

Age Related Macular Degeneration

ARMD

■ Définition

Age-related macular degeneration is a progressive disease affecting the macula, the central part of the retina which allows us to see details. Occurring after the age of 50, macular degeneration is the leading cause of poor vision in the elderly. It leads to a progressive loss of central vision, which is needed for activities like reading, recognising faces, and driving. Peripheral vision is usually retained.

Experts distinguish two forms of macular degeneration: wet and dry. In dry macular degeneration, also called atrophic macular degeneration, the macula atrophies progressively with age and is replaced with scar tissue. It is the most common and least severe form of the disease, and it progresses over many years.

In wet macular degeneration, also called exudative macular degeneration, small blood vessels develop newly under the macula. Due to the fact that they bleed easily, these new blood vessels lead to haemorrhages in the back of the eye. This bleeding may eventually result in macular scarring. This form of macular degeneration is less common but more severe than the dry form, and causes more rapid and profound vision loss.¹

Note:

The macula, also called the yellow spot, is located in the centre of the retina, in the optical axis of the eye. Owing to its central position, the macula transmits 90% of the visual information handled by the eye, and is responsible for visual acuity. The macula is composed of numerous photoreceptors which enable it to perceive colours and details.²

■ Epidemiology

ARMD is a common disease. In the United Kingdom, 3.7% of subjects over 75 years of age and 14.4% of subjects over 90 years of age present a visual deficiency due to ARMD.³ In Canada, more than 2 million people over 50 years of age suffer from ARMD.⁴ In the United States, the disease affects more than 1.7 million people.⁵ In France, over 2 million people are currently diagnosed with ARMD, among which 150,000 to 200,000 suffer from a severe form of the disease.⁶

In industrialised countries, ARMD is currently the leading cause of severe loss of visual acuity. Owing to the increase in life expectancy, the number of affected people is expected to continue to increase in the future.⁷

• Risk factors

The exact causes of ARMD are not currently well known. However, certain risk factors which contribute to the development or acceleration of the disease are known. The principal risk factor is age: Most subjects affected by ARMD are over 50 years old, and the proportion of affected people increases with age.⁸

Among the other risk factors, ethnicity appears to play a role: White populations are more at risk of contracting ARMD than black populations.⁹ Heredity also contributes: First degree relatives of a subject with ARMD are 2.4 times more likely to develop the disease.¹⁰

A relationship between tobacco use and ARMD has been established in a number of clinical studies: Smokers run a 2 to 3 time higher risk of contracting the disease than non-smokers.¹¹ Arterial hypertension, cardiovascular diseases, and cholesterol levels have also been implicated as risk factors, but the exact role they play remains unclear.⁸

Research has shown that diets lacking vitamins, oligo-elements and anti-oxidants contribute to the development of ARMD. Although studies have shown conflicting results, experts believe that a healthy and diverse diet, rich in fruits, vegetables, and fish can delay the disease's onset.¹²

• Symptoms

In initial stages, ARMD is asymptomatic, without signs such as pain, redness, or loss of visual acuity. During this time, only ophthalmological examinations permit diagnosis of the disease. In the advanced stages, symptoms varying in accordance to the disease's severity occur:

- Decrease in visual acuity, necessitating increased lighting for activities such as reading and precision work.
- Progressive blurriness of central vision, alteration of colour perception, and distortion of straight lines, which may appear deformed and wavy.
- Appearance of dark spots called scotoma in the central field of vision, difficulties recognising faces, visual hallucinations, or a severe loss of visual acuity.⁸

• Diagnosis

Diagnosis of ARMD may only be made by an ophthalmologist after a thorough clinical examination and complementary tests which confirm the disease's presence. The first test is an examination of the back of the eye.

During the examination of the back of your eye, the ophthalmologist notices white spots called drusen or abnormalities in the deep layer of the retina, characteristic signs of ARMD in patients over 50 years old. If the examination of the back of the eye is conducted at a more advanced stage, more evolved lesions, such as alterations of the pigment epithelium, haemorrhages, or exudants, are observed. If these signs are present, more complementary tests, particularly a fluorescein angiography, may be required to confirm the diagnosis. In some cases, an indocyanine green angiography or an optical coherence tomography is performed.

Examinations

Examination of the back of the eye

The examination of the back of the eye is performed with a biomicroscope. After applying eye drops to dilate your pupils, the ophthalmologist will ask you to put your chin on a chin rest and look forward. He will examine first the front and then the back the back of your eye with a slit lamp. He will use a variety of lenses so as to better see the back of your eye. It is not advised that you drive during the 2-3 hours following the examination because your vision may be blurred or altered by the eye drops you have received.¹⁶

Fluorescein angiography

Fluorescein angiography is a test which involves the photography of the blood vessels in the back of the eye following the administration of dye which becomes luminescent when exposed to light with a specialized filter. This examination is essential because it allows the ophthalmologist to discern precisely the form and severity of your ARMD. As with the examination of the back of your eye, you will be asked to place your chin on a chin rest attached to a special retinograph. The ophthalmologist will then take a series of photographs. Following the injection of the fluorescein dye into one of your arm veins, an additional series of photographs will be taken.

This examination takes about fifteen minutes, can be performed either at your doctor's office or at the hospital, and is generally well tolerated. If you are prone to allergies, the ophthalmologist may prescribe anti-allergens such as antihistamines or corticosteroids before conducting the examination.¹⁷

Indocyanine green angiography

This examination allows your ophthalmologist to obtain information as a supplement to that obtained through fluorescein angiography. He will use a dye different from fluorescein which will become fluorescent when exposed to infrared light. This angiography may be necessary to determine the exact form of your ARMD. This examination is very well tolerated, but lasts longer than fluorescein angiography. It cannot be performed during the first 3 months of pregnancy.¹⁸

OCT (Optical Coherence Tomography)

OCT or optical coherence tomography is a technique based on the reflection of infrared light. It permits an estimation of the retina's depth by providing layered sub-surface image starting with the

outer layers and proceeding to deeper layers. OTC complements angiographies, allowing a more precise diagnosis of certain forms of ARMD. It is painless and does not require any dye injection.¹⁹

► Progression and complications

The evolution of ARMD depends on the type. Dry ARMD leads to a slow but progressive loss of vision, and only rarely causes blindness.

In the absence of treatment, wet ARMD leads to a marked deterioration of vision, which may continue until the onset of blindness.⁸ In the context of ARMD, “blindness” is not complete as the peripheral retina is not affected. As your field of peripheral vision remains intact, you can continue to function in your daily life: move, eat; dress; etc. Visual re-education treatment focuses on the peripheral field of vision.

► Treatment

Prevention

As ARMD has been linked to poor dietary habits, primary prevention is based on a healthy and balanced diet. To this end, a certain number of rules must be considered: Eat fish two to three times each week, eat plenty of fruits and vegetables, exercise regularly, control your body weight, and stop smoking.¹³

Many dietary supplements which are beneficial for the eye are currently available. Consult your ophthalmologist to find out which are best for you. Depending on the severity of your ARMD and without tobacco, you may benefit from daily intake of zinc oxide, copper, vitamin C, vitamin E, or beta-carotene.⁸

Laser treatment

This technique involves the burning of lesions located near the central region of the retina, with the objective of preventing the lesions from reaching the centre of the retina and causing marked vision loss. Laser treatment is generally conducted in a single session and does not necessitate hospitalisation.

Prior to treatment, your ophthalmologist will apply a few eye drops so as to dilate your pupils. After examining the back of your eye with a lens, he uses precise instruments to aim the laser beam at specific points on the retina. During the treatment session, you must keep your eyes still. Laser treatment has no major risks, and is not painful. However, laser beams may leave some marks on the retina which you will perceive as transitory dark spots in your field of vision. One in six patients will see phenomena of light or colour, or even true visual hallucinations.¹⁴

After treatment, regular angiographies must be performed in order to assure that no new vessels remain or have redeveloped.

Photodynamic therapy

In photodynamic therapy, a photosensitizing dye is injected into the bloodstream. When activated by laser light, it creates blood clots that close off abnormal blood vessels. Photodynamic therapy is a treatment for wet AMD in cases where the newly formed blood vessels have reached the centre of macula and thus cannot be treated by laser therapy.¹²

The dye is administered as a perfusion via a syringe linked to a catheter placed in an arm vein. The perfusion is administered over 10 minutes, and the laser is applied 5 minutes after the perfusion's completion. As in the case of traditional laser treatment, the ophthalmologist applies eye drops as a local anaesthetic and places a small contact lens over the eye. Following this, the laser is focused on the entirety of the affected region of your eye.¹⁵

The treatment is not painful and is generally well-tolerated. Following treatment, certain precautions should be observed: the eye should be protected from bright light with tinted glasses, and sunlight should be avoided for at least 48 hours.¹²

As the effect of treatment is transitory, regular clinical and angiographic checkups are necessary to avoid recurrence of lesions.

Traitements anti-angiogéniques

Plusieurs molécules sont actuellement disponibles en France. En inhibant la croissance des néovaisseaux, ces médicaments anti-angiogéniques ou anti-VEGF permettent d'obtenir une stabilisation, voire une régression des lésions. Ils sont administrés par injection à l'intérieur du corps vitré, toutes les 4 à 6 semaines. Cette injection peut être réalisée soit à l'hôpital soit au cabinet médical mais ne nécessite aucune hospitalisation. Afin de dépister des récives éventuelles, un suivi régulier est nécessaire.

Anti-angiogenic therapies

Visual re-education refers to the techniques which aim to maximise usage of the remaining vision. It lasts about 6 months, and is indispensable pursuant the maintenance of patients' autonomy. It requires a very close collaboration between the patient, the ophthalmologist, the orthoptist, and the optician in charge of the optical equipment.

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