

Fact Sheet: Age-related macular degeneration

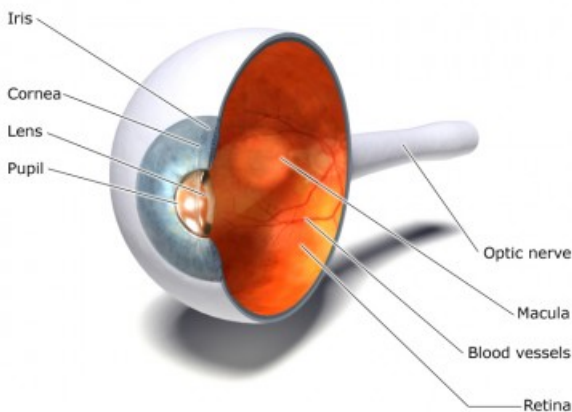


It is a normal part of ageing: with the years, our sight slowly gets weaker. But for some people, it is worse than that and they develop eye disease. One of the problems that can cause vision loss is so-called macular degeneration. In industrialized countries, it is the most common cause of sight loss in older people. There is no cure for this condition, but for some people it is possible to slow down its progress.

How does the eye work?

The eye works a bit like a camera. The pupil helps control how much light gets into the eye. How wide open the pupil is changes in response to light, and is regulated by the iris (the colored part of the eye), which works like the shutter of the camera. The light then reaches the lens, which focuses it onto the retina. There are about 125 million light-sensitive cells in the retina. These cells convert the visual information from our surroundings into nerve signals that the brain can process.

Some of the cells in the retina, called cones, are responsible for seeing colors, and the others, called rods, see black and white. But the rods and cones are not spread equally around the retina. The cones that see color are thickest in the middle of the retina. This is a yellow spot called the macula. It is the part of the eye that helps us see fine details in bright light. What we see with the macula is what we are concentrating most closely on.



What is macular degeneration and what causes it?

There are so many sensory cells packed into such a small space in the macula, that it is no easy task for the body to remove the by-products of metabolism. It is quite common

then for these to build up into little spots called drusen. They are a sign of so-called maculopathy. This condition is not noticeable at first, and does not always lead to problems. People with large drusen do have a higher risk of developing age-related macular degeneration (AMD). If people over the age of 50 have serious problems with vision that are not caused by other diseases, the condition is called AMD.

AMD leads to a loss of the most detailed part of our sight. This part is called our central vision. Precisely those things that we want to look at closely get blurry or distorted. Central vision is important for things like reading, driving and recognizing faces. Objects at the edge of our field of vision generally remain visible, but they cannot be recognized very well.

We do not know exactly what causes AMD. In some families no one ever develops AMD, even as they get much older. If a close relative already has AMD, your own risk is somewhat higher. It is also known that it happens to people who smoke more often and, on average, earlier than to people who don't.

Some researchers suppose that AMD is the result of the very intensive metabolism activity that happens in the sensory cells of the retina. They need a lot of oxygen. Using oxygen, though, results in a lot of so-called free radicals, which gradually do a bit of harm in the tissues. Light encourages this process, too. It is possible that for some people the ability to repair this damage cannot keep up.

This theory has not yet given us any concrete actions that can definitely prevent AMD. One of the common recommendations is to take anti-oxidants, like beta-carotene (a building block of vitamin A) and vitamin E. These vitamins, along with other dietary supplements like zinc, omega-3 fatty acids and ginkgo biloba, are all being tested by researchers to see if they might prevent AMD. But none has yet been proven to definitely work.

What is the difference between 'dry' and 'wet' AMD?

There are two types of AMD. About 8 out of 10 people with AMD have the type called 'dry' AMD. In this form, the light-sensitive cells of the retina are destroyed. Dry AMD is more common than the other form.

The other 2 out of 10 people with the condition have what is called 'wet' AMD. New blood vessels growing

under the retina and lifting it are the cause of wet AMD. For this reason, doctors may also call this condition neovascular AMD. These vessels may leak, allowing blood or fluids to seep into the retina and to damage the cells. In industrialized countries, this is probably the main reason for loss of sight.

What are the treatment options for AMD?

There are no treatments that have been proven to be effective for dry AMD. People with dry AMD are less at risk of losing their sight, though.

There are several treatment options for wet AMD, including

- new drugs that are injected into the eye, such as Lucentis, Macugen and Avastin,
- photodynamic therapy, as laser treatment with medication,
- laser therapy,
- surgical removal of new blood vessels.

You can read more about the new medications in our fact sheet (URL: <http://www.informedhealthonline.org/index.357.en.html>).

Photodynamic therapy is one of the treatments most commonly used for AMD. Sometimes it is used with an additional treatment, for example together with one of the newer drugs. As long as the loss of vision has not gone too far, it can slow progress of the condition for some people. In Germany, the costs of photodynamic therapy for people with wet AMD are covered by health insurance.

Photodynamic therapy is done every 3 or 4 months. A light-sensitive medicine called verteporfin is injected into a vein, where it spreads out through the bloodstream. Then a laser is used to send a microscopic beam of light through the eye's lens. When the light from the laser reaches the medicine in the blood vessels, it reacts to destroy the unwanted blood vessels. The dose needs to be at a level that ensures the retina itself is not damaged.

Using the results of trials on people with wet AMD, it is possible to estimate that 64 out of every 100 people would have a noticeable loss of vision after 2 years without treatment. But for people who had 5 sessions of photodynamic therapy over those 2 years, sight would be worse in 50. In other words: about 14 out of every 100

people benefit from the treatment. But photodynamic therapy cannot repair damage that has already happened in the retina.

The therapy does have adverse effects, though. Verteporfin treatment causes new sight problems in 1 to 5 out of every 100 people. About 2 out of every 100 people have temporary back pain. Important: because sunlight can also activate the medicine in the skin, people need to avoid direct sunlight for several days after treatment. You can read more about research on laser therapy in our research summary (URL: <http://www.informedhealthonline.org/index.355.en.html>).

Laser therapy was one of the early treatment options developed for wet AMD. Today it is not used very often, usually only for cases of a rarer form of AMD called extrafoveal AMD, in which the unwanted blood vessels do not grow directly under the center of the retina.

In laser therapy, abnormal blood vessels are destroyed. Healthy parts of the eye can also be damaged at the same time though. About 15 out of 100 people who have had laser therapy can see better afterwards (15%). But there is also a disadvantage: immediately after treatment vision can temporarily worsen. Because of this, people thinking about getting this treatment should prepare themselves for the situation that their vision gets worse before it gradually gets better. For AMD in the center of the eye, laser therapy would cause too much damage.

There are other forms of laser treatment, but these have not been as well studied as photodynamic therapy.

Other treatment options, including drugs, radiotherapy and implants are in the experimental phase.

What general options to protect our sight are there?

Although they are often recommended, it is not yet known whether or not vitamins can help prevent AMD. The same is true for other specific preventive measures for this condition. Yet there are several general things that help to protect sight.

People with diabetes are at higher risk of eye problems and loss of sight. But so-called diabetic retinopathy is caused by other factors than AMD. In diabetes, the risk of loss of sight can be lowered with good blood glucose control and early treatment of changes in the retina.

Computer screens probably do not harm the eyes. While a long time at the computer and lots of reading might cause eye strain and headaches, it will not damage the functioning of the retina.

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Glossary

beta-carotene

Beta-carotene (or β -carotene) is the colouring that makes some fruit and vegetables yellow or orange (like carrots). It is an early chemical stage of vitamin A, and this is why it is sometimes called pro-vitamin A. The food industry uses beta-carotene as a food colouring agent. It is also an ingredient in many multi-vitamin preparations.

vitamin E

Vitamin E describes a group of 8 different fat-soluble vitamins. They are antioxidants, which mean they protect cells from damage caused by aggressive types of atom or molecule called free radicals. Vitamin E occurs particularly in nuts and cold-pressed plant oils, like sunflower oil. The food industry uses it as a conservative. Because it is not water-soluble, the body only absorbs vitamin E if it comes in fats in the diet.

age-related macular degeneration (AMD)

Age-related macular degeneration (AMD) is the abbreviation for age-related macular degeneration. In industrialized countries, this disease is the most common cause of sight loss in old people. Patients lose their "central vision", which means that they lose precisely the part of the sight that in healthy eyes is responsible for the sharpest and most detailed vision. This loss of vision is caused by a destruction of the central part of the retina, called macula. There are two types of AMD: "Dry" AMD is characterized by small scars and deposits (drusen). "Wet" AMD is caused by new blood vessels growing underneath the retina and lifting it. For this reason, doctors may also call this condition "neovascular AMD". These vessels may leak, allowing blood or fluids to seep into the retina and to damage the cells.

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retina

The retina lines the back of the eye, and the lens projects images onto it. The retina is sensitive to light. It helps us see fine details, contrasts and colours. The retina captures the images focused by the lens and communicates them through nerves to the brain.

macula

The macula lies in the middle of the retina. It is the centre of the visual field. There are sensory cells called rods and cones. Light sensory cells are particularly concentrated in the macula. This makes it responsible for the most detailed part of our vision, and most of the ability to see colours. The messages from the nerves are sent from here to the brain like images.

lens

The lens of the eye lies right behind the pupil. It focuses light onto the retina.

pupil

The pupil is the black round opening in the iris (the coloured part of the eye). The pupil reacts to light. It gets smaller when there is a lot of light, and opens more widely when there is very little light.

drusen

Drusen are deposits of tissue in the retina. They are made of dead cells that are the by-products of metabolism in the eye.

sensory cells

There are more than 120 million sensory cells in the retina of the eye, which convert the light that has entered the eye into nerve signals. There are two kinds of sensory cells: Rods allow black-and-white vision at twilight and at night. Cones allow the detection of color. In the macula, the area of the sharpest vision, the cones are particularly densely packed.

dietary supplement

Dietary supplements (also known as food supplements or nutritional supplements) are concentrated vitamins, minerals, trace elements, fibers and/or other substances that are intended to supplement the diet. Advocates of dietary supplements claim that they have a certain, often preventive or strengthening effect on the body. They are available as capsules, pills, powder or ampules, for example. From a legal point of view, dietary supplements rank among foods and therefore – as opposed to medications – do not need official approval. More information is available on the website of the German Federal Institute for Risk Assessment (Bundesinstitut für Risikobewertung, BfR): [To the BfR website \(in English\)](#)

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