



What You Need to Know About ...

Nutrition and Your Eyes

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Can the foods I eat help keep my eyes healthy?

Absolutely! Proper nutrition is important for healthy eyes throughout your life. Scientists have identified specific vitamins, minerals, and other nutrients that are especially important for your eyes. They are vitamins A, C, and E, beta-carotene, lutein (pronounced LOO-teen), and zeaxanthin (pronounced zee-uh-ZAN-thin), all of which are antioxidants, as well as zinc and omega-3 fatty acids.

What is vitamin A?

Vitamin A is an antioxidant that helps protect against damage caused by free radicals. (See “Why We Need Antioxidants” for more information about free radicals.) Vitamin A helps the heart, lungs, kidneys, and other organs function properly. It is important for a healthy immune system, reproductive function, and vision.

Why is vitamin A important for my eyes?

Vitamin A produces pigments in the retina that help promote healthy vision.

What is vitamin C?

Vitamin C, which is sometimes called ascorbic acid, is also an antioxidant. It is essential for healthy bones, teeth, gums, and blood vessels. Vitamin C helps the body absorb iron and cal-

Why We Need Antioxidants

Vitamins A, C, and E, beta-carotene, lutein and zeaxanthin have antioxidant properties, which means they protect cells from damage caused by free radicals. Free radicals are molecules that form when you exercise, when your body converts food into energy, and when you are exposed to some environmental factors, such as tobacco smoke, air pollution, and sunlight. When free radicals are not fully neutralized by antioxidants, they cause oxidative stress. Scientists believe free radicals may contribute to the aging process and to certain diseases, such as cancer, diabetes, heart disease, and age-related macular degeneration.

cium, aids in wound healing, and contributes to brain function.

What is vitamin E?

Vitamin E is another antioxidant. In addition to helping to protect your body from the damage caused by free radicals, it helps the immune system fight viruses and bacteria. Vitamin E also helps your body form red blood cells, and it dilates blood vessels to keep blood from clotting inside them.

How do vitamins C and E help my eyes?

Researchers have found that vitamin C and vita-

QUICK FACTS ABOUT ...

Age-related Macular Degeneration

Age-related macular degeneration (AMD) is an eye disease that gradually destroys the macula, the part of the eye that's responsible for sharp central vision. We also know that:

- AMD is a leading cause of vision loss for Americans over the age of 60.
- Risk factors for AMD include: age, white race, female sex, and family history of AMD.
- Smoking, obesity, and poor diet may also contribute to the development of AMD.

There is no cure for AMD, but a landmark study — the Age-Related Eye Disease Study (AREDS) — has identified specific nutrients that may help slow the progression of AMD in certain high-risk individuals.¹

HOW TO GET YOUR ...

Vitamin A

Two types of vitamin A exist. *Preformed vitamin A* is found in meat, poultry, fish, and dairy products. *Provitamin A* is found in fruits, vegetables, and other plant-based products. The most common type of provitamin A is beta-carotene. Good sources of vitamin A are milk, eggs, liver, fortified cereals, dark-colored orange or green vegetables, such as carrots, sweet potatoes, pumpkin, and kale, and orange fruits, such as cantaloupe, apricots, peaches, papayas, and mangos. The recommended dietary allowances for vitamin A are 900 micrograms (mcg) per day for men and 700 mcg/day for women.

SOURCE: National Institutes of Health Office of Dietary Supplements
<http://ods.od.nih.gov/factsheets/VitaminA-HealthProfessional/>

Vitamin C

The best sources of vitamin C are raw fruits and vegetables, especially citrus fruits and their juices, red berries, kiwi, red and green bell peppers, tomatoes, and spinach. Other good sources of vitamin C include: broccoli, cantaloupe, and baked potatoes. The recommended dietary allowances for vitamin C are 90 milligrams (mg) per day for men and 75 mg/day for women.

SOURCE: National Institutes of Health Office of Dietary Supplements
<http://ods.od.nih.gov/factsheets/VitaminC-HealthProfessional/>



Vitamin E

Wheat germ and vegetable oils, such as safflower and sunflower, are among the best sources of vitamin E. It is also found in nuts, seeds, and green, leafy vegetables. The recommended dietary allowance for vitamin E is 15 mg (22.4 international units) per day for most adults.

SOURCE: National Institutes of Health Office of Dietary Supplements
<http://ods.od.nih.gov/factsheets/VitaminE-HealthProfessional/>

min E when combined with other essential nutrients may help slow the progression of age-related macular degeneration.¹

What are lutein and zeaxanthin?

Lutein and zeaxanthin are part of a group of antioxidants called carotenoids, which are yellow, orange, and red pigments synthesized by plants. They are particularly important to eye health because they are the only carotenoids in the retina and the lens of the eye.

What foods contain lutein and zeaxanthin?

The best sources of lutein and zeaxanthin are dark green, leafy vegetables, such as kale,

broccoli, collard greens, asparagus, and spinach. Although there is no recommended dietary allowance for lutein and zeaxanthin, the American Optometric Association has stated that daily intake of lutein and zeaxanthin through diet, nutritional supplements (10 milligrams [mg] of lutein per day and 2 mg of zeaxanthin per day), or fortified foods and beverages is important to maintain eye health.

How does zinc help my eyes?

Zinc is an essential trace mineral that is highly concentrated in the eyes, mostly in the retina and the underlying tissue. It plays a vital role in bringing vitamin A from the liver to the retina to pro-

HOW TO GET YOUR ...

Zinc

Oysters are the best source of zinc, followed by red meat, poultry, seafood, and fortified breakfast cereals. Beans, nuts, whole grains, and dairy products provide some zinc. The recommended dietary allowances of zinc are 11 milligrams (mg) per day for men and 8 mg/day for women.

SOURCE: National Institutes of Health Office of Dietary Supplements

<http://ods.od.nih.gov/factsheets/Zinc-HealthProfessional/>



duce rhodopsin, a pigment that helps you see in low-light conditions. Zinc deficiency can result in poor night vision.

Zinc is recommended for people who are at high risk for age-related macular degeneration (AMD) or who are already experiencing the early stages of AMD. Researchers have found that zinc taken in combination with other essential nutrients may help slow the progression of AMD.¹ Higher levels of zinc may interfere with copper absorption, which is why dietary supplements containing zinc also include copper.

Are these nutrients available together in a pill or a capsule?

Several formulations of these nutrients are available. You should discuss them with your eye doctor or your primary care physician, particularly if you're unsure which formula is right for you or if you're taking medications or other dietary supplements. Some of these nutrients are included in multivitamin formulations that support overall eye and body health, so that you don't need a separate multivitamin. Others have specific nutrients that you can take alone or with a multivitamin. The Age-Related Eye Disease Study (AREDS) formulation, for example, is designed for people who are at high risk of advanced age-related macular degeneration. Importantly, people who smoke tobacco should not take any formulation that contains beta-carotene, because researchers found an increased risk of lung cancer in this group.¹

What exactly is AREDS and the AREDS nutritional formulation?

The Age-Related Eye Disease Study is a landmark 10-year study sponsored by the National Eye Institute of the National Institutes of Health. The AREDS researchers found that a specific combination of high-potency antioxidants and zinc slowed the progression of advanced age-related macular degeneration by about 25% and vision loss by 19% in certain high-risk patients.¹

The AREDS formulation includes:

- Vitamin C — 500 milligrams
- Vitamin E — 400 international units (IU)

QUICK FACTS ABOUT...

Dry Eye

Dry eye occurs when the eye does not produce enough tears or when the quality of the tears is poor. The result is irritated, gritty, scratchy, watery, or burning eyes and blurred vision. Advanced dry eye may damage the cornea and impair vision. Risk factors for dry eye include: older age, particularly postmenopausal women, some medical conditions, such as immune system disorders, failure to blink properly, corneal surgery, certain medicines, and exposure to eye irritants, such as smoke. Low levels of the omega-3 fatty acids docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) have been linked to dry eye and other eye diseases.



- Beta-carotene — 15 milligrams (often labeled as equivalent to 25,000 IU of vitamin A)
- Zinc (zinc oxide) — 80 milligrams
- Copper (cupric acid) — 2 milligrams

Researchers recently reported important new data from the AREDS2 follow-up study.²

What is AREDS2?

AREDS2 was designed to find out if adding omega-3 fatty acids or lutein and zeaxanthin to the original AREDS formula would make it more effective. Researchers also wanted to find out if eliminating beta-carotene and lowering the dose of zinc would have any effect.

What did AREDS2 find?

Researchers found that compared to the original AREDS formulation, replacing beta-carotene with lutein and zeaxanthin demonstrated no beneficial or harmful effect.

Can I prevent AMD by taking AREDS vitamins?

No. There is no known treatment to prevent AMD, but AREDS vitamins may help reduce the risk of developing advanced AMD in at-risk populations.

Can I get the nutrients that are in the AREDS formula from diet alone?

The high levels of vitamins and minerals used in the AREDS formulation are difficult to obtain from diet alone; however, according to the National Eye Institute, people who have diets rich in green, leafy vegetables and fish may have a lower risk of developing AMD.

What are omega-3 fatty acids?

Fat is a major source of energy. It helps your body absorb vitamins, and it is important for proper growth and development. Fatty acids are components of fat molecules, and two fatty acids — omega-3 and omega-6 — are considered essential, because our bodies can't make them on their own. We must get them from the foods we

HOW TO GET YOUR ...

Omega-3 Fatty Acids

Omega-3 fatty acids can be found in fish and seafood, including algae and krill, some plants, and nut oils. The American Heart Association (AHA) recommends that healthy adults eat two servings per week of fish, preferably fatty fish, such as mackerel, lake trout, herring, sardines, albacore tuna, and salmon. These fish are high in eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which have demonstrated benefits for reducing heart disease.^{3,4}



eat. Omega-3 fatty acids play an important role in brain function, as well as normal growth and development. The retina, which senses light and sends images to your brain, has one of the highest concentrations of omega-3 fatty acids in the body.

Can I get too much of a good thing?

If you're adding vitamins, minerals, or other nutrients to your diet by taking supplements, you need to be mindful that high doses can be

harmful. For example, too much vitamin C can cause diarrhea, nausea, and stomach cramps. In addition, vitamin C dietary supplements and other antioxidants might interact with chemotherapy and radiation therapy for cancer. In supplement form, high doses of vitamin E might increase your risk of bleeding by reducing the blood's clotting ability. Check with your health-care provider to be sure you're taking safe levels of dietary supplements.

A Word About Vitamin D and Your Eyes

Although many combinations of eye vitamins do not include vitamin D, except as part of a multivitamin formulation, some studies suggest it may protect against age-related macular degeneration.^{5,6}

Dairy products, oysters, and fatty fish contain vitamin D, and many foods, including all milk in the United States, are fortified with vitamin D. Your body makes vitamin D when your skin is directly exposed to the sun, and just 10 to 15 minutes of sunshine three times a week is enough to produce the body's requirement of vitamin D. The recommended dietary allowance of vitamin D is 600 international units (15 micrograms) per day for most people.

*SOURCE: National Institutes of Health Office of Dietary Supplements
<http://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/>*



Resources

Age-Related Eye Disease Study

<https://web.emmes.com/study/areds>

<http://www.nei.nih.gov/amd>

Age-Related Eye Disease Study 2

<http://www.areds2.org>

<http://www.nei.nih.gov/areds2/>

American Academy of Ophthalmology

<http://www.geteyesmart.org/eyesmart/>

[living/diet-nutrition.cfm](http://www.geteyesmart.org/eyesmart/living/diet-nutrition.cfm)

American Optometric Association

<http://www.aoa.org/nutrition.xml>

National Institutes of Health Dietary Supplements Labels Database

<http://dietarysupplements.nlm.nih.gov/dietary/index.jsp>

National Institutes of Health Office of Dietary Supplements

<http://ods.od.nih.gov>

U.S. Department of Agriculture

www.nutrition.gov

U.S. Department of Agriculture

National Nutrient Database for Standard Reference

<http://ndb.nal.usda.gov>

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