The lens of your eye is an important structure. In order to see clearly at all distances (from up close to far away), your eye must be able to change its focus power. The lens of your eye is responsible for this change in focus—it changes its shape to bring whatever you’re looking at into clear focus. In your early 40’s you lost the ability to see up close, and required either bifocals, or at least reading glasses. This was because as we age, the lens hardens and cannot change its shape anymore, and in order to focus at different distances, more than one glasses prescription was required.

As we age even more, the lens becomes cloudy. This cloudiness of the lens is called a cataract. Cataract is a common problem among aging Americans, and cataract surgery is the most common surgery performed on adults in the United States. In cataract surgery, the cloudy lens is removed. In order for you to see clearly afterward, a new lens (called an intraocular lens implant, or IOL) must be inserted at the time of surgery. Selecting the right implant for your eye is very important for your vision after surgery. Your doctor will take measurements of your eye before your surgery to determine how strong your lens is, so an implant with the appropriate strength can be put in during the surgery. If you wear glasses, the implant strength can be adjusted to replace both your lens and your glasses. Like your aging lens, the implant cannot change its shape to help you see both up close and off at a distance. But several options are available to help you minimize, or even eliminate, your need for any type of glasses after cataract surgery.

Typically, your doctor may place implants in your eyes with the appropriate strength for you to see well at a distance, and you can wear reading glasses when you want to see up close, such as for reading.

Monovision

Another option is for your doctor to select the implant strength for you to see clearly off at a distance for one eye, and a different strength for your other eye to allow it to see up close, so that you can see clearly at an increased range of distances without glasses after surgery. This is called monovision. Since the eyes are no longer working together at the same distance your binocular vision is compromised and depth perception can be reduced. Usually people can adjust to this, but if you can’t, your vision may be blurred at both near and far. The people who do best with this method are those who are already used to monovision with contact lenses, which is a common way of correcting presbyopia. If you can’t adjust to monovision after your cataract surgery, you may wish you had tried a multifocal or accommodating IOL instead. Some surgeons will trial-fit a cataract patient in monovision contact lenses prior to inserting monovision IOLs.

Multifocal IOLs and Accommodating IOLs

Traditional IOLs are monofocal, meaning they are able to focus vision at one distance only. In recent years, several types of multifocal implants have been developed. These lenses allow you to see clearly at a variety of distances, effectively eliminating the need for glasses. Several manufacturers, including Alcon, Advanced Medical Optics, and Eyeonics, have recently received approval from the FDA for new technology multifocal lenses following cataract surgery. It should be noted, however, that multifocal lens technology is evolving rapidly and patients are encouraged to consult with their doctor about these offerings. Also, this technology is relatively expensive and is considered elective by Medicare and most payers, thus the difference in price between a standard cataract IOL and the new technology must be paid by the patient.

ReZoom

ReZoom is a multifocal refractive IOL that distributes light over five optical zones to provide near, intermediate, and distance vision (Fig. 2). Its manufacturer, Advanced Medical Optics, brought the first multifocal IOL, the Array, to the U.S. market in the late 1990s. The Array met with limited success due primarily to problems with night-time glare. The ReZoom is AMO’s second-generation multifocal and was FDA-approved in March 2005.

Crystalens

Crystalens (Fig. 3) gained FDA approval in late 2003. It was designed to restore the eye’s accommodation ability, which is gradually reduced with age. Accommodation is the ability of the eyes to change focus from far to near, and all distances in between. With presbyopia, which...
usually begins at around age 40, the eye’s ciliary muscle, has more difficulty in changing the shape of the lens because the lens is becoming less flexible. The ciliary muscle contracts in its effort to allow the lens to become more curved for closeup focusing, but the lens resists because it is not as flexible as it was when the eye was younger. Since Crystalens has hinges on both of its arms or haptics, it’s central optic can be moved forward by the contraction of the ciliary muscle, allowing the eye to focus more naturally at a greater range of distances than traditional IOLs. So far, Crystalens is the only accommodating IOL that has been approved by the FDA, though others are in development. Near vision is not as clear as with the ReSTOR due to limitations in how much movement of the IOL can actually be achieved. In addition, the diameter of the optic is significantly smaller than other multifocal lenses making centration critical and leading to potential glare problems with larger pupils.

Fig. 2. AMO ReZoom IOL

It’s important to note that you can’t be 100 percent certain of seeing well without eyeglasses or contact lenses after cataract surgery, even if your eyes have received multifocal or accommodating IOLs. Some of the factors that can decrease satisfaction with these IOLs include pre-existing astigmatism, incorrect positioning of the IOLs in the eye, and nighttime halos that some patients have experienced.

Toric IOLs for Astigmatism

Most surgeons who treat astigmatism in their cataract patients tend to use astigmatic keratotomy (AK) or limbal relaxing incisions (LRI), which involves making incisions in the cornea. But in addition to or even instead of corneal astigmatism, some people may have lenticular astigmatism, caused by irregularity in the shape of the natural lens and capsule. This lenticular component is eliminated when the cataract is removed leaving only the corneal astigmatism to be corrected. Toric IOLs are designed to correct astigmatism in much the same way as toric contact lenses do. Currently, the Alcon (Fig. 4) and Staar Surgical Intraocular Lenses are the only toric IOLs available in the United States. The Alcon lens is based on the same very successful one-piece acrylic design that has been used for both its multifocal and multifocal IOLs and which has proved to be very stable in its position in the eye. Risks of a toric IOL include poor vision due to the lens rotating out of position, with the possibility of further surgery to reposition or replace the IOL.

Aspheric IOLs

Traditional IOLs are spherical, meaning the front surface has a constant curve. Aspheric IOLs, first launched by Bausch & Lomb in 2004, are slightly steeper centrally and flatter in the periphery in order to more closely mimic the shape of the natural lens and are designed to provide better contrast sensitivity. The cornea is also aspheric and without the balancing effect of this lens shape optical aberrations are produced. The Bausch & Lomb offering is called the SofPort Advanced Optics IOL. Aspheric IOLs are available also from Alcon (the AcrySof SN60WF, which includes the blue light-blocking feature discussed below) and Advanced Medical Optics (the Tecnis Z9000). There is some debate as to how long this contrast sensitivity benefit can last in older patients but most agree it is beneficial. However, younger people are undergoing cataract surgery now, and this group would be able to enjoy the better contrast sensitivity for a longer time. Aspheric IOLs were designed using wavefront analysis of human corneas. Wavefront is the same tool that is used to plan personalized custom LASIK procedures to reduce higher-order aberrations in the visual system.

Blue Light-Filtering IOLs

The Alcon AcrySof Natural IOL filters both ultraviolet (UV) and high-energy blue light, both of which are present in natural and artificially produced light. UV rays have long been suspected to cause cataracts and other vision problems, and many IOLs filter them out just as your natural crystalline lens does before its removal in cataract surgery. Blue light, which ranges from 400 nm to 500 nm in the visible light spectrum, may cause retinal damage and play a role in the onset of age-related macular degeneration. The AcrySof Natural is colored a transparent yellow in order to filter the blue light; actually, the color is similar to that of the natural 50 year old crystalline lens, so the idea behind the AcrySof Natural is to re-add the protection against blue light that is lost when the natural lens is removed. This is particularly important for patients with risk factors for age-related macular degeneration and for younger patients undergoing cataract surgery who would have many more years of exposure to low wavelength blue light. According to Alcon, the manufacturer, the yellow tint doesn’t alter the color of your environment or your vision quality. Alcon has included this blue light-filtering chromophore into its aspheric (SN60WF) and multifocal (ReSTOR) lenses as well. Talk with your doctor about the various types of implants available, and their effects on your vision after surgery. You and your doctor will develop a plan that pairs you with the best type of implants for your eyes and your vision needs.