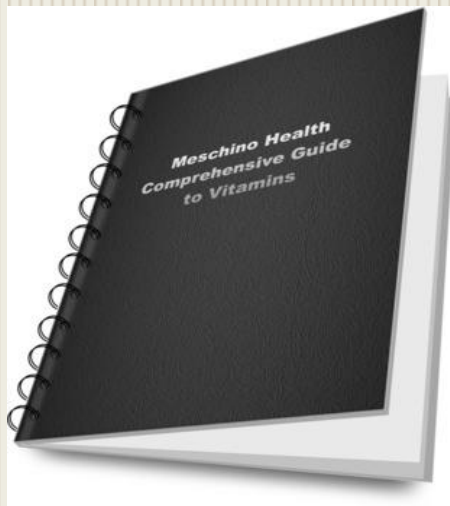


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Meschino Health Comprehensive Guide to Vitamins



Authored by: Dr. James Meschino

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About the Meschino Health Comprehensive Guide to Vitamins

The Meschino Health Comprehensive Guide to Vitamins is one of four eBooks on nutrients written by Dr. James Meschino:

1. Meschino Health Comprehensive Guide to Vitamins
2. Meschino Health Comprehensive Guide to Herbs
3. Meschino Health Comprehensive Guide to Minerals
4. Meschino Health Comprehensive Guide to Accessory Nutrients and Essential Oils

All four books were written to both educate and provide an easy to use quick reference to answer important questions regarding nutrients. Users of the guide can quickly find which health conditions the nutrient can impact, proper dosage, possible effects of a deficiency or the effect any potential toxicity associated with the nutrient. Finally any drug-nutrient Interactions associated with the nutrient.

More eBook and eQuick Guides

Meschino Health is excited to be able to provide tools and resources to help you achieve your healthy living objectives. Sharing the Healthy Living message and helping anyone who is interested in living a healthy happy life is what Meschino Health is all about. Visit www.MeschinoHealth.com to learn the latest a science based research on diet and supplementation that can prevent and treat health conditions often associated with aging. New eBooks and eGuides are added every month and can be downloaded free of charge.

Meschino Health Natural Health Assessment

Welcome to the Nutrition, Lifestyle and Anti-aging Assessment.



The most powerful health assessment on the internet

- Easy to Complete Online Questionnaire
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- The Meschino Health Assessment is a 15 to 20 page comprehensive report complete with diet, lifestyle and supplement considerations that are specific to your profile.

The Meschino Health Assessment is a free service created by Dr. James Meschino. The feedback in your report is based on your answers to the questions in the Health Assessment, and highlights the dietary, lifestyle and supplementation practices that are best suited to your circumstances, according to currently available scientific studies

The Meschino Health Assessment is a Free Service

Why take it?

We all know that we should eat better, exercise more and change some of our less than desirable lifestyle habits. Did you know that 7 out of 10 North Americans are taking some form of nutritional supplements to augment their diet? While that might sound like good news, the downside is that many people are guessing at what supplements to take! So which one should you take? Better yet, what does eating better look like?

You need a plan.

But where would you even begin to find a health assessment that takes into account your personal health status, diet, lifestyle activities and family health history-before recommending a plan of action?

Where? [Right here.](#)

Vitamin A

Dr. James Meschino DC, MS, ND

Introduction

Vitamin A is a vital, but often ignored, nutrient for health optimization and disease prevention. Vitamin A is important to the prevention of cancer, night blindness, and infection. More than 50 percent of Americans do not meet the daily requirement of Vitamin A intake while other Americans ingest excess Vitamin A from supplements, which increases risk of Vitamin A toxicity, birth defects, and osteoporosis. The daily ingestion of Vitamin A is a delicate balancing act between ingesting enough Vitamin A to derive its beneficial effects, while at the same time avoiding over ingestion of this nutrient. This article highlights the important physiological and clinical aspects of Vitamin A that health practitioners should be aware of in regards to making recommendations to their patients about optimizing Vitamin A status and the use of supplements containing Vitamin A.

General Features

Preformed Vitamin A is a fat-soluble group of related compounds. The most common preformed version present in food is retinol; others are retinal (retinaldehyde), and retinoic acid. Retinol can be reversibly oxidized to retinal, which is required for night vision. Oxidation of retinal produces retinoic acid, which does not participate in the visual cycle and cannot be converted back to the aldehyde form (retinal). However, retinoic acid does support growth and normal differentiation of epithelial tissue, but does not support reproductive function, as do other forms of Vitamin A.

In general Vitamin A serves at least five major functions in the body: (1) It helps cells reproduce normally and undergo complete differentiation to fully developed adult cells (cells that have not properly differentiated are more likely to undergo pre-cancerous changes). (2) It is required for vision and one of the first symptoms of Vitamin A deficiency is night blindness. (3) It is required for normal growth and development of the embryo and fetus, influencing genes that determine the sequential development of organs in embryonic development. (4) It may be required for normal reproductive function, with influences on the function and development of sperm, ovaries and placenta. (5) It is a powerful fat-soluble antioxidant. Vitamin A is vital to health optimization and health maintenance as studies show that Vitamin A-deprived animals not only go blind, but also die shortly thereafter. Due to its diverse effects on epithelial cells, including growth, replication, differentiation and antioxidant function, animal studies have shown that Vitamin A reduces the risk of cancer development in epithelial cells in the presence of certain carcinogens.

Absorption and Metabolism

Preformed Vitamin A is absorbed in the gastro-intestinal tract, enters the lymphatic system, within chylomicrons and then the general circulation, which ultimately delivers Vitamin A to the liver, the main storage site (90%) for Vitamin A (also stored to a lesser degree in the kidneys, adipose tissue, and adrenal glands). It is released from the liver in the form of retinol, bound to retinol-binding protein (RBP).

80-90 percent of Vitamin A is typically absorbed from the gut demonstrating excellent bioavailability. Retinoic acid from food is absorbed from the gut and transported in the blood bound to albumin. It normally does not accumulate within the liver or other tissues in any appreciable amounts.

Once delivered to the cells via the bloodstream Vitamin A is extracted from the bloodstream and binds to intracellular proteins within the cell known as CRBP (cellular retinal-binding protein) and CRABP (cellular retinoic acid-binding protein). Within the cells of the body Vitamin A modulates many biochemical reactions, which promote growth, replication, differentiation, and provides additional antioxidant protection.

Functions

Vision

Within the retina, the 11-cis isomer of Vitamin A aldehyde (retinal) is combined with the protein opsin (rhodopsin in the rods and iodopsin in the cones). Light changes the 11-cis configuration to the all-trans form of retinal. This causes visual excitation. When there is a deficiency of Vitamin A, the rods and cones cannot adjust to light changes and night blindness is an early consequence when these cells, especially the rods, are deprived of Vitamin A.

Growth and Bone Development

Through its effects on protein synthesis and differentiation, Vitamin A is necessary for growth and development of bones and soft tissues. It is also required for enamel-forming epithelial cells in the development of teeth. Retinoic acid appears to be the most important form of Vitamin A for these purposes.

Epithelial cell and mucous membrane development and maintenance

Retinoic acid is required for the development of mucous epithelial cells that line the respiratory tract, the alimentary canal, and the urinary tract. Vitamin A deficiency results in "keratinization" (drying and hardening) of these tissues, which lowers the protective barrier of these tissues against infection. Sub-optimal Vitamin A status may also render these tissues more susceptible to cancerous changes.

Immune Function

Vitamin A influences both humoral and cell-mediated immunity. The circulating number of T lymphocytes as well as their response to mitogens is reduced in Vitamin A deficiency. Vitamin A is also known as the anti-infective vitamin due to its effects on mucous membranes, helping to create a barrier to infection.

Reproduction

Animal studies provide evidence that retinal is required for normal reproduction and lactation.

Antioxidant

Vitamin A is a potent fat-soluble antioxidant, which appears to have important implications in regards to the prevention of epithelial cancers.

Retinol Equivalents (RE): In addition to preformed Vitamin A, which is present in animal foods, orange-yellow fruits and vegetables and dark green vegetables contain precursors to Vitamin A synthesis, which occurs in the body (e.g. Beta-carotene). In North America, approximately fifty percent of Vitamin A is derived from Vitamin A precursors from the consumption of fruits and vegetables. The following chart outlines the retinal equivalent values of various carotenes as well as preformed Vitamin A.

1 Retinol equivalent	=	1 ug. Retinal
	=	6 ug. Beta-Carotene
	=	12 ug. other provitamin A carotenoids
	=	3.33 I.U. Vitamin A activity from retinol
	=	10 I.U. Vitamin A activity from Beta-Carotene

Vitamin A Recommended Daily Allowance

Group	
Adult males	1,000 Retinol Equivalents (RE)
Adult women	800 RE or 4,000 IU
Pregnancy	1,000 RE (5,000 IU)
Lactation	1,200 RE (2,000-5,000 IU)
Children	400-1,000 RE (2,000-5,000 IU), the amount increasing from infancy to 14 years.

Overt Deficiency of Vitamin A

1. Night Blindness (Nyctalopia)
2. Xerophthalmia or Xerosis **Conjunctivae**

This progressive disorder of the eye leading to blindness involving dryness, thickening, wrinkling and pigmentation of the conjunctiva, Bitot's spots, dryness and keratinisation of the cornea and finally ulceration, softening of the cornea and possibly perforation and iris prolapse and infection.

3. Follicular Hyperkeratosis (Toad Skin)

Goose flesh appearance known as Xeroderma. In follicular hyperkeratosis, the hair follicles are blocked with plugs of keratin from the epithelial lining. The result is rough, dry, scaly skin beginning with the forearms and thighs and progressing to full-body involvement.

4. Other:

- growth inhibition
- skeletal abnormalities
- decreased resistance to infection
- taste bud keratinisation and loss of sense of taste
- loss of appetite¹

Comment [O1]: Jim is this a mistake should it be part of the first line.

The North American Vitamin A Status Update

The National Health and Nutrition Examine Surveys (I and II), along with the Continuing Survey of Food Intakes by Individuals and 1994-96 Diet and Health Knowledge Survey (ARS Food Surveys Research Group. Internet – 1997), indicate that approximately 56 percent of Americans do not meet the daily requirement for Vitamin A intake. In fact, in many cases individuals only consume 50% of the RDA level on a daily basis. Thus, marginal deficiency of Vitamin A is not uncommon in developed countries. As such, the use of a multiple vitamin supplement each day providing 2,500-3,000 IU of preformed Vitamin A and 10,000-15,000 IU of beta-carotene may be highly beneficial to health optimization and the prevention of epithelial cancers according to epidemiological studies, and experimental data. However, consuming a multiple vitamin containing 5,000 IU or more of preformed Vitamin A, may increase risk of Vitamin A toxicity over the long-term, increase risk of osteoporosis in postmenopausal women, and may increase risk of birth defects. On the other hand, there are special cases where higher doses of Vitamin A can be used on a therapeutic basis, but higher doses require proper monitoring for Vitamin A toxicity and should not be used during pregnancy, lactation or by individuals with liver or kidney disease.

Vitamin A Toxicity

Toxicity has been associated with abuse of Vitamin A supplements and with diets extremely high in preformed Vitamin A. Consumption of 25,000-50,000 IU/d for periods of several months or more can produce multiple adverse effects. Individuals at highest risk have liver function previously comprised by drugs, viral hepatitis, alcohol, or protein-energy malnutrition.

Children - adverse effect have been shown to occur with intakes as low as 1,500 IU/kg/day.

Pregnant women - increased risk of birth defects has occurred with maternal intakes as low as 25,000 IU/day.

From a clinical standpoint, Vitamin A toxicity typically occurs in patients taking high dose Vitamin A ($\geq 50,000$ IU) for various skin conditions (e.g. acne, psoriasis, eczema). Even synthetic water-soluble Vitamin A has been shown to cause toxicity at doses of 18,500 to 60,000 IU per day over a period of months.

Signs and Symptoms of Vitamin A Toxicity	
Children	Adults
Anorexia Bulging fontanelles Drowsiness Increased intracranial pressure Irritability Vomiting	Abdominal pain Anorexia Blurred vision Drowsiness Headache Hypercalcemia Irritability Muscle weakness Nausea, vomiting Peripheral neuritis Skin desquamation Brittle nails Cheilosis Gingivitis Alopecia
Birth defects associated with high maternal intake of Vitamin A (18,000-100,000 IU before and throughout pregnancy): Abnormalities of the head, face, ears, eyes, mouth, lips, jaw, heart and urinary system: other defects ²	

Vitamin A dosages greater than 10,000 IU during pregnancy (specifically the first 7 weeks after conception) have probably been responsible for one out of 57 cases of birth defects in the United States. Women who are at risk for becoming pregnant should keep their supplemented Vitamin A levels below 5,000 IU per day.³ A study showed that

59 women taking prescription Vitamin A 13-cis retinoic acid (Accutane) for acne, who became pregnant resulted in 12 spontaneous abortions and 21 malformed infants.

Vitamin A Supplementation

Acute Viral Infection 50,000 IU for one or two days

Cancer Treatment and Prevention

Wolback and Howe noted that retinoid-deficient epithelial tissues had a premalignant phenotype (appearance) that was characterized by enhanced mitotic activity (rapid cell turnover) and loss of differentiation.⁴

Retinoids are known to possess antiproliferative, differentiative, immunomodulatory and apoptosis-inducing properties. A growing body of evidence supports the hypotheses that the retinoic acid receptor B2 gene is a tumor suppressor gene, and that the chemopreventive effects of retinoids are due to induction of this receptor.⁵ A unique Vitamin A compound is presently being used in cancer prevention and treatment. This form of Vitamin A, known as 9-cis-retinoic acid, has been used to suppress premalignant oral lesions and prevent the development of secondary primary cancers among patients with head and neck and lung cancers. This form of Vitamin A is now being considered in the treatment of breast cancer, which often displays under expression of the retinoic acid receptor B2.⁶⁻⁹

Note that a number of alternative practitioners and holistic medical practitioners often recommend high doses of water soluble Vitamin A (50,000-300,000 IU per day) as part of the adjunctive nutritional support for patients with certain cancers. Many of these practitioners suggest it is a useful intervention to help prevent recurrence of certain cancers and control the spread of existing lesions (www.diagnoseme.com). In these cases, monitoring for Vitamin A toxicity is mandatory.

Acne

There is some evidence that Vitamin A supplementation at 25,000 IU per day may improve acne. However, this dose may lead to signs of toxicity (headache, cracking and chapped lips, fatigue, dry skin, and joint pain are early warning signs and symptoms). A dose above 5,000 IU per day also increases the risk of birth defects in children born to mothers ingesting these higher levels of Vitamin A at the time of conception.¹⁰

In my experience, a safer and more appropriate natural treatment for acne is the ingestion of the P73 Wild Oregano Capsules in conjunction with topical application overnight of the P73 Wild Oregano Cream. This form of wild oregano has been shown to kill many bacteria, viruses and fungi, which appears to include the bacteria involved in acne.

Drug-Nutrient Interactions

Bile acid sequestrants such as cholestyramine and colestipol, are known to reduce Vitamin A absorption.^{11,12}

Neomycin is known to reduce the absorption of Vitamin A and increase its excretion, which increases need for Vitamin A supplementation.¹³

Mineral oil decreases the absorption of Vitamin A.¹⁴

Vitamin A-derivative drugs (isotretinoin) may increase risk of toxicity by potentiating the effects of Vitamin A. Caution should be exercised with respect to Vitamin A supplementation in these cases.¹⁵

Orlistat decreases Vitamin A levels in the body which increases demand for Vitamin A supplementation.^{16,17}

Corticosteroid drugs may decrease Vitamin A levels in the body, which increases demand for Vitamin A supplementation.¹⁸

High doses of Vitamin A may impair the absorption of Vitamin E if taken concurrently.¹⁹

Pregnancy and Lactation

1. During pregnancy and lactation, the only supplements that are considered safe include standard prenatal vitamin and mineral supplements. All other supplements or dose alterations may pose a threat to the developing fetus and there is generally insufficient evidence at this time to determine an absolute level of safety for most dietary supplements other than a prenatal supplement. Any supplementation practices beyond a prenatal supplement should involve the cooperation of the attending physician (eg., magnesium and the treatment of preeclampsia.)

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Beta-Carotene

Introduction

Beta-Carotene is one of 30-50 carotenoids found in plant foods that can be converted by the body into Vitamin A. Beta-Carotene is a fat-soluble compound that is absorbed intact in the presence of bile salts from the intestine. Beta-Carotene is made up of two Vitamin A molecules (attached together). Within intestinal cells they are split to yield retinol (preformed Vitamin A). Approximately one third of all the carotene in food can be converted into Vitamin A. For Beta-Carotene specifically, about one-sixth is available to become Vitamin A, if the body requires it.

Absorption and Metabolism

The splitting of Beta-Carotene (and other carotenes) into retinol within intestinal cells is well regulated to help guard against Vitamin A toxicity. The retinol that is formed from Beta-Carotene enters the chylomicron and is metabolized from that point forward as preformed Vitamin A. Chylomicrons primarily deliver Beta-Carotene to the liver, where they are repackaged within another lipoprotein carrier system known as the very-low-density lipoprotein.

Beta-Carotene (and other carotenoids) enters the bloodstream from the liver and is transported to peripheral tissue by very-low density lipoproteins and low-density lipoproteins (VLDL and LDL, which is the remnant particle of VLDL after triglycerides are removed by fat cells, muscle fibers and other tissues). In contrast, Vitamin A is transported from the liver attached to retinal-binding protein (RBP). Beta-Carotene is stored in fat tissues, and the adrenal glands, testes, ovaries, rather than the liver and is responsible for the yellowish tinge to the skin when large amounts are stored (carotenoderma). However, carotenoderma is considered to be a nonpathological, reversible condition; not associated with any health risks. Some conversion of Beta-Carotene may take place in the liver and lungs. About 40-60% of Beta-Carotene is absorbed from food. Of interest is the fact that Beta-Carotene supplements are better absorbed than carotenes from food. Beta-Carotene comprises 20-25% of the total serum carotene level.

Functions

Vitamin A Precursor: because Beta-Carotene can be converted into Vitamin A, it supports Vitamin A nutritional status and all vitamin A-related functions.

Antioxidant: Beta-Carotene is an antioxidant and does not need to be converted into Vitamin A to perform antioxidant functions.

Immune System: Beta-Carotene appears to enhance thymus gland function and increases interferon's stimulatory action on the immune system.¹

Other Functions: as described below, Beta-Carotene exhibits a number of immune-enhancing and anti-cancer properties, and has therefore, been tested in patients with immune-compromised states, precancerous, and cancerous conditions, as well as in patients at high risk in developing certain cancers.

Beta-Carotene Supplementation

Compromised Immune Function

A number of studies reveal that older subjects can enhance various aspects of immune function through the supplementation of at least 15 mg of Beta-Carotene (25,000 I.U.) per day. The immune system tends to weaken as humans age, thus researchers have examined various nutrients that may prevent or reverse age-related decline in immune function. High doses of Beta-Carotene have been used in the treatment of immune compromised states and studies on normal human volunteers indicate that supplementation with 180 mg (300,000 I.U.) of Beta-Carotene per day, significantly increased in the number of T-helper cells by approximately 30% after seven days of supplementation, with a 30% increase in a total T-cell count after 14 days. This may be of great significance in HIV/AIDS patients, who have low T-helper cell counts and other parameters of immune function compromise.²⁻⁵ Beta-Carotene supplementation at 50,000 I.U., twice per day administered to AIDS patients has resulted in a 66% rise in total lymphocyte count and a small rise in T-helper cell levels. With discontinuation of Beta-Carotene supplementation, lymphocyte and T-helper cell counts returned to base line levels within six weeks.² In a second study, 60 mg (100,000 I.U.) administered to seven AIDS patients resulted in a rise of T-helper cells over the four-week trial period. This is important as it is the T-helper cell (CD4) count that is adversely affected by the HIV virus and largely accounts for the dramatic reduction in immune function seen in HIV and AIDS patients.²⁷ Not all Beta-Carotene studies with AIDS patients have shown these benefits, but the lack of adverse side effects with Beta-Carotene suggests that it can be used safely as a complementary therapy in these cases.² Moderate dosages of Beta-Carotene supplementation may help to slow down or halt the age-related decline in immune function that increases susceptibility to infection and possibly cancer, as we age. This is true as well for other antioxidant vitamins (Vitamin C, Vitamin E, Vitamin A) and the minerals zinc and selenium.^{3,4,5}

was introduced. Moderate doses of beta-carotene supplementation may help to slow down or halt the age-related decline in immune function that increases susceptibility to infection and possible cancer as we age. This is true as well for other antioxidant vitamins and the minerals zinc and selenium.

Cancer Prevention

At this time it is inadvisable to give high dose Beta-Carotene supplementation (50,000 I.U. or greater) to patients who smoke one pack of cigarettes per day or more. The Alpha-Tocopherol, Beta-Carotene study and the CARET study suggested that Beta-Carotene, in these cases, may slightly increase the risk of lung cancer, although this needs confirmation.^{6,7} However, Beta-Carotene does demonstrate a number of anti-cancer properties and has been shown to reverse leukoplakia – a pre-cancerous condition of the oral cavity, as well as early-stage cervical dysplasia, a pre-cancerous condition of the uterine cervix.⁸⁻¹³ In the Linxian China study, the combination of modest dosages of Beta-Carotene, Vitamin E, and selenium significantly reduced stomach and esophageal cancers, as well as total cancer incidence in high-risk individuals, compared to other vitamin and mineral combinations.²⁶ Beta-Carotene is an antioxidant, an immune system modulator and enhances cellular differentiation of epithelial cells. All of these effects are associated with the prevention of cancer and the reversal of some early stage cancers and states of dysplasia (pre-cancerous states).⁴⁻¹³

Cervical Dysplasia

Beta-Carotene has been shown to influence cellular differentiation of surface lining cells (epithelial cells) and enhances immune-system function. Beta-Carotene has been shown to halt the progression of cervical dysplasia and cause a reversal in some cases involving early and moderate stages of this condition, which is known to be a pre-cancerous condition.^{12,13,18}

Cardiovascular Disease

Beta-Carotene supplementation has been shown to decrease oxidation of LDL-cholesterol, but to a lesser degree than Vitamin E. In this regard, it may help to reduce the risk of cardiovascular disease, as oxidized LDL-cholesterol appears to be more inclined to narrow arteries as part of the atherosclerotic process that leads to heart disease and ischemic stroke. However, evidence is stronger for Vitamin E. Both Vitamin E and Beta-Carotene are transported through the bloodstream within VLDL and LDL lipoproteins, where they are able to act as antioxidants in regards to reducing the oxidation of fatty acids and cholesterol within these lipoproteins (VLDL and LDL).^{14,15,16} The Physicians Helath Study failed, to show a benefit in cardiovascular disease reduction with Beta-Carotene supplementation of 50 mg (83,333 I.U.), taken every other day for 12 years. However, a subgroup analysis of these 22,000 medical doctors showed that of the 333 physicians prior history of heart disease, Beta-Carotene supplementation produced a small reduction in risk of fatal and non-fatal heart attack.³⁰ A number of prospective studies have suggested that higher intakes of Beta-Carotene is associated with a significant reduction in heart attack and stroke, as highlighted in the Western Electric Study in Chicago and a study of Italian women by A Tavani, et al.^{28,29}

Dosage

1. Compromised Immune Function: 50,000 I.U., but a dosage of up to 3,000,000I.U. has been used in short term studies²⁻⁵
2. HIV/AIDS: 50,000 I.U., twice daily has been used with some success^{2,27}
3. Oral Leukoplakia: 50,000-1000,000 I.U. per day^{9,10}
4. Cervical Dysplasia: 50,000-100,000 I.U. per day^{12,13}
5. Cancer Treatment Support: 75,000-100,000 I.U. per day (lung cancer would be an exception)¹¹
6. Heart Diseases and Cardiovascular Health: 10,000-75,000 I.U.^{14,30}
7. General Wellness: 10,000-25,000 I.U. is commonly consumed

Adverse Side Effects and Toxicity

Overall, the experimental animal data demonstrate a high level of Beta-Carotene safety and in human trials using doses of 20-180 mg/d (up to 300,000 I.U./d) to treat patients with the genetic disease erythropoietic protoporphyria. These large doses did not produce any toxic effects. Other studies have confirmed this. Babies born to mothers with carotenemia show no untoward effects or defects and are otherwise normal.¹⁷

Drug-Nutrient Interactions

Bile Acid Sequestrants, such as cholestyramine and colestipol may decrease absorption of Beta-Carotene (as they do other fat-soluble vitamins).^{19,20}

Proton Pump Inhibitors such as omeprazole are known to decrease Beta-Carotene absorption.²¹

Other drugs that impair Beta-Carotene absorption include:

- colchicines²²
- mineral oil²³
- neomycin²⁴
- orlistat²⁵

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