified as hydrocarbons, more specifically as terpenoids, with the molecular formula C40H56. Plants, fungi, and photosynthetic bacteria synthesize carotenes, while animals must obtain them as a dietary nutrient. Plants are capable of synthesizing several isomers of carotene. Alpha-carotene (a carotene) and beta-carotene (b carotene) are the two primary isomers found in plants. b Carotene is the most common form of carotene in plants and can be found in yellow, orange, and green leafy vegetables and fruits. It is an important dietary resource and a precursor of vitamin A in humans. carotenoids, Nutricosmetics, tocopherols, flavonoids, Beta-carotene, all-cause mortality, cause-specific mortality, multivariate analysis, epidemiology, biomarker, primary prevention, xanthophylls, cancer chemoprevention, cardiovascular disease, aging, cancer, cardiovascular disease, dementia, diabetes, inflammation, oxidative stress, nutrition, diet, ultraviolet protection, skin aging, antioxidants, fatty acids, flavonoids, vitamins

Keywords: carotenoids, Nutricosmetics, tocopherols, flavonoids, Beta-carotene, all-cause mortality, cause-specific mortality, multivariate analysis, epidemiology, biomarker, primary prevention, xanthophylls, cancer chemoprevention, cardiovascular disease, aging, cancer, cardiovascular disease, dementia, diabetes, inflammation, oxidative stress, nutrition, diet, ultraviolet protection, skin aging, antioxidants, fatty acids, flavonoids, vitamins

Description and Research Abstract: Carotenes, which are yellow-orange pigments, are a class of related organic compounds classified as hydrocarbons, more specifically as terpenoids, with the molecular formula C40H56. Plants, fungi, and photosynthetic bacteria synthesize carotenes, while animals must obtain them as a dietary nutrient. Plants are capable of synthesizing several isomers of carotene. Alpha-carotene (α-carotene) and beta-carotene (β-carotene) are the two primary isomers found in plants. β-Carotene is the most common form of carotene in plants and can be found in yellow, orange, and green leafy vegetables and fruits. It is an important dietary resource and a precursor of vitamin A in humans.

Vitamin A is the name of a group of fat-soluble retinoids, including retinol, retinal, and retinyl esters. Vitamin A is involved in immune function, vision, reproduction, and cellular communication. Vitamin A is critical for vision as an essential component of rhodopsin, a protein that absorbs light in the retinal receptors, and because it supports the normal differentiation and functioning of the conjunctival membranes and cornea. Vitamin A also supports cell growth and differentiation, playing a critical role in the normal formation and maintenance of the heart, lungs, kidneys, and other organs.

Carotenoids are pigments which play a major role in the protection of plants against photooxidative processes. They are efficient antioxidants scavenging singlet molecular oxygen and peroxyl radicals. In the human organism, carotenoids are part of the antioxidant defense system. They interact synergistically with other antioxidants; mixtures of carotenoids are more effective than single compounds.

This study provides evidence that higher beta-carotene biochemical status is associated with lower overall, CVD, heart disease, stroke, cancer, and other causes of mortality. The dose-response associations over a 30-year period were not attenuated by adjustment for other important risk factors, and support greater fruit and vegetable consumption as a means to increase beta-carotene status and promote longevity.

Based on chemical data, the major function of β-carotene is as an optimal, naturally occurring, provitamin A. β-Carotene is structurally and functionally different from other carotenoids. There is no difference between naturally occurring or chemically synthesized β-carotene. Furthermore, β-carotene can also act as a lipid radical scavenger and as a singlet oxygen quencher, as demonstrated in vitro.

Based on evidence that β-carotene supplements have not been shown to confer any benefit for the prevention of the major chronic diseases and may cause harm in certain subgroups, it is concluded that β-carotene supplements are not advisable, other than as a provitamin A source and for the prevention and control of vitamin A deficiency in at-risk populations.

Blood concentrations of carotenoids are the best biological markers for consumption of fruits and vegetables. A large body of observational epidemiological evidence suggests that higher blood concentrations of β-carotene and other carotenoids obtained from foods are associated with lower risk of several chronic diseases.

Aging is positively associated with biological and cognitive degeneration, for instance cognitive decline, psychological impairment, and physical frailty. The elderly population is prone to oxidative stress due to the inefficiency of their endogenous antioxidant systems. As many studies showed an inverse relationship between carotenoids and age-related diseases (ARD) by reducing oxidative stress through interrupting the propagation of free radicals, carotenoid has been foreseen as a potential intervention for age-associated pathologies.

Vitamins, carotenoids, tocopherols, flavonoids and a variety of plant extracts have been reported to possess potent anti-oxidant properties and have been widely used in the skin care industry either as topically applied agents or oral supplements in an attempt to prolong youthful skin appearance.

It is widely hypothesized that the beta-carotene rich in green leafy vegetables and other orange-colored plant may prevent oxidative damage. In conclusion, dietary or circulating beta-carotene was inversely associated with risk of all-cause mortality. More studies should be conducted to clarify the dose-response relationship between beta-carotene and all-cause mortality. Therefore, based upon the antioxidant and pro-vitamin A functions of beta-carotene, it is biologically plausible to extend the human life span.

Various carotenoids, such as β-carotene, a-carotene, lycopene, lutein, zeaxanthin, β-cryptoxanthin, fucoxanthin, canthaxanthin and astaxanthin, have been proven to have anti-carcinogenic activity in several tissues, although high doses of β-carotene failed to exhibit chemopreventive activity in clinical trials.

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