

AGE-RELATED MACULAR DEGENERATION

What is age-related macular degeneration?

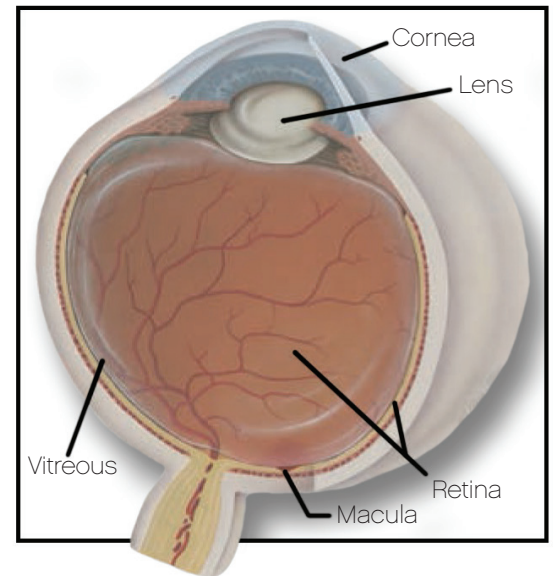
Age-related macular degeneration (ARMD or AMD) is common, affecting up to 20% of people over 60 years of age. AMD is the most common cause of irreversible vision loss in the US. Severe vision loss from AMD can occur in up to 6% of 80 year olds.

Basic eye anatomy

Light that enters the eye is focused by your lens and after passing through the vitreous hits the retina, the light-sensing part of the eye. When light is focused onto the retina this information is transmitted through the optic nerve to the brain where it is interpreted as the images you see.

Your central vision allows you to see fine details, read and recognize faces. Your peripheral vision provides less detailed vision but increases your visual field. AMD usually affects your central vision.

The macula is the part of the retina responsible for your central vision. The fovea is the most sensitive part of the macula. The retinal pigment epithelium (RPE) is the outer layer of the retina that supports the overlying photoreceptors, the cells that actually sense the light that enters your eye. Drusen, a marker for AMD, are yellow or cream colored collections of inflammatory material and retinal waste debris that accumulates below the retina.



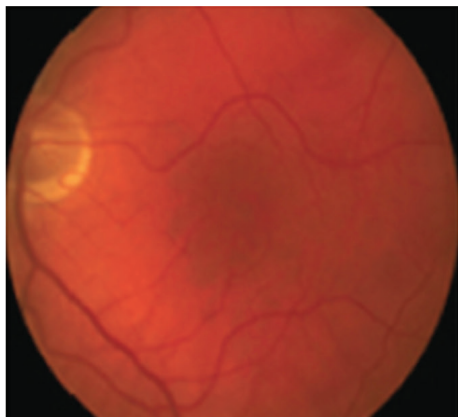
What is AMD?

There are two kinds of AMD; dry and wet. Both forms can lead to vision loss and patients can have either or both. More than 90% of patients diagnosed with AMD have the dry form, which is often associated with a slower course (over many years) characterized by drusen formation, retinal degeneration and gradual wearing away of the retina called atrophy. If these areas of retinal degeneration group together into larger areas, these areas are called geographic atrophy.

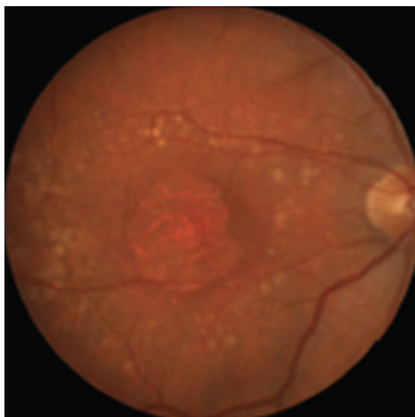
Wet AMD is characterized by the development of abnormal blood vessels known as choroidal neovascular membranes (CNVM), that disrupt the retina and cause leakage of fluid. This growth of abnormal blood vessels can result in vision loss due to fluid build up in the retina (edema), bleeding in the retina and scar tissue formation (fibrosis).

Examination and diagnostic testing

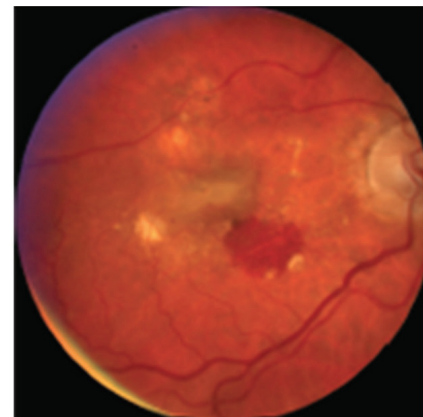
Regular eye examinations are important to diagnose and manage AMD. While being evaluated by your eye doctor you may undergo multiple types of ocular imaging including photography, ocular coherence tomography (OCT), and fluorescein angiography (FA) to facilitate diagnosis and treatment.



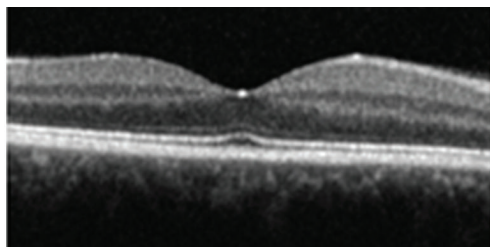
Normal Macula



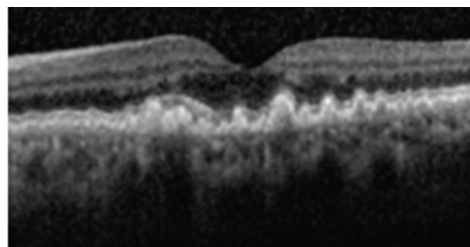
Dry AMD with drusen and central geographic atrophy



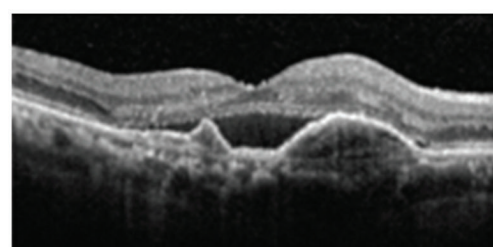
Wet AMD with bleeding and scar tissue



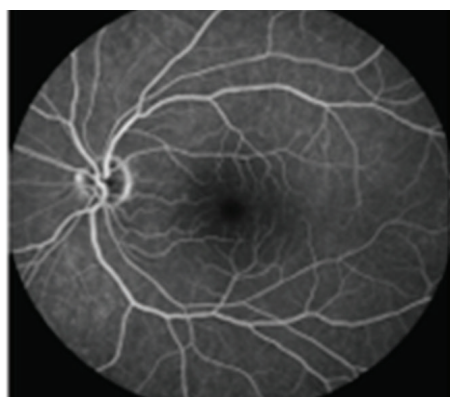
Normal macula OCT



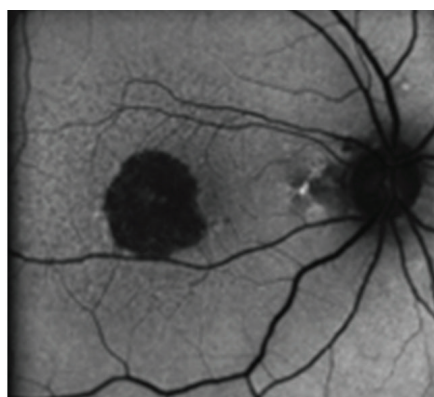
Dry AMD OCT showing drusen



Wet AMD OCT showing fluid under the retina and RPE



Normal FA



Dry AMD (autofluorescence) showing central geographic atrophy



Wet AMD FA showing active CNVM centrally with dye leakage into the retina

What can I expect if I have AMD?

AMD usually manifests after age 50. The disease is often bilateral (present in both eyes), and patients often have a significant family history of AMD. Most patients with early dry AMD with mild retinal changes will have no or minimal problems with their vision. Over time, dry AMD can cause slowing of reading speed, difficulty with adaptation to changing light conditions and loss of contrast sensitivity. In its most advanced form, dry AMD can cause profound central vision loss often with preserved peripheral (side) vision.

Wet AMD is generally associated with more rapid visual loss over days to weeks compared to dry AMD. Patients may notice decreased vision or distorted vision.

Treatment of AMD

There is currently no cure for either dry or wet AMD. Smoking is toxic to the retina and can contribute to AMD progression; stop smoking as soon as possible! Other ways to optimize your retinal health include eating a healthy diet with regular vegetables and fish, and maintaining a healthy body weight.

The risk of vision loss from some forms of AMD can be reduced by taking a specific combination of supplements. The original Age-Related Eye Diseases Study (AREDS1) reported in 2001 that supplemental vitamin C, vitamin E, beta-carotene, zinc and copper can reduce the risk of developing advanced age-related macular degeneration (AMD) by 25%. In 2006, the same National Eye Institute research group, of which Retina Consultants of Houston is an active site, started a follow-up study called AREDS2 to determine if the AREDS1 formulation could be improved. Results of AREDS2, involving over 4200 patients followed for 5 years, were released May, 2013 and show the following:

- **Lutein & Zeaxanthin:** Although the primary analysis showed no benefit by adding lutein and zeaxanthin to the AREDS1 formulation, secondary analysis of ALL patients showed a 10% additional risk reduction and these supplements were better and safer than beta-carotene.
- **Omega-3 Fatty Acids DHA & EPA (Fish Oil);**
No beneficial effect on AMD progression.
- **Beta-Carotene:** Increased risk of developing lung cancer even in patients who had not smoked for over 1 year. Eliminated from AREDS2. **SMOKERS AND NON-SMOKERS CAN NOW USE THE SAME AREDS2 FORMULATION.**
- **Zinc:** Lowering Zinc from 80mg to 25mg had no effect.
- **Vitamin C:** No change from AREDS1 recommendations.
- **Vitamin E:** No change from AREDS1 recommendations.

The overall effect is that the new AREDS2 study shows a reduction in the risk of progression to advanced AMD by using the following formulation, recommended for all patients with medium to high risk of dry AMD:

- Vitamin C: 500mg
- Vitamin E: 400 IU
- Zinc: 80mg as zinc oxide
- Lutein: 10mg
- Zeaxanthin: 2mg
- Copper: 2mg as cupric oxide

Treatment of wet AMD

Incredible advances in our ability to treat wet AMD since the early 2000s have revolutionized patient outcomes. Before that time, a diagnosis of wet AMD carried a very poor prognosis with most eyes progressing to severe vision loss. Fortunately, medications now available can benefit over 90% of wet AMD patients. These medications primarily target VEGF (vascular endothelial growth factor), a molecule responsible for the abnormal blood vessels which cause damage in wet AMD. Repeated injections of anti-VEGF agents (Avastin, Lucentis and Eylea) have been firmly established as the optimal treatment for wet AMD. These powerful drugs are given as injections into the eye to suppress abnormal blood vessel growth and leakage. Because these injections are not a cure, but only a treatment, they have to be administered repeatedly (sometimes as often as monthly, indefinitely) in order to have their maximal vision-improving results. Extensive numbing of the eye makes this injection procedure virtually painless.

If you have AMD you should:

- **Stop Smoking**
- **See your ophthalmologist regularly**
- **Consider AREDS2 supplements** →
- **Check your Amsler grid daily**
- **Eat a healthy diet with regular vegetables and fish**
- **Maintain a healthy body weight**

AREDS Supplements

- 500mg Vitamin C
- 400 IU Vitamin E
- 80mg Zinc as zinc oxide
- 2mg Zeaxanthin
- 2mg Copper
- 10 mg Lutein