

Cataracts & Cataract Surgery

The lens is the structure inside our eyes, immediately behind the iris (the opening in which is the pupil), that focuses light. Cataracts are opacities that occur within this lens. There are many reasons why such opacities form (described below). Initially these opacities affect the focus and glasses can adjust any changes. However, as the opacities progress (the cataracts become worse), they become so opaque as to appear white through the pupil. At this stage, only surgical removal can improve the vision. The term cataract is from the Greek. White, cloudy lenses within the pupil reminded them of white, tumultuous waters: *kataraktes*.

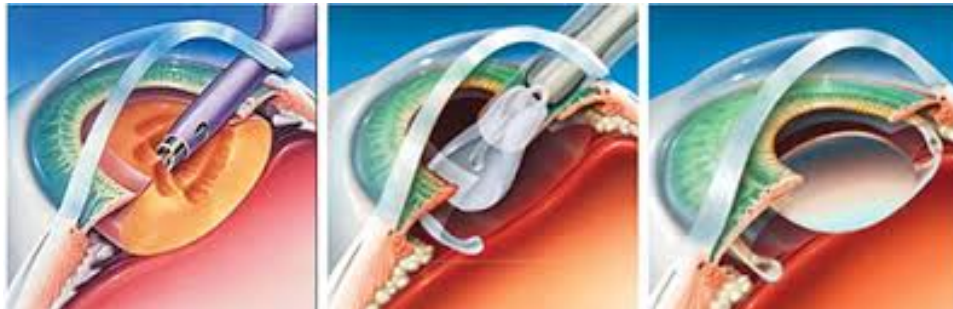
Typically, cataracts take a few years to develop, but some types require only a few weeks or months. The most common causes of cataracts are aging, family history, UV-light, medications, and trauma. Some children are even born with cataracts. Since most cataracts develop slowly, people tend to adapt to the slowly deteriorating vision and often say, "They're getting by."

The degree of lens opacity not only affects visual clarity, but also affects color fidelity. Typically cataracts become yellow to brownish yellow over time. Since yellow absorbs blue light, many people just before their cataract surgery complain of difficulty separating navy from black socks since removing the blue tint from navy makes it look black.



Once the vision is significantly affected, the cataract must be removed. Not until it is removed does the person realize how cloudy the vision or how distorted the color perception was. Frequently, patients will then comment that the previous good eye, the opposite eye, is now the "bad" eye. The fellow eye usually requires cataract surgery within 2 years after the first eye. Should both eyes need cataract surgery, they are usually done 2 to 4 weeks apart, not at the same time.

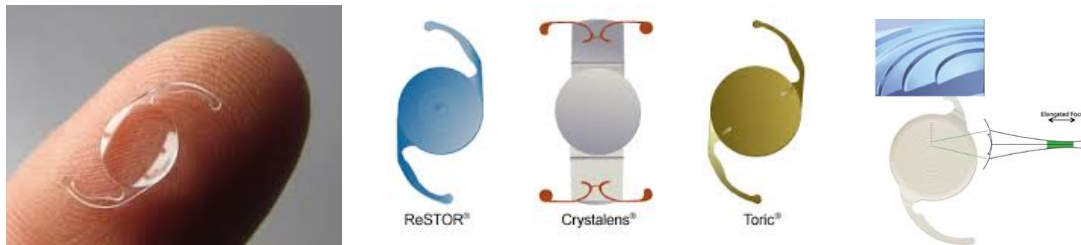
Cataract surgery is the procedure used to remove a cloudy lens. Since the lens normally helps to focus the light, once it is removed vision is quite blurred. So a replacement lens (an intraocular lens or IOL) is immediately positioned after the cataract is removed during cataract surgery. The usual technique for removing cataract is called *phacoemulsification*. My mentor, Dr. Richard Kratz, pioneered this technique, which vacuums out the lens.



The surgery itself takes very little time: 10 to 15 minutes in the hands of an experienced surgeon. The surgery is performed under topical anesthesia, supplemented by IV medications. Some steps may be done using lasers, although this is still optional at this time, with little overall improvement. Often that same day, usually within a few minutes or hours, the patient can begin using their eye. The complete healing requires several days after which time glasses may be required depending upon the patient's optical condition (discussed below).

A common question is “why won't new glasses help when someone has cataracts?” Presently, there is no other solution for cataracts: the cataract must be removed and replaced with a clear lens. Initially, as the cataract is starting, new glasses can help, as described above. But as the cataract progresses and becomes more opaque, new glasses do nothing to improve clarity. The situation is analogous to why a clear window next to a frosted glass window won't make the frosted or scratched window less cloudy; a clear window must replace the frosted or scratched window.

While the natural lens is about 9mm in diameter, IOLs are usually 6mm in diameter. Early IOL designs attempted to use 9mm optics but it led to many problems. Diameters too small can lead to glare and halos, so the 6mm range has become the standard for most IOL designs.



The materials used to make the IOLs vary from rigid to foldable plastics; the type selected is best determined on an individual basis. Optically, most are fixed for a given focal point. Some designs incorporate multifocal properties, allowing one to see well at both near and far as well as in between. There are 3 focus ranges we must deal with: near (within arms length, usually at 16 inches), intermediate (or social vision at 2 to 3 feet), and distance (beyond 8 feet or so for human eyes). Each of these distances requires a different power for clear vision.

Monofocal IOL patients will need glasses for some tasks. If the focus is fixed for distance, they'll need readers. While most patients, when selecting a monofocal IOL design, choose to have their IOLs set for distance focus, a few patients choose near vision, so that they can read without glasses. People who've been near-sighted (myopic) most of their lives are the ones who most often make this choice. If the IOLs are focused for near, they'll need glasses to drive and watch TV.

Patients with multifocal IOLs are much less spectacle dependent since all distances are covered by the IOL. However, no one can guarantee that a patient with any IOL will never need glasses after cataract surgery, no matter the IOL design.

The optic is held in position inside the lens capsule (or “bag”) by haptics. The haptics act like little arms or springs to keep the optical portion centered. Some haptics are pliable or have hinges permitting slight bending to occur. Bending at a hinge allows such designs to have a degree of accommodation, the process of focusing. The Crystalens® is one such design. However, as will all things, there are limitations. The required range of focus and the age of the individual can affect whether such designs will work.

Non-accommodative designs (Restor® by Alcon and Tecnis Symphony® by AMO are examples) permit a wide range of focus without need for bending or movement. Non-accommodative designs are more forgiving as we age. However, there is a slight reduction of contrast with these designs under dark conditions. This is not so much a problem with simply a dark room, but if the object you're viewing is dimly lit. Viewing a brightly lit stage production seated in a dark theater is not problem; whereas trying to view stars on a dark night would allow seeing the brightest stars but not necessarily those more dimly glowing. Glare and halos have been described with some multifocal IOLs and rarely even with monofocal IOLs. The risk of these optical aberrations can be reduced by careful IOL selection. By discussing your needs and expectations after cataract surgery, your surgeon can help guide you in selecting an IOL that will be the best optical device for you.

Another factor affecting IOL design and focus is astigmatism. (Please see our FAQ on this topic.) These IOL designs correct this optical distortion inside the eye instead of forcing the patient to use glasses for correction. This type of IOL design is called a “toric” IOL. Toric correction can be on both monofocal and multifocal IOL platforms. About half the population has 0 to 0.75 diopters of astigmatism; the other half has more than 0.75 diopters. This latter group is potentially eligible for IOL correction of their astigmatism at the time of cataract surgery.

Finally, those patients who've previously undergone refractive surgery (such as laser vision correction or radial keratotomy) should very carefully discuss IOL design options with their surgeon. These patients should also realize that the certainty of the focus distance may be less certain due to less precise outcomes following refractive surgery. The implication is that the need for glasses will be more likely if predicted outcomes are missed. While there are uncertainties for all patients, the tolerance is greater following refractive surgery. Any missed optical can be a source of disappointment for a patient. For example if they chose a multifocal IOL and yet required either distance or reading glasses after cataract surgery, their unhappiness is understandable. At the same time, while contemporary IOL calculation formulas are much more accurate, none are perfect for all patients. Occasionally a small deviation from the optical goal can occur; this deviation is more common after refractive surgery. (There are various methods to deal with these deviations but the discussion is outside the scope of this FAQ.) At Newport Eye Center we use multiple formulas, including customized ray tracing formulas, to reduce any deviations to a minimum.

Your options should be discussed in detail with your surgeon prior to surgery. Whichever IOL design you choose, realize that all choices are a compromise. Worry less about what a friend chose and more about which design best satisfies your needs. Only you can decide which design is best for you and your lifestyle.