

MORE ABOUT KERATOCONUS

Astigmatism is a normal condition that is correctable with glasses. It causes the appearance of streaming lights from street lights at night or perhaps a double image from lights.

Astigmatism not correctable with glasses is usually not normal and should be checked by an eye doctor. Progressively worse astigmatism is a warning sign of one of a number of medical conditions, including keratoconus.

Keratoconus is a natural condition that can begin as early as the pre-teen years and worsens over life. Glasses help people with keratoconus see better for a while. Hard contact lenses can cover the irregularly shaped cornea and help vision, although the contacts do nothing for the basic problem.

As keratoconus progresses, contact lenses become more uncomfortable and not wearable. In the past, corneal transplant was the only option. Transplant, although generally effective, brings the lifetime risk of transplant rejection, and generally only restores vision when hard contact lenses are worn. Also, since only the center of the cornea is transplanted, the peripheral cornea remains weak and visual decline can continue.

A condition that is essentially the same as keratoconus can also be a rare complication of laser vision correction for freedom from glasses because of the tissue that the laser removes for reshaping the cornea. Fortunately, in most but not all cases, early structural weakness of a cornea can be detected before laser vision correction. Such detection is a routine part of screening before laser vision correction.

The technology to detect keratoconus has developed greatly in the last decade, although it is still not perfect. High-tech cameras linked to advanced computer systems can help detect

keratoconus in its early stages. Presently, the best computer system for following subtle changes in the cornea is the Pentacam device. As with other diseases, early attention and detection of keratoconus gives better outcomes.

CROSSLINKING IS NOT:

Corneal transplant: A surgical procedure in which the central portion of a cadaver cornea replaces the corresponding central portion of a patient's diseased cornea.

LASIK: A laser surgical procedure that removes tissue from the cornea to shape it to produce freedom from glasses and contact lenses.

Laser vision correction: Includes LASIK and also surface laser sculpting to produce freedom from glasses and contact lenses. Surface laser vision correction might be used before or after crosslinking to produce a more rounded shape to the diseased cornea.

Cataract surgery: Removing the lens within the eye once it becomes clouded and what doctors call a cataract.

Intacs® corneal implants: Another procedure to reshape the cornea. Intacs are tiny arc-shaped clear plastic braces surgically inserted within the cornea under eyedrop anesthesia. The plastic is the same material as hard contact lenses. Intacs are useful in many cases of keratoconus to produce a more normal shape to the cornea and also to slow the progressive worsening distortion of corneal shape and worsening of vision. Intacs are used to try to prevent the need for corneal transplant. Although Intacs brace the cornea, they do not change the molecular makeup of the corneal tissue. Intacs have been used in conjunction with crosslinking and are FDA approved.



Robert L. Epstein, MD
Board certified ophthalmology
Dr. Epstein is medical director of The Center for Corrective Eye Surgery and is a nationally recognized expert in procedures to reduce or eliminate

dependency on eyeglasses including bifocals. He was first in the Midwest to perform the following new surgical techniques: radial keratotomy, LASIK, sutureless cataract surgery, and presbyLASIK (to eliminate bifocal need). He is now one of only a very few U.S. physicians government-designated to be a principal investigator for an FDA-monitored keratoconus treatment study.

FOR MORE INFORMATION

To learn more about your particular situation and whether or not you are eligible for crosslinking, call The Center for Corrective Eye Surgery at (800) I-Can-See (800-422-6733). When visiting our office, you will get more information about crosslinking and also about other options to treat your keratoconus.



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Crosslinking Treatment for Keratoconus

The Center For
Corrective Eye Surgery



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CROSSLINKING TREATMENT SUMMARY

Crosslinking is a treatment for a condition called keratoconus. People who have keratoconus have progressively worsening vision because the front optical wall, or cornea, becomes more and more misshapen. There is a structural weakness in the cornea with keratoconus. Crosslinking increases the structural strength of the treated cornea.

The process involves applying vitamin B2 (riboflavin) eye drops on the cornea and applying a low dose of ultraviolet light to the cornea in a single

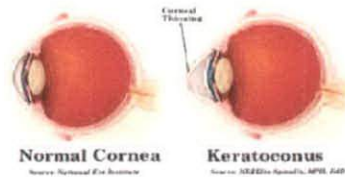
KERATOCONUS

Keratoconus is a condition in which the cornea becomes weak, progressively thinner, and irregular in shape. Instead of a normal, relatively round shape offering clear vision, the cornea in keratoconus can become cone shaped. This can interfere with the ability to see clearly.

Often keratoconus patients first require glasses, then contact lenses. Keratoconus is genetically based. Therefore, family members of keratoconus patients should be tested so that the condition can

treatment. The process, developed in Switzerland in 1998, is available in over 400 centers worldwide outside of the U.S. and is the subject of over 200 peer-reviewed medical journal articles. The process is under review by the FDA. Certain centers have FDA permission to conduct a clinical study of this new process. The Center For Corrective Eye Surgery in McHenry, Illinois, under the direction of Robert L. Epstein, MD, is one of a few centers so designated nationwide.

be discovered early when there are more treatment options. People whose eyeglass prescription is changing, especially with more astigmatism, should be checked for early keratoconus.



CROSSLINKING OVERVIEW

Corneal collagen crosslinking is a procedure in which vitamin B2 (riboflavin) drops are placed upon the diseased cornea until the riboflavin has fully penetrated through the stromal body of the cornea and into the inner eye. Once the riboflavin has well penetrated throughout the cornea, a highly precise, weak beam of ultraviolet light is directed at the cornea for 20 to 30 minutes. The eye is numbed with drops and the patient is comfortable during the procedure.

In keratoconus, the cornea is structurally weak and the collagen fibers that make up the cornea have too few crosslinks. Corneal collagen crosslinking is a chemical process a little like the vulcanizing of soft rubber that strengthens it into the strong rubber of a rubber tire. Unlike vulcanization, in corneal collagen crosslinking with riboflavin and UV light, the strengthening process happens at body temperature. Within minutes the strengthening process has occurred. Important during the process is the good

CROSSLINKING TREATMENT

Crosslinking is an outpatient procedure performed in the doctor's office using only numbing eye drops and a mild sedative. Patients lie flat on their back in a reclining chair and look up at a soft blue light during the treatment. The epithelium of the cornea is partially removed to a lesser extent than is typically done in surface laser vision correction. The riboflavin drops are then instilled onto the eye for a few minutes and the eyes are examined to make sure that there has been adequate penetration of the drops through the cornea. After that, the patient looks at a weak light that has a soft blue color. The treatment actually comes from invisible ultraviolet light from the light. After the treatment, a medicated bandage contact lens is placed on the treated eye. The procedure takes

about an hour. The UV light source looks like a soft blue from the perspective of the person being treated.

Typically, only one eye is treated at a time. If the patient wears contact lenses, the use of the lens on the treated eye must be discontinued for two weeks prior to treatment. Since crosslinking is rated investigational by the FDA, insurance does not pay for the procedure.



The UV light source looks like a soft blue light to the person being treated

CROSSLINKING FOLLOW UP

Patients return to the office the next day for an examination and then generally several days later. Typically on that second visit, the bandage contact lens is removed. After the contact lens is removed, patients may resume normal activities. Mild sensitivity to light is normal at first, but patients should report to the treatment center an increase in sensitivity to light or eye irritation. A sequence of visits, mostly in the beginning, assures proper healing. Then patients return at one, three, six and 12 months after crosslinking.

penetration of the yellow riboflavin liquid into the cornea to produce the strengthening of the cornea.

Worldwide experience from many thousands of procedures has shown that in corneal collagen crosslinking there is an initial healing process of typically several days and then a slow process where the corneal shape becomes somewhat more regular. The key effect of crosslinking is the halting of the process of worsening corneal shape. This

effect has been shown repeatedly in worldwide studies. But crosslinking uses riboflavin and ultraviolet light, neither of which have been FDA approved for use on the cornea. Thus, crosslinking still needs to undergo clinical testing here in the U.S. before it is generally applied without restriction.