

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.

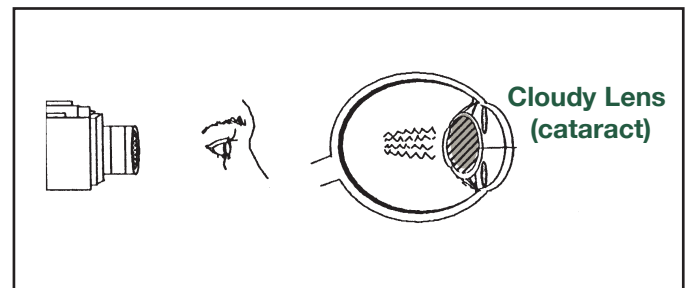
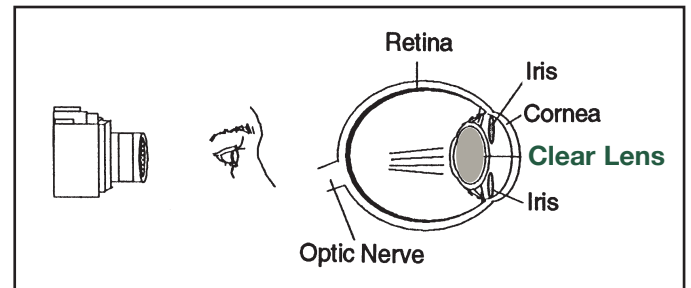
Immediately behind the pupil is the natural lens of the eye. Just as a camera lens focuses light onto film at the back of the camera, the human lens focuses light onto the retina, the thin layer of tissue lining the back of the eye. Like camera film, the retina forms the "picture" which is then relayed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

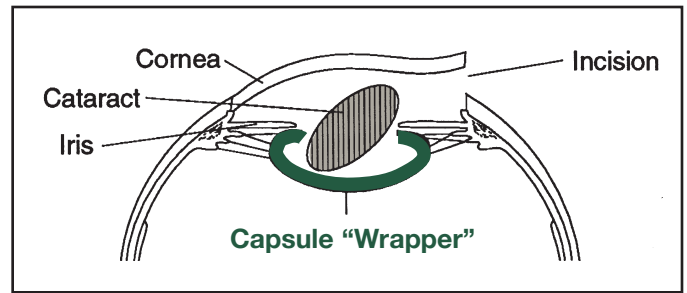
The “prescription” or power of each patient’s implant is selected based on computer calculations that use a series of precise eye measurements performed in the office prior to surgery. The distance between the front of the eye and the retina can be measured precisely using precise optical methods. This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

Newer implant designs that can decrease your dependence upon glasses have become increasingly popular. However, they are not appropriate for all individuals, and the additional cost is not covered by health insurance. During your consultation, I will determine and explain what the best options are.

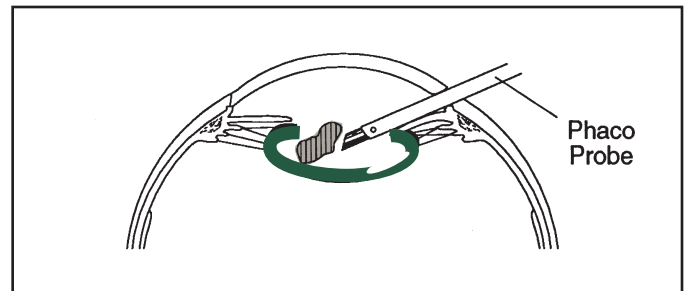


How is surgery performed?

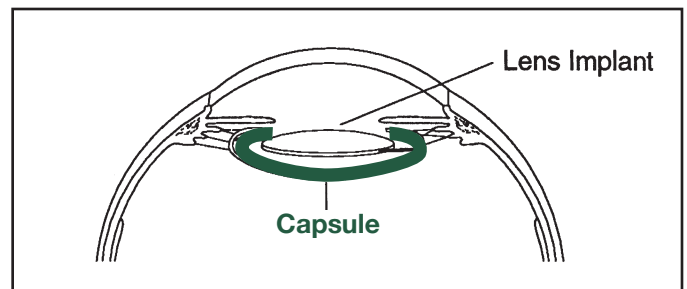
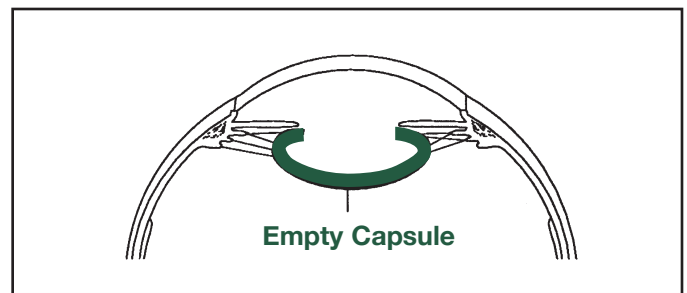
Cataract surgery is microsurgery; it utilizes an operating microscope and is performed inside the eye through an incision. One can think of the human lens as having a thin, transparent “wrapper” which holds the lens in the center of the eye. This delicate, cellophane-like skin is called the lens “capsule.” 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.



Older 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 entering practice in 1984, Dr. Chang has routinely performed the most advanced techniques 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 2.5 mm incision (1/8 inch). Modern foldable lens implants can fit through incisions this small, and sutures and bandages are not required. Physical activities are not restricted after small incision surgery, and the vision stabilizes faster than with large incision methods.




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 edge of cornea).

NOTE: Dr. Chang personally performs all of his own cataract surgeries. Being in private practice, there are no trainees performing any part of the procedure.



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, we can be very confident that 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 in the San Francisco-San Jose region 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 20 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.



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.

If I previously had LASIK 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 newer, but very expensive type of lens implant - the light adjustable lens - solves this problem because we are able to precisely change and adjust the lens prescription using a UV light treatment after we surgically implant it.



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. More than 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. There is much more additional information on my www.changcataract.com website, including information about the different lens implant options.

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 more advanced artificial lens implants that can reduce (but not totally eliminate) your need for eyeglasses. **Multifocal** lens implants are designed to provide focus at multiple zones - far, intermediate, and near. Patients with multifocal lenses generally wear glasses the least often, but they should have perfect eye health and no problems with the retina or cornea. Multifocal lenses produce halos around

lights at night that become less noticeable over time for most patients. **Extended focus** lens implants provide greater focusing range than a monofocal, but not as much as a multifocal lens. Patients with extended focus or multifocal lens implants generally don't need progressive bifocal or trifocal glasses; they typically just carry reading glasses.

Will 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 extended focus 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 basic 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 necessarily 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. This causes a natural misfocus or blur (astigmatism) that requires prescription eyeglasses for the clearest vision.

Although it has nothing to do with cataracts, astigmatism can be reduced or possibly eliminated at the same time that cataract surgery is done. For small amounts, the **astigmatic keratotomy** technique places tiny superficial incisions that do not enter the eye, but reduce the undesirable oblong shape of the cornea. The most common method is to permanently incorporate the astigmatism correction into the artificial lens implant, rather than relying on prescription eyeglasses after surgery. This built-in feature is called "**toric**" and can be added to any monofocal, extended focus, or multifocal lens implant. The light adjustable lens also corrects astigmatism, and may be particularly advantageous for patients who are accustomed to "**monovision**" with contact lenses or following LASIK.

All of these astigmatism-correcting 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 35 years.

As an internationally recognized cataract expert, Dr. Chang regularly lectures on cataract surgery 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) and the following international cataract and refractive surgery societies: American (Binkhorst Medal), Canadian (Award of Excellence), United Kingdom and Ireland (Rayner Medal), German (DOC Innovator Lecture), Indian (Gold Medal), and the Asia Pacific Association of Cataract & Refractive Surgery (Lim Medal). He has been honored by the International Society of Refractive Surgery (President Award), American-European Congress of Ophthalmic Surgery (Visionary Award), All India Ophthalmology Society (President's Lecture), Italian Ophthalmological Society (Strampelli Medal), Chinese American Ophthalmological Society (Pioneer Award), Royal Australia & New Zealand College of Ophthalmologists (Gregg Medal), Asia-Pacific Academy of Ophthalmology (Jose Rizal International Medal), International Intraocular Implant Club (IIIC Medal), Middle East Africa Council of Ophthalmology (El-Maghraby Award), and the International Council of Ophthalmology (Krwawicz Gold Medal). Including these, Dr. Chang has delivered more than 40 named lectures.

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. He chaired the American Academy of Ophthalmology (AAO) Cataract Preferred Practice Pattern Committee. This select national committee writes the clinical guidelines for cataract surgery that are used in the United States and in many foreign countries. Dr. Chang is also a leading expert on global cataract blindness. He co-chairs the ASCRS Foundation and received the prestigious AAO Humanitarian Service Award in 2019.

Dr. Chang has authored 5 best-selling 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 served as Chief Medical Editor of *EyeWorld*, a leading trade journal which has a global circulation of more than 30,000 ophthalmologists. Dr. Chang 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 American surgeon to implant the light adjustable lens implant and the first Northern California surgeon to implant a multifocal lens and the Symphony extended focus 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 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.

