



FAMILY

Age-related changes in vision

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Quick Facts...

In older adults, the four most common vision-threatening diseases/conditions are cataracts, glaucoma, macular degeneration, and diabetic retinopathy.

Cataracts are the primary cause of poor vision among adults, and one of the leading causes of blindness.

The term *glaucoma* is used to refer to several conditions that are caused by the build-up of pressure in the eye.

Age-related macular degeneration (AMD) is caused by damage to or breakdown of the macula (an area 3/16 of an inch in diameter), in the retina. It causes loss of central or "straight-ahead" vision.



Introduction

Although there are some important differences, the eye functions much like a camera. Light enters through a primary lens called the cornea and then through a secondary lens called the "lens." The cornea and the lens are needed for vision. Between these two lenses is a diaphragm called the iris (similar to the diaphragm on a camera made of overlapping metal leaves that can be adjusted to let more or less light pass through the opening).

The iris is the colored part of the eye and the opening it makes is called the pupil (like the aperture on a camera). Just as the light in a camera passes through a dark air-filled chamber, the light in our eye passes through a fluid-filled chamber, known as the posterior (rear) chamber.

The fluid is called the vitreous ("glassy") because it is gelatin-like. Instead of film, our eyes use the retina, which is a network of thousands of nerve endings (rods and cones) packed tightly together. The light on the retina produces complex chemical reactions that stimulate nerve endings. These stimulations travel along the optic nerve to the brain where they are seen as visual images.

Normal Age-Related Changes in the Eye

The main parts of the eye are the cornea, iris, lens, vitreous, retina and optic nerve. The normal process of aging can produce changes in these parts of the eye that affect vision. For example, when we are young, the lens of the eye is soft and flexible and accommodates the visual demands to change shape in order to maintain a clear focus of visual images on the retina. As we grow older, the lens loses flexibility. Often, by the time a person is 40, the lens may harden and set. No matter how hard the muscles operating the shape of the lens strain, they cannot change

Changes in the structure of the eye result in common age-related change in vision:

- Decrease in sharpness of vision (visual acuity),
- Decrease in ability to focus on near objects,
- Decrease in the ability to focus on objects at varying distances (visual accommodation),
- Decrease in the ability to discriminate or discern between certain color intensities, especially in the blue-green end of the color spectrum (note: the “yellowing” of the lens with age makes blues and greens appear “washed out” or faded),
- Decrease in the ability to perceive or judge depth,
- Decrease in the ability to focus in low light levels,
- Slow responsiveness to changes in light levels (dark to light, and light to dark),
- Increase in sensitivity to glare,
- Decrease in ability to accurately judge distances, and
- Increase in the light needed to see objects clearly.

its shape. At this point, the eye becomes like a fixed focus camera: fine for distance, but not much good for close-up work. The condition wherein the lens loses elasticity and flexibility as a result of aging is known as *presbyopia*.

Normal Changes vs. Diseases and Conditions

As we get older, we can expect to experience the normal changes described on the left. Generally, these are focusing problems called *refractive errors*. The most common refractive errors (near- or far-sightedness) occur when our eyes change shape or the lenses lose elasticity. When this happens, an ophthalmologist or optometrist can usually correct vision by prescribing glasses or contact lenses.

However, there are some eye diseases and conditions that, while they are not part of normal aging, are serious and become more so with age. In older adults, the four most common vision-threatening diseases and conditions are cataracts, glaucoma, macular degeneration, and diabetic retinopathy.

Cataracts: Symptoms and Treatment

Cataracts are the primary cause of poor vision among adults, and one of the leading causes of blindness. At 60, the probability of having cataracts is about 66 percent, and at 90 percent at 70.

The word cataract comes from the Latin word for waterfall. If you imagine trying to look at objects as if you were standing behind a waterfall, you can get some idea of what it’s like to see the world when suffering from cataracts. Perhaps a more practical means of simulating a cataract is to look through a piece of plastic kitchen wrap, and then contrast this by looking through a piece waxed paper. The view through the waxed paper is similar to vision impaired by cataracts.

A cataract is formed by a change in the lens of the eye itself; not a film over the eye as is often thought. The lens is the structure behind the pupil that helps focus images on the retina. In a healthy eye, the lens is clear and transparent, and light can pass through normally. In the case of cataracts, certain parts of the lens become cloudy or opaque, and hinders the passage of light.

Symptoms. Although a cataract may occasionally be caused by an illness, such as diabetes, more commonly the development of a cataract is a function of age due to

How to Help The Visually-Impaired

1. Use color contrast
2. Use coding schemes
3. Control glare
4. Encourage regular eye examinations
5. Increase light levels
6. Use balanced lighting instead of increased light intensity from a single source
7. Give the person time to respond
8. Provide materials with larger print
9. Announce your presence
10. Tell what you are going to do
11. Simplify the visual field
12. Keep objects in the same place
13. Talk directly to the person
14. Orient the person in unfamiliar environments
15. Offer assistance
16. Use the person's remaining senses
17. Know how to be a sighted guide
18. Obtain low vision aids for the person to use

chemical changes in the lens of the eye. The occurrence of a cataract is indicated by one or more of the following symptoms: hazy, fuzzy, or blurred vision; frequent changes in prescription lenses; film over the eyes that doesn't disappear when you blink; changes in the color of the normally black pupil; and lights that appear double or dazzling.

Cataracts usually develop gradually, without pain, redness, or tearing. How seriously a cataract will affect vision depends on its location, density and size.

Treatment. Studies indicate that 95 percent of all men and women develop some degree of cataracts between 65 and the end of their lives. This statistic does not mean that all people will require cataract surgery. If and when a cataract is discovered, the key question is "How much is the cataract affecting my lifestyle?" A cloudy lens can be removed and full vision restored with an intraocular lens at any stage, but most doctors agree that surgery should not be performed at the first sign of a cataract. Surgical treatment is considered when cataracts begin to affect lifestyle and functioning.

Cataract surgery is performed on more than a million patients annually and has become one of the most successful surgical procedures. In most cataract surgery, the eye with the cataract is anesthetized, and an ophthalmologist surgeon removes the natural lens and provides a substitute (artificial) lens to focus light on the retina.

The implanting of intraocular artificial lenses (the third option) accounts for 90 percent of all cataract surgery cases. Implants are safe and effective replacements for natural lenses.

Usually the surgery is done on an outpatient basis, no hospital stay, little discomfort, and disruption of routine. Shortly after surgery, most people are sent home (driven by a friend or family member) wearing a protective patch over the eye. Usually the patch is removed the next morning after the surgery. At that time, vision may be excellent, or it may take a few days to clear. Except for swimming and lifting heavy objects, there are no ordinary activities that a person cannot resume after the first day subsequent to surgery. (Note: A myth believed by many people is that surgeons use lasers to treat cataracts. While this may be possible in the future, all primary cataract surgery is currently performed by making a tiny incision in the cornea

People with low vision need to take advantage of low-vision aids such as special lenses or magnifiers, large print, or television reading machines.

FREE Literature

The Lighthouse, The National Center for Vision and Aging, (800) 334-5497 or (212) 355-2200, 111 East 59th Street, New York, NY 10022.

American Foundation for the Blind, Program Services, (212) 620-2063, 15 West 16th Street, New York, NY 10011.

National Library Service for the Blind and Physically Handicapped, (202) 707-5100. Library of Congress, Wash. DC 20542.

National Eye Institute, (301) 496-5248, Scientific Reporting Section, Bdg. 31, Room 6A32, Bethesda, MD 20892.

National Society to Prevent Blindness, (312) 843-2020, 500 E. Remington Road, Schamburg, IL 60173.

and inserting an ultrasonic probe to break the cataract into an emulsion, which is subsequently vacuumed out of the eye.)

Glaucoma: Symptoms and Treatment

The eye is also a biological plumbing system that circulates fluid from the back chamber to the area around the lens and the pupil. In the healthy eye, this fluid is constantly being formed and drained away, and a normal pressure maintained within the eye.

In the case of glaucoma, the drainage channels in the eye become blocked. When fluid cannot drain normally, pressure in the eye builds. The term *glaucoma* is used to refer to several conditions that are caused by the build-up of pressure in the eye. If left unchecked, this pressure can damage the optic nerve and cause a loss of vision.

Properly speaking, glaucoma is not an eye disease, but rather an age-linked condition affecting the eye. Nearly 3 million people in the U.S. have glaucoma, which is a leading cause of blindness. Although anyone can get glaucoma, those at risk include people with a family history of glaucoma or diabetes, African Americans over 40, and everyone over 60.

Symptoms. Common symptoms and signs of advanced glaucoma include one or more of the following: blurred vision, sensitivity to glare, difficulty in adjusting to changes in light levels, pain or redness in the eye (absence of pain DOES NOT indicate glaucoma, which makes it particularly important to have regular checkups after 35), the appearance of colored rings, “halos”, around light sources, tunnel vision (loss of peripheral or side vision).

Treatment. There are currently two forms of treatment: medication and surgery. The primary method is medication: eye drops, pills, ointment or some combination of these. Some of these medications slow down the eye’s production of fluid; others help fluid drain more rapidly.

Some surgical treatments use the laser wherein a tiny beam of light is focused on a spot in the eye. People see only a bright flash of light and feel faint tingling. The laser beam passes harmlessly through the outer eye and cuts only where it is focused. Other

In terms of surgical treatment of glaucoma, considerable advances have occurred in recent years. The specific type of surgery will depend on the type of glaucoma (i.e. the nature of the structural problem causing the build-up of pressure).

Eye Care Tips

- Exercise and eat right. Have regular check-ups to monitor high blood pressure and diabetes.
- Schedule a complete eye exam every few years, even if you haven't noticed any vision problems. Have more frequent eye exams if you have diabetes or a family history of eye disease.
- See an eye doctor right away if you notice blurred or distorted vision (even with prescription lenses), unusually tired or painful eyes, an unusual amount of discharge from your eyes, double vision, red or swollen eyelids, dry or burning or itching eyes, or an increase in the number of threadlike particles that normally float across your eyes.

surgical treatments involve microsurgery (surgery performed with a microscope). Unlike laser treatment, microsurgery must be done in a hospital or surgery center, and requires recuperation time.

Macular Degeneration: Symptoms and Treatment

Age-related macular degeneration (AMD) is caused by damage to or breakdown of the macula, an area 3/16 of an inch in diameter, in the retina. It causes loss of central or "straight-ahead" vision. Sometimes only one eye is affected. Macular degeneration does not progress to total blindness, and peripheral vision is not affected.

There are two types of AMD. The most common is "dry" AMD, in which tiny yellow deposits from beneath the macula and light-sensitive cells in the macula break down. Vision is typically blurred or distorted.

The second type is "wet" AMD, caused by the growth of abnormal blood vessels under that macula that may leak fluid or blood into surrounding cells. Wet AMD distorts vision in more pronounced ways: straight lines may look wavy, or there may be blank spots in the field of vision.

Symptoms. Four general conditions are symptomatic of macular degeneration: dark, empty, or blurred space appears in the center of vision; parts of words on a page appear blurred, or appear to disappear; objects with straight lines appear bent or wavy.

Treatment. Only a professional eye care specialist can tell whether an individual has dry or wet AMD. Individuals whose sight is threatened by wet AMD can be helped by a treatment called *laser photocoagulation*. In this treatment, powerful light rays focus on a tiny spot on the macula, destroying abnormal blood vessels. This treatment works best in the early stages of wet AMD and does not seem to help those with dry AMD, or people whose eyes have already been badly damaged by AMD.

Eye-care Professionals:

Ophthalmologists specialize in the diagnosis and treatment of eye diseases, vision problems, and perform eye surgery.

Optometrists screen for vision problems and prescribe glasses or contact lenses. Referrals made to ophthalmologists for diagnosis of suspected eye diseases and medical treatment or surgery

Opticians fit/adjust eye wear prescribed by ophthalmologists and optometrists.

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Diabetic Retinopathy: Symptoms and Treatment

Diabetic retinopathy, one of the possible complications of diabetes, occurs when small blood vessels within the retina weaken. In the early stages, blood vessels may leak fluid and blur the central field of vision. In later stages, new blood vessels may grow on the retina and optic nerve and release blood into the center of the eye, resulting in serious loss of vision. The retina may also become detached from the back of the eye. If untreated, blindness can occur.

Symptoms. Some people with diabetic retinopathy notice changes in their vision, but there are usually no discernible changes in the early stages. Instead, diabetics need to rely on trained eye care professionals to detect signs of the disease.

Treatment. Laser photocoagulation may lower the risk of losing vision. Powerful beams of light are focused on the diseased retina to seal the leaking of blood vessels. Laser treatment may not be appropriate for everybody. Discuss the risks and benefits with an ophthalmologist.

Dry Eye Syndrome: Symptoms and Treatment

In the eye, tears are produced in the lacrimal gland, wash across the cornea of the eye, and drain into the nose through tiny ducts on the inner corner of the eye. With age, some people's eyes don't produce enough tears, resulting in a condition known as *keratoconjunctivitis* or dry eyes.

Many older adults opt to live in drier climates to help maintain their active lifestyles. One drawback of these dry environments is that fans and air-conditioning can negatively affect the "lacrimal" (tear) system in the eyes.

Treatment. People who experience dry eye syndrome should consult an eye specialist. In some cases, medication may solve the problem. In severe cases, eye specialists can insert a tiny implant, or plug, into a person's tear ducts. In effect, this dams the normal drainage system between the eye and the nose, keeping the eye bathed in normal tears.

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