Chapter 1

Macular Degeneration

The Second Most Serious Vision Problem

Age-Related Macular Degeneration (AMD) results in the deterioration of central vision, and is caused by changes in the cells of the macula where the highest concentration of cones, responsible for central vision, are found. The macula is located in the retina at the back of the eye.

In the United States, it is estimated that 17 million people have macular degeneration. Cataracts are the leading cause of blindness worldwide, and the second largest eye problem is age-related macular degeneration (AMD):

Age	Percentage with AMD
65-74	25%
Over 75	33%

Besides blurred vision, people with AMD may have a loss of color perception, and may have a dark or empty spot in the center of the field of vision.

The photographs that follow illustrate the central vision loss in AMD patients.

Types of Macular Degeneration

There are two types of macular degeneration. Both types are associated with the macula, located in the central portion of the retina, at the back of the eye.

Dry AMD

Dry macular degeneration may be an early form of the disease. It is characterized by a gradual loss of central vision that is caused by a build up of cellular wastes in a part of the retina called the Bruch's membrane.

Wet AMD

A wet type of macular degeneration occurs when fluid builds up within the layers of the macula. Degeneration is more sudden and often more severe than in dry AMD.

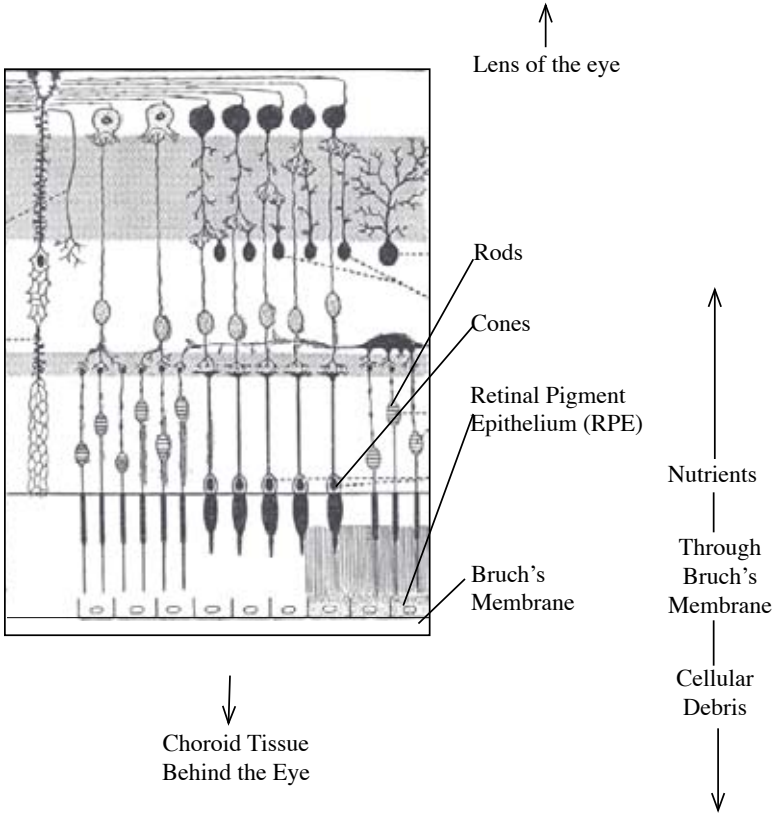
Layers of the Retina

The retina is a thin layer of neural cells that lines the back of the eye and is considered to be part of the central nervous system (CNS). To understand the role of nutrition and the effect of toxins on the development of AMD, it is helpful to understand how nutrients pass into the retinal cells, and how cellular debris is discarded.

Nutrients and discarded cellular material pass through a membrane called Bruch's membrane (See: diagram on p. 17). The membrane forms a layer between the cells of the retina and the blood vessels behind the retina in an area known as the choroid.

Some researchers believe that AMD begins with a thickening of Bruch's membrane. As the membrane thickens, nutrients cannot reach the Retinal Pigment Epithelium (RPE) and other retinal layers. When this happens, nutrients that are needed by the macula and photoreceptor cells (rods and cones), become scarce and cells can die off (Note: Rods are more numerous in the periphery of the retina and cones are more numerous in the central part of the retina).

Some researchers have theorized that new blood vessels, which are fragile, form when cellular wastes build up in Bruch's membrane. When this happens, nutrients cannot pass through it. The formation of leaky new blood vessels (neovascularization) is a characteristic of wet AMD.



FYI...

If you have dry macular degeneration, the risk of developing the wet form of AMS will increase 10% per year every year that you have the disease.

Risk Factors Associated with AMD

Besides age and nutrition, there are several other risk factors associated with AMD including:

- *Genetics*
  Macular degeneration appears to be hereditary in some families.
- *Gender*
  More women have macular degeneration than men. Note: Although it may only be one piece of the dietary puzzle, the mineral zinc is needed to transform plant-based polyunsaturated fats into forms that researchers now realize play a protective role in eye health (e.g. EPA and DHA). All minerals have antagonists, and copper is the mineral that has a see-saw relationship with zinc. The gender-related risk factor may be related to a copper overload associated with surging estrogen levels that occur prior to menopause. This, combined with high environmental xenoestrogens that behave like estrogens in the body, could cause many women to have precariously low zinc levels for an extended period of time. Given that zinc is needed by more than 225 enzyme reactions in the body, it would be hard to recover if one had a copper overload, without extra zinc (See High Estrogen, High Copper and Low Zinc in Chapter 3).
- *Race*
  Caucasians have a higher incidence of macular degeneration than other races, and people with blue eyes seem to be at the greatest amount of risk.

- *Smoking*
  In a 2005 study, published in the *British Journal of Ophthalmology* (89:550-553), researchers concluded that smoking doubles the risk of macular degeneration.
- *Ultraviolet Light Exposure*
  Prolonged exposure to ultraviolet light seems to be a risk factor (See: FYI on this page).

Sunlight and Cataractogenesis

Although sunlight overexposure is an accepted risk factor for cataracts and a suspected risk factor for age-related macular degeneration, Dr. Richard Hobday, author of *The Healing Sun*, says the sunlight hypothesis of cataractogenesis evolved in the early years of the 20th century when cataracts were observed to be more common in third-world countries than in the West. He explains that although the hypothesis ignored diet, culture, poverty, malnutrition and disease—the hypothesis survives.

Although Hobday says that the causal relationship between cataracts and solar radiation has never been established, he does say that malnutrition, smoking and pollution are all possible contributory factors.

Scientists have only recently started to look at the relationship between fats and cataracts. In 2005, a group of researchers at the Human Nutrition Research Center at Tufts University in Boston looked at the relationship between dietary fat intake and age-related lens opacities (cataracts). They found that a diet high in plant-derived linoleic acid (omega-6 fatty acid) and linolenic acid (omega-3 fatty acid) correlated with an increased risk of age-related nuclear opacity, or yellowing of the lens of the eye. This was the first published study that performed an extensive analysis of the relationship between diet and cataracts.

The fatty acid cascade on page 29 shows that mineral co-factors are necessary to transform linoleic acid, found in flax, walnuts and green leafy vegetables, into DHA and EPA, that researchers have recently discovered play a protective role in eye health. If the diet is low in these co-factors, the necessary conversion will not take place (Note: DHA and EPA are present in fish oil, but that was not part of the Tufts University study).

As described in chapter 3, a four-to-one ratio of omega-6 to omega-3 fatty acids is the ratio that is required for a healthy diet. Besides difficulties of conversion of fats that occur in people without

co-factors, there may also be an imbalance in the proportion of omega-6 to omega-3 fatty acids. Most Americans consume a ratio of twenty-to-one or a ratio as high as fifty-to-one of omega-6s to omega 3s.

How to Reduce the Risk of Macular Degeneration

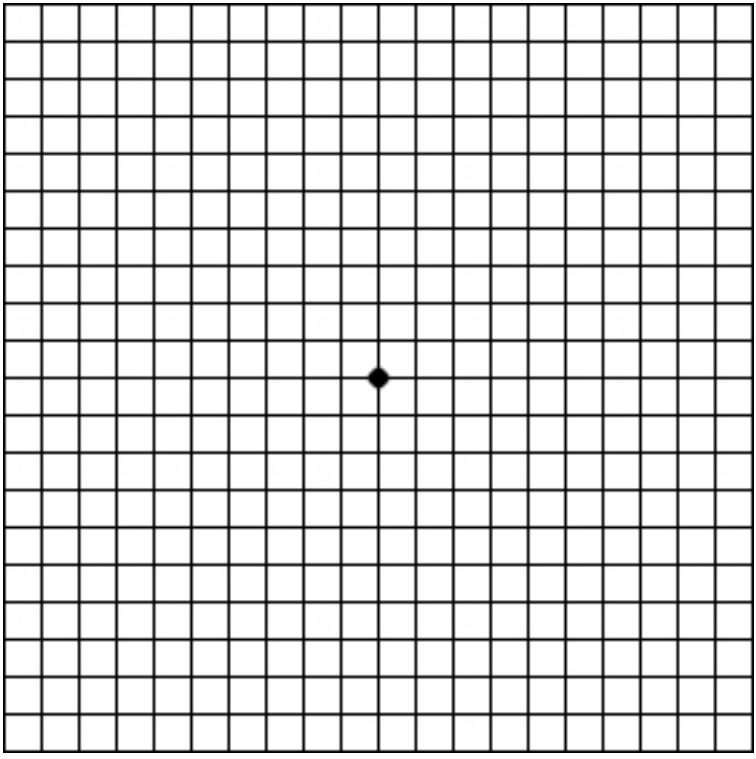
To reduce the risk of macular degeneration, you'll want to:

- Quit smoking
- Eliminate trans fats from your diet (See: chapter on fats)
- Increase your intake of healthy fats (See: chapter on fats)
- Eat brightly-colored fruits and vegetables (See: chapter on carotenoids)
- Take zinc and antioxidant supplements
- Exercise regularly
- Control your weight

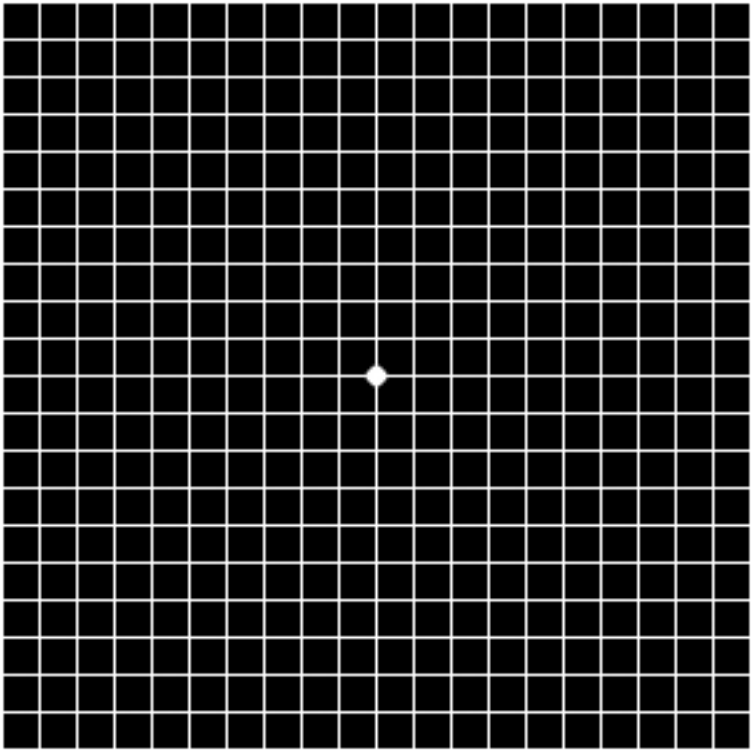
Test To Detect Macular Degeneration

A black and white drawing called an Amsler Grid has been used as a test for macular degeneration, and other macular diseases for over 50 years. To test your eyes for early stage macular degeneration:

1. Position the black on white grid so that it is about 20 inches in front of your eyes.



2. Wear your glasses if you use them for close work.
3. Cover your left eye.
4. With your right eye, stare at the spot in the center of the grid and do not look away.



5. Notice the horizontal and vertical lines in your peripheral vision and try to determine if the lines look curved, distorted or broken.
6. Repeat the test with your other eye and then repeat the test with the white on black grid.

If you notice curved, distorted or broken lines on either grid, you may have an early state of macular degeneration (Note: Similar distortions may occur with other eye diseases such as diabetic retinopathy).

Try repeating the test later in the day or on another day. If the result is the same, have your eyes examined by an optometrist or ophthalmologist.

Australia's Macular Degeneration Foundation

Dr. Paul Beaumont, Director of Australia's Macular Degeneration Foundation, has seen an alarming fivefold increase in macular degeneration. Beaumont says the increase is tied to an increase in consumption of trans fats and that there has been a similar increase all over the world. As he explains, "The major reason for blindness in Australia 30 years ago was diabetes, and it was rare to find macular degeneration. That situation has changed. I've seen an exponential rise from the early 1970s through to the 1990s."

Colleen McCullough's Macular Degeneration

Colleen McCullough, Australia's best-selling author who is most known for *The Thorn Birds* (1977), was diagnosed with macular degeneration in 2004 and has been named the patron of the Macular Degeneration Foundation. She has increased public awareness of age-related macular degeneration (AMD) by speaking publicly about the disease. When interviewed, Colleen tells people who are over

fifty to have the macula of their eye checked. She says, "Don't put it off. Make checking for macular degeneration a part of your routine. It's an absolutely terrible sentence; really an awful thing to try and compensate for. I urge everyone to watch what they eat, try not to smoke and to have regular eye checks, so that at least you give yourself a chance to prevent it."

Celebrities With Macular Degeneration

Comedienne Phyllis Diller has macular degeneration. Like Colleen McCullough, Phyllis has speaks publicly about her condition so that others may learn how to protect their own eyes.