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Beta-carotene

A content family of "carotenoids" molecules.

Beta-carotene is one of the orange pigment (colours) found in most green leaves, vegetables, fruits, herbs and berries.

Found in leaves – then when leaves lose their chlorophyll (green colour) in the autumn, carotene is one of the colours left in the leaf.

Beta-carotene is a member of a family of molecules known as the "carotenoids".

These have a basic structure made up of "isoprene" units.

Beta-carotene is made up of eight isoprene units, which are cyclised at each end.

Beta-carotene is the pigment that gives carrots, sweet potatoes, and other yellow vegetables their characteristic colouring.

Beta-carotene is used in foods to provide colour (margarine would look as white as shortening without it).

Another similar molecule, "annatto" is used in cheeses, and another famous carotenoid dyes - saffron is used to colour rice and other foods for their colour.

Most beta-carotene in supplements is synthetic, consisting of only one molecule called "all trans beta-carotene".

Natural beta-carotene, found in food items, is made of two molecules - all trans beta-carotene and "9-cis beta-carotene".

The 600 carotenoids -beta-carotene- is beneficial in the form of vegetables fruits berries and herbs.

Carotenoids are "polyisoprenoids" which typically contain 40 carbon atoms and an extensive system of conjugated double bonds.

They usually show internal symmetry and frequently contain one or two ring structures at the ends of their conjugated chains.

Principal dietary carotenoids are beta-carotene along with alpha-carotene, lycopene, lutein, zeaxanthin and beta-cryptoxanthin.

Three of these carotenoids, **alpha-carotene, beta-carotene and beta-cryptoxanthin**, can serve as dietary precursors of retinol ("all-trans retinol, vitamin A").

Beta-carotene is the most potent precursor to vitamin A, but its conversion to vitamin A in the body is limited by a feedback system.

Beta carotene has two roles in the body.

It can be converted into vitamin A (retinol) if the body needs more vitamin A.

If the body has enough vitamin A, instead of being converted, beta carotene acts as an antioxidant which protects cells from damage caused by harmful free radicals.

The body converts beta-carotene into vitamin A - recognized as vital to the growth and development of the body.

Beta-carotene is considered a conditionally essential nutrient and an important antioxidant in its own right - and one that can only build up to toxic levels in rare circumstances.

Beta-carotene becomes an essential nutrient when the dietary intake of retinol (vitamin A) is inadequate.

Beta-carotene (vitamin A) functions, uses, and health benefits.

The body turns it into vitamin A, and beta carotene is sometimes added to foods or vitamin supplements as a nutrient. The same long chains of conjugated double bonds (alternating single and double bonds) that give the carotenes their colours are also the reason they make good anti-oxidants.

They can mop up oxygen free radicals and dissipate their energy.

Vitamin A and its analogues have shown the ability to help inhibit cancer cell proliferation and help in returning to normal growth patterns. Individuals with highest levels of beta-carotene intake have lower risks of lung cancer, artery and heart disease, stroke and age-related eye disease than individuals with lowest levels of beta-carotene intake. Beta-carotene has been shown to have benefits to the immune system.

Like all other carotenoids, beta-carotene is an antioxidant.

Consuming various foods (over time) rich in beta-carotene daily help the body protect from damaging free radical molecules.

Free radicals molecules daily cause damage to cells through a process known as oxidation, and over time, without supplementing the diet with antioxidants such damage can lead to a variety of chronic illnesses.

Beta-carotene's antioxidant actions make it valuable in protecting against, and in some cases even reversing, precancerous conditions affecting the breast, mucous membranes, throat, mouth, stomach, prostate, colon, cervix, and bladder. Beta carotene is therefore added to products for its anti-oxidant effects and also to keep fats from going rancid.

Sources of beta-carotene.

The richest sources of beta-carotene are yellow, orange, and green leafy fruits, vegetables, berries and herbs (such as carrots, spinach, lettuce, tomatoes, sweet potatoes, broccoli, cantaloupe, and winter squash and various berries).

The more intense the green, yellow or orange colour the more beta carotene the item contain.

Important to note! - Beta carotene **is not** destroyed by cooking which, in fact, may make it even easier to absorb.

In commercial dietary supplements, beta-carotene is available as synthetic all-trans beta and alpha-carotene from the algae "Dunaliella" and also mixed carotenes from oils – fish krill coconut or palm oil.

Looking at beta-carotene (vitamin A) deficiency.

A low dietary intake of carotenoids such as beta-carotene is not known to directly cause any diseases or health conditions.

One important mechanism for this carotenoid-disease relationship appears to be free radicals. Research indicates that diets low in beta-carotene and carotenoids can increase the body's susceptibility to damage from free radicals. As a result, over the long term, beta-carotene deficient diets may increase tissue damage from free radical activity, and increase risk of chronic diseases.

Diets low in beta carotene may reduce the effectiveness of the immune system and lead to an increased risk of cancer. Symptoms of a beta-carotene deficiency mimic those of a vitamin A deficiency: dry skin, eye site, susceptibility to infection and comprised digestive and immune system.

Looking at beta-carotene overdose and toxicity.

Supplementing the diet with beta-carotene does not produce any significant toxicity despite its use in very high doses in the treatment of numerous photosensitive disorders.

At recommended dosages, beta-carotene is believed to be very safe. High intake of carotenoid-containing foods or supplements is not associated with any toxic side effects. But the skin may turn slightly

yellow-orange in colour when extra-large amounts are taken. But will return to normal with decreased dosage.