

Age-Related Macular Degeneration—Wet Forms Including Macular Neovascularization

Age-Related Macular Degeneration (AMD) is a deterioration of the retina and **choroid** that leads to a substantial loss in visual acuity (sharpness of vision).

AMD is the leading cause of significant visual acuity loss in people over age 50 in developed countries.

Causes: The exact cause of AMD is unknown, but the condition develops as the eye ages. There are 2 types of AMD: non-neovascular AMD or dry AMD; and neovascular AMD or wet AMD.

Macular Neovascularization (MNV) otherwise known as choroidal neovascularization occurs when abnormal blood vessels grow beneath the central part of the retina known as the macula, which is responsible for the sharp vision needed for reading and recognizing faces. These vessels can bleed or leak and cause a distortion of the retina's structure. Ultimately, the MNV can turn into a **disciform scar** that replaces the normal architecture of the outer retina and leads to permanent loss of central vision. (Figure 1)



Figure 1
Wet AMD. Macular neovascularization (indicated by arrow). Photo courtesy Anat Loewenstein, MD

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SYMPTOMS

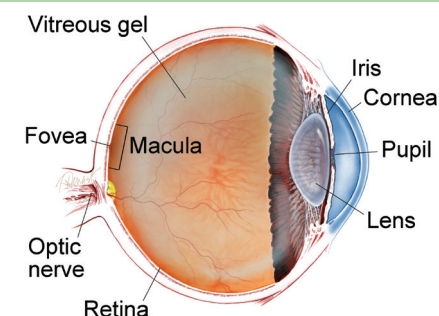
In early stages, AMD may have no symptoms at all. When the disease progresses, the symptoms are:

- Distortion (warping) of straight lines
- A decrease in the intensity or brightness of colors

As the macular degeneration progresses, AMD symptoms include:

- A gradual or sudden loss of central vision, or
- Dark, blurry areas in the center of vision ●

WHAT IS THE RETINA?



THE RETINA is a thin layer of light-sensitive nerve tissue that lines the back of the eye (or vitreous) cavity. When light enters the eye, it passes through the iris to the retina where images are focused and converted to electrical impulses that are carried by the optic nerve to the brain resulting in sight.

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Risk Factors:

- Age—the strongest risk factor
- Caucasian race
- Family history of AMD
- Cigarette smoking

Possible risk factors:

- Female gender
- Lower level of education
- Light iris color
- Far-sightedness
- Cardiovascular (heart) disease
- High blood pressure
- High cholesterol
- Sunlight exposure
- Low dietary fish intake
- Higher body mass index (BMI)
- Having a diet low in lutein and zeaxanthin/antioxidants

Diagnostic Testing: Disease features related to wet AMD may be found in the retina and in the layers beneath it.

A wet AMD diagnosis is made by a clinical examination with a **slit lamp** and by using several types of imaging, including:

- **Fluorescein angiography** (FA)
- **Indocyanine green angiography** (ICGA)
- **Optical coherence tomography** (OCT)
- **Optical coherence tomography angiography** (OCTA)

Treatment and Prognosis: Wet-AMD treatment has been revolutionized in recent years after the discovery of vascular *endothelial growth factor* (VEGF), a family of compounds in the body. VEGF promotes the growth of abnormal new blood vessels in the eye—known as neovascularization—that can lead to wet AMD.

Anti-VEGF drugs have been developed to help control neovascularization and preserve vision for AMD patients. There are currently 5 available anti-VEGF drugs, although more may be approved in the next few years

- Avastin® (bevacizumab)
- Lucentis® (ranibizumab)
- Eylea® (aflibercept)
- Beovu® (brolucizumab)
- Vabysmo® (faricimab)

Wet AMD cannot be cured, but its progression may be blocked with the use of *intravitreal* (in-the-eye) anti-VEGF injections. These injections may preserve, and even recover, vision. Local anesthetic eye drops are given before the injections to numb the eye and minimize discomfort.

There are 3 anti-VEGF treatment regimens commonly used for Avastin, Lucentis, Eylea, Beovu and Vabysmo. The best option is chosen in consultation with your retina specialist.

1. *Pro re nata* (PRN) (As needed) or “treat and observe”—patients are treated with three initial monthly injections, followed by treatment as needed.
2. “Treat and extend”—after 3 initial monthly injections, the time between treatments is gradually increased as long as the MNV does not show increased activity until a safe treatment interval is determined. Some eyes will continue to require monthly injections, but others can be treated less often as long as the wet AMD is controlled. Some patients may require treatment only every 10-16 weeks, depending on their response.

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3. Monthly injections. The anti-VEGF drugs are typically started with monthly injections, although this treatment regimen is used less often now with the extended duration of some anti-VEGF drugs.

Before the first anti-VEGF drugs were introduced, wet-AMD patients were treated with **laser photocoagulation** or **photodynamic therapy (PDT)**, although these are used much less often now. There are occasional circumstances where these treatments are still used for the treatment of MNV.

Anti-VEGF drugs have greatly improved wet-AMD treatment since 2005; patients today have a much better chance of maintaining their central vision so they can read, drive, recognize faces, and live normal lives.

Although patients with wet AMD can experience a progressive decrease in visual acuity, they will almost never be completely blind. ●

Clinical Terms *(appearing green within fact sheet text)*

Choroid (pronounced CORE oid): The layer of blood vessels and connective tissue between the retina and the white of the eye, also known as the sclera.

Disciform scar: A scar that develops in the macula area of the retina resulting from leakage and bleeding from abnormal blood vessels (neovascularization) in the eye.

Fluorescein angiography (FA): An imaging technique where a yellow dye called sodium fluorescein is injected into a vein in the arm, allowing a special camera to record circulation in the retina and choroid in the back of the eye. This test can be very useful in diagnosing a number of retinal disorders.

Indocyanine green angiography (ICGA): A diagnostic procedure that uses a green dye to illuminate blood flow in the choroid, which is a layer of blood vessels located between the white of the eye (sclera) and the retina that supplies nutrients to the inner eye.

Laser photocoagulation: A surgical technique that uses a highly targeted laser light to seal blood vessels and coagulate (clot) tissue.

Macular Neovascularization (MNV): Growth of abnormal new blood vessels in the choroid layer of the eye that grow under the retina and macula and disrupt vision.

Optical coherence tomography (OCT): A non-invasive imaging technique that uses light to create a 3-dimensional image of your eye for physician evaluation.

Optical coherence tomography angiography (OCTA): A noninvasive imaging technique that uses light to image the blood vessels in different layers of the retina and choroid.

Photodynamic therapy (PDT): A treatment for macular degeneration in which a light-activated medicine (verteporfin) is injected into the bloodstream followed by application of a cold laser which targets abnormal blood vessels growing in the macula at the center of the retina.

Slit lamp: An instrument that combines a high-intensity light source with a microscope to examine the external and internal structures of the eye, including the optic nerve and retina.

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