

## **EYE DISEASES and Aging**

As we get older, changes may affect our vision, making some activities such as reading more difficult, but many changes do not necessarily lead to significant loss of vision or blindness. However, more significant vision loss does become more common with age. Vision loss results in decreased quality of life, increased healthcare costs, and increased risks of household accidents, falls, and car crashes.

Visual loss is medically defined as visual acuity (visual ‘sharpness’) less than 20/40. This ‘20/40’ vision means that a person sees things at 20 feet away that other people without vision loss can see at 40 feet away. Visual loss increases rapidly with age, with 20%—30% of people affected after age 74.

Blindness is legally defined as visual acuity of 20/200 or less. About 2% of the population 75 years old and older is legally blind. Those aged 65 and older make up 12% of the total population, but 50% of the blind population. Age-related eye changes, cataracts, macular degeneration, eye disease caused by diabetes, and glaucoma are the most common causes of blindness.

People 65 years old and older should have a comprehensive eye examination every 1—2 years. Treatment, management, and prevention can effectively change the course of various conditions that result in visual loss, and avoid blindness in about one-third of all new cases.

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## **Types of Vision Problems**

The eye operates much like a television camera. The visual image enters the eye through the cornea, which is the clear outer surface of the eye. It then passes through the pupil and the lens, which focuses the image. The image then passes through a clear liquid (the vitreous) to reach the retina, which forms the back of the eye. The cells in the retina record the image and send it through the optic nerve to the brain, which interprets the image and results in vision.

We all lose some of our visual acuity over time. As we age, the eyeball changes shape, the lens darkens, and the eye muscles weaken. Many older adults become either nearsighted or farsighted, and need to wear glasses. Losing the ability to focus on objects that are near is most common. Our pupils also become smaller, letting in less light, and we become more sensitive to glare.

Contact lenses and laser refractive surgery can correct some of these problems. It is helpful to wear a hat with a brim when going outside in the sun and to give your eyes time to adapt when moving from a brightly lit area to a dark area (or vice versa).

There are four major eye diseases that cause serious visual impairment in older adults:

- Cataracts
- Macular degeneration
- Glaucoma
- Diabetic eye disease

### *Cataracts*

Approximately one in five older adults has a cataract. A cataract develops when the lens becomes cloudy or opaque (less transparent or see-through) and blurs the image coming into the eye. This clouding is thought to be caused by a variety of age-related changes

in the lens. For example, a yellow-brown pigment caused by protein builds up in the lens over time.

Risk factors for developing cataracts:

- age (most important)
- diabetes
- exposure to ultraviolet sunlight
- smoking
- alcohol use
- decreased vitamin intake
- long-term corticosteroid use

Symptoms differ from person to person, but people with cataracts generally lose vision gradually in one or both eyes. Early on, the location of the cataract may influence the type of vision loss. For example, one cataract may affect the ability to see things far away (particularly at night or in bright daylight), while another may have a greater effect on seeing things close up. Months to years later, when the cataract is fully developed, the entire range of vision can be affected. People with cataracts are particularly sensitive to glare.

*Treatment:*

Most cataracts are treated by surgical removal. Cataract surgery improves vision, mental outlook, ability to function, and quality of life. Cataract surgery generally takes less than 15 minutes under local or topical (applied directly on the eye) anesthesia. In this surgery, sound waves are used to break down the affected lens and suck it out through a small incision. An artificial lens is then put in place. Most people can have their cataracts removed and a new lens inserted in the same procedure, on an outpatient basis.

In about 15% of people, another area of the eye, called the posterior capsule, becomes cloudy within 3 years after cataract surgery. Fortunately, this complication can be treated easily without surgery, using a special laser technique known as a capsulotomy.

Cataracts may be managed without surgeries if they are mild and do not greatly affect vision or quality of life. In this case, eyeglasses, contact lenses, and other aids for low vision can be used. Steps should also be taken to prevent or slow down the cataracts from progressing, including controlling blood sugar in people with diabetes and wearing sunglasses to protect the eyes against ultraviolet light.

### *Macular degeneration*

Macular degeneration is the leading cause of permanent loss of central vision in older adults. Central vision (as opposed to peripheral or side vision) is needed to read, watch television, recognize faces, drive a car, etc. Central vision is maintained by the macula, which is a small, central area of the retina. The retina is the layer of cells, nerves, and blood vessels at the back of the eye that sends the visual images to the brain via the optic nerve.

In macular degeneration, the pigmented tissues in the retina change, and a yellowish material is deposited within the layers of the retina near the macula. Other changes in the eye may include loss of the cells that recognize the visual image as well as formation of new blood vessels. These new vessels may leak or bleed, and the hemorrhage that accumulates could possibly separate the layers of the retina. This is called retinal detachment. The blood also stimulates the formation of scar tissue, which can replace tissues in the retina that are needed for sight.

Risk factors for macular degeneration:

- age (most important)
- genetics
- fair skin
- smoking
- high blood pressure

Macular degeneration is often classified into dry or wet forms. The dry form accounts for about 80—90% of all cases, and it causes loss of some central vision. A person with the dry form sees a dark fuzzy spot in the middle of the visual field, but usually still has good

peripheral vision. Only about 10% of affected people fit the definition of legal blindness (ie, 20/200 vision).

The wet form of macular degeneration is much more likely to cause severe visual loss or central visual blindness. New blood vessels form and fluid accumulates, eventually causing the retina to detach. Older adults have a high risk of complications and visual loss from retinal detachment.

Indications that a problem has developed in a person who has macular degeneration include sudden or recent loss of central vision, blurred vision, distorted vision, or a new blind spot. Older adults who develop sudden visual loss or distortion should be evaluated as soon as possible.

*Treatment:* Unfortunately, no specific medical treatment for dry macular degeneration is widely accepted. However, research suggests that oral vitamin supplements that contain high levels of beta-carotene (25,000 IU), vitamin E (400 IU), vitamin C (500 mg), and zinc (80 mg) may slow the progression of visual loss.

People who smoke should not take this vitamin therapy because of the higher risk of lung cancer in smokers who take beta-carotene supplements. Medical management of dry macular degeneration also includes using aids for low vision, such as magnifying lenses and adequate lighting. People with the dry macular degeneration should have periodic eye examinations by an ophthalmologist.

In some people with macular degeneration and new blood vessel growth, lasers are used to burn the new vessels to try and stop their development. However, laser treatment usually only postpones visual loss, rather than preventing it. Laser therapy helps the most when the edges of the abnormal area are clear and distinct, and do not enter the area of the macula associated with the clearest vision.

Complications of laser treatment include decreased vision and laser injury to areas next to and beyond the treatment area.

Another treatment called ‘photodynamic therapy’ uses special dyes that are activated by light. This treatment may help some people for whom laser treatment would destroy part of the macula. It is a possible alternative for delaying visual loss in people who have wet macular degeneration.

New therapies under investigation include injecting drugs directly into the eye to prevent new blood vessels from forming. Early results have been promising, especially when injections are used together with photodynamic therapy.

### *Glaucoma*

Glaucoma is the second most common cause of blindness worldwide. Glaucoma is caused by increased fluid pressure within the eye, which damages the optic nerve. Untreated, it can lead to total blindness. Your health care provider will measure the pressure in your eyes, and also look for signs of damage to the optic nerve (eg, ‘cupping’) and defects in the visual field.

The most common form of glaucoma among older adults is ‘open-angle’ glaucoma. Normally, fluid travels to the front of the eye where it is reabsorbed by a network of vessels within the ‘angle’ between the iris and the cornea. In open-angle glaucoma, this network gets clogged, so that fluid drains through the angle more slowly. Over time, the pressure within the eye builds up and causes damage to the optic nerve. People with open-angle glaucoma have no symptoms and may lose a substantial amount of vision before making an appointment with an ophthalmologist. This highlights the importance of regular ophthalmologic checkups for older adults. Adults 50 years old and older should be screened for glaucoma every 1—2 years. Older adults with a family history of glaucoma, or have other risk factors may need to be screened more often.

‘Closed-angle’ glaucoma is a rarer but much more serious form of glaucoma. In closed-angle glaucoma, the angle between the iris and the cornea is suddenly blocked (usually from the iris ‘bowing out’). This completely blocks the flow of fluid, and the pressure in the eye

increases rapidly. Loss of vision is sudden. Pain may be severe, leading to headaches, nausea, and vomiting. Closed-angle glaucoma is a serious medical emergency.

*Treatment:* In open-angle glaucoma, treatment is not usually needed if high pressure in the eye is the only sign, unless the pressure is very high. Treatment is usually started only if there is evidence of damage to the eye (eg, changes in the optic nerve). Initial treatment is usually eye drops either to increase the drainage of fluid or to decrease the production of fluid. Oral medications are also available (eg, beta-blockers and carbonic anhydrase inhibitors), but they must be used carefully in older adults, because they can cause confusion, drowsiness, poor appetite, numbness in the hands and feet, and kidney stones.

Closed-angle glaucoma requires emergency treatment to reduce the eye pressure. Medical therapy may be tried first, but if it does not relieve the pressure enough, surgery will be required. Laser surgery can help remove blockages from the angle and increase fluid drainage. Pressure can also be immediately reduced by surgeries that open a new passage for fluid drainage by shunting the fluid outside the eye.

### *Diabetic eye disease*

The medical term for eye disease caused by diabetes is ‘diabetic retinopathy.’ Defects in the small blood vessels and sometimes new blood vessel formation lead to bleeding within the eye, accumulation of fluid around the macula, and possibly retinal detachment.

Diabetic retinopathy is most common among people who have had diabetes for a long time or whose diabetes is poorly controlled. After 10 years, 70% of people with type 2 diabetes have some form of retinopathy. Other factors that may increase the risk of diabetic retinopathy include poor kidney function, high cholesterol, and high blood pressure.

*Treatment:* Proper diet, exercise, and blood sugar management are important in preventing diabetic retinopathy. Controlling cholesterol, blood pressure, and other risk factors may also be helpful. All people with diabetes should have an eye examination every year. People with early signs of retinopathy should be checked even more frequently.

#### *Other causes of blindness*

Although much less common, other causes of blindness include reduced blood flow to or inflammation of the optic nerve, inflammation involving the certain blood vessels in the head, and brain tumors.

### **Other Disorders of the Eye**

Several other eye disorders that are common in older adults do not usually directly cause vision loss.

#### *Benign conditions*

Eyes can become reddened from inflammation of the eyelids caused by facial oils or eyelash dandruff. Treatment includes keeping the eyelids clean by gentle scrubbing with a nontearing baby shampoo twice daily and possibly using antibiotic eye drops. Less commonly, a viral infection can cause inflammation of the eyelids, leading to a clear mucus discharge from the eye and the eyelids "matting" together, especially in the morning. Treatment includes warm compresses and keeping the area clean to limit spread of the infection to the other eye (or to contact lenses).

Problems with eyelid shape are common problem among older adults. As we age, the skin around the eyelids relaxes and the facial muscles weaken. This can lead to the edges of the eyelids 'turning in' toward the cornea, which can become irritated by the eyelashes. This is called 'entropion.' In another condition called 'ectropion' the eyelids sag, causing a loss of tears and the tissue at the base of the eye to dry out. Both of these conditions can be corrected by surgery.

Tears have several important functions, including keeping the cornea moist and lubricated, and clearing debris from the eye. Tears are also



involved in immune protection. With age, tear production decreases, so that older adults are prone to develop ‘dry-eye syndrome,’ medically known as keratitis sicca. A number of underlying diseases, especially those related to rheumatoid arthritis, can affect the tear system and lead to dry eyes. Dry eye syndrome is characterized by redness, tearing, and the feeling that something is in the eye. Management includes replacing our natural tears with artificial tears, using eye drops during the day and an ointment at bedtime.

However, some people are sensitive to the preservatives used in artificial tears, which leads to more irritation. In severe cases, surgery can be done to prevent tears from flowing out of the eye. Allergic inflammation of the eyes is common in both younger and older adults. Affected people should avoid known triggers (eg, pet dander). Management of allergic inflammation includes oral or topical antihistamines or decongestants, and topical steroids. However, these treatments can have side effects.

#### *More serious conditions*

More serious eye conditions include corneal scrapes and ulcers. To make a diagnosis, your ophthalmologist will use a fluorescent dye that ‘stains’ into the ulcer, but not the normal cornea. He or she may also want to perform a corneal scraping to determine whether there is any infection.

Shingles (ie, herpes zoster) is a common problem among older adults, and it can affect the eyes. Shingles is a painful reactivation of the chickenpox virus, which can remain dormant or inactive in the body for many years. The virus can form painful ulcers on the cornea. Treatment may include antiviral eye drops, oral antiviral drugs, and other medications to help with the pain and inflammation.

### **Aids for Low Vision**

Despite the advancements in treatment of vision problems, many older adults may still have some visual loss. Adequate lighting is important to improving vision in older adults who have some vision loss. Glare can be avoided by using sunglasses, visors, etc. People

with low vision can often adapt with proper training. For example, people with macular degeneration can learn to use their peripheral vision more effectively.

Visual aids are most commonly needed for reading. More and more reading material is becoming available in bold, large type. Many people use 'high-plus' reading glasses and hand-held or stand magnifiers. Magnifying glasses usually allow a broad field of vision, but looking at objects close up requires that they be held fairly near the eye. Closed-circuit television is also helpful.

Small telescopic devices to magnify items at distances can be hand-held for spot viewing or mounted on glasses for continuous viewing. Although telescopes can magnify images that are further away, they can cause distortion and create a 'tunnel-vision' effect (only seeing things in the middle of a scene and nothing to either side).

Talking aids can eliminate some of the problems caused by visual loss. These include talking books or talking computers (eg, used at stoplights).

Braille is especially helpful for those who have completely lost vision.