

## AGE-RELATED MACULAR DEGENERATION (AMD) DEFINED

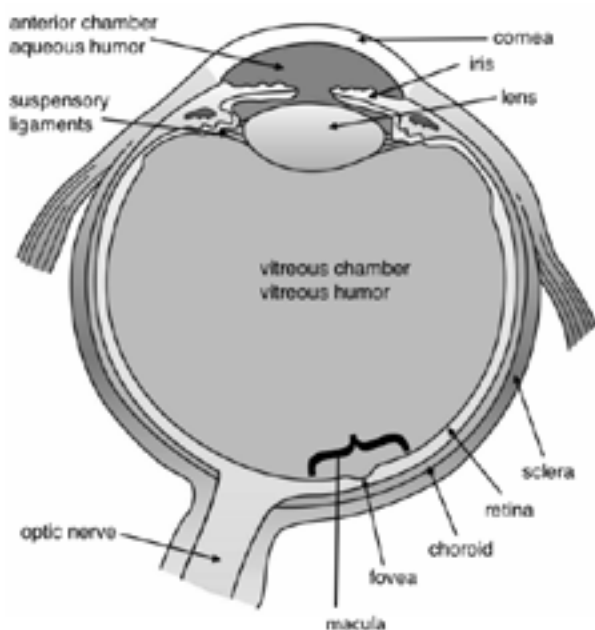
### WHAT IS AGE-RELATED MACULAR DEGENERATION?

**Age-related macular degeneration (AMD)** is a disease associated with aging that gradually destroys sharp, central vision. Central vision is needed for seeing objects clearly and for common daily tasks such as reading and driving.

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 people notice little change 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 60 years of age and older.

AMD occurs in two forms: wet and dry.



### WHERE IS THE MACULA?

The macula is located in the center of the *retina*, the light-sensitive tissue at the back of the eye. The retina instantly converts light, or an image, into electrical impulses. The retina then sends these impulses, or nerve signals, to the brain.

### WHAT IS WET AMD?

**Wet AMD** occurs when abnormal blood vessels behind the retina start to grow under the macula. These new blood vessels tend to be very fragile and often leak blood and fluid. The blood and fluid raise the macula from its normal place at the back of the eye. Damage to the macula occurs rapidly.

With wet AMD, loss of central vision can occur quickly. Wet AMD is also known as advanced AMD. It does not have stages like dry AMD.

An early symptom of wet AMD is that straight lines appear wavy. If you notice this condition or other changes to your vision, contact your eye care professional at once. You need a comprehensive dilated eye exam.

### WHAT IS DRY AMD?

**Dry AMD** occurs when the light-sensitive cells in the macula slowly break down, gradually blurring central vision in the affected eye. As dry AMD gets worse, you may see a blurred spot in the center of your vision. Over time, as less of the macula functions, central vision is gradually lost in the affected eye.

The most common symptom of dry AMD is slightly blurred vision. You may have difficulty recognizing faces. You may need more light for reading and other tasks. Dry AMD generally affects both eyes, but vision can be lost in one eye while the other eye seems unaffected.

One of the most common early signs of dry AMD is drusen.

## WHAT ARE DRUSEN?

Drusen are yellow deposits under the retina. They often are found in people over age 60. Your eye care professional can detect drusen during a comprehensive dilated eye exam.

Drusen alone do not usually cause vision loss. In fact, scientists are unclear about the connection between drusen and AMD. They do know that an increase in the size or number of drusen raises a person's risk of developing either advanced dry AMD or wet AMD. These changes can cause serious vision loss.

Dry AMD has three stages, all of which may occur in one or both eyes:

1. **Early AMD.** People with early AMD have either several small drusen or a few medium-sized drusen. At this stage, there are no symptoms and no vision loss.
2. **Intermediate AMD.** People with intermediate AMD have either many medium-sized drusen or one or more large drusen. Some people see a blurred spot in the center of their vision. More light may be needed for reading and other tasks.
3. **Advanced Dry AMD.** In addition to drusen, people with advanced dry AMD have a breakdown of light-sensitive cells and supporting tissue in the central retinal area. This breakdown can cause a blurred spot in the center of your vision. Over time, the blurred spot may get bigger and darker, taking more of your central vision. You may have difficulty reading or recognizing faces until they are very close to you.

If you have vision loss from dry AMD in one eye only, you may not notice any changes in your

overall vision. With the other eye seeing clearly, you still can drive, read, and see fine details. You may notice changes in your vision only if AMD affects both eyes. If blurriness occurs in your vision, see an eye care professional for a comprehensive dilated eye exam.

Ninety percent of all people with AMD have this type. Scientists are still not sure what causes dry AMD.

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## FREQUENTLY ASKED QUESTIONS ABOUT WET AND DRY AMD

### WHICH IS MORE COMMON-THE DRY FORM OR THE WET FORM?

The dry form is much more common. More than 85 percent of all people with intermediate and advanced AMD combined have the dry form.

However, if only advanced AMD is considered, about two-thirds of patients have the wet form. Because almost all vision loss comes from advanced AMD, the wet form leads to significantly more vision loss than the dry form.

### CAN THE DRY FORM TURN INTO THE WET FORM?

Yes. All people who have the wet form had the dry form first.

The dry form can advance and cause vision loss without turning into the wet form. The dry form also can suddenly turn into the wet form, even during early stage AMD. There is no way to tell if or when the dry form will turn into the wet form.



Normal vision



Viewed by a person with AMD

## THE DRY FORM HAS EARLY AND INTERMEDIATE STAGES. DOES THE WET FORM HAVE SIMILAR STAGES?

No. The wet form is considered advanced AMD.

## CAN ADVANCED AMD BE EITHER THE DRY FORM OR THE WET FORM?

Yes. Both the wet form and the advanced dry form are considered advanced AMD. Vision loss occurs with either form. In most cases, only advanced AMD can cause vision loss.

People who have advanced AMD in one eye are at especially high risk of developing advanced AMD in the other eye.

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## CAUSES AND RISK FACTORS

### WHO IS AT RISK FOR AMD?

The greatest risk factor is age. Although AMD may occur during middle age, studies show that people over age 60 are clearly at greater risk than other age groups. For instance, a large study found that people in middle-age have about a 2 percent risk of getting AMD, but this risk increased to nearly 30 percent in those over age 75.

Other risk factors include:

- **Smoking**— may increase the risk of AMD.
- **Obesity**—research studies suggest a link between obesity and the progression of early and intermediate stage AMD to advanced AMD.
- **Race**—whites are much more likely to lose vision from AMD than African Americans.
- **Family history**—those with immediate family members who have AMD are at a higher risk of developing the disease.
- **Sex**—women appear to be at greater risk than men.

### CAN MY LIFESTYLE MAKE A DIFFERENCE?

Your lifestyle can play a role in reducing your risk of developing AMD.

- Eat a healthy diet high in green leafy vegetables and fish
- Don't smoke
- Maintain normal blood pressure
- Watch your weight
- Exercise

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## SYMPTOMS AND DETECTION

### WHAT ARE THE SYMPTOMS?

Both dry and wet AMD cause no pain.

**For dry AMD:** the most common early sign is blurred vision. As fewer cells in the macula are able to function, people will see details less clearly in front of them, such as faces or words in a book. Often this blurred vision will go away in brighter light. If the loss of these light-sensing cells becomes great, people may see a small--but growing--blind spot in the middle of their field of vision.

**For wet AMD:** the classic early symptom is that straight lines appear crooked. This results when fluid from the leaking blood vessels gathers and lifts the macula, distorting vision. A small blind spot may also appear in wet AMD, resulting in loss of one's central vision.

### HOW IS AMD DETECTED?

Your eye care professional may suspect AMD if you are over age 60 and have had recent changes in your central vision. To look for signs of the disease, he or she will use eye drops to dilate, or enlarge, your pupils. Dilating the pupils allows your eye care professional to view the back of the eye better.

AMD is detected during a comprehensive eye exam that includes:

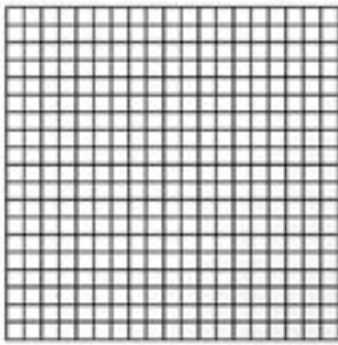
1. **Visual acuity test**—this eye chart test measures how well you see at various distances.
2. **Dilated eye exam**—drops are placed in your eyes to widen, or dilate, the pupils. Your eye care professional uses a special magnifying lens to examine your retina and optic nerve for signs of AMD and other eye problems. After the exam, your close-up vision may remain blurred for several hours.

3. **Tonometry**—an instrument measures the pressure inside the eye. Numbing drops may be applied to your eye for this test.

Your eye care professional also may do other tests to learn more about the structure and health of your eye.

During an eye exam, you may be asked to look at an Amsler grid. The pattern of the grid resembles a checkerboard. You will cover one eye and stare at a black dot in the center of the grid. While staring at the dot, you may notice that the straight lines in the pattern appear wavy. You may notice that some of the lines are missing. These may be signs of AMD.

Do NOT depend on the grid displayed below for any diagnoses-check with your eye care professional.



Amsler Grid

If your eye care professional believes you need treatment for wet AMD, he or she may suggest a **fluorescein angiogram**. In this test, a special dye is injected into your arm. Pictures are taken as the dye passes through the blood vessels in your retina. The test allows your eye care professional to identify any leaking blood vessels and recommend treatment.

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## TREATMENT

### HOW IS WET AMD TREATED?

Wet AMD can be treated with laser surgery, photodynamic therapy, and injections into the eye. None of these treatments is a cure for wet AMD. The disease and loss of vision may progress despite treatment.

1. **Laser surgery**—this procedure uses a laser to destroy the fragile, leaky blood vessels. A high

energy beam of light is aimed directly onto the new blood vessels and destroys them, preventing further loss of vision. However, laser treatment may also destroy some surrounding healthy tissue and some vision. Only a small percentage of people with wet AMD can be treated with laser surgery. Laser surgery is more effective if the leaky blood vessels have developed away from the fovea, the central part of the macula. (See illustration at the beginning of this document.) Laser surgery is performed in a doctor's office or eye clinic.

The risk of new blood vessels developing after laser treatment is high. Repeated treatments may be necessary. In some cases, vision loss may progress despite repeated treatments.

2. **Photodynamic therapy**—a drug called verteporfin is injected into your arm. It travels throughout the body, including the new blood vessels in your eye. The drug tends to “stick” to the surface of new blood vessels. Next, a light is shined into your eye for about 90 seconds. The light activates the drug. The activated drug destroys the new blood vessels and leads to a slower rate of vision decline. Unlike laser surgery, this drug does not destroy surrounding healthy tissue. Because the drug is activated by light, you must avoid exposing your skin or eyes to direct sunlight or bright indoor light for five days after treatment.

Photodynamic therapy is relatively painless. It takes about 20 minutes and can be performed in a doctor's office.

Photodynamic therapy slows the rate of vision loss. It does not stop vision loss or restore vision in eyes already damaged by advanced AMD. Treatment results often are temporary. You may need to be treated again.

3. **Injections**—wet AMD can now be treated with new drugs that are injected into the eye (anti-VEGF therapy). Abnormally high levels of a specific growth factor occur in eyes with wet AMD and promote the growth of abnormal new blood vessels. This drug treatment blocks the effects of the growth factor.

You will need multiple injections that may be given as often as monthly. The eye is numbed before each injection. After the injection, you will remain in the doctor's office for a while and your eye will be monitored. This drug treatment can help slow down vision loss from AMD and in some cases improve sight.

## HOW IS DRY AMD TREATED?

Once dry AMD reaches the advanced stage, no form of treatment can prevent vision loss. However, treatment can delay and possibly prevent intermediate AMD from progressing to the advanced stage, in which vision loss occurs.

The National Eye Institute's Age-Related Eye Disease Study (AREDS) found that taking a specific high-dose formulation of antioxidants and zinc significantly reduces the risk of advanced AMD and its associated vision loss. Slowing AMD's progression from the intermediate stage to the advanced stage will save the vision of many people.

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## AGE-RELATED EYE DISEASE STUDY [AREDS]

### WHAT IS THE DOSAGE OF THE AREDS FORMULATION?

The specific daily amounts of antioxidants and zinc used by the study researchers were 500 milligrams of vitamin C, 400 International Units of vitamin E, 15 milligrams of beta-carotene (often labeled as equivalent to 25,000 International Units of vitamin A), 80 milligrams of zinc as zinc oxide, and two milligrams of copper as cupric oxide. Copper was added to the AREDS formulation containing zinc to prevent copper deficiency anemia, a condition associated with high levels of zinc intake.

### WHO SHOULD TAKE THE AREDS FORMULATION?

People who are at high risk for developing advanced AMD should consider taking the formulation. You are at high risk for developing advanced AMD if you have either:

1. Intermediate AMD in one or both eyes.
- OR
2. Advanced AMD (dry or wet) in one eye but not the other eye.

Your eye care professional can tell you if you have AMD, its stage, and your risk for developing the advanced form.

The AREDS formulation is not a cure for AMD. It will not restore vision already lost from the disease.

However, it may delay the onset of advanced AMD. It may help people who are at high risk for developing advanced AMD keep their vision.

### CAN PEOPLE WITH EARLY STAGE AMD TAKE THE AREDS FORMULATION TO HELP PREVENT THE DISEASE FROM PROGRESSING TO THE INTERMEDIATE STAGE?

There is no apparent need for those diagnosed with early stage AMD to take the AREDS formulation. The study did not find that the formulation provided a benefit to those with early stage AMD. If you have early stage AMD, a comprehensive dilated eye exam every year can help determine if the disease is progressing. If early stage AMD progresses to the intermediate stage, discuss taking the formulation with your doctor.

### CAN DIET ALONE PROVIDE THE SAME HIGH LEVELS OF ANTIOXIDANTS AND ZINC AS THE AREDS FORMULATION?

No. The high levels of vitamins and minerals are difficult to achieve from diet alone. However, previous studies have suggested that people who have diets rich in green leafy vegetables have a lower risk of developing AMD.

### CAN A DAILY MULTIVITAMIN ALONE PROVIDE THE SAME HIGH LEVELS OF ANTIOXIDANTS AND ZINC AS THE AREDS FORMULATION?

No. The formulation's levels of antioxidants and zinc are considerably higher than the amounts in any daily multivitamin.

If you are already taking daily multivitamins and your doctor suggests you take the high-dose AREDS formulation, be sure to review all your vitamin supplements with your doctor before you begin. Because multivitamins contain many important vitamins not found in the AREDS formulation, you may want to take a multivitamin along with the AREDS formulation. For example, people with osteoporosis need to be particularly concerned about taking vitamin D, which is not in the AREDS formulation.

# HOW CAN I TAKE CARE OF MY VISION NOW THAT I HAVE AMD?

**Dry AMD.** If you have dry AMD, you should have a comprehensive dilated eye exam at least once a year. Your eye care professional can monitor your condition and check for other eye diseases. Also, if you have intermediate AMD in one or both eyes, or advanced AMD in one eye only, your doctor may suggest that you take the AREDS formulation containing the high levels of antioxidants and zinc.

Because dry AMD can turn into wet AMD at any time, you should get an Amsler grid from your eye care professional. Use the grid every day to evaluate your vision for signs of wet AMD. This quick test works best for people who still have good central vision. Check each eye separately. Cover one eye and look at the grid. Then cover your other eye and look at the grid. If you detect any changes in the appearance of this grid or in your everyday vision while reading the newspaper or watching television, get a comprehensive dilated eye exam.

**Wet AMD.** If you have wet AMD and your doctor advises treatment, do not wait. After laser surgery or photodynamic therapy, you will need frequent eye exams to detect any recurrence of leaking blood vessels. Studies show that people who smoke have a greater risk of recurrence than those who don't. In addition, check your vision at home with the Amsler grid. If you detect any changes, schedule an eye exam immediately.

# WHAT CAN I DO IF I HAVE ALREADY LOST SOME VISION FROM AMD?

If you have lost some sight from AMD, don't be afraid to use your eyes for reading, watching TV, and other routine activities. Normal use of your eyes will not cause further damage to your vision.

If you have lost some sight from AMD, ask your eye care professional about low vision services and devices that may help you make the most of your remaining vision. Ask for a referral to a specialist in low vision. Many community organizations and agencies offer information about low vision counseling, training, and other special services for people with visual impairments. A nearby school of medicine or optometry may provide low vision services.

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# CURRENT RESEARCH

## WHAT RESEARCH IS BEING DONE?

The National Eye Institute is conducting and supporting a number of studies to learn more about AMD. For example, scientists are:

- Studying the possibility of transplanting healthy cells into a diseased retina.
- Evaluating families with a history of AMD to understand genetic and hereditary factors that may cause the disease.
- Looking at certain anti-inflammatory treatments for the wet form of AMD.

This research should provide better ways to detect, treat, and prevent vision loss in people with AMD.

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# MORE INFORMATION

[National Eye Institute/NIH](#)

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## ADDITIONAL NOTES:

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