

WHAT IS RETINA?

The retina is the innermost layer of the eye. It consists of a set of neurons whose job it is to transform the information that the eye receives in the form of light into nerve impulses that travel to the brain.

The retina is nourished by blood vessels that provide the oxygen and nutrients necessary for its proper functioning.

Any damage to the retina will result in a significant limitation of vision, since it is a key part of the eye.

The therapeutic armament available at present consists of laser therapies, injections of drugs into the eye or surgery depending on the condition requiring treatment.

The most common diseases of the retina are:

AGE-RELATED MACULAR DEGENERATION. (AMD)

- What is age-related macular degeneration (AMD)?

AMD is an ocular disease linked to aging. It is the leading cause of severe vision loss in people over 65 years of age.

<https://www.youtube.com/watch?v=OpVGLqNuifE>

- Why does AMD occur?

The normal function of the retina produces waste products and with the passage of time, the retina is not able to remove such debris effectively, these waste products therefore accumulate and can consequently damage the retina.

Initially, these deposits cause alterations in retinal function, but over time can lead to injury and scarring. Risk factors include age, smoking, genetics, diabetes, high blood pressure and high cholesterol, among others.

According to the lesions that appear, two types of AMD are distinguished. Dry AMD affects 80% of patients and has a slow and progressive development.

The accumulated deposits damage the macula, the area of the retina responsible for central vision and detail.

As a result the patient may see a spot in the center of his vision or have an inability to recognize faces.

Currently there is no specific treatment, except dietary and health recommendations to prevent the appearance and evolution of dry AMD. Wet AMD affects 20% of patients and has a rapid and more aggressive progression.

The waste deposits cause the appearance of lesions in the macula that can bleed and later form irreversible scarring of the retina, with the loss of central vision.

For wet AMD there is an effective treatment that improves vision and controls the progression of the disease, as long as these scars have not yet formed.

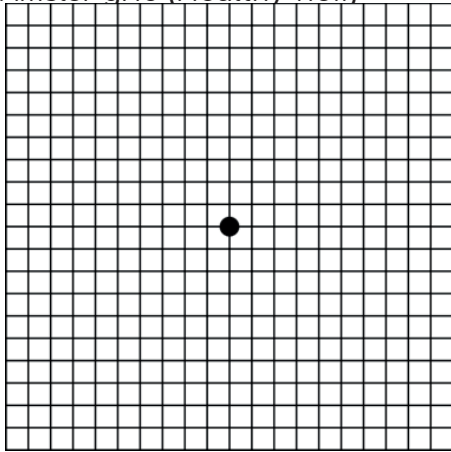


- **How can I tell if I have AMD?**

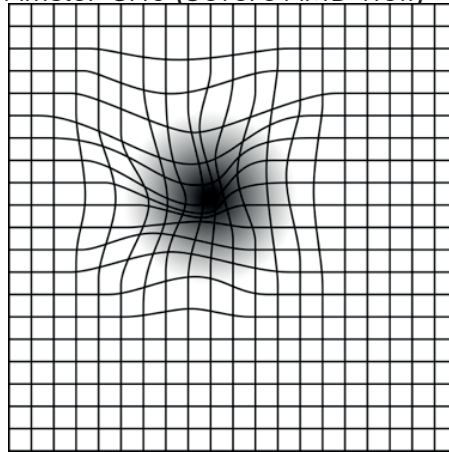
The first visual symptom is distorted vision of straight lines. When the debris is deposited, ripples develop in the retina, causing straight lines to appear undulated. Sometimes a black spot may appear in the center of the visual field.

A simple and effective test that the patient can do at home is to look at a grid, first with one eye and then compare it with the other, and see if he sees distorted lines or some fixed spot. In such a case, it is recommended that you consult your ophthalmologist urgently for the evaluation of the fundus (the interior surface of the eye).

Amsler grid (Healthy view)



Amsler Grid (Severe AMD view)



https://www.youtube.com/watch?v=ozZQlZ_52YY&feature=youtu.be

https://www.youtube.com/watch?v=HsKdl_QzDlc

- **How is AMD diagnosed?**

The diagnosis of AMD is made through a series of tests whose results are evaluated by an ophthalmologist who will confirm or dismiss the existence of the disease.

- **Measurement of visual acuity.** Visual loss is quantified according to the smallest letters or symbols you can see with each eye using a simple eye chart.

- **Evaluation of the fundus.** The lesions that cause visual loss are examined by an ophthalmologist. The examination is performed by direct observation of the retina using a light source and a lens. In order to evaluate the whole retina, it is necessary to apply drops that dilate the pupil, so after performing the fundus examination patients will not see well until the effect of the drops wears off i.e. until the pupil regain normal size. Sometimes, in order to objectively compare different examinations, it is necessary to take photographs of the fundus, this test is called **retinography**.

- **Optical coherence tomography (OCT).** In order to be able to study how the lesions have affected the retina the macular area is analyzed by OCT. OCT is a simple, fast and accurate test that allows detection, measurement and comparison of retinal lesions in successive examinations, as well as assessment of the effectiveness of treatment.

- **Angiography.** This is a very specific form of retinography. A contrast (fluorescein) is given prior to the test by injection into a vein in the arm. Serial photographs are then taken of the fundus of the eye with a special filter that allows views of the circulation of the arteries and veins of the fundus, so leaky or bleeding lesions can be detected by fluorescence.

- **How is AMD treated?**

<https://www.youtube.com/watch?v=Hl8Uzx6lNlo>

Pharmacological treatment is useful in the wet form of AMD and involves injecting a drug into the eye. Although it sounds very uncomfortable in fact, hardly any discomfort is experienced throughout the procedure as anesthetic drops are previously instilled. It is a simple and safe procedure, although not without complications. After injection you should consult your ophthalmologist immediately if you experience a sudden decrease in visual acuity, painful red eyes and/or discharge. It is normal, to experience slight bleeding at the injection site and to see floating bodies, which are actually particles of the medication that has been injected.

Antiangiogenic drug (Anti-VEGF) slows the formation of bleeding blood vessels and helps accumulated fluid to drain away. AMD is a chronic disease, so periodic injections will be necessary. For dry AMD there is no definitive treatment; it is recommended not to smoke, to take moderate exercise and eat a healthy preventive diet such as the Mediterranean diet with oily fish, olive oil and plenty of fruit and vegetables. This diet can be combined with nutritional supplements as they may be able to decrease the risk of disease progression.

- **What can I do to prevent AMD?**

To prevent AMD, it is important to minimize risk factors. Age and genetics are not in our hands but we can eliminate tobacco and oxidizing agents with a diet rich in zinc, vitamins A, C and E and lutein, with foods such as salmon, vegetables, pulses, nuts or olive oil, in addition the use of recommended sunglasses with UV protection may be useful.

MACULAR EDEMA

- **What is macular edema?**

Macular edema is an inflammatory lesion resulting from an accumulation of fluid in the macula, the central area of the retina with which we see in detail, and where we have the maximum vision. When liquid accumulates in the macula we see distorted lines, have blurred vision and may even have a black spot in our field of vision.

The causes of macular edema are multiple, including: diabetic retinopathy, macular degeneration, venous occlusions and so on.

- **How is macular edema diagnosed?**

The diagnosis of edema is made through a series of tests.

- **Measurement of visual acuity.** Visual loss is quantified according to the smallest letters or symbols you can see on an eye chart.

- **Evaluation of the fundus.** The lesions that cause vision loss are examined by an ophthalmologist. It is performed by direct observation of the retina using a light source and a lens. In order to evaluate the whole retina, it is necessary to apply drops that dilate the pupil, so after performing the fundus test patient's will not see well until the effect of the drops wears off i.e. until the pupil regain normal size. Sometimes, in order to objectively compare different examinations, it is necessary to take photographs of the fundus, this test is called retinography.



- **Optical coherence tomography (OCT).** OCT is a simple, fast and accurate test that allows detection and measurement of macular edema, with a series of tests comparison can be made to detect early signs that suggest reactivation of the disease and/or the need for treatment whilst evaluating its effectiveness.

- **How is macular edema treated?**

There are different treatments to combat macular edema: medication in the form of anti-inflammatory eye drops, injections of antiangiogenic drugs into the eye or installation of implants with potent anti-inflammatory drugs.

Intraocular injection is a simple and safe procedure, although not without complications. After injection you should consult your ophthalmologist immediately if you experience a sudden decrease in visual acuity, painful red eyes and/or discharge. It is normal, to experience slight bleeding at the injection site and to see floating bodies, which are actually particles of the medication that has been injected.

DIABETIC RETINOPATHY

- **What is diabetic retinopathy?**

Diabetic retinopathy is a complication of diabetes caused by the deterioration of the walls of blood vessels as a result of elevated glycemia (blood sugar) over a prolonged period. When the blood vessels are altered, the liquid and substances that circulate in the blood can escape and accumulate in the retina, damaging it.

The main cause of decreased visual acuity in a diabetic patient is macular edema (see section on macular edema).

Diabetic retinopathy causes gradual damage to the retina and decreased vision without pain, except in case of complications or if the disease is very advanced. To prevent it, it is very important to have a good control of diabetes, maintaining a correct medication regimen prescribed by your doctor/endocrinologist and following recommended diet and exercise advice; as well as periodic ophthalmological reviews to enable early detection and prompt treatment of complications.

- **How is diabetic retinopathy diagnosed?**

The diagnosis is made through a series of tests:

- **Measurement of visual acuity.** Visual loss is quantified according to the smallest letters or symbols you can see on an eye chart.

- **Evaluation of the fundus.** The lesions that cause vision loss are examined by an ophthalmologist. It is performed by direct observation of the retina using a light source and a lens. In order to evaluate the whole retina, it is necessary to apply drops that dilate the pupil, so after performing the fundus test patient's will not see well until the effect of the drops wears off i.e. until the pupil regain normal size. Sometimes, in order to objectively compare different examinations, it is necessary to take photographs of the fundus, this test is called retinography.

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- **Angiography.** This is a very specific form of retinography. A contrast (fluorescein) is given prior to the test by injection into a vein in the arm. Serial photographs are then taken of the fundus of the eye with a special filter that allows views of the circulation of the arteries and veins of the fundus, so leaky or bleeding lesions can be detected by fluorescence.

- **How is diabetic retinopathy treated?**

There are multiple treatments for diabetic retinopathy. Depending on the type of lesions or stage of the disease, one or the other will be applied according to the criteria of the retinologist.

Blood Glucose Levels: First and foremost is good control of blood sugar levels.

Photocoagulation: Laser photocoagulation uses the heat from a laser to seal or destroy abnormal, leaking blood vessels in the retina; also in the cases where the prognosis is especially bad, scatter photocoagulation can treat the peripheral retina, to preserve central vision.

Intraocular injection: that is, to inject medicine inside the eye using antiangiogenic and anti-inflammatory drugs is an effective treatment. Although it sounds very uncomfortable in fact, hardly any discomfort is experienced throughout the procedure as anaesthetic drops are previously instilled. It is a simple and safe procedure, although not without complications. After injection you should consult your ophthalmologist immediately if you experience a sudden decrease in visual acuity, painful red eyes and/or discharge. It is normal, to experience slight bleeding at the injection site and to see floating bodies, which are actually particles of the medication that has been injected. Antiangiogenic drug (Anti-VEGF) slows the formation of bleeding blood vessels and helps accumulated fluid to drain away. Diabetic retinopathy is a chronic disease, so periodic injections may be necessary.

RETINAL DETACHMENT

- **What is retinal detachment and how is it diagnosed?**

Retinal detachment is when the retina, the innermost layer of the eye, begins to pull away from the adjacent layer containing the blood vessels that supply it with oxygen and nutrients.

This is a serious visual problem and its prognosis will largely depend on whether the central part of the retina (macula) is involved, the macula is responsible for central and detailed vision.

Retinal detachment can occur in anyone, but it is more frequent in myopic people, those with a history of eye surgery and those with a history of retinal disease. Retinal detachment can be caused by tumors, retinal diseases such as advanced diabetic retinopathy, trauma or when the gel-like material (vitreous) leaks through a retinal hole or tear and collects underneath the retina (posterior vitreous detachment). Aging or retinal disorders can cause the retina to thin. Retinal detachment due to a tear in the retina typically develops when the vitreous collapses and tugs on the retina with enough force to create a tear

It is not a painful process and results in some loss of vision, it may be preceded by symptoms such as the sight of flies or floating bodies and flashes; so it is recommended to go to your ophthalmologist immediately should such symptoms occur.

For a diagnosis of retinal detachment it is necessary to carry out an assessment of visual acuity using eye charts, measurement of intraocular pressure and finally an examination of the fundus of eye will be done by means of a light source and a lens, to study the periphery in detail.

To do this it will be necessary to dilate the pupil with drops.



- **How can retinal detachment be treated?**

In the majority of cases the treatment will be surgical by means of the most suitable technique according specific indications and the retinologist.

In specific cases it can be treated by injecting gas into the eye and sealing the lesions with a laser.

All procedures aim to reapply the detached retina to the adjacent layer whilst maintaining the integrity of the eyeball and restoring vision as much as possible.

● **VASCULAR OCCLUSIONS OF THE RETINA**

- **What are they, why do they happen, how are they diagnosed, and how are they treated?**

Oxygenated blood and nutrients reach the retina through the arteries, deoxygenated blood leaves the eye through the veins taking with it debris and waste products .

These vessels may get blocked by a thrombus resulting in a sudden and painless decrease in vision.

The risk factors for thrombosis are mainly hypertension, smoking and inflammatory diseases amongst others.

To diagnose vascular occlusion similar tests to those for diabetic retinopathy will be performed including: assessment of visual acuity, examination of the fundus of the eye, OCT and angiography (see section 'diagnosis of diabetic retinopathy').

Treatment can be performed using laser photocoagulation or injections into the eye with antiangiogenic or anti-inflammatory drugs (see section 'treatment of diabetic retinopathy').

The treatment is aimed at restoring visual acuity and avoiding posterior complications such as neovascular glaucoma or tractional retinal detachment. Both complications are due to the growth of abnormal blood vessels; which in the first case block off the drainage areas of the eye fluid thus increasing the pressure within the eye, and in the second case pulling the retina off (retinal detachment).

● **WHAT RESEARCH DOES GIMSO DO IN RETINAL PATHOLOGY?**

The research group Miguel Servet Ophthalmology has been active for more than 15 years in the study of eye diseases and in the prevention of blindness.

In this long journey, different aspects related to retinal diseases have been studied.

The treatment of retinal pathology has improved considerably over the last 15 years, with the appearance new and effective drugs for intraocular administration whose aim is the control of the disease and the recovery of vision.

Pharmaceutical research on retinal diseases is performed through clinical trials aimed at improving these drugs to achieve optimum visual results, eliminating and preventing lesions, and minimizing the number of periodic administrations required by the patient.

GIMSO actively participates in different clinical trials aimed at various retinal pathologies such as AMD, diabetic retinopathy, macular edema, lesions in high myopia, and vitreous-macular traction. (see section 'clinical trials').

