



PRESBYOPIA

**near
vision
difficulties**

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Presbyopia (Greek for "old eye") occurs when the natural lens of the eye becomes less flexible or pliable. Specifically, the natural lens becomes stiffer or more rigid and the muscles that control the lens become relatively weaker, hindering the lens's ability to thicken and flatten in order to focus light on the retina. As a result, the eye has difficulty focusing on objects up close.

Refractive Errors

Nearsightedness (Myopia):

Occurs when the eyeball is relatively long, or the cornea is irregularly shaped so that the light entering the eye focuses in front of the retina, rather than directly on the retina. You will know you are nearsighted if you can see well up close, but distant objects are fuzzy.

LASIK, PRK and other refractive procedures correct nearsightedness by reshaping the cornea so that the focal point shifts onto the retina. Patients who are suffering from presbyopia have sought Presbyopia surgery - a form of laser vision correction - that leaves them with a low degree of nearsightedness in both eyes.

Farsightedness (Hyperopia):

Occurs when the eyeball is relatively short, or the cornea is irregularly shaped so that the light entering the eye focuses behind the retina, instead of directly on the retina. Patients that are farsighted have trouble seeing objects up close and must often squint to see them clearly.

Astigmatism:

The most common of all eye disorders, astigmatism is when the eyeball is shaped more like a football than a basketball, which is its natural shape. This odd shape causes the light to focus on two points of the retina, rather than one.

Astigmatism is often accompanied by either nearsightedness or farsightedness. LASIK laser eye surgery will treat astigmatism with one of the other conditions simultaneously.

Presbyopia:

Presbyopia occurs when the lens of the eye becomes less flexible. Specifically, the lens becomes stiffer and the muscles that control the lens become weaker, hindering its ability to bend and flatten in order to focus

light on the retina. As a result, the eye has difficulty focusing on objects up close.

Monovision surgery and surgery that leaves the patient with a low degree of myopia in both eyes are two types of refractive surgery to treat presbyopia.

What Is It?

Presbyopia is the progressive inability of the lens of the eye to respond and change its shape so as to focus clearly on near objects. No one knows exactly what causes the lens to become inflexible, **but it happens to everyone as a natural part of aging.**

In order for us to see images clearly, light rays enter the eye, where the lens bends and focuses the rays on the retina. The lens changes shape to accommodate the differences in light coming from objects at different distances. Beginning early in life — perhaps as early as age 10 — our lenses gradually stiffen and lose the ability to change shape. By the time we reach our 40s, the stiffness has progressed to the point that light rays from close objects cannot be focused properly, and we begin to experience blurred vision when we try to do tasks that require up-close focus, such as reading or needlework. The lens continues to harden / stiffen until about age 65, when almost all elasticity has been lost.

Presbyopia eventually affects everyone, even people who are already farsighted (hyperopic) or nearsighted (myopic). Because people who are farsighted already have difficulty focusing on near objects, they may experience presbyopia a earlier than their 40s. People who are nearsighted may find that their distance vision improves slightly, and may experience presbyopia a few years later in life.

Causes of Presbyopia

Presbyopia is part of the natural process of aging. The content of the natural lens gradually loses its elasticity and becomes progressively less pliable compared with the lens of a baby. The loss of pliability progresses gradually and patients will begin to notice changes in their vision beginning in their early to mid-forties.

Risk Factors

In addition to age, there are several other risk factors for presbyopia:

- Hyperopia - this puts additional demand on the flexibility of the lens, when the natural focus is so far away
- Occupation - this is a risk factor if a job requires near vision demands, e.g. beauticians, technicians, etc.
- Gender - presbyopia often occurs earlier in females
- Ocular Disease or Trauma - damage to the lens or ciliary muscles can accelerate the progression of presbyopia
- Systemic Disease - diseases such as diabetes or multiple sclerosis put patients at an increased risk for presbyopia due to the loss of function in the ciliary muscle, which controls the focusing power of the eye
- Drugs - drugs such as alcohol, anti-depressants, and antihistamines can decrease the flexibility of the lens
- Geographic Factors - due to higher annual temperatures and greater exposure to ultraviolet radiation, patients living close to the equator are at an increased risk for presbyopia

Symptoms and Signs

First Sign of Presbyopia

A common first sign of presbyopia is difficulty with reading fine print, such as that found on a medicine bottle or in a phone book, or even shopping labels.

Near vision also deteriorates in low light conditions such as restaurants, making choices on the menu even more of a challenge!
Another sign of presbyopia is fatigue while reading a book or looking at a computer screen.
The

Symptoms of Presbyopia

Presbyopia causes the following symptoms:

- Difficulty seeing clearly up close
- Words appear blurred at a previously comfortable reading distance
- Less contrast when reading print
- Needing to hold reading material or other objects farther away from your eyes to gain clarity or see details
- Needing brighter and more direct light for reading and to see clearly — Bright light constricts the pupils, which changes / improves the focus of the light on the retina.
- Difficulty reading late at night, or when you are tired or stressed
- Eye discomfort, fatigue or drowsiness when doing close work because of the strain of eye muscles working to change the lens shape.
- Possible headaches as a result of muscle tension or fatigue when doing work that requires near vision

Diagnosis

Many people over age 40 self-diagnose presbyopia based on their inability to read clearly at a distance that used to be natural and comfortable. Because the condition comes on gradually over many years, most people don't notice small vision changes and delay seeking professional help until the focusing problems interfere with daily life.

For many persons the change happens within days or from the one week to the next and can be very distressing.

Many optometrists joke that patients seek help only when their arms become "too short", unable to hold printed pages far enough away to see clearly.

Presbyopia can be diagnosed by an optometrist, ophthalmologist or physician, who will take a complete medical history to determine the extent of your vision problem. He or she will test your vision by having you read text at a distance that is typically comfortable to you.

If the doctor or optometrist diagnoses presbyopia, he or she will do a test to determine the extent of the focusing problem and the appropriate corrective lens prescription. In this test, the doctor has you look through different corrective lenses as per your needs, and continues to increase the magnification power until the words on the page are clear to you and you are comfortable reading.

Expected Duration

Presbyopia cannot be reversed and gets worse as we get older. Vision changes stop around age 65-70.

Prevention

Nothing can be done to prevent presbyopia. It is an inevitable part of aging. However, people who do a lot of close visual work, such as working with a computer or intensive reading, may develop presbyopia earlier than others. If you do close work, take a 10-minute break every one to two hours to relieve strain on the eyes. Allow your eyes to focus on objects at a middle or long distance away to give your eyes a rest from close focusing. Be sure to use bright lighting when reading to help your eyes focus.

Presbyopia Treatment

Although there is no cure for presbyopia, there are several treatment options that work to improve patients' near vision. These include: eyeglasses, contact lenses, and several forms of refractive surgery.

Eyeglasses

Glasses are the simplest way to regain your ability to see close objects clearly.

There are four types of eyeglasses that can be worn to correct for presbyopia: reading, bifocal, trifocal, and progressive addition lenses.

Reading glasses, also known as half-glasses or granny glasses are used for patients who only have problems with presbyopia. These glasses only correct for near vision. If you don't already wear corrective lenses or you wear contact lenses, you may choose to wear reading glasses only when necessary to magnify up-close objects.

The strength of simple reading glasses is categorized in increments of +0.25. Glasses with +0.50 have a minimal amount of correction — only two steps. Standard lenses are available up to +6.00 (24 steps of reading correction), but typically range from +1.00 (four steps) to +2.50 (10 steps).

Your vision care professional can tell you what amount of correction is best for your eyes.

Standard inexpensive reading glasses are available in most drugstores, supermarkets and office supply stores. They are rated on the same vision correction scale, so if you know the amount of correction you need, you can purchase the right pair for you. If you don't know how much correction you need, test the glasses in the store by trying to read text at a comfortable distance using different magnification strengths. The one that allows you to read most clearly is the right power for you.

Standard, off-the-rack reading glasses may not be right for everyone, though.

Many people need different amounts of correction in each eye, and therefore require custom glasses. Also, custom glasses usually are made of better materials and are shaped to allow your eyes to focus properly across the full range of the lens.

The distance between the centers of the pupils differ from one person to the next, being wider or narrower, or just average. The standard off-the-rack readers might have wider or narrower pupil distances than what you need.

Bifocal eyeglasses combine two points of focus: near and distance. The bottom half of the glasses is used to add the near vision correction, while the top half is used to correct the pre-existing refractive errors such as myopia, hyperopia and astigmatism.

If you already wear corrective lenses for nearsightedness or farsightedness you may need either two sets of glasses — one for distance vision and one for up-close vision — or glasses with **bifocal lenses**, in which the upper portion of the glass corrects for distance and the lower portion for near vision.

Trifocal eyeglasses are used to help the wearer with three points of focus: near, intermediate, and distance. An intermediate point of focus would be something approximately one arm's distance from the body, such as a computer monitor or the dashboard of a car.

Progressive Addition Lenses is another option, which changes focus gradually from the upper to the lower portion of the lens. Progressive addition lenses (PALs) use a series of focus points to correct for presbyopia. These lenses correct for a wide range of distances and studies have shown that they are often preferable over bifocal and trifocal eyeglasses.

Your optometrist or vision care professional can measure and order the appropriate prescriptions for you.

Contact Lenses

Contact lenses also can be used to treat presbyopia, although many people find it difficult to adjust to them.

There are two types of contact lenses that can be worn to correct for presbyopia: bifocal and monovision.

Bifocal contact lenses can be made, or you may opt for **monovision lenses**, in which one eye has a contact lens with a prescription for distance vision, and the other eye has a contact lens for up-close vision. Bifocal contact lenses work in much the same way as bifocal eyeglasses. The bottom portion of the contact lens corrects for near vision, while the

top portion corrects for other refractive errors. Specially manufactured lenses keep the contacts from rotating on the eye.

Monovision contact lenses use one contact to correct for near vision and the other contact to correct for distance vision. Monovision works by training the brain to use one eye for distance vision and the other eye for near vision. It usually takes some time for patients to adjust to monovision contact lenses, but a lot of patients adapt very quickly.

Because presbyopia continues to get worse as we age, the right magnification lenses needed may change over time.

As your natural lenses increase in rigidity, your need for stronger corrections do increase with the years, and you will typically need to update your reading correction every 12-18 or 18-24 months.

Refractive Surgery

There are several types of refractive surgery used to treat presbyopia: monovision surgery and surgery that leaves the patient with a low degree of myopia in both eyes.

“Pseudo-Accommodative Cornea” – a style of LASIK surgery - became available recently, which reshapes the cornea, enabling it to focus both for far and near.

Monovision surgery corrects one eye for distance vision and the other eye for near vision.

LASIK Vision Correction Surgery can be adjusted for Presbyopic patients to achieve monovision. (I am an example myself)

Another type of monovision surgery, laser thermal keratoplasty (**LTK**), uses a different type of laser to reshape the cornea.

Yet another surgery option leaves the patient with a low degree of myopia in both eyes. This allows them to focus relatively well for near vision tasks as may be needed in an office environment, for instance. However, it is likely that the patient will need eyeglasses for distance and reading glasses for some detailed near vision.

Unlike correction with contact lenses, monovision surgery is not reversible. As a result, patients are often encouraged to try monovision

contact lenses before having surgery to see if their eyes can adjust to the correction.

Presbyopia: Other Surgical Procedures Under Study / investigation

Although there is no cure for presbyopia, there are three new procedures currently under study that may reverse the effects of presbyopia:

- Surgical Reversal of Presbyopia (SRP)
- Anterior Ciliary Sclerotomy (ACS)
- OptiVision Laser Surgery

Surgical Reversal of Presbyopia (SRP)

Surgical Reversal of Presbyopia (SRP) was developed by Presby Corp. It involves the use of a device known as a scleral expansion band (SEB) implanted in the white portion of the eye (sclera). This band increases the distance between the lens and sclera, allowing the muscles between them to bend and flatten the lens as necessary. Clinical trials are currently being conducted across the U.S. A main concern is the longevity of the effect.

There are several expected benefits to this surgery:

- Long-term vision correction - SRP is expected to benefit the patient for a number of years.
- Low risk - SRP is performed on the sclera, an area that is rarely associated with complications.
- Minimally invasive - SRP can be performed on an outpatient basis under local anesthesia with a surgery time of 30 minutes per eye.
- Reversible - unlike laser surgery, this procedure is expected to be fully reversible - the implants should be removable at any time.
- Reduction of intraocular pressure - preliminary studies have indicated that the surgery reduces intraocular pressure in patients with primary open angle glaucoma and ocular hypertension

Anterior Ciliary Sclerotomy (ACS)

Anterior Ciliary Sclerotomy (ACS) is an experimental procedure that is used to reduce the effects of presbyopia. A series of eight or more radial incisions are made in the sclera of the eye, allowing it to expand and giving the eye more room to bend and flatten the lens as necessary. ACS does not restore all near vision and it is not a cure for presbyopia, but it does offer some improvement in focusing ability. The FDA considers the procedure investigational, but approval is not necessary since the FDA approves surgical devices and drugs, not surgical procedures. It is not widely used as an option yet.

OptiVision Presbyopia Surgery

OptiVision presbyopia surgery involves the use of a laser to correct vision. The eye surgeon ablates tissue on the white portion of the eyes, expanding the sclera and giving the lens more flexibility. OptiVision is currently undergoing clinical trials in Canada and other parts of the world and in the U.S. SurgiLight, the maker of the laser system, hopes to begin FDA clinical trials in the near future.

When To Call A Professional

Although there is no harm in delaying treatment for presbyopia, optometrists recommend seeing a professional whenever you have blurred vision because this can indicate other vision or health problems.

For example, cataracts also can cause blurred vision, and diabetes, multiple sclerosis, vascular disease and other diseases can affect vision.

*** If your vision suddenly blurs, or if you have eye pain or double vision, see black spots or light flashes or have other visual problems, see your doctor immediately.

Prognosis of Presbyopia

The condition will persist, get worse, then stabilize in the mid to late 60's.

With proper corrective glasses or contact lenses, you'll still be able to read and do other close work as well as ever, provided no other conditions exist which may reduce your vision..

This information is intended to provide a brief overview of presbyopia. Contact an Ophthalmologist or eye care professional for information specific to your own situation.

Additional Information

How the Eyes Work

The eye can be likened to a camera. As light passes through the cornea and lens it is bent and transposed / focused onto the eye's film - the retina. The film is then 'developed' by the brain, becoming the image that we see and interpret.

As light enters the eye it first passes through the cornea - the clear 'window' to the eye. Because the cornea is curved, the light rays bend (refract). Light then passes through the pupil to the lens. The iris - the colored portion of the eye - controls the amount of light that enters the eye with muscles that cause the pupil to contract if there is too much light or to dilate if there is too little light. When light hits the curved surface of the lens it is refracted, or bent even more, so that it focuses properly on the retina. The retina then turns the light into electrical energy, which passes through the optic nerve to the brain stem, and into the occipital lobe where it is converted into an image. To summarize:

- Cornea - clear surface of the eye. Light rays refract as they pass through to the pupil.
- Iris - colored portion of the eye. The iris controls the amount of light that passes through the pupil.

- Pupil - an open space in the center of the iris. Light passes through the pupil to the lens.
- Lens - refracts light to focus it properly on the retina.
- Retina - converts light rays into electrical energy. This electrical energy is passed to the optic nerve.
- Optic Nerve - serves as a pathway to the brain stem, which forwards electrical energy to the occipital lobe.
- Occipital Lobe - electrical energy is converted into an image.

This process works perfectly in people with 20/20 vision. Imperfect vision occurs when the shape of the eye is irregular or when the eyeball length is above or below average, so that the light rays do not focus directly on the retina - these imperfections are collectively known as refractive errors.

Presbyopia Links

American Academy of Ophthalmology

<http://www.aaopt.org>

National Eye Institute

<http://www.nei.nih.gov/>

Journal of Refractive Surgery

<http://www.slackinc.com/eye/jrs/vol151/bauer.htm>

Nova Southeastern University

<http://www.nova.edu/hpd/otm/otm-c/presbyopia.html>

American Society of Cataract & Refractive Surgery

<http://www.ascrs.org>

Medem Medical Library (provides patient info for AAO.org)

<http://www.medem.com/>

If you do not have an eye health care provider and have medical concerns regarding your eyes or your family's eyes, please feel free to enquire and schedule an appointment with Dr Grim.



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