

Vitamin A pdf

Vitamin A

AT A GLANCE

Introduction

Vitamin A is a group of fat-soluble compounds that can be differentiated into two categories, depending on whether the food source is an animal or a plant:

- Vitamin A found in foods that come from animals is called preformed vitamin A or retinol;
- Vitamin A found in fruits and vegetables is called provitamin A carotenoid, which can be cleaved into retinol in the body; the carotenoid beta-carotene is most efficiently converted into retinol, making it an important vitamin A source.

Health Functions

A sufficient vitamin A (retinol) intake is essential for

- the process of vision (especially night vision)
- growth and development it is involved in the genetic regulation of cell and tissue formation, programming, and communication needed for reproduction and for the proper development of the embryo in the womb
- immune function it helps to protect against infections by ensuring the effectiveness of mechanical barriers (e.g., skin, mucosa), and increasing the production and efficacy of protective cells (e.g., lymphocytes)
- male and female reproductive organs.

The European Food Safety Authority (EFSA), which provides scientific advice to assist policy makers, has confirmed that clear health benefits have been established for the dietary intake of vitamin A in contributing to:

- normal cell differentiation;
- a normal function of the immune system;
- the maintenance of normal skin and mucous membranes;
- the maintenance of normal vision;
- normal iron metabolism.

Disease Risk Reduction

Cancer

Presently, there is only little evidence in humans that increased intake of natural (in food) or isolated vitamin A (in dietary supplements) reduce breast or lung cancer risk.

Other Applications

Please note:

Any dietary or drug treatment with high-dose micronutrients needs medical supervision.

Eye and skin disease

High doses of vitamin A (retinol) supplements have been used successfully to treat an inherited eye disease (retinitis pigmentosa) and to alleviate the symptoms. 13-cis retinoic acid, a very potent metabolite of vitamin A is used to treat skin disorders such as psoriasis and acne.

Intake Recommendations

The recommended daily intake of vitamin A varies according to age, sex, risk group and other criteria applied in individual countries: 700 to 1000 micrograms (mcg) Retinol Equivalents (RE) per day for men, 600 to 800 mcg RE/day for women. In the USA the recommended intake for adults is 900 mcg (men) and 700 mcg (women) per day of preformed vitamin A (retinol).

Supply Situation

Surveys undertaken in a number of countries suggest that vitamin A intake patterns vary considerably across Europe and in the U.S. The number of people at risk from vitamin A deficiency depends on the intake of total vitamin A, which is defined as preformed (retinol) and provitamin A (e.g. beta-carotene).

Based on numerous studies it is evident that parts of the world's population do not receive the RDA for vitamin A through dietary sources for preformed vitamin A. To fill the gap between low intake from sources containing preformed vitamin A, adequate amounts of provitamin A, such as beta-carotene, must be supplied. However, according to national nutrition surveys, beta-carotene intake, and therefore the provitamin A supply of large parts of the population, is insufficient.

Deficiency

Vitamin A deficiency usually results from inadequate intake of foods high in vitamin A or beta-carotene, a precursor of vitamin A. The earliest symptom of vitamin A deficiency is night blindness. Groups at risk for insufficient vitamin A supply are mainly pregnant and breast-feeding women, newborns, children with frequent infections, the elderly and people who avoid animal-derived foods, especially vegans.

Sources

The richest food source of preformed vitamin A is liver, with considerable amounts also found in egg yolk, whole milk, butter and cheese. Provitamin A carotenoids (e.g., beta-carotene) are found in carrots, yellow and dark green leafy vegetables (e.g., spinach, kale, broccoli), various fruits, pumpkin, apricots, melon, and palm oil.

Safety

Intake of high amounts of vitamin A (over 5x RDA for several weeks) interferes with the vitamin A homeostasis and plasma retinol levels can reach a value 20-30x higher than normal, which is 0.7-2.5 μM . Because vitamin A is stored in the liver, large amounts taken over a period of time can eventually exceed the livers storage capacity and produce adverse effects, such as liver damage, bone abnormalities and joint pain. More common symptoms of hypervitaminosis A are headache, vomiting, nausea, vertigo and visual disorientation, peeling of the skin, and chronic liver disease.

Some research has associated high-dose vitamin A (retinol) supplementation over several years with an increased risk of osteoporosis. The reasons for these findings are not yet fully clear. Most probably an interaction of vitamin A and vitamin D on the level of gene regulation is at least partially responsible for this effect. However, it is too early to draw a final conclusion.

Nevertheless people above 50 should not exceed the recommended daily intake of vitamin A.

Pregnancy risk

Normal foetal development requires sufficient vitamin A intake, but consumption of high doses of retinol during pregnancy is known to cause malformations in the foetus. In general WHO recommends to limit the vitamin A intake during pregnancy strictly to 10'000 IU/day (3000 micrograms/day).

Tolerable upper intake level

To avoid such adverse effects, upper intake levels of preformed vitamin A have been set at 3,000 micrograms Retinol Equivalents (RE) per day for adults with appropriately lower levels for children.

Drug interactions

Please note:

Because of the potential for interactions, dietary supplements should not be taken with medication without first talking to an experienced healthcare provider.

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