

## Age-Related Macular Degeneration

Age-related macular degeneration (AMD) is one of the most common causes of poor vision after age 60. AMD is a deterioration or breakdown of the **macula**. The macula is a small area at the center of the retina in the back of the eye that allows us to see fine details clearly and perform activities such as reading and driving.

The visual symptoms of AMD involve loss of central vision. While peripheral (side) vision is unaffected, with AMD, one loses the sharp, straight-ahead vision necessary for driving, reading, recognizing faces, and looking at detail.

Although the specific cause is unknown, AMD seems to be part of aging. While age is the most significant risk factor for developing AMD, heredity, blue eyes, high blood pressure, cardiovascular disease, and smoking have also been identified as risk factors. AMD accounts for 90% of new cases of legal blindness in the United States.

Nine out of 10 people who have AMD have **atrophic** or “**dry**” AMD, which results in thinning of the macula. Dry AMD takes many years to develop. A specific vitamin regimen has been shown to slow progression of dry AMD.

**Exudative** or “**wet**” AMD is less common (occurring in one out of 10 people with AMD) but is more serious. In the wet form of AMD, abnormal blood vessels may grow in a layer beneath the retina, leaking fluid and blood and creating distortion or a large blind spot in the center of your vision. If the blood vessels are not growing directly beneath the macula, laser surgery is usually the treatment of choice. The procedure usually does not improve vision but tries to prevent further loss of vision. For those patients with wet AMD whose blood vessels are growing directly under the center of the macula, a procedure called **photodynamic therapy (PDT)**, which causes fewer visual side effects, is sometimes used. Intravitreal injections of certain medications can also be used in these cases.

Promising AMD research is being done on many fronts. In the meantime, high-intensity reading lamps, magnifiers, and other low vision aids help people with AMD make the most of their remaining vision.

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## Central Retinal Artery Occlusion

You probably know that high blood pressure and other vascular diseases pose risks to your overall health, but you may not know that they can affect your eyesight by damaging the arteries in your eye.

**Central retinal artery occlusion (CRAO)** usually occurs in people between the ages of 50 and 70. The most common medical problem associated with CRAO is **arteriosclerosis** (hardening of the arteries). Carotid artery disease is found in almost half the people with CRAO.

The most common cause of CRAO is a **thrombosis** (an abnormal blood clot formation). CRAO can also be caused by an **embolus**, a clot that breaks off from another area of the body and is carried to the retina by the bloodstream.

CRAO blocks the central artery in your retina, the light-sensitive nerve layer at the back of the eye. The first sign of CRAO is a sudden and painless loss of vision that leaves you barely able to count fingers or determine light from dark.

Loss of vision can be permanent without immediate treatment. Irreversible retinal damage occurs after 90 minutes, but even 24 hours after symptoms begin, vision can still be saved. The goal of emergency treatment is to restore retinal blood flow. After emergency treatment, you should have a thorough medical evaluation.

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## Indocyanine Green Angiography

Indocyanine green angiography (ICG) is a clinical test used to detect abnormal blood vessels in the choroid, the layer of blood vessels under the retina. These abnormal blood vessels, typically associated with **macular degeneration**, may cause bleeding, scarring, and vision loss. If the blood vessels can be restricted with treatment, vision loss may be stabilized or improved.

Indocyanine, a harmless green dye, gives off infrared light. When injected into the bloodstream, the dye travels through the veins to the blood vessels in the eye. A video camera connected to a computer picks up the infrared light and makes a picture of the blood's circulation. No film or X-rays are involved.

Following the test, the liver removes the dye from the body. There is little risk in having an ICG angiogram. Some people may have mild allergic reactions and, although rare, a few severe allergic reactions have been reported in people allergic to iodine, X-ray dyes, and shellfish.

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## Fluorescein Angiography

Fluorescein angiography, a clinical test to look at blood circulation inside the back of the eye, aids in the diagnosis of retinal conditions associated with diabetes, age-related macular degeneration, and other eye abnormalities. The test can also help follow the course of a disease and monitor its treatment. It may be repeated on multiple occasions with no harm to the eye or body.

Fluorescein is an orange-red dye that is injected into a vein in the arm. The dye travels through the body to the blood vessels in the retina, the light-sensitive nerve layer at the back of the eye. A special camera with a green filter flashes a blue light into the eye and takes multiple photographs of the retina. The technique uses regular photographic film, or, more commonly, is performed with digital equipment. No X-rays are involved.

If there are abnormal blood vessels, the dye leaks into the retina or stains the blood vessels. Damage to the lining of the retina or atypical new blood vessels may be revealed as well. These abnormalities are determined by a careful interpretation of the photographs by an ophthalmologist (Eye M.D.).

The dye can discolor skin and urine until it is removed from the body by the kidneys. There is little risk in having fluorescein angiography, though some people may have mild allergic reactions to the dye. Severe allergic reactions have been reported but only very rarely. Being allergic to X-ray dyes with iodine does not mean you will be allergic to fluorescein. Occasionally, some of the dye leaks out of the vein at the injection site, causing a slight burning sensation that usually goes away quickly.

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## Birdshot Retinochoroidopathy

Birdshot retinochoroidopathy (BR) is a rare, inflammatory condition of the retina and choroid, the layer of blood vessels under the retina. BR is a chronic disease that flares up and then goes into remission. Although some people eventually lose vision, others maintain or recover good vision.

The cause of BR is unknown. It usually occurs in white women over the age of 40, and usually affects both eyes. Symptoms are poor vision, night blindness, and disturbance of color vision. Pain is rare.

**Fluorescein angiography**, a test used to evaluate the retina and choroid, detects BR's characteristic cream-colored spots, similar in appearance to the splattered pattern of birdshot from a shotgun.

If you have been diagnosed with birdshot retinochoroidopathy, it is important to see your ophthalmologist (Eye M.D.) regularly.

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## Anti-VEGF Treatment for Wet Age-Related Macular Degeneration

Anti-VEGF treatment is a way to slow vision loss in people who have a condition known as “wet” age-related macular degeneration (AMD).

AMD is the leading cause of vision loss in people 50 years or older in the United States. This condition damages the **macula**, which is located in the center of the retina and enables you to see fine details clearly. You rely on your macula whenever you read, drive, or do other activities that require you to focus on precise details. A person with AMD loses the ability to perceive fine details both up close and at a distance. This vision loss usually affects only your central vision.

There are two types of AMD. About 90% of people with AMD have the atrophic or “**dry**” form of AMD, which develops when the tissues of the macula grow thin with age. About 10% have the exudative or “**wet**” form of AMD. With wet AMD, abnormal blood vessels grow underneath the retina. These unhealthy vessels leak blood and fluid, which can scar the macula. Vision loss can be rapid and severe.

Researchers have found that a chemical called **vascular endothelial growth factor**, or **VEGF**, is critical in causing abnormal blood vessels to grow under the retina. Scientists have developed several new drugs that can block the trouble-causing VEGF. These are referred to as “anti-VEGF” drugs, and they help block abnormal blood vessels, slow their leakage, and help reduce vision loss.

Treatment with the anti-VEGF drug is usually performed by injecting the medicine with a very fine needle into the back of your eye. Your ophthalmologist (Eye M.D.) will clean your eye to prevent infection and will administer an anesthetic into your eye to reduce pain. Usually, patients receive multiple anti-VEGF injections over the course of many months. There is a small risk of complications with anti-VEGF treatment, usually resulting from the injection itself. However, for most people, the benefits of this treatment outweigh the small risk of complications.

Anti-VEGF medications are a step forward in the treatment of wet AMD because they target the underlying cause of abnormal blood vessel growth. This treatment offers new hope to those affected with wet AMD. Although not every patient benefits from anti-VEGF treatment, a large majority of patients achieve stabilized vision, and a significant percentage can improve to some degree.

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## Coats Disease

Coats disease is a chronic, progressive disorder that affects the retina, the light-sensitive nerve layer at the back of the eye. Coats disease is an abnormal growth spurt of the small blood vessels (capillaries) that nourish the retina. The fragile abnormal vessels break and leak the clear serum part of the blood into the retina, causing the retina to swell.

Coats disease usually affects children (especially boys) in the first ten years of life, but it can also affect young adults. The condition affects central vision, typically in only one eye. Severity can range from mild vision loss to total retinal detachment and blindness. No cause has yet been identified for Coats disease.

The leaking blood vessels can be treated with laser surgery or cryotherapy (freezing). If the retina is detached, a vitrectomy to replace the vitreous (the clear gel-like substance inside the eye) with a gas bubble may be necessary to restore vision.

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## Cytomegalovirus Retinitis

Cytomegalovirus retinitis (CMV retinitis) is a serious eye infection of the retina, the light-sensing nerve layer that lines the back of the eye. It is a significant threat to people with weak immune systems, such as people with HIV and AIDS, newborns, the elderly, people undergoing chemotherapy, and recipients of organ transplants. About 20% to 30% of people with AIDS develop CMV retinitis.

Infection with cytomegalovirus, one of the herpes viruses, is extremely common and does not pose a problem for someone with a strong immune system. But when immunity is weak, the CMV can reactivate and spread to the retina through the bloodstream.

First signs of CMV retinitis are loss of peripheral vision or a blind spot that can progress to loss of central vision. Without treatment or improvement in the immune system, CMV retinitis destroys the retina and damages the optic nerve, which results in blindness.

Treatment is possible for CMV retinitis. **Ganciclovir** and other antiviral medicines are available, and they can be administered orally, intravenously, as an intraocular injection, and, in some cases, via a sustained-release intraocular implant.

Warning signs that should prompt an immediate examination by an ophthalmologist (Eye M.D.) are the appearance of floating spots or spider webs, flashing lights, blind spots, or blurred vision. Recurrence of CMV retinitis is common, so monthly checkups with an ophthalmologist are important.

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## Branch Retinal Artery Occlusion

Most people know that high blood pressure and other vascular diseases pose risks to overall health, but many may not know that high blood pressure can affect vision by damaging the arteries in the eye.

**Branch retinal artery occlusion (BRAO)** blocks the small arteries in the retina, the light-sensing nerve layer lining the back of the eye. The most common cause of BRAO is a **thrombosis**, the formation of a blood clot. Sometimes the blockage is caused by an **embolus**, a clot carried by the blood from another part of the body.

Central vision is lost suddenly if the blocked retinal artery is one that nourishes the macula, the part of the retina responsible for fine, sharp vision. Following BRAO, vision can range from normal (20/20) to being barely able to detect hand movement.

BRAO poses significant risks to vision. If you have had a branch retinal artery occlusion, regular visits to your ophthalmologist are essential.

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## Branch Retinal Vein Occlusion

Most people know that high blood pressure and other vascular diseases pose risks to overall health, but many may not know that high blood pressure can affect vision by damaging the veins in the eye. High blood pressure is the most common condition associated with **branch retinal vein occlusion (BRVO)**. About 10% to 12% of the people who have BRVO also have **glaucoma** (high pressure in the eye).

BRVO blocks small veins in the retina, the layer of light-sensing cells at the back of the eye. If the blocked retinal veins are ones that nourish the **macula**, the part of the retina responsible for straight-ahead vision, some central vision is lost. During the course of vein occlusion, 60% or more will have swelling of the central macular area. In about one-third of people, this macular edema will last for more than one year.

BRVO causes a painless decrease in vision, resulting in misty or distorted vision. If the veins cover a large area, new abnormal vessels may grow on the retinal surface, which can bleed into the eye and cause blurred vision.

There is no cure for BRVO. Finding out what caused the blockage is the first step in treatment. Your ophthalmologist (Eye M.D.) may recommend a period of observation, since hemorrhages and excess fluid may subside on their own. Depending on how damaged the veins are, laser surgery may help reduce the swelling and improve vision. Laser surgery may also shrink abnormal new blood vessels that can grow and that are at risk of bleeding. Newer injectable medicines are being investigated for treating BRVO.

If you have had a branch retinal vein occlusion, regular visits to your ophthalmologist are essential to protect vision.

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## Central Serous Retinopathy

Central serous retinopathy (CSR) is a small, round, shallow swelling that develops on the retina, the light-sensitive nerve layer that lines the back of the eye. Although the swelling reduces or distorts vision, the effects are usually temporary. Vision generally recovers on its own within a few months.

In the initial stages of CSR, vision may suddenly become blurred and dim. If the **macula** (the area of the retina responsible for central vision) is not affected, there may be no obvious symptoms.

CSR typically affects adults between the ages of 20 and 50. People with CSR often find that their retinal swelling resolves without treatment and their original vision returns within six months of the onset of symptoms. Some people with frequent episodes may have some permanent vision loss. Recurrences are common and can affect 20% to 50% of people with CSR. While the cause of CSR is unknown, it seems to occur at times of personal or work-related stress.

As CSR usually resolves on its own, no treatment may be necessary. Sometimes laser surgery can reduce the swelling sooner, but the final visual outcome is usually about the same. If retinal swelling persists for more than three or four months, or if an examination reveals early retinal degeneration, laser surgery may be helpful.

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## Epiretinal Membrane

The retina is a layer of light-sensing cells lining the back of your eye. As light rays enter your eye, the retina converts the rays into signals that are sent through the optic nerve to your brain, where they are recognized as images.

The **macula** is the small area at the center of your retina that allows you to see fine details. The macula normally lies flat against the back of the eye, like film lining the back of a camera. As you age, the clear, gel-like substance that fills the middle of your eye begins to shrink and pull away from the retina. In some cases, a thin “scar tissue” or membrane can grow on the surface of the macula. When wrinkles, creases, or bulges form on the macula due to this scar tissue, this is known as an **epiretinal membrane** or **macular pucker**. Damage to your macula causes blurred central vision, making it difficult to perform tasks such as reading small print or threading a needle. Peripheral (side) vision is not affected.

Symptoms, which can be mild or severe and affect one or both eyes, may include:

- blurred detail vision;
- distorted or wavy vision;
- gray or cloudy area in central vision; and
- blind spot in central vision.

Your ophthalmologist (Eye M.D.) detects an epiretinal membrane by examination and special photographic techniques. If your symptoms are mild, no treatment may be necessary. Updating your eyeglass prescription or wearing bifocals may improve your vision sufficiently. If you have more severe symptoms that interfere with your daily routine, your ophthalmologist may recommend **vitrectomy surgery** to peel and remove the abnormal scar tissue. During this outpatient procedure, your ophthalmologist uses tiny instruments to remove the wrinkled tissue. Vision often improves.

Be sure to discuss your options with your ophthalmologist. If surgery is recommended, you should be aware that as with any surgical procedure, rare complications can occur, including infection, bleeding, retinal detachment, recurrence of the epiretinal membrane, and earlier onset of cataract.

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## Cotton-Wool Spots

Cotton-wool spots are tiny white areas on the retina, the layer of light-sensing cells lining the back of the eye. Caused by a lack of blood flow to the small retinal blood vessels, they usually disappear without treatment and do not threaten vision. However, they can be an indication of a serious medical condition.

**Diabetes** is the most common cause of cotton-wool spots. The presence of more than eight cotton-wool spots has been associated with a higher risk of the more severe form of diabetic retinopathy known as **proliferative diabetic retinopathy (PDR)**.

Cotton-wool spots are also a common sign of infection with the **human immunodeficiency virus (HIV)**. They are present in more than half of the people with full-blown AIDS. Their presence can be an important sign of the severity of HIV-related disease.

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## Floaters and Flashes

Small specks or clouds moving in your field of vision as you look at a blank wall or a clear blue sky are known as **floaters**. Most people have some floaters normally but do not notice them until they become numerous or more prominent.

In most cases, floaters are part of the natural aging process. Floaters look like cobwebs, squiggly lines, or floating bugs. They appear to be in front of the eye but are actually floating inside. As we get older, the **vitreous** (the clear, gel-like substance that fills the inside of the eye) tends to shrink slightly and detach from the retina, forming clumps within the eye. What you see are the shadows these clumps cast on the retina, the light-sensitive nerve layer lining the back of the eye.

The appearance of flashing lights comes from the traction of the vitreous gel on the retina at the time of vitreous separation. **Flashes** look like twinkles or lightning streaks. You may have experienced the same sensation if you were ever hit in the eye and “saw stars.”

Floaters can get in the way of clear vision, often when reading. Try looking up and then down to move the floaters out of the way. While some floaters may remain, many of them will fade over time.

Floaters and flashes are sometimes associated with retinal tears. When the vitreous shrinks, it can pull on the retina and cause a tear. A torn retina is a serious problem. It can lead to a retinal detachment and blindness. If new floaters appear suddenly or you see sudden flashes of light, see an ophthalmologist (Eye M.D.) immediately.

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## Detached and Torn Retina

A retinal detachment is a very serious problem that usually causes blindness unless treated. The appearance of flashing lights, floating objects, or a gray curtain moving across the field of vision are all indications of a retinal detachment. If any of these occur, see an ophthalmologist (Eye M.D.) right away.

As one gets older, the **vitreous** (the clear, gel-like substance that fills the inside of the eye) tends to shrink slightly and take on a more watery consistency. Sometimes as the vitreous shrinks, it exerts enough force on the retina to make it tear.

Retinal tears can lead to a retinal detachment. Fluid vitreous, passing through the tear, lifts the retina off the back of the eye like wallpaper peeling off a wall. Laser surgery or cryotherapy (freezing) are often used to seal retinal tears and prevent detachment.

If the retina is detached, it must be reattached before sealing the retinal tear. There are three ways to repair retinal detachments. **Pneumatic retinopexy** involves injecting a special gas bubble into the eye that pushes on the retina to seal the tear. The **scleral buckle procedure** requires the fluid to be drained from under the retina before a flexible piece of silicone is sewn on the outer eye wall to give support to the tear while it heals. **Vitreotomy surgery** removes the vitreous gel from the eye, replacing it with a gas bubble, which is slowly replaced by the body's fluids.

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## Central Retinal Vein Occlusion

You probably know that high blood pressure and other vascular diseases pose risks to overall health, but you may not know that they can affect eyesight by damaging the veins in the eye.

**Central retinal vein occlusion (CRVO)** blocks the main vein in the retina, the light-sensitive nerve layer at the back of the eye. The blockage causes the walls of the vein to leak blood and excess fluid into the retina. When this fluid collects in the **macula** (the area of the retina responsible for central vision), vision becomes blurry.

“Floaters” in your vision are another symptom of CRVO. When retinal blood vessels are not working properly, the retina grows new fragile vessels that can bleed into the vitreous, the fluid that fills the center of the eye. Blood in the vitreous clumps and is seen as tiny dark spots, or floaters, in the field of vision.

In severe cases of CRVO, the blocked vein causes painful pressure in the eye. Retinal vein occlusions commonly occur with **glaucoma, diabetes, age-related vascular disease**, high blood pressure, and blood disorders.

The first step of treatment is finding what is causing the vein blockage. There is no cure for CRVO. Your ophthalmologist (Eye M.D.) may recommend a period of observation, since hemorrhages and excess fluid often subside on their own. Laser surgery may be effective in preventing further bleeding into the vitreous or for treating glaucoma, but it cannot remove a hemorrhage or cure glaucoma once it is present. New experimental treatments are now under investigation.

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## Anti-VEGF Treatment for Non-AMD Disease

Researchers have found that a chemical called vascular endothelial growth factor, or VEGF, is critical in causing abnormal blood vessels to grow under the retina. Scientists have developed several new drugs that can block the trouble-causing VEGF known as “anti-VEGF” drugs. They help block abnormal blood vessels, slow their leakage, and help reduce vision loss.

Certain anti-VEGF treatments are approved for a condition known as “**wet**” **age-related macular degeneration (AMD)**, in which abnormal blood vessels grow underneath the retina. These unhealthy vessels leak blood and fluid that can swell and scar the macula (the central part of the retina), and vision loss may be rapid and severe.

Since anti-VEGF therapies have shown good potential for slowing vascular leakage and preventing vision loss associated with wet AMD, ophthalmologists (Eye M.D.s) are using them to treat other causes of macular edema. If your ophthalmologist has diagnosed you with **diabetic retinopathy**, **retinal venous occlusion**, or other conditions, you may benefit from anti-VEGF treatment if other therapies are not producing the desired results or if your ophthalmologist thinks that anti-VEGF therapy is the best first course of action.

Treatment with the anti-VEGF drug is usually performed by injecting the medicine with a very fine needle into the back portion of your eye. Your ophthalmologist will clean your eye to prevent infection and will administer an anesthetic into your eye to reduce pain. Usually, patients receive multiple anti-VEGF injections over the course of many months. There is a small risk of complications with anti-VEGF treatment, usually resulting from the injection itself. However, for most people, the benefits of this treatment outweigh the small risk of complications.

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## Face-Down Recovery After Retinal Surgery

The retina is a layer of light-sensing cells lining the back of your eye. As light enters your eye, the retina converts the rays into signals that are sent through the optic nerve to your brain, where they are recognized as images.

To repair a damaged or detached retina, your ophthalmologist may remove some of your eye's **vitreous** (the gel-like substance that fills the inside of your eye) and inject a gas bubble into the eye to take its place. This bubble holds the retina in place as it re-attaches to the back of your eye. With time, the bubble disappears and is replaced with your normal eye fluid.

You must keep your head facing downward or turned to a particular side for up to several weeks after surgery so that the bubble will remain in the right position. In some cases the positioning requirements are full-time, and in others it may be part-time. If you lie in the wrong position, such as face-up, pressure may be applied to other parts of the eye, causing further problems like cataract or glaucoma. To assist you in keeping your face pointed downward, special equipment is available, including adjustable face-down chairs, tabletop face cradles, face-down pillows, and mirrors.

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