Your Vision and Nutrition… What's the Connection?

We all want good, clear vision. Most of us start life with good vision, but as we age, things can change, sometimes very quickly. This brief overview covers the basics of Age-Related Macular Degeneration, and how your diet and nutrition can prevent problems, and sometimes help existing ones.

The eye is a complex organ that provides us with the sense of sight, allowing us to perform countless everyday activities. It works in a manner similar to a camera. The cornea is like the lens cover, and takes diverging rays of light and bends them through the pupil. The pupil is the dark, round opening in the center of the colored iris. The iris and pupil function like the aperture of a camera. The lens helps to focus light to the back of the eye. It is the part that can become cloudy due to cataracts, and the lens can be removed in cataract surgery. The retina is like the film (in a non-digital camera!) which is a membrane containing photoreceptor nerve cells that line the inside back wall of the eye. These cells change the light rays into electrical impulses and send them through the optic nerve to the brain, where an image is perceived. The center of the retina, called the macula, is most sensitive and is responsible for sharp vision.

Age-Related Macular Degeneration (AMD)

AMD describes a condition that leads to loss of function of the light-sensitive cells at the center of the retina, thus leading to the loss of "central vision". Peripheral vision is preserved, but reading becomes impossible. Blurred or distorted vision and trouble discerning colors can be symptoms of AMD. You can perform a self-test, or monitor your vision between visits to your eye care professional, at the website for the Macular Degeneration Foundation, at **http://www.eyesight.org/Macular_Degeneration/Eye_Test/eye_test.html.** **(This test is considered of value primarily with advanced disease).** From this website: "AMD affects the macula, the part of the eye that allows you to see fine detail. AMD causes no pain. In some cases, AMD advances so slowly that individuals do not notice changes in their vision. In others, the disease progresses faster and may lead to a loss of vision in both eyes. AMD is a leading cause of vision loss in Americans aged 60 years and older. It has two forms, wet and dry."

Nutritional Risk Factors for AMD

- Low intake of carotenoids, (which humans cannot manufacture), especially lutein and zeaxanthin, found in fruits and vegetables (see side bar).
- Low intake of fish, related to omega 3 fatty acids.
- Eating a high fat diet
- Having low serum level of Vitamin D

Lutein and Zeaxanthin are dietary *carotenoids* that are present in the macular region of the retina at higher concentration than in other tissues. They are the main component of the macular pigment, and protect the macula by filtering the photo-toxic blue-light portion of the sun's rays.

Lutein and Zeaxanthin Content In Selected Foods

(Micrograms per 3.5 ounces edible portion)

Kale, raw	39,500
Kale, boiled, drained	15,798
Spinach, raw	11,938
Spinach, boiled, drained	7,034
Lettuce, romaine, raw	2,635
Broccoli, boiled, drained	2,226
Corn, Sweet, drained	1,800
Peas, green, canned	1.350
Carrots, baby, raw	358
Oranges, raw	187
Egg, raw	55

(USDA-NCC Carotenoid Database for US Foods, 1998) This shows you the value of greens in your diet!!

These carotenoids are typically in the cell wall of fruits & vegetables, and must be broken down to be made bioavailable and absorbed. Gentle cooking, chopping, shredding and thorough chewing can enhance their absorption. They are best absorbed with a small amount of fat, so using avocado or avocado oil, in a salad or salsa is a good example.

Flavinoids in whole foods show benefit in preventing retinal pigment cells from oxidative stress:

Strawberries
Oranges
Spinach
Apples
Red Onions
Green Tea

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Foods that may delay progression of wet-AMD:

Green Tea
Pomegranate Extract
Oranges
Berries
Cocoa, dark; very dark chocolate
Red Wine (resveratrol)

Other Nutrients that affect AMD

* **Zinc.** The concentration in the eye is higher than most other tissues in the body. It is a co-factor for enzymes involved in visual function. Food sources are red meats, seafood, whole grains and legumes. Zinc is included in vision supplement blends.

* Vitamin E, specifically a form call **gamma-tocopherol**; antioxidant found in oils, nuts, seeds, eggs.

* **Selenium,** an antioxidant, found in Brazil nuts, seafood, meats, eggs.

* **Anthocyanosides**, flavinoids in blueberries and bilberries.

* **Quercetin**, a flavinoid in apples, onions, and black tea.

* Cysteine, an amino acid, (usually as N-acetylcysteine) and the cysteine-derived **antioxidants: glutathione and taurine. Taurine** protects retina cells from harmful effects of ultraviolet light.

* **B Vitamins**: B6, folate, and B12, can lower homocysteine levels, which is a risk factor for AMD.

An amazing array of nutrients and phytonutrients work together to make your eyes function properly! And fortunately, they can also both prevent and treat AMD. Eat well to take care of your eyes and vision!

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Other Risk Factors for AMD

- Smoking, Age over 50, Obesity, Poor Diet
- Diagnosis of diabetes, photophobia, family history of AMD
- Having a high serum level of homocysteine (an inflammatory marker and cardiovascular health risk factor.)

Testing for AMD should be done regularly by your eye care provider.

Nutritional Recommendations:

- Eat a whole foods diet, especially foods grown in the ground. Take advantage of the synergy of whole foods to provide a healthy mix of antioxidants, carotenoids, and Omega-3 polyunsaturated fatty acids. Whole fruits and vegetables contain an extensive mix of valuable phytonutrients, which is impossible to fully duplicate in dietary supplements. Whole foods contain a mix of vitamins and minerals, and phytonutrients that act as antioxidants and anti-inflammatories. Phytonutrients are plant nutrients that work with the traditionally recognized vitamin and minerals, and have therapeutic benefits.
- Eat more fish, ideally at least twice a week, and if unable, take a DHA supplement, a specific Omega-3 fatty acid. DHA is the predominate fatty acid in brain and retinal tissue, and retinal concentrations of DHA are dependent on dietary intake.
- Limit intake of vegetable oils that are a source of Omega-6 fats, for they disrupt the desired ratio of omega 3's and 6's. This includes corn, soybean, sunflower, safflower and cottonseed oils.
- Avoid all hydrogenated fats and trans fats, as they interfere with the body's ability to synthesize DHA, and they reduce the availability of many fat-soluble vitamins and nutrients.
- Limit or avoid refined carbohydrates and sugars. Research has shown low intake of these foods slows progression of AMD.
- Buy in-season fruits and vegetables from local growers, and buy organic when possible. This will optimize the nutrients from whole foods.
- Eat a variety of fruits and vegetables from the list provided to increase intake of lutein and zeaxanthin, which can prevent AMD and also slow its progression. Dark green, leafy vegetables are most valuable!
- Drink fresh brewed green tea, for the ECGC in it has a protective effect against free radicals in the retina.

Other Modifiable Risk Factors

- Protect your eyes from the sun and any source of ultraviolet and blue spectrum light, which can injure eye tissue through oxidative damage from the generation of free radicals. Wear sunglasses that filter UBA and UVH wavelengths, and ideally also block high-energy blue light.
- If you are overweight or obese, work to lose excessive body fat.