

**Age-related  
Macular-  
Degeneration**

# **Main- taining Good Vision until old Age**



**Information for patients  
and relatives**



**MEINE WELT  
IM BLICK**



## Imprint

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# The human eye

“He kept him as the apple of his eye,” says the Bible (Deuteronomy 32:10). This comparison from the Old Testament symbolises caring for something very valuable like hardly any other proverb or quote.

Even then, people were well aware of how valuable eyesight is and how much we need to protect and care for one of our most important sensory organs.

## The eye: the most important organ

Our eye is an exceptional organ: in a healthy state, it can differentiate between **600,000 shades of colour** and absorbs more than **10 million pieces of information per second** which it passes on to the brain. All that is needed for this remarkable achieve are **around 7.5 grammes** – the same weight as the human eye.

## Essential to the senses

Almost three-quarters of all the information we take in is through the visual system!



## Interesting facts about the eye

### › Eye colour

Only about one-tenth of the world population has blue eyes. The most people with blue eyes live in Scandinavia and the Baltic States. The iris is the part of the eye that determines our eye colour.

### › Eye muscles

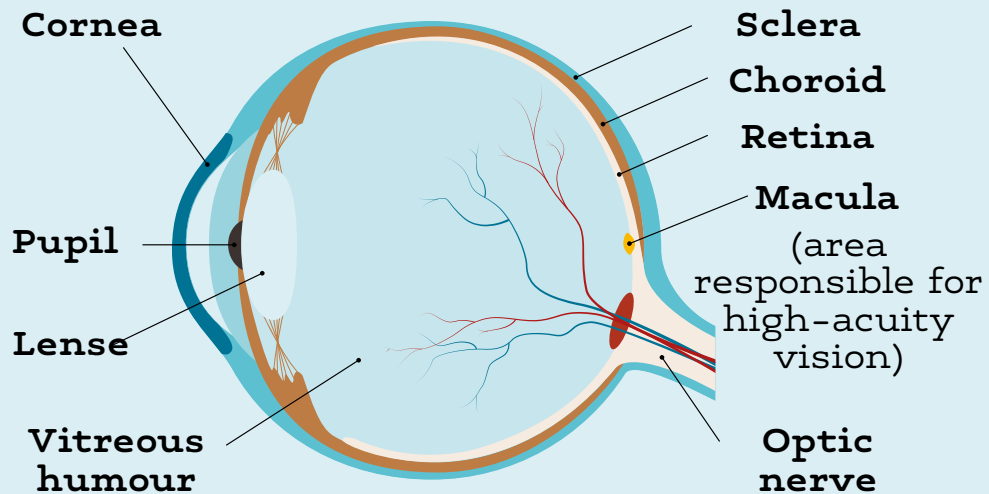
Tedious activities: six different eye muscles control the movement of each of our eyes in the direction we look – several hundred thousand times a day! If one of these muscles is weak or damaged, double vision occurs.





## How the eye works

Our eyes work like a state-of-the-art camera. Whereas a common miniature camera weighs around 100 grammes, less than 10 grammes are enough for our eyes to perform far better technically.



### From the first moment to the final image

When we look at something, for example a house, the light rays bounce off this house and enter the cornea first. Incoming light is focused by the **cornea** and passes through to the iris.

### The iris - an open and shut case

The iris works similar to a camera's aperture: in dark conditions, the transparent centre (pupil) expands, and in bright conditions it contracts. The lens behind the iris regulates near and distant vision and loses its elasticity with increasing age. This is also the cause of presbyopia. After passing through the cornea, pupil and lens, the light ray travels through the vitreous humour to the **retina**, on which the photoreceptors are located and in the centre of the retina, the **area responsible for high-acuity vision** (macula).

### Millions of cells - one image

More than 100 million photoreceptors convert light into nerve impulses that the **optic nerve** transmits to the brain, thus enabling us to see the house we are looking at. The photoreceptors known as **cones** are responsible for colour vision, and the **rods** for perceiving lower and higher intensity light. Roughly 95 per cent of the photoreceptors are located in the macula. Medical professionals call the blind **spot** the point at which the optic nerve leaves the eye.





## Low vision over 50: age-related macular degeneration (AMD)



Retinal diseases can severely impair vision and damage eyesight. Among these is **age-related macular degeneration (AMD)**. With this chronically progressing eye disease, which usually does not appear until the age of 50, retinal damage occurs in the area responsible for high-acuity vision: the macula. This can cause **age-related blindness**.

### Dangers to eyesight

Caused by various factors (see chapter: “What can damage your eyes”), age-related macular degeneration often leads to a deterioration or even loss of central visual acuity if untreated.

Everyday activities such as driving a car, watching television or reading often turn into tedious activities, and the quality of life suffers considerably. AMD is considered the most common cause of severe visual impairment in old age in the western industrial world.



## AMD: facts and figures

Ophthalmologists distinguish two different types of this chronic disease: **wet** and **dry AMD**.

- › There are about **7.5 million people with AMD in Germany**.
- › Approximately **85 per cent** of all people with AMD are affected by the dry type, and 15 percent of those with the disease develop into the aggressive wet type.
- › Typically, the disease only affects one eye, with a **probability that the second eye will also become diseased** within 5 years.



Regular preventive care is thus necessary, as only prompt treatment can maintain vision as best as possible!



# E

## Macular degeneration – what causes it?

It is only a few square millimetres in size and needs plenty of nutrients to do its job: the macula – the area responsible for high-acuity vision. The underlying tissue layer, called **pigment epithelium**, is responsible for getting rid of metabolic waste products. With increasing age, however, this ‘waste collection’ sometimes no longer functions properly, and deposits form in the retina. The consequence: the eye can often only perform its work to a limited extent.



## No risk of total blindness

Yet even if the macula is no longer able to perform its function properly such as colour and sharp vision, recognising details, etc., this central loss of visual acuity does not lead to total blindness. The reason: the disease affects ‘only’ the centre of the retina, therefore the peripheral vision and thus orientation discrimination. For example, people can recognise the dial of a watch but not the hands, or a person’s hair but not their face.





## One disease – two types

Age-related macular degeneration is a slow progressing chronic disease and is not painful. If only one eye is affected, the healthy eye compensates for the loss of vision for a while, which means that those affected often do not notice their condition until much later.

### Dry AMD

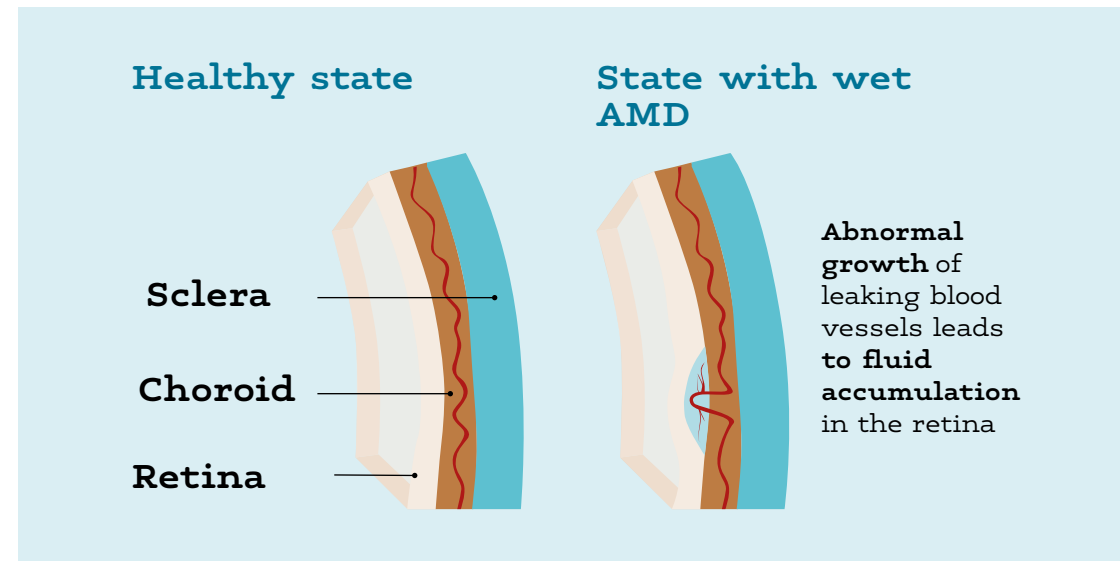
The dry type of age-related macular degeneration progresses quite slowly. Doctors distinguish between an early and a late stage. In the early stages, small yellowish deposits form under the retina (drusen), and the patients notice a slight loss of vision at most. In the late stage, retinal cells die off. As soon as these areas spread to the point of sharpest vision, central vision usually deteriorates significantly.

### Wet AMD

In some patients with dry AMD, the disease pattern develops into much more aggressive and faster progressing type: wet AMD.

### Undesirable growth

In response to the drusen, new sick and less stable blood vessels form under the retina and grow into it. Fluid and blood leak out of the vessel walls, and the centre of the retina swells and/or scars. This process ultimately destroys the sensitive sensory cells of the macula – patients suffer from various visual impairments.



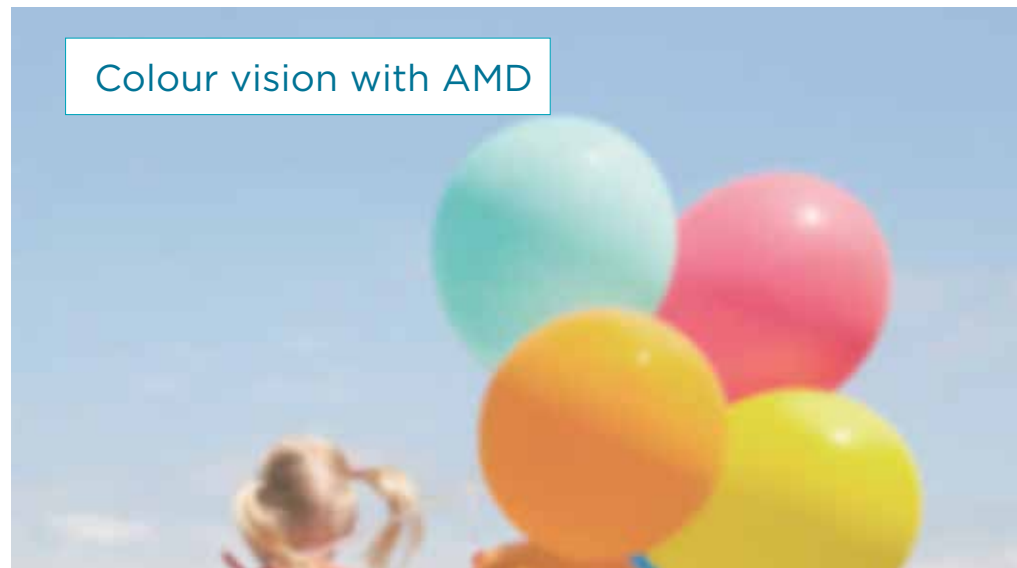


## Limited vision: typical symptoms of AMD

The symptoms caused by age-related macular degeneration depend on the type and stage of the disease. In the beginning stages of AMD, patients feel only minor impairment – if at all. Colours may appear a little paler or when changing from light to dark, it takes a little longer than usual for the eyes to get used to the dark.



Colour vision with AMD



Normal colour vision

## Significant discomfort only in the late stages

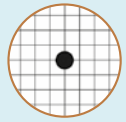
If significant symptoms arise in the further course of the disease, part of the vision has often already been destroyed. This loss can also no longer be completely reversed. Typical AMD symptoms include



- › Increased need for light to see during the day
- › Increased sensitivity to glare (e.g. at night when driving a car)
- › Reduced perception of contrasts (pale, blurred colours)
- › Distorted vision (straight lines appear bent, such as tile joints or picture frames)
- › Reduced central visual acuity (blurred vision, difficulty reading or recognising faces)
- › Grey/dark spot or empty area in the centre of the visual field, blurred view outside this field



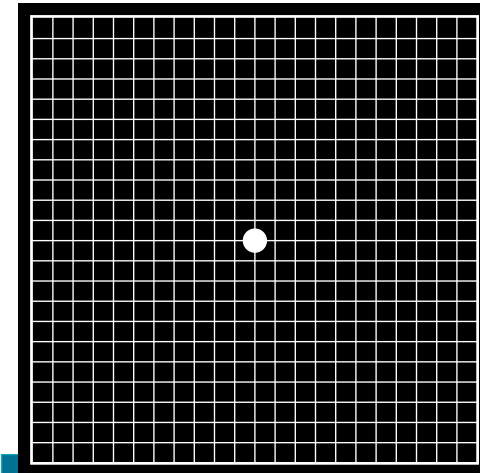
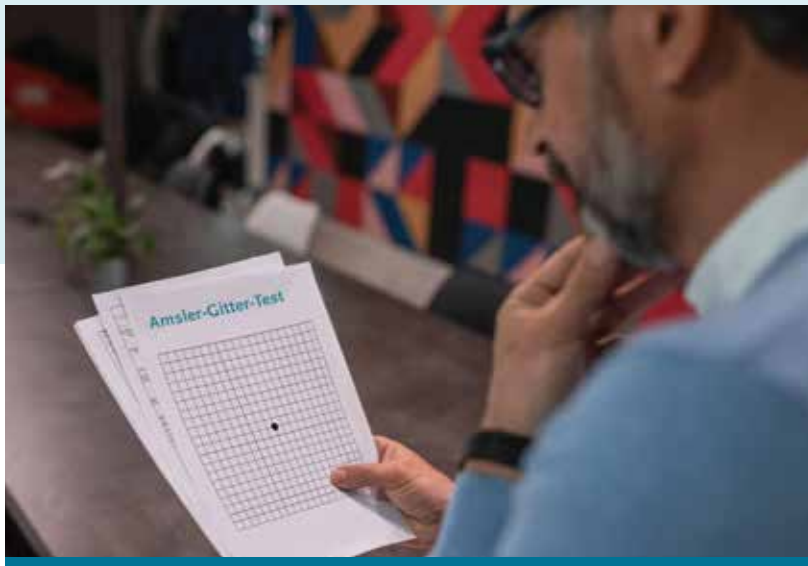
If you experience one or more of these symptoms, you should make an appointment with your ophthalmologist quickly! Because early intervention increases the chances of treatment.



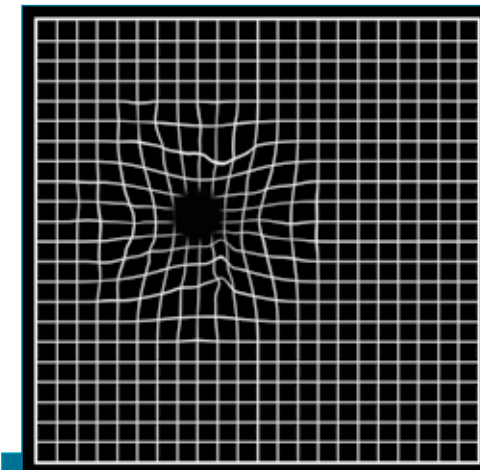
## The Amsler Grid Test

To detect the early signs of age-related macular degeneration, everyone should visit an ophthalmologist once a year from the age of 50 at the latest.

You can check the state of your macula easily by doing the Amsler Grid Test. However, this self-test in no way replaces a regular check-up by your eye doctor.



**Normal vision**



**Dark spot/distorted vision**

The chequered square (Amsler grid) required for the test and a description of the test have been enclosed with this brochure. (Reorders available by phone +49 (0)911 2731 2100)





## What harms your eyes – risk factors for AMD

According to studies, there are apparently different circumstances that can trigger or promote age-related macular degeneration. Experts distinguish between risks that can and cannot be influenced. Although AMD is now a widespread disease, three-quarters of the risk group aged 50+ are not familiar with the illness.

### Risk factors as diagnostic criteria

When diagnosing age-related macular degeneration, ophthalmologists take the patient's medical history and the findings from an exam into account. This is because some risk factors for age-related macular degeneration cannot be influenced – they are simply in the genes or are unchangeable (see box on the right).

The consultation with the doctor is therefore just as important as modern examination techniques. These risk factors, which cannot be influenced, give the doctor important clues about possible onset of AMD.



## Uncontrollable risk factors for AMD

### › Age

Every fourth person over 65 years of age shows signs of AMD. The risk of AMD increases with age.

### › Sex

Women are more likely to suffer from AMD than men.

### › Disposition

AMD in parents or grandparents increase the risk of the disease.

### › Skin and eye colour

Light skin and blue eyes apparently favour AMD.







## Controllable risk factors for AMD

Some possible causes or other risk factors for age-related macular degeneration are in the hands of those affected:

### › **Smoking (active/passive)**

Smoking triples the risk of AMD, and smokers also develop age-related macular degeneration about 10 years earlier than non-smokers.

**TIP:** If you are a smoker, ask your doctor about cessation aids

### › **Obesity and poor nutrition**

Obesity and an unbalanced diet as well as high blood lipid levels apparently increase the risk of AMD according to studies. Poor eating habits also supply the organism with too few nutrients that protect the eyes and open the door to harmful oxygen compounds ('free radicals').

**TIP:** Get professional nutritional advice, eat lots of green vegetables and high-fat sea fish (e.g. salmon)

### › **Sun/UV rays**

Sun and UV rays are not good for the eyes.

**TIP:** Wear quality-tested sunglasses with the CE mark when exposed to bright light

### › **Diabetes and high blood pressure**

High blood sugar and blood pressure levels endanger the retina and thus the vision. Well adjusted levels thus reduce the risk of developing AMD.

**TIP:** Purchase a home blood pressure measuring device



## Give free radicals no chance

As much as we appreciate the sun, it can cause considerable damage – not only to the skin but also to the eyes. The UV rays and the blue light, which is also contained in sunlight, are responsible for causing this harm. The combination of oxygen and these high-energy rays produces free radicals that cause massive damage to the eye.

### Smoking produces free radicals

Not only sunlight but also smoking, high alcohol consumption, poor nutrition, environmental toxins and psychological stress cause an increase in these aggressive oxygen compounds in the body. Scientists describe too much as oxidative stress. Some antioxidant nutrients (e.g. vitamins A, C and E and the trace elements selenium, zinc and copper) help to absorb harmful free radicals.



## Eye protection from the kitchen

Various nutrients unfold their protective effect specifically on the eye and can minimise the risk of AMD and slow down the course of the disease. This includes above all:

### › The carotenoids lutein and zeaxanthin

These plant dyes accumulate in the macula as a natural sun protection factor and radical catcher. Good sources: e.g. corn, egg yolk, grapes, green vegetables

### › Omega-3 fatty acids

These fatty acids (abbreviated DHA and EPA) perform important functions in the retina of the eye. Good sources: e.g. fat sea fish (salmon), walnuts, rape seed oil





## See an ophthalmologist

Prevention pays off: Using various examination methods, the ophthalmologist can detect abnormal changes in the centre of the retina (macula) even before the patient notices any impairment of vision.

Annual check-ups are therefore essential from the age of 50 – for the sake of your eyes! This is the only way to detect and treat chronic eye diseases such as AMD at an early stage.



## AMD: Paths to a reliable diagnosis

Your ophthalmologist has various absolutely painless examination methods at their disposal to diagnose age-related macular degeneration.

### **A first look: eye charts panels and the Amsler Grid Test**

Using eye charts with optotypes (e.g. numbers), the doctor gets a first impression of possible problems with vision. The Amsler Grid Test (see insert sheet) provides early indications of possible AMD.

### **In focus: the ocular fundus**

The doctor examines the retina using a special lamp and a magnifying glass or with an electronic ophthalmoscope. To do so, the pupil is dilated with special drops in order to obtain the largest possible field of vision (risk of glare: please do not drive a car or ride a bicycle afterwards). Your doctor uses optical coherence tomography (OCT) to detect fluid and thickening of the retina. In fluorescein angiography, a dye is injected into a vein in the arm to produce precise images of the retinal vessels.



## Treatment options for age-related macular degeneration

Whereas only a few years ago, chronic AMD resulted in severe vision loss or even blindness for most patients, today at least wet AMD can be stopped or delayed thanks to various therapeutic approaches. The different treatment options are listed below.

### Injections

Virtually painless injections into the vitreous body of the eye ('eye injections') under local anaesthetic – for example with **VEGF inhibitors** – are also a suitable method in the late stages of wet AMD. Treatment with VEGF inhibitors involves different injection regimens according to which the injections are administered. The first three injections are performed at equal intervals for all schemes. Your ophthalmologist decides which scheme is suitable for you based on your personal clinical picture.



### Painless and safe: There is nothing to fear with an eye injection!

Granted: The thought of getting an injection in the eye is unpleasant at first. But don't worry! Thanks to local anaesthesia with special eye drops, you will notice almost nothing – the procedure, which has been established for more than ten years, is considered almost painless and safe. The injections are performed exclusively by specially trained and regularly instructed ophthalmologists in a sterile surgical area of their practice or clinic.





## How VEGF inhibitors work

The abbreviation VEGF refers to a growth factor (vascular endothelial growth factor) that promotes the formation of new, unwanted blood vessels in the eye as well as vascular permeability and thus accumulation of fluid (oedema). Patients with age-related macular degeneration have increased VEGF levels. VEGF inhibitors block this growth factor and reduce the risk of unwanted blood vessels and oedemas from developing in the eye.

Some of the damage that has already occurred can even be reversed with these substances: pathological vascular growth and the accumulation of fluid can be reduced through treatment, and in an ideal case scenario, vision can even be improved!

In concrete figures, this means: treatment with a VEGF inhibitor stabilises visual acuity in nine out of ten patients with wet AMD to the current level and even improves vision in four out of ten patients!

## Classic laser therapy (hot laser)

With classic laser therapy, the warm beam of light burns the newly formed leaking blood vessels in the eye caused by wet AMD, however it can damage the macula. That is why this treatment is not used directly for the centre of the sharpest vision but only if the peripheral vision is affected. However, this occurs very rarely in the case of AMD – laser treatment is thus rarely indicated.

## Photodynamic therapy (cold laser)

In PDT, which is now rarely used, the physician works with cold laser light after injecting an active substance into a vein in the arm that makes the diseased vessels in the eye sensitive to the beam of light. This can cause the leaking blood vessels to close by forming a clot.

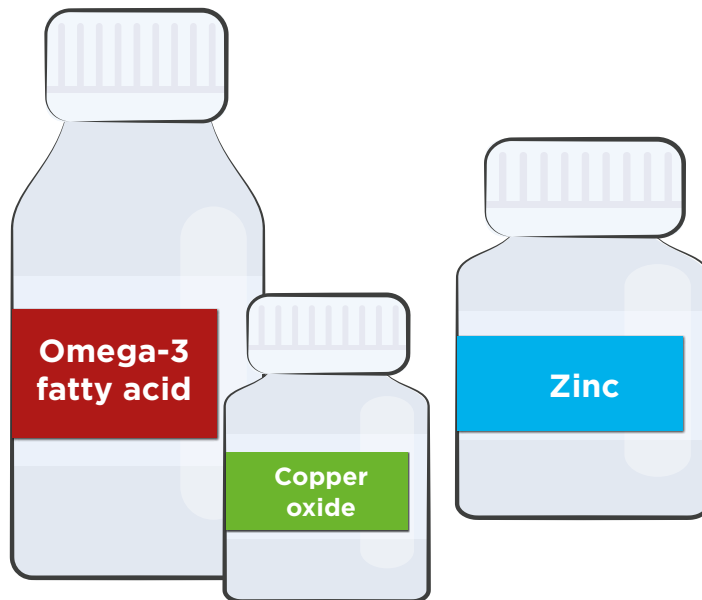




## Do not lose sight of the quality of life

### Nutrient mix for the eyes

There is currently no effective treatment available for dry AMD. However, studies from the USA show therapeutic success with a high-dose nutrient combination of antioxidative vitamins, zinc and copper oxide. There is also increasing evidence that taking lutein or omega-3 fatty acids can have a beneficial effect on dry AMD. Talk to your ophthalmologist about whether such a therapy is suitable for you.



Age-related macular degeneration can be a heavy burden on the daily life of AMD patients. Most importantly, the fact that the patient is no longer able to read properly and thus loses their independence, mobility and the ability to find their way around is a major challenge. Treatment methods such as injections with VEGF inhibitors can reduce these effects in many patients or prevent them from worsening, thus relieving not only the patients but also their relatives.

### Take advantage of rehabilitation offers

In severe cases, special rehabilitation measures can help AMD patients to cope better with daily life. In rehabilitation they learn, among other things, how to use special reading aids, with which reading ability can be significantly improved in many cases. Also recommended: social care and counselling services (e.g. with PRO RETINA, see address on the following page) and dialogue with other AMD patients in self-help groups.



## Helpful addresses and websites

### › **Deutscher Blinden- und Sehbehindertenverband e.V. (DBSV)**

Rungestraße 19, 10179 Berlin, Germany

Telephone: +49 (0)30 285 387-0

Email: [info@dbsv.de](mailto:info@dbsv.de)

Internet: [www.dbsv.org](http://www.dbsv.org)

### › **Blickpunkt Auge – Rat und Hilfe bei Sehverlust**

Internet: [www.blickpunkt-auge.de/kontakt.html](http://www.blickpunkt-auge.de/kontakt.html)

### › **PRO RETINA Deutschland e.V.**

Kaiserstraße 1 c, 53113 Bonn, Germany

Office:

Mon–Thur 8.00 a.m.–4.00 p.m.,

Fri 8.00 a.m.–2.00 p.m.

Telephone: +49 (0)228 227 217-0

Email: [info@pro-retina.de](mailto:info@pro-retina.de)

Internet: [www.pro-retina.de](http://www.pro-retina.de)

### › **Stiftung Auge**

Geschäftsstelle der Deutschen

Ophthalmologischen Gesellschaft e.V.

Platenstr. 1, 80336 Munich, Germany

### › **Internet**

[www.amdalliance.org](http://www.amdalliance.org)

[www.augeninfo.de](http://www.augeninfo.de)

[www.bewahren-sie-ihr-auge Licht.de](http://www.bewahren-sie-ihr-auge Licht.de)

[www.ratgeber-makula.de](http://www.ratgeber-makula.de)



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