

# Understanding Keratoconus & the Importance of Early Diagnosis

Not long ago, a diagnosis of progressive keratoconus left patients with few treatment options.

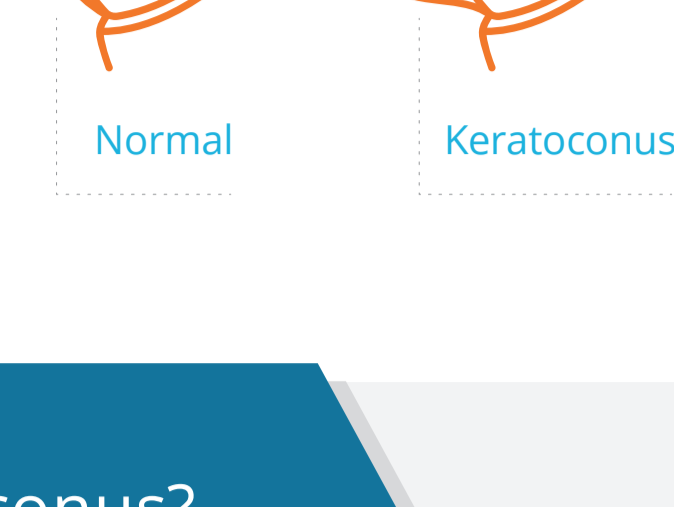
Today, Avedro's Photrexa® Viscous (riboflavin 5'-phosphate in 20% dextran ophthalmic solution), Photrexa® (riboflavin 5'-phosphate ophthalmic solution), and KXL® system are FDA-approved for use in corneal cross-linking and provide patients with a one-time, minimally invasive therapeutic treatment to limit the progression of their condition.

## What is Keratoconus?

### Keratoconus

[ker-uh-toh-koh-nuh s]

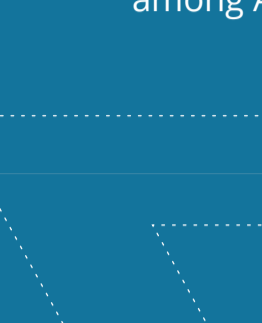
1. Keratoconus or "KC" is a non-inflammatory eye condition in which the normally round dome-shaped cornea progressively thins causing a cone-like bulge to develop. This results in significant visual impairment.<sup>1</sup>



Normal

Keratoconus

## Who's Affected by Keratoconus?



**Keratoconus Affects Both Genders** although it is unclear whether significant differences exist between males and females<sup>2</sup>

**The Disease is Also Found in All Ethnic Groups** with some studies showing higher incidence rates among Asian populations, in particular<sup>3</sup>



## Keratoconus

is estimated to occur in

**1 OUT OF EVERY /2,000**

**persons** in the U.S. population<sup>4</sup>

## Signs & Symptoms of Keratoconus<sup>5</sup>

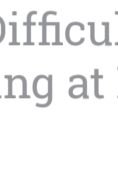
usually first appear in the late teens and early twenties<sup>6</sup>



Excessively Rubbing Eyes



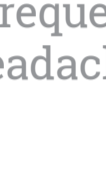
Mildly Blurred Vision



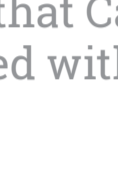
Difficulty Seeing at Night



Frequent Changes in Eyeglass Prescription



Frequent Headaches



Vision that Cannot Be Corrected with Glasses

## Risk Factors for Keratoconus



While the **exact cause** of keratoconus is **unknown**, it is believed that genetics, the environment and the endocrine system all play a role<sup>7</sup>

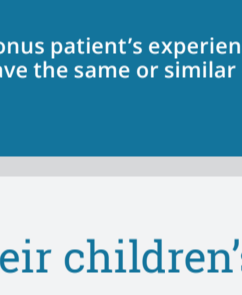
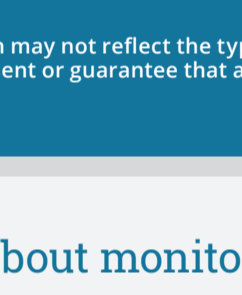
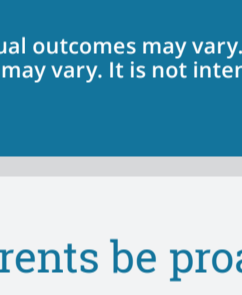
Some KC cases have a **hereditary component** and studies indicate that

**~10%** OF PATIENTS HAVE AFFECTED RELATIVES<sup>8</sup>



## Importance of Early Detection

KC is a progressive condition which worsens over time, so early diagnosis is critical



Example of Keratoconus Progression Over Time\*

\*Individual outcomes may vary. The depiction may not reflect the typical keratoconus patient's experience and the timeline may vary. It is not intended to represent or guarantee that anyone will have the same or similar outcomes.

## How can parents be proactive about monitoring their children's eye health?



If they have a family history of keratoconus and the children start needing glasses, I would recommend getting screened for KC - especially starting at age 12.

- Dr. Darcy Wolsey, Eye Institute of Utah



Don't wait to call the eye doctor if you notice changes in your child's vision! Ask about FDA approved cross-linking, clinically proven to limit the progression of this sight-threatening disease.

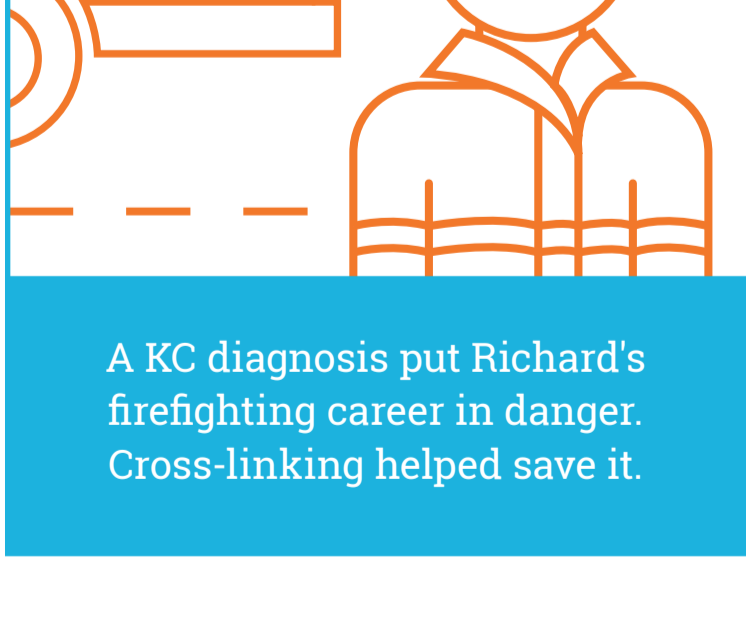
## Treatment Options for Keratoconus

Treatment options for keratoconus include eyeglasses or soft contact lenses, rigid gas permeable contact lenses, scleral contact lenses, intracorneal ring segment implants, corneal cross-linking or corneal transplant surgery.<sup>9</sup>

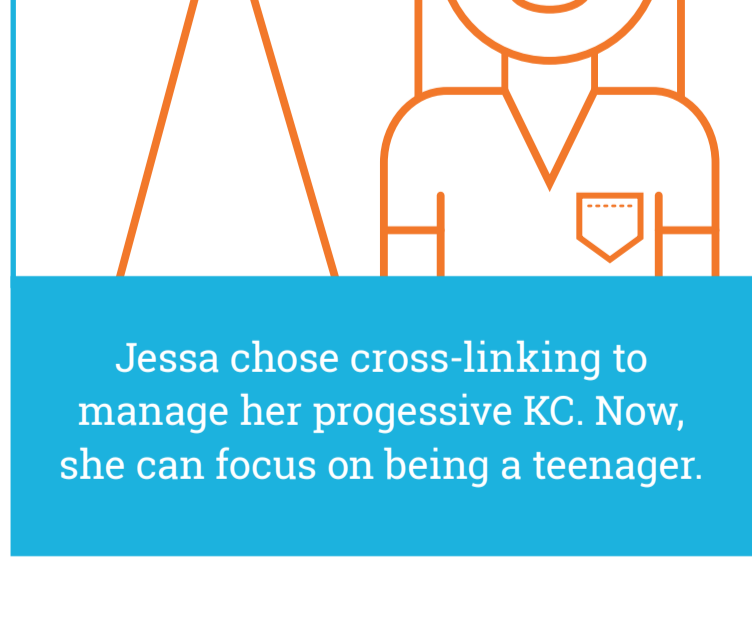
	Eyeglasses or Soft Contact Lenses	Specialty Contact Lenses (RGP, Scleral, Hybrid)	Corneal Cross-Linking (CXL)	Intracorneal Ring Segments (ICRS)	Corneal Transplant Surgery
Description	Prescription glasses or disposable/reusable contact lenses	RGP lenses are small diameter rigid contact lenses that are placed on the corneal surface. Scleral lenses are large diameter lenses that rest on the sclera (white of the eye) and vault over the cornea. Hybrid lenses are RGP lenses with a soft contact lens surround	Minimally invasive outpatient procedure using riboflavin eye drops plus UVA light	Specially designed implants, made of medical plastic, surgically placed under the surface of the cornea	Surgery to replace part of cornea with donor tissue
Goals	Improve vision while wearing	Improve vision while wearing	Slow progression of keratoconus	Improve corneal shape	Improve corneal shape and/or clarity
How it Works	Eye glasses and soft contact lenses bend rays of light to focus images on the retina inside of your eye.	Rigid and specialty lenses create a smooth, uniform surface. Your natural tears or a saline solution fill in the space between the lens and the cornea, "masking" the irregular corneal shape.	Riboflavin (Vitamin B2) eye drops are activated with UVA light to create additional cross-link bonds in the cornea, making it stiffer.	Intracorneal ring segments are implanted into the cornea to flatten the steep part of the cone into a more regular shape.	Irregular or scarred corneal tissue is replaced with donor tissue from a cornea without keratoconus. Usually used for advanced cases when contact lenses can no longer be tolerated or vision is severely compromised.
Challenges	As keratoconus progresses, the cornea becomes more irregularly shaped. Eye glasses and soft contact lenses can not correct for the irregular corneal shape.	Lenses must be precisely fit by to maintain comfort, enable stable vision and avoid damaging the eye. As keratoconus becomes more advanced, contact lens fitting becomes more challenging, and some patients may no longer tolerate contact lens wear.	CXL does not restore visual function that has already been lost, and does not eliminate the need for glasses or contact lenses. Patients may experience haze, inflammation, fine white lines, eye pain, decreased and/or blurred vision.	Do not slow keratoconus progression. Glasses or contact lenses are usually still needed. Patients may experience infection, inflammation, and/or visual symptoms such as glare or haloes.	Recovery after corneal transplant can be lengthy, lasting up to 1 year. Glasses/contacts are usually still needed, and visual rehabilitation can take several years. Possible complications include graft rejection, graft failure, infection.

## Impact Over Lifetime

Early diagnosis and treatment allowed Richard and Jessa to be able to continue to do the things they do



A KC diagnosis put Richard's firefighting career in danger. Cross-linking helped save it.



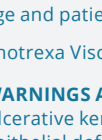
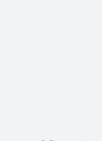
Jessa chose cross-linking to manage her progressive KC. Now, she can focus on being a teenager.

## Advancements in KC Treatment



Now that cross-linking is available clinically, FDA approved, it is a very exciting time to be a cornea specialist and be able to have a treatment that is effective for progressive keratoconus.

- Dr. Kathryn Hatch, Massachusetts Eye and Ear Institute



Find a Corneal Cross-Linking Specialist That is Right for You at [LivingWithKC.com](http://LivingWithKC.com)

### IMPORTANT SAFETY INFORMATION

#### INDICATIONS

Photrexa® Viscous (riboflavin 5'-phosphate in 20% dextran ophthalmic solution) and Photrexa® (riboflavin 5'-phosphate ophthalmic solution) are indicated for use with the KXL System in corneal collagen cross-linking (CXL) for the treatment of progressive keratoconus and corneal ectasia following refractive surgery.

The safety and effectiveness of CXL has not been established in pregnant women, women who are breastfeeding, patients who are less than 14 years of age and patients 65 years of age or older.

Photrexa Viscous and Photrexa should be used with the KXL System only.

#### WARNINGS AND PRECAUTIONS

Ulcerative keratitis can occur. Patients should be monitored for resolution of epithelial defects.

#### ADVERSE REACTIONS

In progressive keratoconus patients, the most common ocular adverse reactions in any CXL treated eye were corneal opacity (haze), punctate keratitis, corneal striae, corneal epithelium defects, eye pain, reduced visual acuity, and blurred vision. In corneal ectasia patients, the most common ocular adverse reactions were corneal opacity (haze), corneal epithelium defect, corneal striae, dry eye, eye pain, punctate keratitis, photophobia, reduced visual acuity, and blurred vision.

You may report an adverse event to Avedro by calling 1-844-528-3376. Option 1 or you may contact the U.S. Food and Drug Administration (FDA) directly at 1-800-FDA-1088.

For more information, see Prescribing Information.

### SOURCES

1-<http://www.nkcf.org/about-keratoconus/>

2-<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3775068/>

3-<https://www.nature.com/eye/journal/v14/n4/pdf/eye200154a.pdf?origin=ppub>

4-Kennedy R. H., Bourne W. M., Dyer J. A. A 48-year clinical and epidemiologic study of keratoconus. The American Journal of Ophthalmology. 1986;101(3):267-273. doi: 10.1016/0002-9394(86)90817-2.

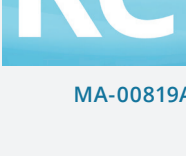
5-<http://www.nkcf.org/living-keratoconus/>

6-<http://www.nkcf.org/content/view/full/14/26/>

7-<http://www.nkcf.org/about-keratoconus/what-causes-keratoconus/>

8-<http://www.nkcf.org/content/view/full/14/26/>

9-<http://www.nkcf.org/homepage-clean/featured-content/treatment-options-for-keratoconus-focus-on-correcting-the-distorted-vision-caused-by-the-thinning-and-bulging-of-the-cornea/>



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