THE CRYSTALENS IMPLANT
FREQUENTLY ASKED QUESTIONS

There are two different types of premium lens implant options – the *multifocal* and the *accommodating* lens - that are designed to reduce your dependence on glasses as compared to if you had received a standard "single-focus" lens implant. When you are not wearing glasses, a standard lens implant will provide your eye with optimum focus set at one particular distance that does not change. You would then wear glasses in order to change this focus (e.g., moving the focus farther away or closer up).

How do multifocal and accommodating lens implants differ?

Conventional single-focus lens implants are called monofocal lenses because they optimize the focus at a single location. 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, and this technology can significantly reduce your dependence on reading glasses. Accommodating lens implants seek to reduce eyeglass dependence according to a completely different principle. Accommodation is the medical term which describes the natural ability of a young eye to focus by changing the lens shape. If the lens implant could also change its shape or position, some focusing ability could be restored.

The *Crystalens* implant is the first and only accommodating lens to be approved by the FDA. This lens implant has an ingenious hinged design, to allow it to flex slightly. This enables your eye's natural focusing muscles to cause some flexing and movement of the lens, thereby adjusting the focus. There is usually not enough lens movement to allow you to see far off in the distance one moment and to read up close the next. As you would imagine, there is also individual variability in the ability of the eye muscles to move the implanted lens. While the Crystalens does increase one's capacity to change focus relative to a standard single-focus lens implant, unfortunately it does not duplicate the focusing ability that we all enjoyed when we were young.

The Crystalens should provide the ability to see without glasses across a greater range of different viewing distances when compared to a single-focus lens implant. For example, if an individual can see well enough to drive with the Crystalens, they should also be able to focus in toward the dashboard. The latter is a good example of our need to see many things at a mid-range or "intermediate" distance – that is neither far off in the distance nor up close. Other examples of tasks performed at an intermediate distance would include working on a desktop computer, playing the piano, cooking, or viewing items on a shelf at arms length. For reading up close, patients with the Crystalens typically wear low power reading glasses.

Will this expensive technology eliminate the need for glasses?

Unfortunately, neither the Crystalens nor multifocal lens implants are expected to eliminate the need for eyeglasses. There may always be situations where you are trying to see details at some distance that are simply too small to be seen clearly. The print size and the amount of available

light will make a difference. In addition, your retina must be completely healthy to achieve the optimum results.

Because a single Crystalens implant does not provide enough focusing range to encompass both the far and near distance extremes, one common strategy is to slightly stagger the separate focusing range of each eye. For example, imagine that after the first eye surgery, you can see well in the distance but cannot read without glasses up close. One option is to implant a Crystalens in your second eye that is focused closer in, rather than far away. Although this particular eye might not see as well far away as the first eye does without glasses, the benefit is that it should see better at near distances when you are not wearing glasses. Unless you were to test each eye separately, this intended slight difference will generally go unnoticed, because the brain "blends" what is seen by the two eyes together. The result would be an expanded ability to see across a greater range of distances (from near to mid-range to far) than would be possible with either eye alone. This concept is similar to the "monovision" strategy that many contact lens wearers over the age of 40 have used, except that it is accomplished without wearing contact lenses.

In a different situation, imagine that your first eye has good vision at the intermediate and near ranges with the Crystalens, but is not very clear in the distance. Your second eye could then be targeted for far distance to complement and supplement what you can already see with the first eye. Again, improved distance focus would come at the cost of decreased near performance in that one eye. Regardless of the strategy, your ability to see without glasses should improve after the second eye receives a Crystalens. Finally, in select circumstances, there is even an option to combine a Crystalens in one eye, with a multifocal lens implant in the second eye.

Remember that how often an individual requires glasses varies across a broad range of percentages. At one extreme is always (people who must wear their glasses constantly = 100%); at the other end of the continuum is never (some young individuals with perfect vision and a naturally focusing lens never need glasses = 0%). Most of us are somewhere along this continuum in between the two extremes. It is impossible to know in advance how often you will "need" glasses after your Crystalens implants. This depends upon variables such as your retina, any remaining astigmatism, and how visually demanding your everyday activities are. However, when compared to a standard single-focus lens implant, the Crystalens should put you much closer to the desirable end of the spectrum discussed above. This is because the Crystalens provides your eye with some ability to adjust and vary the focus. Therefore, the Crystalens implants do offer the convenience of being less dependent on glasses compared to standard single-focus lens implants.

There is always normal variability in the rate of visual improvement following uncomplicated cataract surgery. Beyond the initial postoperative period, however, many Crystalens patients have observed a gradual improvement in their ability to change focus over time. Since the Crystalens is designed to be flexed and moved by the focusing muscles of the eye, it makes sense that in some eyes, the strength of these focusing muscles improves with greater use.

Will I see halos?

The design of the multifocal lens implant will always produce mild ghost images that appear as rings or halos, particularly around lights at night. Although halos are much less apparent with the newest generation of multifocal lens implants, and they always become less distracting over time,

there is always some small risk that a given individual may struggle to adapt to them. In general, the quality of vision at night is slightly less with a multifocal lens compared to a conventional single-focus lens implant. Because the Crystalens works according to an entirely different principle, it will not produce the halos that are seen with multifocal lenses. The clarity and quality of vision at night should be equally good as with a conventional lens implant.

Does insurance cover the premium cost to upgrade to a Crystalens implant?

Unfortunately it does not. Health insurance, including PPOs, HMOs, and Medicare, covers a cataract operation with a standard lens implant when the cataract is bad enough to be considered "medically necessary". The additional fee to upgrade to a Crystalens (accommodating lens implant) or a multifocal lens implant is not covered, because the added convenience of reducing your dependence on eyeglasses is not "medically necessary". We ask that you pay this premium out-of-pocket fee in advance. Rarely, unexpected situations might arise during surgery where I determine that a Crystalens might not be as stable in your particular eye due to the condition of the lens capsule. I would implant a standard lens implant in this situation.

Can patients without cataracts have the Crystalens?

Many people are interested in surgical methods to reduce their dependence upon eyeglasses and contact lenses. Laser eye surgery, such as LASIK, is the most common way to correct nearsightedness if one is under the age of 40. However, for patients over the age of 50, laser surgery by itself is less advantageous. By this time of life, any method that corrects your distance vision (including contact lenses, LASIK, or a standard lens implant) will not work for reading up close without glasses. Another problem with laser eye surgery, such as LASIK, is that it complicates any lens implant surgery that is done later on for a cataract. Unfortunately, determination of the correct lens implant power is very unpredictable in eyes that have had prior LASIK.

The Crystalens implant is a technology that can allow a 50+ year-old eye to have some focusing ability without glasses. For this reason, people over the age of 50 wearing strong prescription glasses but with no other eye problems may elect to have accommodating lens implants in order to see much better without glasses. Health insurance covers none of the costs, however, if there is no cataract present. Because the natural lens must still be removed before implanting the Crystalens, the procedure is performed in the same way as for cataract surgery. Thus, patients electing to have lens implant surgery to reduce their need for glasses will never have to worry about developing cataracts later on in life.

Who might need a LASIK "enhancement" after a Crystalens implant?

Like contact lenses or eyeglasses, every artificial lens implant model (standard, multifocal, or Crystalens) is manufactured in more than 60 different "powers". As with prescription eyeglasses or contact lenses, it is important to match the appropriate artificial lens implant power to your eye. To prescribe the correct spectacle or contact lens power, we utilize trial and error to preview different lens powers placed in front of your eye. When you are asked, "which is better, one or two?" you are selecting the lens power that you see best with. However, because the artificial lens implant is inserted inside the eye, and only after your natural lens (cataract) has been removed, it is impossible for you to preview or "try out" different powers before surgery. Furthermore, once it is

implanted, we cannot easily exchange the lens implant the way we could with contact lenses or eyeglasses.

Fortunately, an appropriate lens implant power can be estimated using mathematical formulas that utilize preoperative measurements of your eye's dimensions. Although the measurements are very accurate, there are individual variables that prevent this process from being 100% perfect. One variable is the final precise position where the implant will end up inside your eye. Another individual variable that may reduce your ability to see *without* glasses is astigmatism, which is a naturally occurring imperfection in the optical shape of your cornea. Astigmatism is therefore not corrected by the lens implant placed inside the eye. The overall process is accurate enough so that most patients will see quite well without glasses in the distance. However, it usually won't be "perfect" and you might choose to wear mild prescription glasses for those occasional tasks that require more precise distance focus.

For a Crystalens implant to work well, it is very important for the selected lens power to match your individual eye. Despite flawless surgery, some patients with Crystalens implants are still not able to see as well without glasses as they would like. What can be done if this is because the lens power is "off"? One option is to wear glasses or contact lenses. A theoretical solution might be to exchange the Crystalens implant for another with a different power. However, because of the risks involved with removing a lens implant, it is usually safer to "enhance" or fine-tune any residual prescription with an external LASIK procedure on the cornea instead. LASIK can also correct any remaining astigmatism coming from your cornea.

All eye operations intending to reduce a person's need for eyeglasses may need to be "enhanced" with a second procedure. For example, nearsighted people choosing to have laser eye surgery (e.g. LASIK) may need a second treatment if the first one does not fully correct their prescription. This unpredictability is understandable because we are working with human tissue and not plastic or metal. Likewise, it is possible that either the standard or Crystalens implant that has been selected may not adequately focus your distance vision without glasses. Depending upon how far off we are, laser enhancement may be a good option. The odds that this would need to be done with a Crystalens are usually less than 5-10%, but the chances are greater in patients with a lot of astigmatism or who are wearing very strong prescription glasses to begin with. The need will also depend upon how much better one wants to see without glasses. You should know about this possibility in advance before making your decision to have a Crystalens implant.

What do you recommend I do?

Like cosmetic surgery, taking extra steps to reduce spectacle dependence is a discretionary and personal decision. Because this does not involve health advice or medical needs, the ultimate decision is yours. Start by evaluating how strong your desire is to see as much as possible without glasses. Every individual will value such convenience quite differently. My role, as your eye surgeon, is to explain your options to you. To implant these special lenses, eye surgeons must be trained and certified by the manufacturers. I have extensive experience with all types of lens implants, and frequently lecture or write articles on this subject. Many lens manufacturers have asked me to consult or to assist in training other eye surgeons. Fortunately, your options are not limited by any lack of experience on my part.

If you are a patient with cataracts, you are considering surgery because your cataracts prevent you from seeing well with your corrective eyeglasses. After cataract surgery you should be able to see well for far, mid-range, and near distances with your new eyeglasses (assuming no other eye health problems). The decision about which type of artificial lens implant to have will only affect your ability to see without eyeglasses following cataract surgery. Compared to a standard lens implant, the Crystalens should provide the added convenience of being able to adjust your focus across a larger range of different distances without eyeglasses.

No current technology can eliminate eyeglasses, and how well you will perform with Crystalens implants can vary because of individual factors. Nevertheless, they are an excellent option for patients who already need cataract surgery and who want to decrease their reliance upon eyeglasses. While Crystalens implants carry no guarantees, they should greatly improve the odds that you will be able to see better overall without eyeglasses.

(This handout is modified from an original authored by Dr. David Chang.)