Decreases in the availability of nutritional molecular antioxidants of beta-carotene.

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Introduction

Experts in the field of carotenoids gathered in July 2009 at the Hohenheim consensus conference to discuss the present state of -carotene research and to summarise what is known about its chemical properties, physiological function, and consumption. In each case, the experts addressed 17 questions and came to an agreement that was expressed in a consensus answer. These consensus responses are based on publicly available, reliable data that was thoroughly vetted by the individual experts and is supported by background information. Because the efficiency of conversion of -carotene to retinol is not a single ratio, multiple conversion factors have been employed in various surveys and following governmental recommendations within different nations to determine the impact of -carotene on total dietary intake of vitamin A. Several studies, however, show that -carotene plays a role in meeting the necessary vitamin A intake. The consensus conference, in addition to elucidating the various functions, distribution, and uptake of -carotene, placed a special emphasis on the provitamin A function of -carotene and the role of -carotene in achieving the required/recommended total vitamin A intake in both developed and developing countries. There was agreement that -carotene is a healthy source of vitamin A and that its provitamin A functions aids in vitamin A absorption [1].

Intake of beta-carotene helps to compensate for retinol deficiency in many parts of the world. Vegans and vegetarians have the highest consumption of provitamin A. The corresponding consumption of -carotene would be as given in based on computed RE and a conversion factor of 6:1.These findings reveal that substantial provitamin A consumption is achievable under some circumstances, but that preformed vitamin A intake is sometimes critically low and falls short of the necessary limits [2].

The major function of -carotene, according to chemical data, is as an optimal, naturally occurring provitamin A. -Carotene differs from other carotenoids in terms of structure and function. There is no difference between -carotene that is naturally occurring and -carotene that is chemically manufactured.

Carotene (-carotene) is the most well-known of the carotenoids, which are natural colourants found in the human diet. It is a tetraterpenoid with 40 carbon atoms in a core structure made up of conjugated double bonds and two -ionone rings. -Carotene has a significant absorption peak in the visible spectrum with a maximum at 450 nm, which is responsible for the compound's orange to red colour. This is due to its extended system of 9 completely conjugated double bonds. All-trans-carotene is the most common isomer in biological systems (E-isomer). In living creatures and food samples, however, cis-isomers have been discovered, including 9-cis-, 13-cis-, and 15-cis—carotene (Z-isomers), as well as various di- and poly-cis analogues [3].

The most favourable and crucial precursor for vitamin A is all-trans-carotene. This is related to its symmetrical structure, as all-trans—carotene is the only carotenoid capable of oxidative cleavage of the central 15,15' carbon-carbon bond, which is mediated by the -carotene monooxygenase, releasing two molecules of all-trans-retinal. Other geometrical isomers are less efficiently cleaved, according to in vitro research.

Antioxidant activity

Carotene has been identified as an antioxidant for structural reasons and based on experimental findings. However, this has been called into question, and the chemical has even been labelled as having prooxidant effects, at least in vitro. There are several in vitro studies that both support and refute the compound's antioxidant capabilities. Antioxidant effects of -carotene have also been researched in humans based on tests of biomarkers for oxidative damage (e.g. malondialdehyde, isoprostanes, 8-oxo-guanosine), however with mixed findings [4].

For structural reasons and based on experimental findings, -carotene has been identified as an antioxidant. This has been questioned, and the molecule has even been labelled as having prooxidant properties, at least in vitro. Several in vitro experiments have been conducted to support and dispute the compound's antioxidant properties. Humans have also been tested for antioxidant properties of -carotene using biomarkers for oxidative damage (e.g. malondialdehyde, isoprostanes, and eight-oxo-guanosine), with inconsistent results [5].

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