

Macular Degeneration

Causes

Damage to the macula can gradually destroy central vision, which is used to read and see objects clearly.

Scientists are not sure what causes AMD. The disease is most common in people over 60, which is why it is often referred to as age-related macular degeneration.

Symptoms

At first you may not have symptoms. As the disease progresses, your central vision can be affected.

The most common symptom in dry AMD is blurred vision. As the disease progresses, you may need more light to read or perform everyday tasks. The blurred spot in the center of vision gradually gets larger and darker. In the later stages, you may not be able to recognize faces until people are close to you.

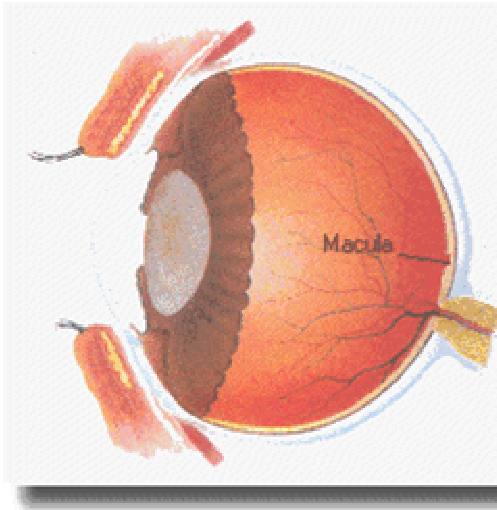
AMD typically does not affect side (peripheral) vision. This is very important, because it means you will never have complete vision loss from this disease.

The most common early symptom of wet macular degeneration is that straight lines appear distorted and wavy. You may also notice a small dark spot in the center of your vision that gradually gets larger.

People who take a combination of folic acid, B6 and B12 for several years had a lower chance of developing the most common cause of vision loss.

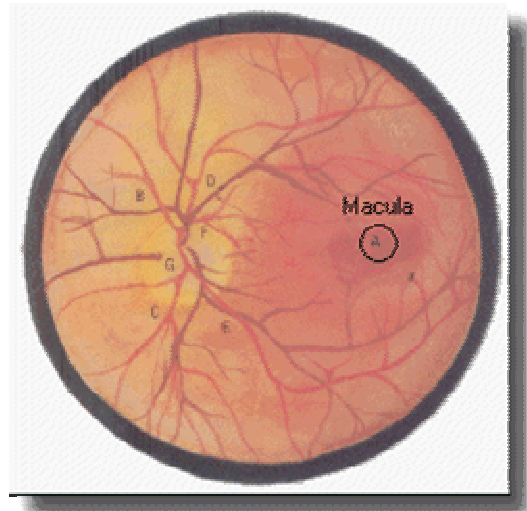
The beneficial effect of supplementing with these B vitamins might be due to the lowering effect they have on homocysteine levels.

Types of Macular Degeneration and Risk factors



The retina is thin lining of nerve cells which lines the inside of the eye. It receives and processes images, and sends these images to the brain via the optic nerve. The macula is a small, but very important part of the retina capable of perceiving the sharpest of images. It is here that our central vision (what we look directly at), our reading vision, and our color vision are received. Without the macula, we would be legally blind, with only peripheral vision (side vision) to guide us.

An enlarged view of the macula is shown here. The optic nerve is the yellow circle with blood vessels leaving it. The nerve head is about 1.5 mm in diameter. The vessels are retinal arteries and veins which supply the inner layers of the retina. The center of the macula is the small red and yellow dot, called the "fovea". This is our point of visual fixation (with what we look directly at).



The condition known as ‘age-related macular degeneration’ leads to deterioration of the macula, and possible loss of vision. Risk factors for this condition include:

- Advancing age, over 50 years of age, and especially over 65
- Race
- A history of visual loss related to macular degeneration in the other eye
- Certain types of retinal deposits, called drusen
- A family history of macular degeneration
- Tobacco smoking (especially for the more severe form of macular degeneration)
- Arteriosclerosis and increased cholesterol, possibly hypertension
- A diet deficient in anti-oxidant vitamins and minerals
- A recent study showed that sensitivity to glare and poor tanning ability were markers of increased macular degeneration risk. Interestingly, the study could not demonstrate that sun exposure itself was a risk factor.

Age-related macular degeneration is broadly grouped into two categories: a "dry" form, and a "wet" form. The next section discusses these differences.

‘Dry’ Macular Degeneration

This form of macular degeneration consists of a slow deterioration of the retina. Deposits form under the retina called "drusen". Drusen may block nutrition from reaching the retina from a highly vascular layer

under the retina called the "choroid". The choroid nourishes the outer layers of the retina, while the retinal blood circulation supplies the inner layers. Over time, the retina atrophies, or degenerates, over these area of drusen, and a spotty loss of vision occurs. If more and more of these atrophic areas form and merge together, the macula

can take on a moth-eaten appearance, with progressive loss of vision. This usually occurs over a period of many years.

There is no known treatment for this form of macular degeneration. Theoretically, it may help to reduce any risk factors one may have (listed above), but it has not been proven that this will help prevent visual loss. If a person with macular degeneration has a well balanced diet, nutritional supplements may not be necessary. If not, a multi-vitamin is usually recommended.

‘Wet’ Macular Degeneration

This is a more severe and rapidly progressive form of macular degeneration. In some cases, the ‘dry’ form of macular degeneration will lead to the ‘wet’ form, but in other cases this form occurs without warning. Between the vascular choroid layer under the retina and the retina is a dividing membrane called the ‘retinal pigment epithelium’. If a break occurs in the retinal pigment epithelium, it becomes possible that an abnormal blood vessel could grow from the choroid to directly underneath the retina in the macula. Such a break could occur in an area of drusen, especially drusen that have pigmentation and appear diffuse or fuzzy. When a new blood vessel grows under the retina, it is termed ‘subretinal neovascularization’. Subretinal neovascularization in the macula can be a surgical emergency. If such a blood vessel is treatable, it should be treated as soon as possible after the diagnosis is made. Symptoms of this condition, otherwise known as ‘wet’ macular degeneration, include:

- A change in vision, usually a sudden blurring in one eye.
- Distortion of vision, where straight lines appear crooked in the affected eye.
- A blind spot appearing in the vision of the affected eye, where things seem to disappear when looked at. Sometimes, a blind spot will occur near to what is being looked at instead.
- A change in the size appearance of things, with objects appearing to be smaller or larger than with the other eye.

Note: other conditions such as ocular histoplasmosis, myopic macular degeneration, and macular degeneration related to angioid streaks and trauma can lead to subretinal neovascularization.

When an ophthalmologist examines the retina, the blood vessel growing under the retina can often be seen. Other times, there may be hemorrhage in or under the retina, obscuring the view of the vessel. Swelling of the retina can often be observed as well. An additional test, called a fluorescein angiogram, is usually done as immediately as possible to better determine where the new, abnormal blood vessel is and if it can be treated.

A fluorescein angiogram is a test done where a pigmented dye is photographed as it passes through the retinal blood vessels. For this test, the eyes are dilated, and initial color photographs are taken of the retina. Then, the fluorescein dye is injected into an arm vein. This is similar to having blood drawn. Once the dye is in, the needle is removed, and the photographs are taken. The dye reaches the eye in a matter of seconds. About 30 photographs are taken between the two eyes over a 10 minute time span. The film is then developed, and the ophthalmologist studies the results. Important information about the leakage and blockage of blood vessels can be gained from this test.

Diagnosis and Treatment of Macular Degeneration

The diagnosis of macular degeneration depends on several factors:

- A careful history taken by the examiner as to possible risk factors and symptoms of macular degeneration
- A careful retinal examination to look for evidence of macular degeneration, or for any precursors of it (drusen)
- Additional tests such as fluorescein angiography and Amsler grid testing (discussed below)
- Scheduling appropriate follow-up visits, and self-monitoring of vision by the patient

The 'Amsler grid' is a small graph-like chart with a central dot. It is useful for testing for distortion of vision. To do the test, the grid is held at normal reading distance (16 inches) with glasses on if needed. With one eye covered, the central dot is looked at. Any missing lines, distorted lines, or other abnormality on the chart is then noted by the patient. The other eye is then tested. This is a way for patients with risk factors for macular degeneration, or with previously treated macular degeneration to monitor their vision for development of "wet" macular degeneration (subretinal neovascularization).

Treatment of "dry" macular degeneration

- Unfortunately, there is no cure for this form of the disease
- Vision should be monitored with the Amsler grid for early detection of the 'wet' form of macular degeneration
- Nutritional supplements can be considered

Treatment of 'wet' macular degeneration

- Once diagnosed with 'wet' macular degeneration, it is implied that subretinal neovascularization is present. If this finding meets certain criteria on the fluorescein angiogram, laser treatment may be able to eliminate the abnormal blood vessel.
- If treated with laser, a blind spot will result in the vision.
- The purpose of the laser treatment is to prevent severe loss of vision. Sometimes some loss of vision may occur with the laser treatment in order to prevent further loss of vision.
- After successful laser treatment, the situation needs to be closely monitored for signs of recurrence. This includes follow-up examinations and possibly more fluorescein angiograms.
- The Amsler grid should be closely monitored by the patient in both the affected and unaffected eye for a change in vision.
- Nutritional supplements can be considered.

The Controversy of Nutritional Supplements

It has been found that people with diets deficient in certain ‘anti-oxidant’ vitamins and minerals may be at increased risk for age-related macular degeneration. However, a well-balanced diet with the possible supplementation of a multivitamin will usually prevent such a deficiency.

The retina is at risk for light induced damage termed ‘oxidative’ damage. This damage could possibly lead to macular degeneration. The retina has relatively high concentrations of anti-oxidant vitamins and minerals. These substances help to prevent this oxidative damage. These vitamins and trace minerals include:

- Vitamin A
- Vitamin E
- Vitamin C
- Zinc
- B-Carotene
- Other carotenoids found in foods
- Selenium

Different studies have been done to try to determine if there is any relationship between blood level and dietary intake of these substances with age-related macular degeneration (AMD).

- One study showed that high **blood levels** of Vitamin E were protective for AMD. Similarly, a combination of high blood levels of Vitamin C, Vitamin E, and b-carotene was also protective. However, no protective effect was found with the use of vitamin supplements themselves!
- Another study found that high **blood levels** of a combination of carotenoids, Vitamin C, Vitamin E, and selenium had a reduction of risk for the ‘wet’ form of AMD. However, the authors of the study stated that it would be premature to translate these findings into nutritional recommendations.
- A high **dietary intake** of zinc was found to be weakly protective in some early stages of AMD.

- High intake of certain foods containing carotenoids not normally found in vitamin supplements was found to reduce the risk of the ‘wet’ form of AMD. These foods included spinach, collard greens, kale, mustard greens, and turnip greens.

If one has poor nutrition, however, vitamin supplementation and striving to eat a well balanced diet may improve the risk.

Many vitamins, especially Vitamins A and E can be stored by the body, and dangerous side effects can occur when high dosages of these are consumed. In many people, supplementation with high amounts of zinc may lead to anemia.

A recent study was terminated because high levels of B-carotene consumption were found to **increase** the risk of lung cancer in male and female smokers.

Thus, vitamin supplementation is not without risk. However, the body regulates the absorption of many vitamins and minerals. If the body does not need a particular one of these, it may leave the body undigested.

The recommended supplements contain:

- 500 milligrams of vitamin C
- 400 International Units of beta-carotene
- 80 milligrams of zinc
- 2 milligrams of copper

Although there is no cure for wet AMD, treatments may include:

- Laser surgery (laser photocoagulation) -- a small beam of light destroys the abnormal blood vessels.
- Photodynamic therapy -- a light activates a drug that is injected into your body to destroy leaking blood vessels.
- Special medications that slow the formation of new blood vessels in the eye (anti-angiogenesis (anti-VEGF) therapy) --

drugs such as bevacizumab (Avastin) and ranibizumab (Lucentis) are injected into the eye to stabilize or improve vision.

Low-vision aids (such as special lenses) and therapy can help improve your vision and quality of life.