

VITAMIN A - CHARACTERISTICS, STRUCTURE

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Abstract:

Vitamin A is a group of substances closely related in chemical structure, they are retinol (A1 vitamin A, axerophytol) and other retinoids with similar biological activity: dehydroretinol (vitamin A2), retinal (retinen, vitamin A1 aldehyde) and retinoic acid. Provitamin A includes carotenoids, which are metabolic precursors of vitamin A; β -carotene is the most important among them. Retinoids are found in animal-derived foods, and carotenoids are found in plant-derived foods. All these substances are very soluble in non-polar organic solvents (for example, oils) and poorly soluble in water. Vitamin A is stored in the liver and can be accumulated in tissues. It is toxic in cases of overdose.

Products rich in vitamin A

Vitamin A was discovered in 1913. Its structure was described in 1931, and it was crystallized in 1937.

Vitamin A performs many important biochemical functions in the body of humans and animals. Retinal is a component of rhodopsin, the main visual pigment. Vitamin in the form of retinoic acid stimulates growth and development. Retinol is a structural component of cell membranes and provides antioxidant protection of the body.

In the case of vitamin A deficiency, various damage to the epithelium develops, vision deteriorates, and the hydration of the cornea is disturbed. A decrease in immune function and a slowdown in development are also observed.

Vitamin A is a cyclic unsaturated alcohol consisting of a β -ionone ring and a side chain consisting of two isoprene residues and a primary alcohol group. In the body, it is oxidized to retinal (vitamin A-aldehyde) and retinoic acid. It is stored in the liver in the form of retinyl palmitate, retinyl acetate and retinyl phosphate.

Vitamin A is present in all forms of animal products, but since pure retinol is unstable, most of it is stored in the form of complex esters of retinol (produced mainly in industry as palmitate or acetate).



Plants contain provitamin A and some carotenoids. Predecessors of the vitamin can be two groups of substances similar in structure: carotenes (α -, β - and γ -carotenes) and xanthophylls (β -cryptoxanthin). Carotenoids are also isoprenoid compounds, α - and γ -carotene contain one β -ionone ring each, and in the process of oxidation, 1 molecule of retinol is formed from them, while β -carotene has two ionone rings, so it has more biological activity. has and two retinol molecules are formed from it.

Carnivores, such as cats, cannot convert carotenoids into retinal due to the lack of 15-15'-monooxygenase (as a result, no carotenoid type is considered a form of vitamin A for these animals).

VITAMIN A PRESERVING PRODUCTS

Retinol is found in large quantities in animal and plant-based products, especially in marine fish and mammalian liver. Carotenes can also be a source of vitamins for humans. They are not toxic in high doses, but they cannot completely replace retinol, since only a limited amount can be converted to vitamin A. The largest amount of β -carotene is found in different types of carrots, but its concentration can vary dramatically depending on the variety (from 8 to 25 mg per 100 g). Good sources are red peppers, green onions, lettuce, zucchini, and tomatoes.

Plant-based (carotenoids):

Green and yellow vegetables - carrots, pumpkin, sweet pepper, spinach, broccoli, green onions, parsley;

Legumes - soybeans, peas;

Fruits - peaches, apricots, apples, grapes, watermelons, cantaloupe, plums, cherries.

Animal (retinoids) - fish oil, liver (especially beef liver), caviar, milk, butter, margarine, sour cream, cottage cheese, cheese, egg yolk.

Genetically modified golden rice, rich in beta-carotene, is a potential solution to vitamin A deficiency, but no variety of "golden rice" is available for consumption.

Synthetic retinol (in the form of complex esters) is obtained from β -ionone by gradually growing a chain of double bonds.

References:

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