

UNDERSTANDING CATARACTS...



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Introduction

Because cataracts are so common, and because cataract surgery is my specialty, I have written this booklet for patients to answer commonly asked questions about cataracts. Although each individual's condition may differ, advances in cataract surgery continue to benefit more patients than ever before.

I hope that this information will help you to better understand your situation, and to view it with less apprehension.



What is a cataract?

A cataract is a clouding of the normally transparent lens within the eye. It is not a growth or a film that can be peeled off. Located inside the eye, cataracts cannot be seen without a special microscope. Thus, they do not change the appearance of the eye; they do not cause discomfort. Changes may be so gradual that you are not aware of a cataract's effect at first.

Cataracts are the most common cause of blurred vision over the age of 50. Although there is no medicine or diet to cure cataracts, surgical removal of the cataract and replacement with a permanent artificial lens implant can restore lost vision.



How does the eye work?

The eye functions very much like a camera. Light enters through the cornea - the clear front "window" of the eye. In order to reach the back of the eye, it passes through the pupil, which is the hole in the iris. The color of our eyes (blue, brown, hazel) is really the color of the iris seen through the transparent cornea.

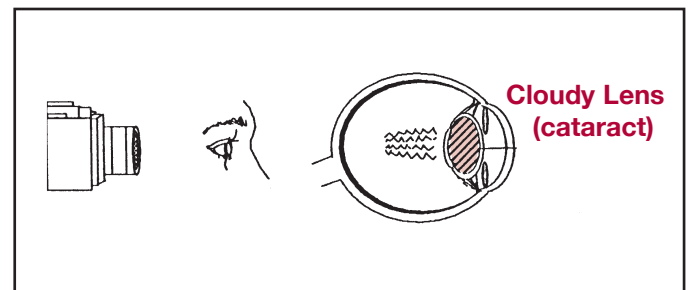
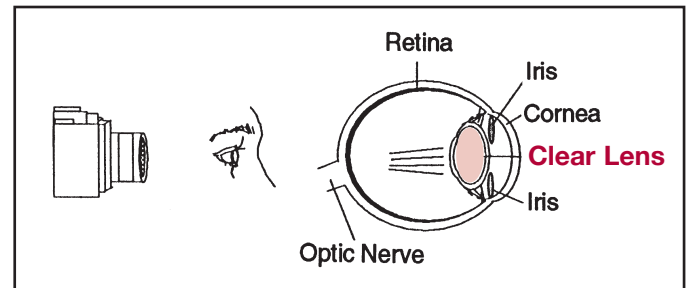
Immediately behind the pupil is the natural lens of the eye. Just as a camera lens focuses light onto film at the back of the camera, the human lens focuses light onto the retina, the thin layer of tissue lining the back of the eye. Like camera film, the retina forms the "picture" which is then relayed to the brain along the optic nerve.



Normal eye



Simulated advanced cataract





What causes blurred vision?

Just as fingerprints on a camera lens cause blurred pictures regardless of our efforts to focus, a cloudy lens within the eye causes blurred vision. When the human lens becomes cloudy or hazy enough to interfere with vision, it is called a cataract. Changing glasses (focus) will not help the blur that is caused by a cataract.

Just as defective film will spoil photographs, a weak retina (as in a condition called **macular degeneration**) will cause blurred vision in eyes despite a clear lens and proper focus (glasses). Good vision always requires (1) optimal focus - usually with glasses, (2) a clear lens, and (3) a healthy retina.



What are the symptoms?

Cataracts cause visual symptoms only; they do not cause pain, discomfort, tearing, or redness. The visual symptoms can vary. Blurriness, hazy vision, or increased glare from sunlight and headlights may be present. Some cataracts turn yellow, causing fading of color. Reading may take more effort, and you may tire prematurely. Vision progressively worsens over a period of years or sometimes after only a few months.



What causes cataracts?

Some cataracts are caused by birth defects, injuries, diabetes, or prolonged use of certain medications, such as steroids. Highly nearsighted patients may develop cataracts at a young age. However, most cataracts result simply from the natural aging process of the human lens. Like gray hair, cataracts are not a disease, nor do they occur at the same age or rate in everyone.



When should cataracts be removed?

The decision to have cataracts removed is elective. Because cataracts do not harm other parts of the eye, nothing needs to be done if you are not significantly bothered by symptoms. However, as activities such as driving and reading become increasingly affected by cataracts, surgery becomes a logical option to consider.

With the success of the modern implant, waiting for cataracts to “ripen” is no longer necessary. Since cataracts will not improve and will eventually worsen, there is no advantage in delaying treatment if vision is sufficiently affected and the prognosis of surgery is good. You are never “too old” to have cataract surgery, just as you are never “too old” to enjoy better vision.



What is a “lens implant”?

To take the place of the clouded human lens, a tiny, delicately engineered artificial lens is implanted into the eye. The modern intraocular lens “**implant**” does not change the appearance or sensation of the eye. The implant is permanent. Unlike a contact lens, it cannot fall out and does not require cleaning.

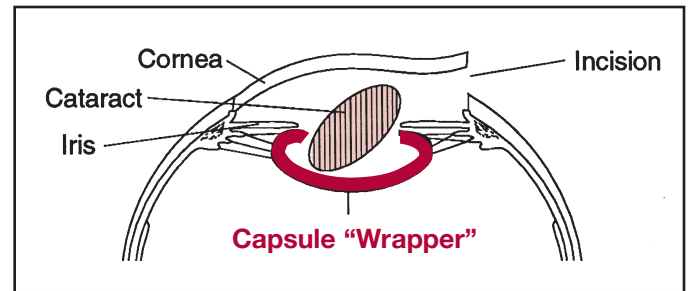
The “prescription” or power of each patient’s implant is selected based on computer calculations that use a series of precise eye measurements performed in the office prior to surgery. The distance between the front of the eye and the retina can be measured precisely using precise optical methods. This painless test is called biometry.

Recently, newer implant designs that can decrease your dependence upon glasses have become very popular. However, they are not appropriate for all individuals, and the additional cost is not covered by insurance.

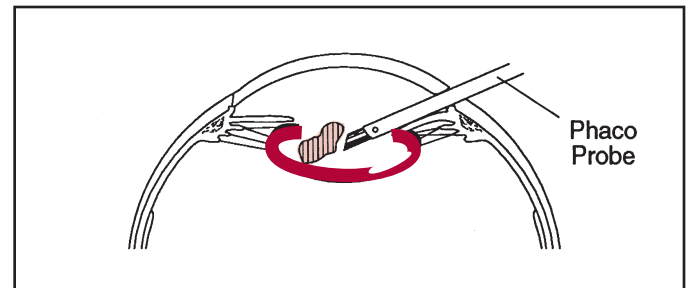


How is surgery performed?

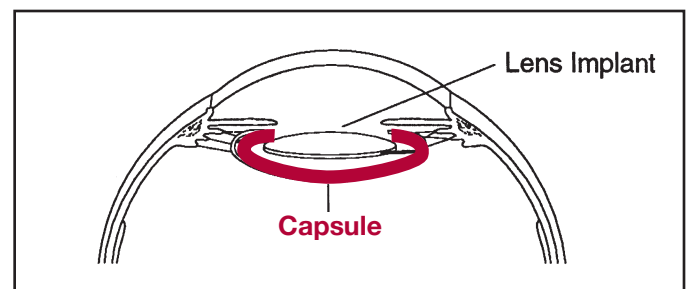
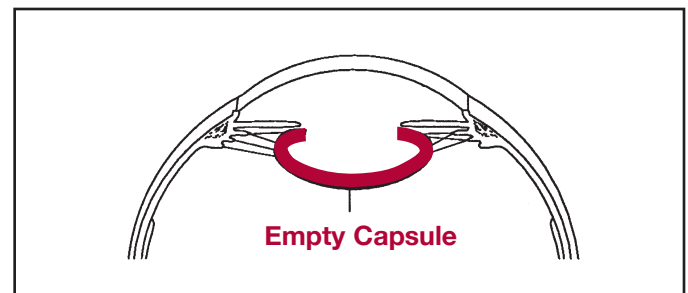
Cataract surgery is microsurgery; it utilizes an operating microscope and is performed inside the eye through an incision. One can think of the human lens as having a thin, transparent “wrapper” which holds the lens in the center of the eye. This delicate, cellophane-like skin is called the lens “capsule.” A hole is made in the front of this wrapper, and the cloudy lens is removed in several delicate stages, leaving behind an empty clear capsule. The implant is then inserted into this empty wrapper, occupying the original place of the natural lens.



Conventional method (large incision)



Fragmentation method (small incision)



What is “small incision” cataract surgery?

Removing the solid core of the cataract as a single piece requires a large incision with multiple sutures. Physical activities must be limited to avoid straining the large incision, which takes several months to stabilize. Since 1983, Dr. Chang has routinely performed the more advanced technique of “small incision surgery” using specialized technology called **phacoemulsification**.

The firm cataract core is fragmented into small particles that can be gently sucked out through a tiny three mm incision (1/8 inch). Modern foldable lens implants can fit through incisions this small, and sutures are usually not required. Physical activities are not restricted after small incision surgery, and the vision stabilizes faster than with the conventional large incision method.



Conventional large incision closed with 8 or 9 sutures. (See stitches above iris).



Incision is much smaller when inserting a foldable intraocular lens following phacoemulsification. (Incision is placed on side).

What are the risks of cataract surgery?

There is some risk with any surgical procedure. For each patient, I carefully weigh the risk/benefit ratio by imagining what I would do if I were in your place. Fortunately, in experienced hands, severe complications that could worsen the vision are rare. The chances of eyelid, cornea, retina, and ocular pressure problems may depend on individual circumstances, but all may occur even without surgery - i.e. with aging alone. With modern advances in technique, more than 98% of patients with otherwise healthy eyes will gain significant visual improvement following surgery.

What is the experience of surgery like?

Your outpatient surgery will be performed at the Peninsula Eye Surgery Center, 1128 W. El Camino Real, in Mountain View, CA, (650) 964-3200. This was the first surgery center from San Francisco to San Jose to specialize in eye surgery only, and performs one of the highest volumes of cataract surgery in Northern California.

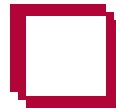
Dr. Chang was among the first in the Bay Area to employ topical or “needle-free” anesthesia for cataract surgery. The eye is numbed by anesthetic drops, rather than the conventional shot of Novocaine. Thanks to light sedation, you will feel calm and relaxed, but awake. Since your lids are gently held open, you will see light, but not the operation itself. This most advanced method eliminates sutures, anesthetic injections, eye bandages, and postoperative restrictions for most patients. Since the surgery takes less than 30 minutes, even patients in poor health can successfully undergo cataract surgery.



What is the recovery like following surgery?

You will receive detailed written instructions on care after the operation. An eye bandage is not necessary when topical anesthesia is used. The eye surface may feel scratchy at first. With small incision surgery, you may resume everyday activities and physical exercise as soon as you like.

As with any surgery, the healing period will vary with each individual. Use of the eye is not harmful, but the vision is normally blurry at first. Your eyeglass prescription will be different after surgery and will be changed approximately one month later.



In conclusion

Helping patients regain vision they have lost is one of my most gratifying experiences. Thanks to the many advances in ocular microsurgery, we can safely restore excellent vision to most people with cataracts. Nearly 3 million Americans enjoy the benefits of renewed sight through cataract surgery annually. I hope this material has been both interesting and reassuring to you. If you should have any further questions please ask us.



FAQ about artificial lens implants

Does the artificial lens replace the need for sunglasses?

Sunglasses provide two benefits. Dark tinting reduces brightness, and a transparent UV coating blocks out the invisible, but harmful, ultraviolet rays of the sun. Because all modern artificial lens implants contain this UV coating, they provide ultraviolet protection at all times. However, since implants are not darkly tinted, patients may still choose to wear sunglasses for comfort, just as they did before their cataract surgery.

Can the lens implant be removed and replaced?

Yes, but the need to remove the lens implant is very unusual.

If I previously had LASIK, R.K., or other refractive surgery, can I still have a lens implant?

Yes. However, prior refractive surgery significantly impairs the accuracy of corneal measurements, making it very difficult to estimate the optimum implant power. A new technology called wavefront aberrometry can improve the results by utilizing measurements taken in the operating room after the cataract is removed.

Does cataract surgery mean that I won't need glasses anymore?

Not exactly. While we are young, our internal eye muscles change the shape of the natural human lens to move our focus from far to near, and back. This natural focusing ability present in young eyes is called **accommodation**. Due to a loss of lens flexibility with age, we all lose this ability to automatically change focus by the time we reach our mid-forties. This re-focusing function must be replaced with reading glasses, bifocals, or trifocals.

Conventional artificial lens implants are single-focus or "**monofocal**" lenses. Like the older human lens, they cannot change focus from far distance to near. Following cataract surgery, although many activities may be fine without glasses, patients are able to choose from the same options available to everyone else over the age of 50 – contact lenses, bifocals, or separate driving or reading spectacles - to optimize their focus at different distances.

There are newer artificial lens implants that can reduce (but not eliminate) your dependence on eyeglasses. **Multifocal** lens implants are designed to produce a dual focus - part of the lens is set for distance focus and part of the lens is set for near. Therefore, compared to a monofocal lens implant set for distance focus,

a multifocal should improve your ability to see up close without glasses. The advantages of multifocal lenses may be lost, however, if there is too much astigmatism or if there are other eye problems. The option of a toric monofocal lens implant to reduce astigmatism is discussed below.

Can these special lens implants eliminate my glasses altogether?

This is unlikely. Most people with multifocal lenses still find it easier to read with glasses under certain conditions. However, compared to conventional monofocal lenses, multifocal lens implants generally provide the convenience of reading many things (e.g. your mail, price tags, handouts, menus, and a wristwatch or cell phone) without having to put on reading glasses. With reading glasses on, you should see equally well with all of these lens implants.

Using any of these special lens implants does not change the surgery or recovery rate. Like conventional lenses, the multifocal and toric implants are foldable lenses that are implanted through a small incision and are equally safe.

What about the cost?

Health insurance, such as Medicare, covers the costs of cataract surgery with a conventional monofocal lens implant. Not surprisingly, the multifocal or toric lens implant procedure is more expensive, and the additional costs must be paid out-of-pocket by the patient. Remember that the benefits of these more advanced lens implants are to reduce the inconvenience of having to wear eyeglasses as frequently. They are not “medically necessary” because they have nothing to do with improving your eye health.

Reducing the need to wear glasses is not a priority for everyone and may therefore not be worth the added expense. All artificial lenses should provide equally good vision with glasses following cataract surgery. The difference is in what you can see when you aren't wearing glasses.

You may also need eyeglasses to correct or optimize your far distance vision following cataract surgery. The artificial lens comes in more than 60 different powers. Since there is no

opportunity for trial and error in selecting the lens implant for your eye, “perfect” distance focus is not usually achieved with surgery. Astigmatism is another reason that distance glasses may be needed at times. Fortunately, eyeglasses can be used to optimize distance focus just as they do for anyone whose eyes are not in perfect focus naturally.

Can Astigmatism be reduced with cataract surgery?

Like nearsightedness, *astigmatism* describes a common type of blur in healthy eyes that is corrected by wearing eyeglasses. It results from an inherited, imperfect optical shape of the cornea, the clear front window of the eye. If the shape of your cornea is more oblong (like the back of a spoon) instead of spherical, then it will mis-focus details when corrective eyeglasses are not worn.

Although it has nothing to do with cataracts, astigmatism can be reduced or possibly eliminated at the same time that cataract surgery is done. The **astigmatic keratotomy** technique places tiny superficial incisions that do not enter the eye, but reduce the undesirable oblong shape of the cornea. Another popular option is a modification to the artificial lens implant that is permanently implanted in every cataract operation. This so-called **toric lens implant** incorporates the astigmatism correction that otherwise would have to be worn in prescription eyeglasses.

Both of these astigmatism-reducing techniques allow appropriate patients to see better when they are not wearing eyeglasses, and any eyeglasses worn will be less strong as a result. They are perfectly safe and do not require the cataract surgery to be performed any differently; however, they do involve additional costs.



About Dr. Chang

David F. Chang, M.D. is widely recognized as one of the top cataract surgeons in the world. He graduated Summa Cum Laude from Harvard College and earned his Medical Degree from Harvard Medical School. Dr. Chang completed his ophthalmology residency at the University of California, San Francisco, where he advanced to the rank of Clinical Professor of Ophthalmology in 1999. He has taught cataract surgery to ophthalmology residents in training for more than 30 years.

As an internationally recognized cataract expert, Dr. Chang regularly lectures on cataract techniques to other surgeons in the U.S. and abroad. Dr. Chang has received the highest international awards for cataract surgery from the American Academy of Ophthalmology (Kelman Medal Lecture), the American Society of Cataract and Refractive Surgery (Binkhorst Medal), the Asia Pacific Association of Cataract & Refractive Surgery (Lim Medal), the Canadian Society of Cataract and Refractive Surgery (Award of Excellence), the United Kingdom and Ireland Society of Cataract & Refractive Surgery (Rayner Medal), the All India Ophthalmology Society (President's Lecture), the Indian Intraocular Implant & Refractive Society (Gold Medal), the Italian Ophthalmological Society (Strampelli Medal), the Royal Australia and New Zealand College of Ophthalmologists (Gregg Medal), and the Asia-Pacific Academy of Ophthalmology (Jose Rizal International Medal).

Having served as president in 2012-2013, Dr. Chang is on the executive board of the American Society of Cataract & Refractive Surgery (ASCRS), the largest international organization for cataract and refractive surgeons with over 9000 members. He chaired the American Academy of Ophthalmology Cataract Preferred Practice Pattern Committee. This select national committee writes the clinical guidelines for cataract surgery that are used in the US and worldwide. Dr. Chang is also a leading expert in global cataract blindness, serving on the medical advisory board of several humanitarian organizations and as co-chair of the ASCRS Foundation.

Dr. Chang has authored four textbooks on cataract surgical techniques for ophthalmologists. *Mastering Refractive IOLs* covers advanced lens implants and is considered the most comprehensive textbook on the subject. He has designed a number of popular cataract surgical instruments that bear his name and are used worldwide. As a clinical investigator, Dr. Chang was the first surgeon in the United States to implant the light adjustable artificial lens and the Synchrony accommodating lens implant. He was the second US surgeon to use the LensAR femtosecond laser for cataract surgery. Dr. Chang was also the first surgeon in Northern California to implant a multifocal lens. Dr. Chang has been regularly voted by his peers into the national edition of Best Doctors in America and is listed by Beckers Review as one of the top 39 ophthalmologists in the United States. He was also voted the 5th most influential ophthalmologist in the world by the international readership of *The Ophthalmologist*. He has maintained his private practice in Los Altos since 1984 and developed and founded the Peninsula Eye Surgery Center, which opened in 2005. He limits his practice to cataract and intraocular lens implant surgery.

