



## **ANUVIT PLUS Vitamin A 10000 IU Tablet**

### **INDICATED CLAIMS:**

- A factor in the maintenance of good health.
- Helps to maintain eyesight, skin, membranes and immune function.
- Helps in the development and maintenance of bones.
- Helps in the development and maintenance of teeth.

### **GENERAL INFORMATION**

A refers to a group of fat-soluble substances that are structurally related to and possess the biological activity of the parent substance of the group called all-trans retinol or retinal Vitamin A plays vital roles in vision, epithelial differentiation, growth, reproduction, pattern formation during embryogenesis, bone development, hematopoiesis and brain development. It is also important for the maintenance of the proper functioning of the immune system. Certain carotenoids, such as beta-carotene alpha-carotene and betacryptoxanthin are dietary' precursors of vitamin A. Collectively, these substances are called provitamin A.

Vitamin A deficiency can result in night blindness (defective vision at low illumination), xerosis of the conjunctiva and cornea (destruction of the cornea secondary to vitamin 11 deficiency or xerophthalmia is a major cause of blindness in children), keratinization of the lung, gastrointestinal tract and urinary tract epithelia, growth retardation, follicular hyperkeratosis of the skin, increased susceptibility to infections and death. Children are particularly susceptible to the effects of vitamin A deficiency. Deficiency of the vitamin is a serious public health issue in developing countries.

Vitamin A deficiency occurs under certain conditions. These include inadequate dietary intake of vitamin A or provitamin A, malabsorption syndromes (cystic fibrosis; Whipple's disease, Crohn's disease, ulcerative colitis, short bowel syndrome), pancreatic disease and chronic liver

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disease. Vitamin A may prevent loss of vision or restore lost vision. Vitamin A may have anticarcinogenic, immunomodulatory and antioxidant activities.

### **PHARMACOKINETICS:**

Preformed vitamin A is present in food in the form of retinyl esters. The principal nutritional supplement forms of preformed vitamin A are retinyl palmitate and retinyl acetate.

Retinyl palmitate is also used in food fortification. Preformed vitamin A is efficiently absorbed from the small intestine. The efficiency of absorption ranges from 60% to 90%. Vitamin A absorption requires bile salts, pancreatic enzymes and dietary fat. Vitamin A is delivered to the enterocytes in the form of micelles. Prior to its absorption, the retinyl esters are hydrolyzed by pancreatic lipase. Long-chain retinyl esters, such as retinyl palmitate, appear to be hydrolyzed by a lipase which is a component of the brush border. Within the enterocytes, all-trans-retinol is reesterified to retinyl esters and the retinyl esters are secreted by the enterocytes into the lymphatics in the form of chylomicrons.

The chylomicrons enter the circulation via the thoracic duct. Chylomicrons undergo metabolism in the circulation via lipoprotein lipase to form chylomicron remnants. Most of the retinyl esters in chylomicron remnants are rapidly taken up into liver parenchymal cells. Within the liver parenchymal cells, retinyl esters are again hydrolyzed to all-trans-retinol and fatty acids. All-trans-retinol may be stored in the liver as retinyl esters or may be transported in the circulation bound to serum retinol binding protein (RBP). RBP delivers retinol to the various tissues. Approximately 50%-85% of the total body vitamin A content is stored in the liver. Greater than 95% of serum retinol is present in its unesterified form.

All-trans retinol is oxidized to retinal via retinol dehydrogenase; retinal is metabolized to retinoic acid via retinal dehydrogenase. All-trans-retinol is delivered to the cornea via the tears and by diffusion through eye tissue. Retinol and retinoic acid form a number of oxidized metabolites. The metabolites of retinol and retinoic acid undergo glucuronidation,

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glucosylation and amino acylation and are excreted mainly via the biliary route. Some excretion of retinol and its metabolites occurs via the kidneys.

### **ANUVIT PLUS Vitamin A 10000 IU Tablet**

**Treatment for vitamin A deficiency**

#### **Product information**

Available as 60 tablets

Each tablet contains:

Vitamin A Acetate 10,000IU

Non-medicinal ingredients: Microcrystalline Cellulose, Magnesium Stearate, DiCalcium Phosphate Dihydrate and Colloidal Silicon Dioxide.

Directions for use: take 1 tablet once a day or as directed by a health care practitioner.

#### **Benefits**

- Vitamin A may prevent loss of vision or restore lost vision.
- Vitamin A may have anticarcinogenic, immunomodulatory and antioxidant activities.

#### **CONTRAINDICATIONS**

Doses of vitamin A above 5,000 IU are contraindicated in pregnant women.

Vitamin A is contraindicated in those hypersensitive to any component of a vitamin A-containing product.

Vitamin A is contraindicated in those with hypervitaminosis A.

#### **PRECAUTIONS:**

The use of vitamin A for the treatment of vitamin A deficiency requires medical supervision.

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The use of vitamin A or any retinoid for the treatment of any medical condition must be prescribed and supervised by a physician.

Nursing mothers should avoid doses of vitamin A great than the U.S. RDA (5,000 IU daily), unless prescribed by a physician. Supplemental vitamin A may add to the toxicity of retinoids or retinoid analogues which are used pharmaceutically. These include acitretin, all-trans-retinoic acid, bexarotene, Ordinate and isotretinoin. Those taking any of these drugs should avoid the use of supplemental vitamin A. Too little or too much vitamin A may increase the risk of osteoporosis. Further research into the relationship between vitamin A and the risk of osteoporosis is needed and warranted. For now, doses higher than the DV or U.S. RDA (5,000 IU) should not be used except if medically indicated and prescribed and monitored by a physician.

## **ADVERSE REACTIONS**

High intakes of vitamin A may cause acute or chronic toxicity. Symptoms and signs of chronic toxicity include dry rough skin, cracked lips sparse coarse hair and alopecia of the eyebrows. These are early signs. Late symptoms and signs include irritability, headache, pseudotumor cerebri (benign intracranial hypertension), elevated serum liver enzymes, reversible noncirrhotic portal hypertension, hepatic fibrosis and cirrhosis. There are a few reports of death secondary to liver failure.

Supplemental doses of 10,000 IU of vitamin A daily or greater have been reported to increase the risk of birth defects when used by pregnant women.

Subjects in the EUROSCAN study were given 300,000 IU/day of vitamin A for one year followed by 150,000 IU/day for the second year. Typical side effects were mucocutaneous ones (dryness, desquamation, itching, and bleeding and hair loss).

I-lepatotoxicity has been reported in one patient who took 25,000 IU/day of vitamin A over a six-year period.

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## **INTERACTIONS:**

### **DRUGS**

Cholestyramine: Concomitant intake of cholestyramine and vitamin A may reduce the absorption of vitamin A.

Colestipol: Concomitant intake of colestipol and vitamin A may reduce the absorption of vitamin A.

Mineral Oil: Concomitant intake of mineral oil and vitamin A may reduce the absorption of vitamin A.

Oral Contraceptives: Oral contraceptives may increase serum retinol.

Orlistat: Orlistat may decrease the absorption of vitamin A.

Retinoid Drugs (acitretin, all-trans-retinoic acid, tretinoin, isotretinoin, and adapalene): Supplemental vitamin A may add to the toxicity of these drugs.

### **NUTRITIONAL SUPPLEMENTS**

Vitamin K: Intake of large doses of vitamin A may decrease the absorption of vitamin K.

### **FOODS**

Olestra: The fat substitute olestra inhibits the absorption of vitamin A as well as the other fat-soluble vitamins D, E and K. These vitamins are added to olestra to compensate for this. Olestra contains 170 IU of vitamin A per gram (500 IU retinol equivalents per gram).

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## **OVERDOSAGE**

Acute toxicity in infants or children can occur with a single dose of 25,000 IU per kilogram of body weight. Vomiting increased intracranial pressure and death may occur. A dose of 2,000,000 IU or greater in adults, can cause a similar clinical picture. Some Arctic explorers have ingested several million units of vitamin A from eating polar bear or seal liver two of the richest sources of vitamin A. The Arctic explorers developed irritability, drowsiness, headache and vomiting.

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