Controlled Kerato-Reformation (CKR™) Design

Certification Course

Supplement

Bausch & Lomb

Vision Shaping Treatment™

The Controlled Kerato-Reformation (CKR™) Design for Vision Shaping Treatment Certification Course

Welcome to the **Controlled Kerato-Reformation or CKR Design** Certification Course.

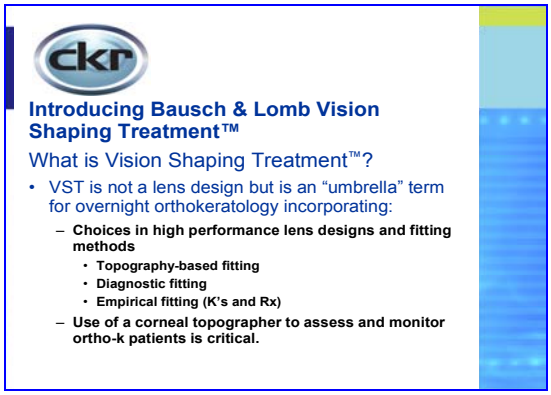
This handout is designed to accompany the online or in-person certification process for this exciting product for contact lens corneal reshaping. This presentation will introduce you to Bausch & Lomb Vision Shaping Treatment for the temporary reduction of myopia and will provide you information and certify you on the CKR Design

Please keep in mind that this certification test is not meant to take the place of detailed training on overnight orthokeratology and the CKR design.

Additional ongoing training is advised to increase your knowledge in managing patient care in this modality.

In June 2004 Bausch & Lomb acquired a premarket approval for the Boston Orthokeratology Lens. This is being marketed in the United States as the Bausch & Lomb Vision Shaping Treatment, or VST, for overnight orthokeratology using Boston Equalens II lens material.

Additionally, in December of 2004 a supplemental fitting approval that encompasses the use of corneal topography and/or software based designs was also received from the FDA.



It's important to note that Vision Shaping Treatment is not a lens design, but instead is a term to describe methods and designs for overnight orthokeratology.

With regards to vision shaping treatment this means that you have choices in high performance overnight orthokeratology lens designs and fitting methods and

the use of the high Dk Boston® Equalens® II material.

A unique feature of the Vision Shaping Treatment is that it offers you the flexibility to choose the fitting method that best suits you and your practice style. We will describe each of these in a moment.

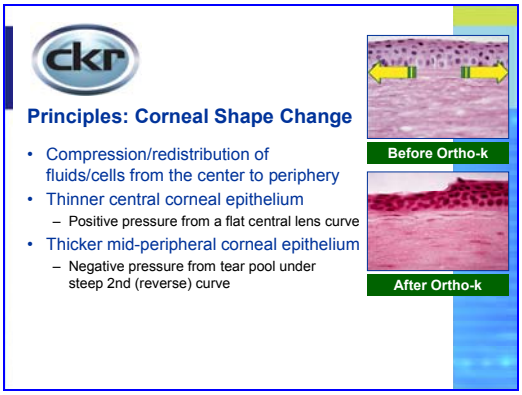
While corneal topography may not be necessary to select the initial lens in some of the vision shaping treatment design offerings, topography is considered essential to properly evaluate the ongoing progress in all designs.

The Boston Equalens II material has been available for a number of years in North America and has been FDA approved for extended wear since 1991.

It provides a significant amount of oxygen exchange having a Dk of 85 as measured by the ISO/Fatt polarographic method. Importantly, Equalens II provides excellent on-eye wetting resulting in a decrease of debris and surface deposit buildup.

Uniquely, Boston Equalens II materials for overnight orthokeratology are available in distinctive colors to allow patients to easily discern which lens belongs in which eye.

A RED lens is used for the right eye and a YELLOW lens for the left. This allows the wearer to easily determine the proper lens for each eye and also ensures the prescriber is receiving the Boston lens material they expect.



In vision shaping treatment the change in corneal shape results from forces exerted on the tear film between the back surface of the lens and the cornea causing a gradual and steady compression and possibly a redistribution of fluids and epithelial cells under the lens from the center toward the periphery.

Specifically, the central corneal epithelium becomes thinner as a result of positive pressure under a flat central curve of the shaping lens, while the mid periphery becomes thicker due to the negative pressure created by the annular tear pool under a steeper second or reverse curve.

The back optic zone radius, also termed BOZR or base curve, is the first curve of Vision Shaping Treatment designs.

Calculated to be flatter than the central corneal radius, this curve provides positive pressure that results in compression of the central corneal epithelium.

Generally the back optic zone diameter – termed BOZD - ranges from 6.0 to 8.0mm depending on the specific design – creating a treatment zone of 5.0mm or more.

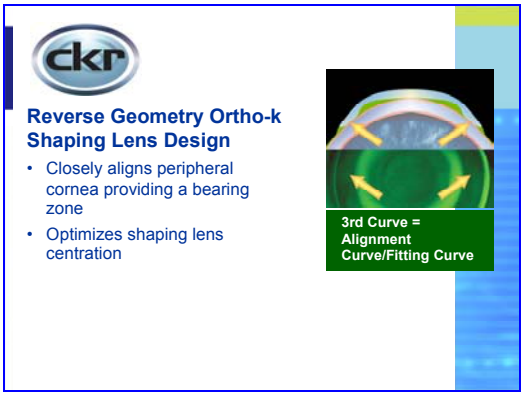
Unlike the base curve in traditional GP designs this BOZR is used only to flatten the cornea and is not considered a fit factor.

The second curve is most often termed the reverse zone and typically has a radius of 0.5mm to 1.0mm or is 3 to 5 diopters or more steeper than the back optic zone radius.

It forms an annulus shaped tear reservoir surrounding the central flat zone, inducing negative pressure.

The reverse zone provides an area for the epithelial cells and intracellular fluid to collect.

This zone, comprised of one or more curves, is typically 0.6 to 1.0mm wide depending on the design of the shaping lens.



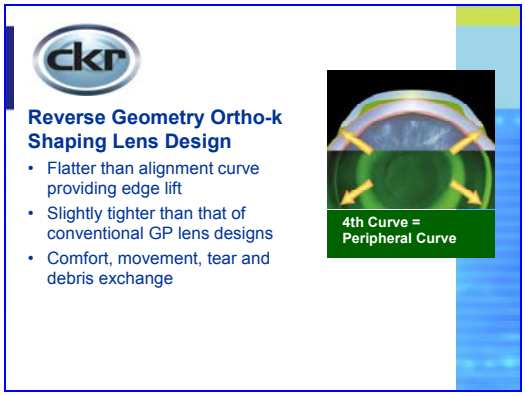
The third zone is the alignment zone.

This area is flatter than the reverse curve area and closely aligns the peripheral cornea providing a bearing zone to help the lens to center.

Its main function is the optimizing of lens centration.

The fitting relationship can be modified by altering the angle or radius of the curve or curves, thus improving the lens centering characteristics.

It is generally 1.0 to 1.5mm wide depending on the lens design.



The 4th curve or peripheral edge curve is flatter than the alignment curve, but slightly steeper than that of conventional lens designs, providing an edge lift adequate for lens comfort and movement, along with tear and debris exchange.

It is useful to understand the relationship between units such as microns, millimeters and diopters as these are the most commonly used to describe lens design.

Let's start the CKR Design Certification process. Here are the directions for completing your Answer Sheet.

- *Be sure to completely fill-out the personal information at the top of the answer sheet. PLEASE PRINT LEGIBLY*
- *Choose the **best** answer from among those offered*
- *Mark your choice on the answer sheet by completely coloring-in the circle on the answer sheet*
- *If you decide to change your answer draw an "X" through the answer you do not want to be counted*
- *You will have approximately 30 seconds to complete each of the questions.*

Question 1: In which direction are the fluids and cells compressed or redistributed when a vision shaping treatment lens is worn?

a. From the center toward the periphery
b. From the anterior toward the posterior
c. From the periphery toward the center
d. From the posterior toward the anterior

Question 2: What is the value of topography in the course of ortho-k treatment?

a. It has limited or no value in the ortho-k treatment process.
b. It is only required for choosing the initial ortho-k shaping lens in some fitting systems.
c. Whether used for choosing the initial ortho-k shaping lens or not, topography is necessary to monitor the entire ortho-k treatment effect process.
d. It is used in conjunction with keratometry to determine the initial ortho-k shaping trial lens or the first shaping lens to be ordered.

Question 3: What is the function of the second fitting/reverse curve of the ortho-k shaping lens?

a. To provide optical correction
b. To promote movement of the ortho-k shaping lens across the cornea
c. To aid the forces controlling ortho-k shaping lens centration
d. To allow fluid and cell "movement," which promotes mid-peripheral corneal thickening

Question 4: What is the function of the third or alignment curve of the ortho-k shaping lens?

a. To promote edge lift
b. To stabilize the ortho-k shaping lens and promote optimal centration
c. To link the back optic zone radius (BOZR) to the reverse curve
d. To minimize movement of the ortho-k shaping lens

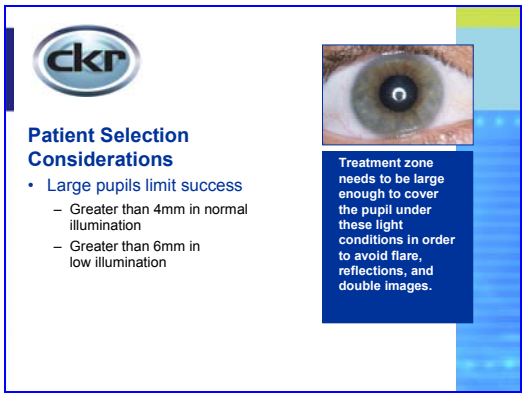
Let's discuss which patients are best suited for overnight orthokeratology.

The range of myopic correction reduction approved with Vision Shaping Treatment is -1.00D to –5.00 diopters.

The most successful ortho-k candidates are moderate to low level myopes whose corneal shapes have "e" values of 0.5 and higher, an apical radius measurement between 40.00 and 46.00 diopters and corneal diameters greater than 11.00mm.

Beware of those patients with higher amounts of myopia, low corneal eccentricity measurements and flat corneas. Against the rule astigmatism greater than three quarters of a diopter can also be problematic, in that this reshaping process may induce even higher amounts of against the rule astigmatism. These types of patients may not be as well-suited for vision shaping treatment.

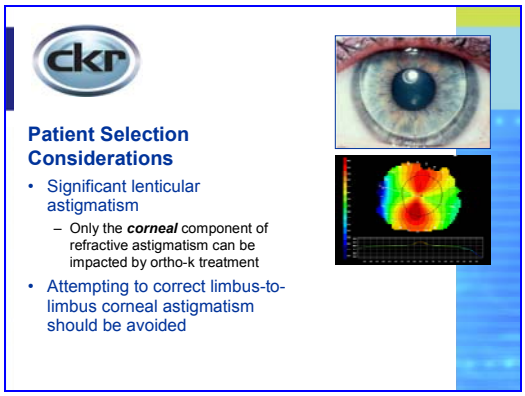
Also, proceed with caution with previous GP and PMMA lens wearers. These patients should remain out of their lenses until the corneal and refractive measurements have stabilized, often 2 to 4 weeks or more.



Evaluate the pupil size accurately in both normal and dim illumination.

Depending on the amount of attempted myopic reduction, the expected treatment area in overnight orthokeratology is usually 5 to 6mm in size.

Therefore, patients with pupils greater than 5mm in normal illumination and/or greater than 6mm in low illumination may not be suitable candidates. Large pupils may result in haloes, glare, or peripheral distortion in dim lighting conditions.



The effectiveness of ortho-k treatment is reduced where there is significant internal or lenticular astigmatism.

Note any potential residual astigmatism by comparing the cylinder component of the spectacle Rx to the amount of corneal astigmatism measured by central keratometry. Since vision shaping treatment affects corneal astigmatism only, avoid cases where residual astigmatism may be greater than 0.75D.

Also, limbus-to-limbus corneal astigmatism may result in a less effective ortho-k procedure. In these cases the fitting relationship is altered in the periphery and lens rocking may occur. Visually, the net result is that full myopic reduction is not achieved or the treatment regresses quickly.

It is advisable to avoid those patients that have any active ocular infections.

Patients with severe corneal irregularity from injury, surgery or a condition such as keratoconus or a corneal dystrophy should also be avoided.

Also note patients who have demonstrated an allergic response to lens care products that would be used in vision shaping treatment.

Question 5: What is the generally accepted maximum "against-the-rule" astigmatism that can be attempted with ortho-k fitting?

A. - 0.75 Diopters
B. - 2.75 Diopters
C. - 0.25 Diopters
D. - 1.75 Diopters

Question 6: What is the maximum amount of myopic reduction that Vision Shaping Treatment is approved for by the FDA?

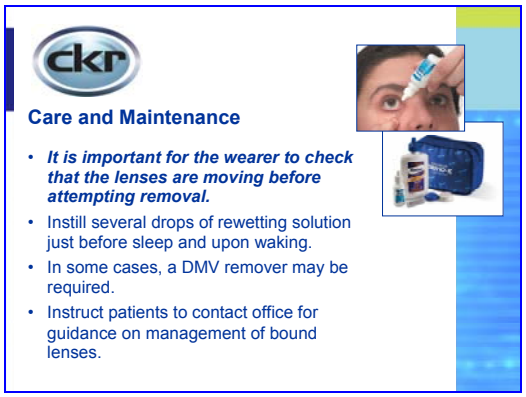
a. 10.00 Diopters
b. 8.00 Diopters
c. 5.00 Diopters
d. 2.00 Diopters

Question 7: Why may patients with large pupils experience problems with ortho-k?

a. The treatment zone will not be large enough and will cause visual problems.
b. The treatment zone will be too large and will cause myopic regression.
c. The treatment zone will be too large and will cause night-time blur.
d. The treatment zone will not be large enough and will cause lens decentration.

Question 8: Why is lenticular astigmatism a potential problem when fitting ortho-k shaping lenses?

a. Ortho-k shaping lenses are only produced with a back surface cylinder correction.
b. Ortho-k shaping lenses always cause a decrease in the cylinder correction.
c. Ortho-k shaping lenses only impact corneal astigmatic changes.
d. Ortho-k shaping lenses are difficult to manufacture.



Patient compliance is an important factor in the success of Vision Shaping Treatment patients. Here are a few important tips.

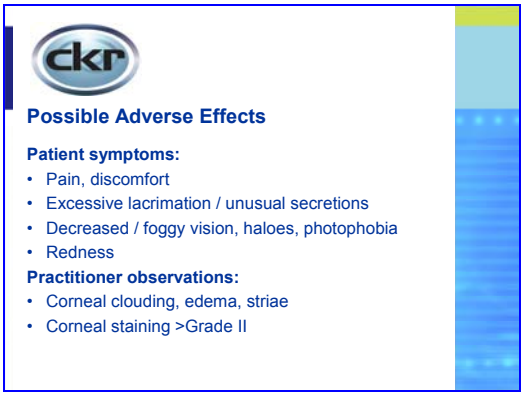
There is no need to remove the shaping lenses if awoken during the night - but upon awaking in the morning it is advisable that patients instill a few drops of the recommended rewetting solution and wait a few minutes before attempting to remove their lenses.

Of greatest importance is that the patient should check that the shaping lens is moving prior to lens removal.

While removal of Vision Shaping Treatment lenses is usually not a problem for the patient, in some cases, due to the larger lens diameter, it may be necessary to employ the use of a DMV lens remover.

Be sure to advise your patients to contact your office if they have difficulty removing the lenses.

Also, remind the patient to use only the recommended approved GP lens care products with their Vision Shaping Treatment lenses.



Patients should be advised to discontinue reshaping lens wear and call your office immediately if they experience pain, discomfort, excessive tearing or any of the other symptoms described on this slide.

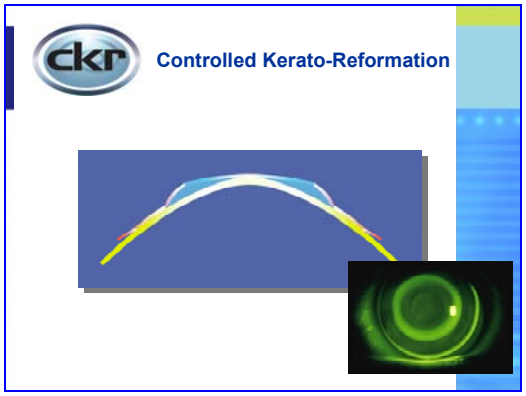
Vision shaping treatment should also be discontinued if you observe any corneal hypoxia or staining greater than Grade 2.

Question 9: Which patient symptoms with vision shaping treatment are of most concern to the contact lens practitioner?

a. Comfortable wear of the ortho-k shaping lens and facial redness
b. Lid twitching and loss of lashes
c. Pain, lacrimation, redness, photophobia
d. Inability to sleep and sweating

Question 10: What is the most important observation that the wearer should make prior to attempting removal of their ortho-k shaping lenses after waking?

a. Check for mucus build-up in the nasal canthus
b. Check for adherence of the ortho-k shaping lens to the cornea
c. Check for redness around the limbus
d. Check for excessive discomfort in the eye



Now that we have discussed some general principles regarding Vision Shaping Treatment let's look at the details of how the CKR™ lens design works.

CKR stands for Controlled Kerato-Reformation, a term first presented by Dr. Sami El Hage in 1978. CKR is a non-invasive procedure of molding the cornea in a highly controlled manner with the aid of photokeratoscopy.

Of course, today's computerized videokeratoscopy has taken the place of yesterday's laborious photokeratoscopy.

The patented CKR™ lens design is a continuous back aspheric design that can be fit by using diagnostic lenses or empirically based on corneal topography.

The topography method uses Focal Point software to aid in the calculation of lens parameters. The software also can show the lens profile and simulate the fluorescein pattern to refine the lens fit.

Parameter Availability

- ***Overall diameter*** 10.6mm standard (range from 9.6mm to 11.6mm)
- ***BOZR*** based on topography
- ***Reverse curve depth (invagination)*** 10-60µm
- ***Alignment curve (anchor curve)*** continuous asphere

The standard overall diameter of the CKR lens is 10.6mm, but diameters are also available from 9.6mm to 11.6mm.

The back optic zone radius, or base curve, will determine the amount of myopic reduction and is based on topography.

The reverse curve depth ranges from 10 to 60 microns and is referred to as the "invagination." The purpose of the alignment or "anchor" curve is to center the lens while the peripheral curve, a continuous asphere, provides the appropriate edge lift for the lens.

Typical CKR™ Design Parameters

- ***Overall diameter*** 10.6mm
- ***Back optic zone diameter (BOZD)*** 6.0mm
- ***Reverse curve depth (invagination)*** 30µm
- ***Alignment curve*** Slope 3
- ***Edge lift*** 110µm
- ***Lens power*** +0.75D

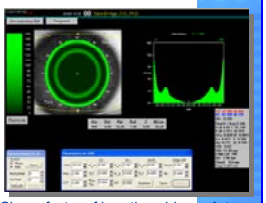
A typical CKR lens will have an overall diameter of 10.6mm with a 6.0mm back optic zone diameter or BOZD. It will also incorporate an invagination or reverse curve depth of 30 microns, an anchor or alignment curve slope of 3, and an edge lift of 110 microns.

The base curve or BOZR is designed to provide a -0.75D tear lens in the flatter meridian of the cornea. The lens power is, therefore, always +0.75D.

The lens may be designed from computer software with the Optivision EH-300 Corneal Map Computerized Corneal Topographer or with the use of a diagnostic lens set.

CKR™ Lens Fitting Software Nomogram

- Target myopia reduction
- Shape factor of cornea and lens (asphericity)
- BOZR and BOZD
- Width and height of reverse curve
- Location of anchor (landing) zone
- Edge lift
- Overall lens diameter



Shape factor of less than 1 is ***prolate***
Shape factor of 1 or more is ***oblate***

The CKR Lens Fitting Software Nomogram utilizes the following criteria to determine the initial lens parameters: Target myopia reduction, the shape factor of the cornea and the lens, the back optic zone radius and back optic zone diameter, width and height of the invagination or reverse curve, location of the anchor or landing zone, edge lift and the overall lens diameter.

The shape factor describes the asphericity of the cornea. If the shape factor is less than 1, the cornea is prolate, or on the steep side of an ellipse. If the shape factor is 1 or more than 1, the cornea is oblate, or on the flat side of an ellipse. When fitting ortho-k lenses like the CKR lens, the goal is to flatten the cornea to reduce the amount of myopia. Therefore, the goal is to take a prolate cornea and create more of an oblate surface.

Question 11: If the shape factor of the cornea is prolate, it is:

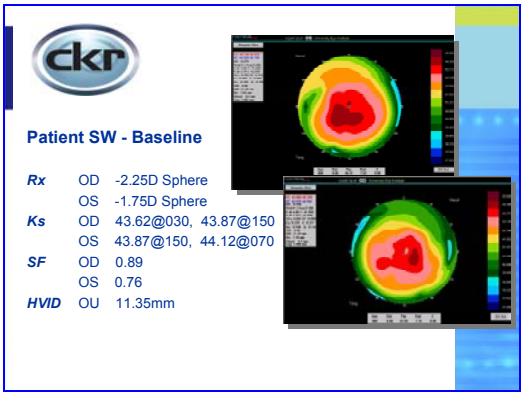
a. On the steep side of an ellipse
b. On the flat side of an ellipse
c. Round
d. Elliptical

Question 12: A shape factor that is 1 or more is:

a. Prolate
b. Oblate
c. Round
d. Steep

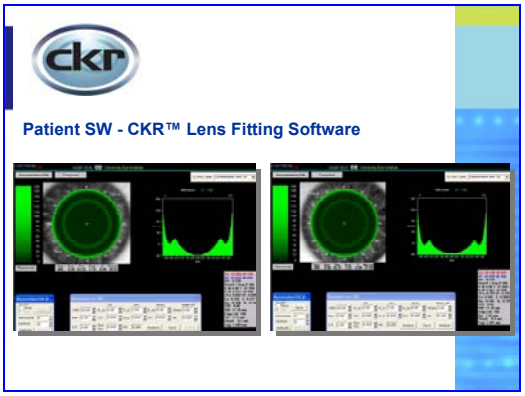
Question 13: The process of orthokeratology changes the cornea from:

a. an aspheric surface to a spherical surface
b. a prolate ellipse to an oblate ellipse
c. an oblate ellipse to a prolate ellipse
d. an elliptical surface to a parabolic surface



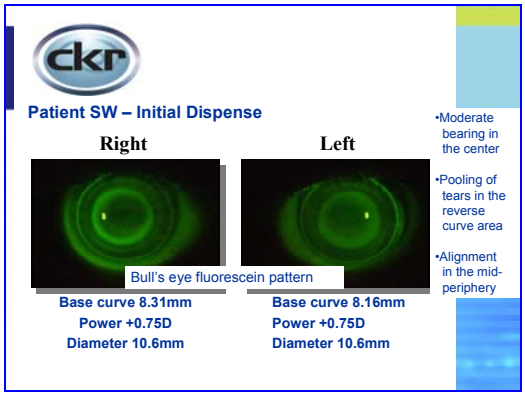
Let's look at a case history to demonstrate how the fitting process for CKR works. Two very important factors in myopia reduction are the corneal curvature and the asphericity of the cornea and the most reliable way to determine these two characteristics is through computerized corneal topography since central and even peripheral K readings do not provide a true eccentricity value or shape factor for the cornea. And certainly corneal topography is the best way to monitor what is really happening to the corneal surface during orthokeratology treatment.

This patient, SW, has a baseline Rx of -2.25D sphere for the right eye and -1.75D for the left eye. K readings were 43.62 @ 30 / 43.87 @ 150 and 43.87 @ 150 / 44.12 @ 70. The shape factor or SF is very similar between the two eyes - 0.89 for the right eye and 0.76 for the left. The patient's horizontal visible iris diameter or HVID is 11.35mm. Everything here indicates a good candidate for CKR lenses.



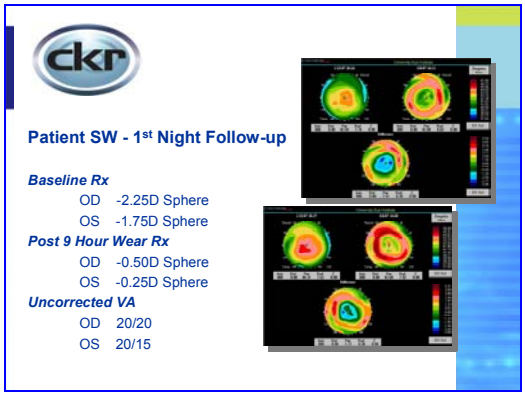
This patient is then fit with CKR lenses with the use of corneal topography and the CKR fitting nomogram.

The lenses are calculated with the software and then electronically ordered from the manufacturer with no diagnostic or trial lenses necessary.



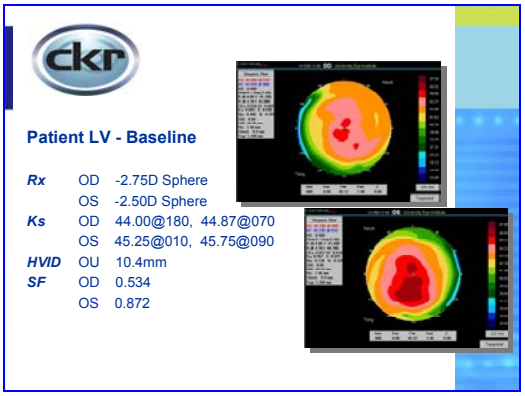
At the initial dispensing, the hoped for "bulls eye" fluorescein pattern was achieved. This shows moderate bearing in the center of the lens, a pooling of tears in the area of the reverse curve and alignment in the mid periphery.

While the lenses are positioned slightly low on the cornea, an excellent result was obtained after just one night of wear. It is important, however, to note that if a lens remains in a decentered position overnight, an uneven refractive change and irregular astigmatism may result.



Let's look at the patient findings the first morning after overnight wear. After wearing the CKR lenses for nine hours, the patient's uncorrected acuity in the right eye is -0.50D and the left eye it is -0.25D. The uncorrected visual acuity is 20/20 in the right eye and 20/15 in the left.

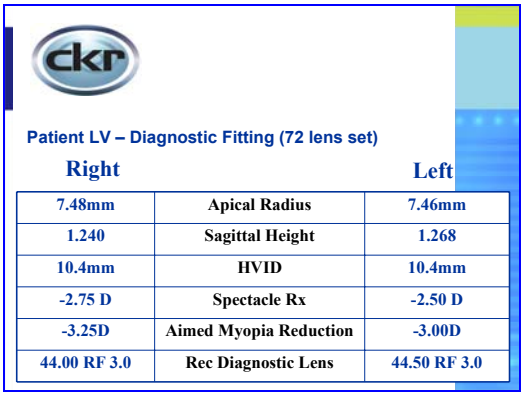
The graphics here show the difference plot before and after CKR with good centration and good visual acuity.



Let's look at a second case. Patient LV has a baseline Rx of -2.75D in the right eye and -2.50D in the left. Ks are 44.00 @ 180 / 44.87 @ 70 in the right eye and 45.25 @ 10 / 45.75 @ 90 in the left.

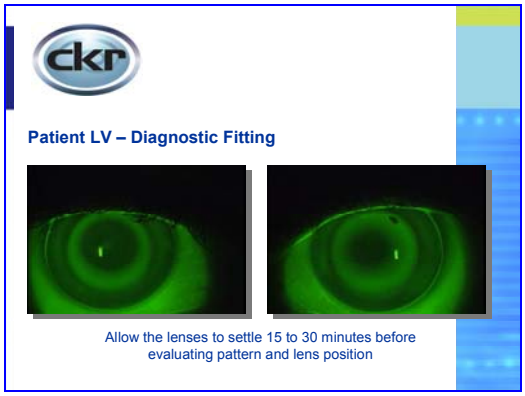
The patient's horizontal visible iris diameter is 10.4mm and the shape factor is 0.534 and 0.872. In this case the shape factors between the two eyes are very different.

Remember, the lower the number, the steeper the curve. The left eye is more prolate or steeper in curve than the right eye.



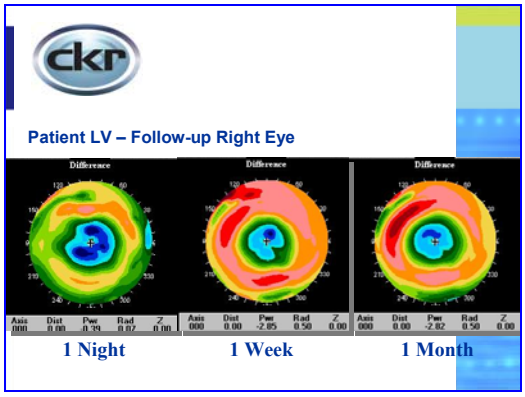
CKR lenses can also be fit from a diagnostic set usually made up of 72 lenses. The diagnostic lens is chosen based on the flat K reading and aimed myopia reduction or AMR which in the right eye example above results in a diagnostic lens of 44.00D with an AMR of 3.00.

Ideally this diagnostic lens should center. A well centered lens is perhaps the single most important element in obtaining a successful orthokeratology result.

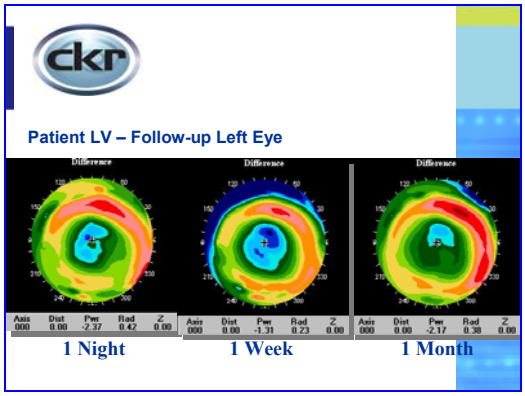


Place the diagnostic lenses on; allow them to settle for 15-30 minutes then evaluate for positioning and fluorescein pattern.

The initial lenses on this slide show a bulls-eye fluorescein pattern and lenses positioned slightly inferior. These can be dispensed for next morning evaluation.



Corneal topography is the most definitive method of determining how well the lens is centered during treatment. If we take a look at the corneal topography for the right eye, we can see how well the lens is centered at day 1, week 1 and at the end of the first month.



Corneal topography for the patient's left eye also demonstrates good centration after one night and one week. At four weeks the lens was still centered, but

not quite as well as it was before. Applying a drop of artificial tears in gel form before sleeping will help to create a more centered treatment zone.

Patient LV – Follow-up

	Baseline	1 Week	1 Month
OD	-2.75D Sphere	Plano UCVA: 20/20	+0.50D Sphere UCVA: 20/15-2
OS	-2.50D Sphere	Plano UCVA: 20/15	Plano UCVA: 20/15-2

As we can see here, the patient is seeing 20/20 or better after just one week of wearing CKR lenses and the vision continues to improve during the first four weeks.
Let's take a moment to make sure that the information is clear by answering a few questions.

Question 14: The single best way to monitor corneal curvature changes secondary to orthokeratology is by:

a. performing a post-wear refraction
b. taking keratometry readings
c. performing computerized corneal topography
d. doing a careful slit lamp examination

Question 15: When screening patients for CKR, which of the following patients would be considered an excellent candidate?

a. Rx of -2.00 DS with central flat "K" of 40.00 D.
b. Rx of -2.00 DS with central flat "K" of 44.00 D.
c. Rx of -2.50 DS with 2.00D of ATR corneal astigmatism
d. Rx of -2.50 DS with internal astigmatism of 1.25D

Question 16: The single most important concept in obtaining a successful orthokeratology result is..

a. to always order base curves 3.00 D. flatter than the corneal topographer's equivalent K-readings.
b. to always have the patient wear the lenses on an overnight basis.
c. to keep the lenses well centered.
d. to always use high DK materials for your lens designs.

Follow-up Visits

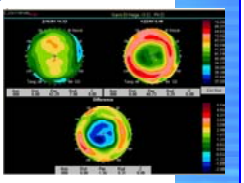
- Unaided visual acuity
- Refraction for BCVA
- Slit-lamp examination
- Corneal topography
- Record time of visit
  - Time lenses worn
  - Time lenses off

During a patient's follow up visit, there are a number of evaluations and tests that should be performed. Without the CKR lenses being worn it is important to evaluate the patient's unaided visual acuity accompanied with the refraction to achieve the best corrected visual acuity.

A slit lamp examination should be performed, corneal topography taken and at the time of the visit, the amount of time the lenses were worn as well as how long they've been out of the eye prior to the visit should be noted.

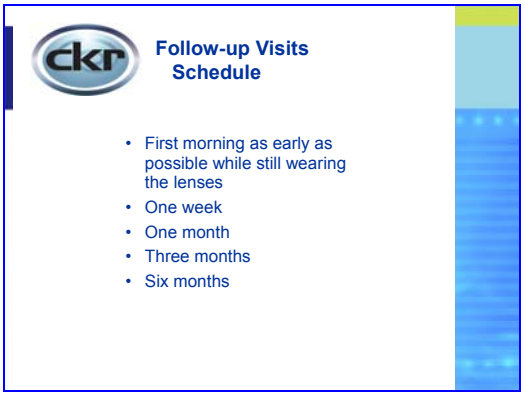
Follow-up Visits
Corneal Topography

- Utilize the follow-up topography maps
- Subtractive or difference maps can help to monitor progress
- Maps are the best way to visualize how well the CKR lenses are positioning on the cornea



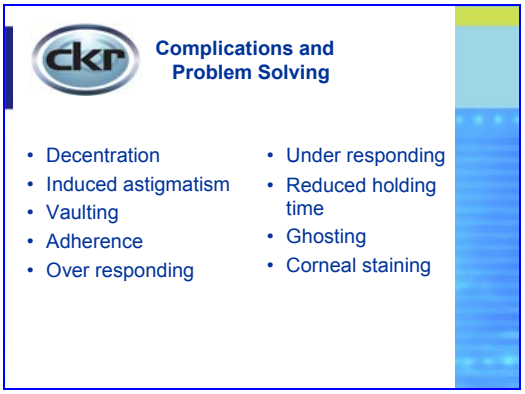
Corneal topography, as we discussed earlier, is a very important part of the follow-up for any orthokeratology lens design.

Utilize the follow-up maps found on the topography system to visualize the difference between the patient's corneas pre and post treatment. Subtractive or difference maps can help to make certain the corneal changes are as expected. The maps are also the best way to visualize how well the CKR lenses are positioning on the cornea.



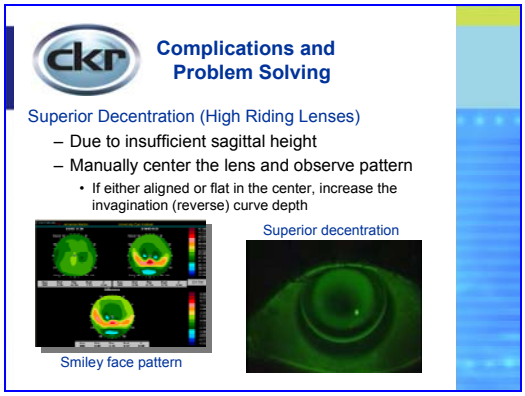
While the CKR lens can show a successful outcome as early as the next morning, it is still important that the patient is followed throughout the 6 to 12 months to make certain that the results remain positive.

A suggested follow-up schedule includes a visit the first day after overnight wear, which should take place as early as possible in the day while the patient is still wearing the contact lenses. The next follow-up would typically take place one week later, one month later, at three months and then at six months providing there are no changes made to the lens fit or design.



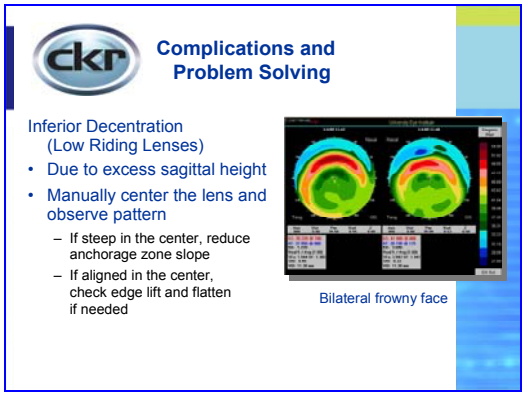
The fitting process for CKR is quite straightforward, but occasionally the individual patient response may not be exactly as predicted.

Let's review some the potential fitting complications and how they may be solved. We'll look at decentration, induced astigmatism, vaulting, adherence, over responding, under responding, reduced holding time, ghosting and issues involving corneal staining.



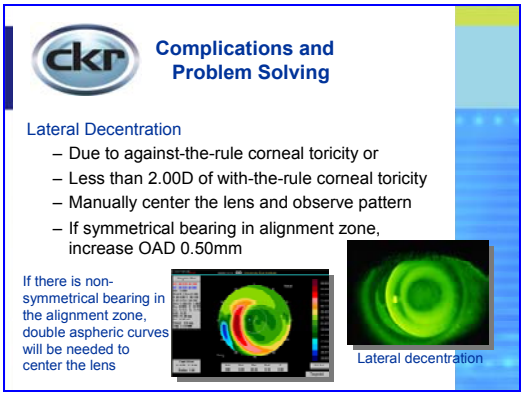
In the case of decentration in the superior direction or high riding lenses, this may occur because there is insufficient sagittal height. To evaluate, manually center the lens and observe the fluorescein pattern.

If the pattern in the center of the lens is either aligned or slightly flat when the lens is centered increase the invagination or reverse curve depth.



If the lens decenters inferiorly, and is a low rider, this is due to excessive sagittal height. In this case, once again manually center the lens on the patient's cornea by manipulating it upward.

If the central portion of the lens shows a steep pattern, the anchorage zone slope should be reduced. If, however, when manually recentered, the central pattern looks appropriate, then pay attention to the edge lift and flatten it to loosen the lens fit.



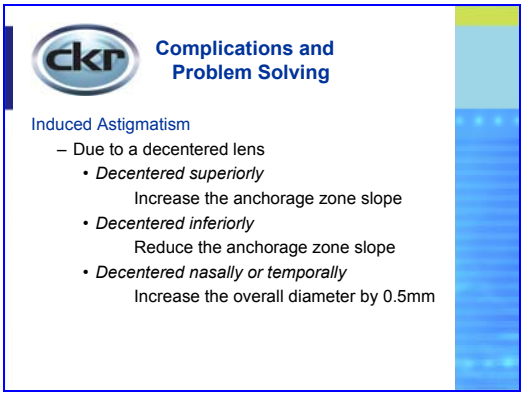
What if the lens is decentered laterally?

This may happen when the patient has against-the-rule corneal toricity or more than 2.00D of with-the-rule astigmatism. If the lens is decentered laterally, manually center the lens on the patient's cornea. If there appears to be symmetrical bearing in the alignment zone, increase the overall diameter by 0.50mm to improve the centration.

Here's another question.

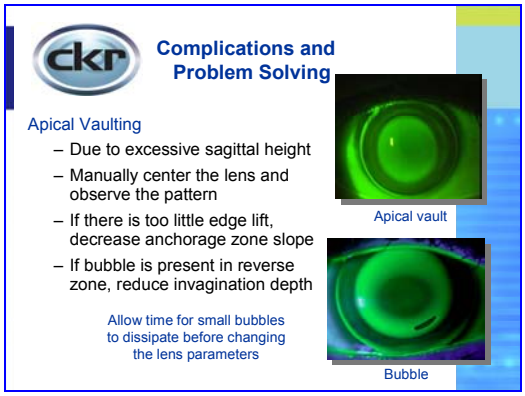
Question 17: If an ortho-k lens is decentering laterally and demonstrates a good "bulls-eye" pattern when manually centered, you should…

a. flatten the base curve
b. decrease the overall diameter
c. increase the overall diameter
d. increase the edge lift



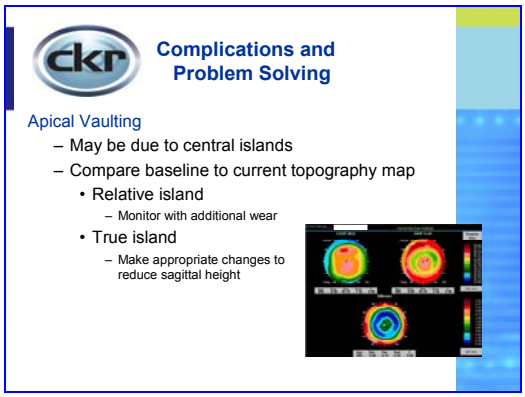
Induced astigmatism is another condition that a patient may present with during follow-up. This astigmatism occurs when a lens decenters.

If the lens is decentering superiorly, the anchorage zone slope should be increased. If the induced astigmatism is because the lens decenters inferiorly, the anchorage slope should be reduced. And if the induced astigmatism is because the lens decenters nasally or temporally, the overall diameter of the lens should be increased by 0.5mm.



Apical vaulting is a result of excessive sagittal height. When the lens is manually recentered, if there is too little edge lift, the anchorage zone slope should be decreased. If a bubble is present in the reverse zone, as you can see here in the photo, reduce the invagination depth.

It is important to keep in mind that small bubbles may occasionally get trapped in the reverse zone, so before the lens is changed first manually move the lens and ask the patient to blink a few times to see if the bubbles go away on their own.

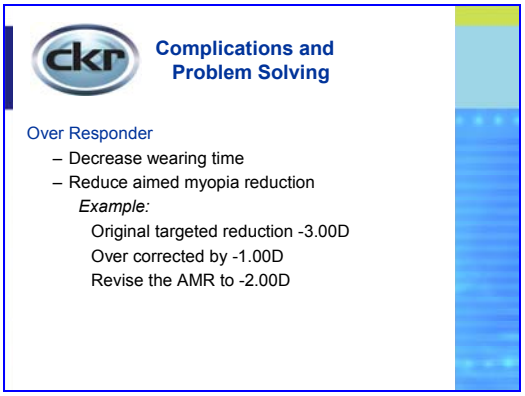


Another reason for apical vaulting may be because of central islands that can be viewed on corneal topography. If this is the case, compare the baseline topography to the current topography.

If the island is relative – meaning the central cornea has flattened as expected except for this area, then it should simply be monitored as the patient continues to wear the lenses. If it is a true island and steeper than the original corneal shape then changes should be made to reduce the sagittal height of the lens by either reducing the BOZR or decreasing the back optic zone diameter

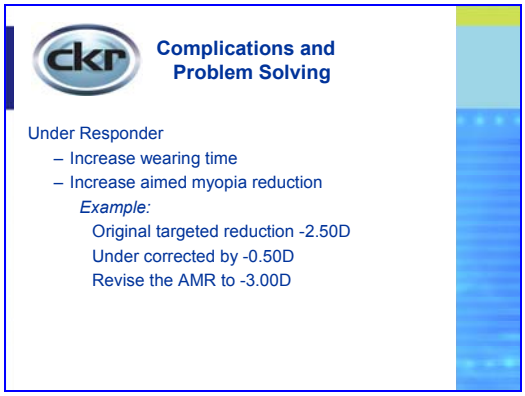
Lens adherence is another issue that may need to be addressed on follow-up.

If there is no movement when the lens is evaluated during a slit lamp exam, it is first important to rule out the presence of a dry eye. If the patient's eyes have adequate tear film then decreasing the anchorage zone slope, flattening the peripheral zone by 0.50D or reducing the overall diameter are all possible steps that can be taken to flatten the lens to cornea relationship and resolve the adherence.



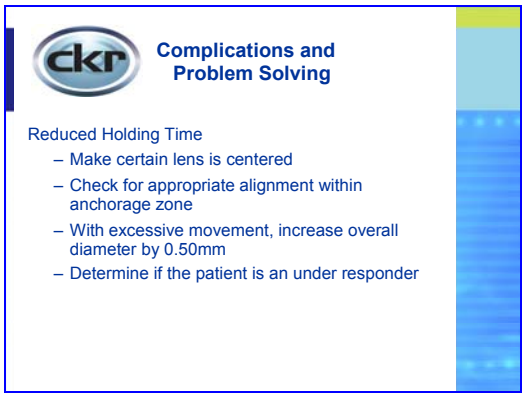
Some patients may actually over respond to the treatment and more than the expected amount of myopia will be corrected. If that is the case, reducing the wearing time is one step toward correcting this problem. If that isn't possible, reduce the aimed myopia reduction.

For instance, if the original targeted reduction was -3.00D and the patient is overcorrected by 1.00D then revise it to -2.00D.



The opposite is true if the patient isn't able to get the full correction when wearing well fit CKR lenses. If that is the case, the first step would be to increase the amount of wearing time. If more wearing time doesn't result in the desired correction, increase the aimed myopia reduction amount.

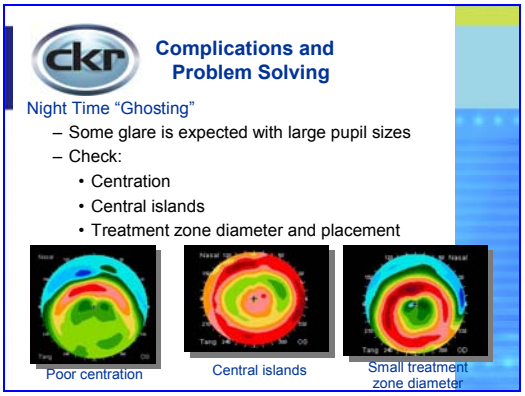
For example, if the targeted reduction is -2.50D and the patient still has -0.50D undercorrected revise the AMR to -3.00D and reorder a new lens.



When the patient's myopic reduction doesn't hold for an acceptable amount of time there are a few things that should be checked that can remedy the situation.

First, make certain that the lens is centered on the cornea. Make sure that there is appropriate alignment within the anchorage zone. If there is excessive lens movement, increase the overall lens diameter by 0.50mm.

Finally, determine if the patient is an under responder. If that is the case, follow the suggestions we just covered to help the patient attain a better end result.

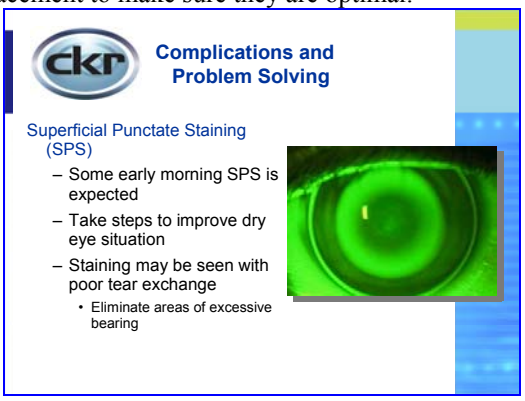


Nighttime ghosting can also be a symptom that patients present with during a follow-up visit.

Patients with large pupils will be more susceptible to this complication than those with small to average pupils, simply because their pupils are too large for the treatment area. If pupil size is not an issue, you can reduce nighttime ghosting by checking the centration of the lens.

If the lens is decentered, follow the steps we've outlined to improve the position of the lens. The presence of central islands can be determined through corneal topography and if they are found, steps to eliminate them should be followed.

Finally, evaluate the treatment zone diameter and placement to make sure they are optimal.



Superficial punctate staining or SPS may be evident when the patient returns for follow-up.

It is first important to understand that some staining is expected in the early morning. So, minimal amounts that clear as the day progresses may be a normal finding. The presence of dry eyes should be ruled out and if it is determined that the SPS is a result of dryness, then incorporating artificial tears or lubricating drops will improve not only the staining, but the patient's comfort.

Of course, there are some patients who will show evidence of superficial punctate staining due to a lens fit that inhibits tear exchange underneath the lens. If this is the case, look for areas of excessive bearing and take steps to eliminate them.

Let's work through some more questions.

Question #18: If a patient is complaining of haloes and glare at night, what changes may you make to enlarge the treatment zone?

a. Steepen the base curve of the lens
b. Reduce the reverse curve height flattening the curve
c. Reduce the edge lift
d. Make the overall lens diameter larger

Question #19: Which of the following answers would you choose? If a CKR lens adheres to the cornea, ...

a. evaluate the patients' tear film and lids and treat any abnormal conditions
b. flatten the base curve
c. steepen the base curve
d. Both "a" and "c" are correct

Question 20: Your patient has been wearing an unknown brand of ortho-k lens for 1 year. The lens rides high, you find 2.00D of refractive astigmatism and corneal topography shows a "smiley face". You should …

a. steepen the base curve.
b. flatten the base curve.
c. reduce the sagittal height of the lens.
d. discontinue lens wear until the cornea recovers and start over.

The CKR lens design is a clinically proven, non-surgical means of myopia management. It is safe, there are very few complications and unlike refractive surgery, it is reversible when lens wear is discontinued.

The CKR lens is easy for candidates to adapt to since the lenses are only worn on an overnight basis and there is no need for daytime wear of corrective lenses, either contact lenses or eyeglasses.