Welcome to Global-OK Vision & ArtMost Vision Seminars

Basic Optics of Orthokeratology

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Orthokeratology

- Planned corneal molding with RGPs
- Hydraulic Push & Pull dual forces
- Epithelial and superficial stromal redistribution

Double Reverse Geometry Ortho-K lens

- B.C. Flatter than K. for 3~5 D
- Fitting Curve : 8 ~ 12 D steeper
- Alignment Curve 3 ~ 5 D steeper
- Bulls eye F.S. pattern
- 1~2 Pairs for -5.00 D

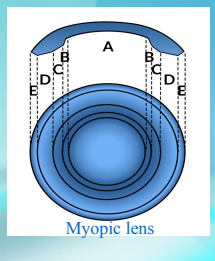
Basic 4-Curve OK Lens

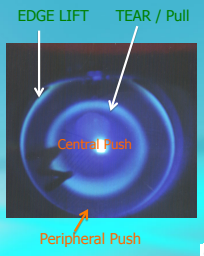
- Optical zone (BC, Base curve)
  - Central Push or Positive force
- Fitting zone (FC, Fitting curve)
  - Connecting OZ & AZ
  - Pull or Negative force
  - Space for tear & tissue redistribution

Basic 4-Curve OK Lens

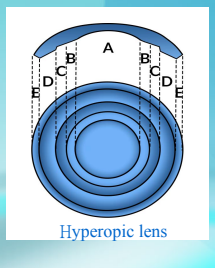
- Alignment zone (AC, Alignment curve)
  - Peripheral Push force
  - Adhesive force for centration
- Peripheral zone (PC, peripheral curve)
  - Form edge lift
  - Tear pumping

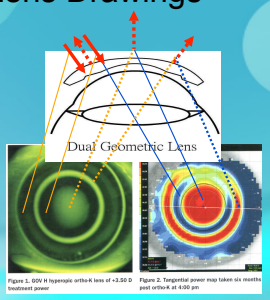
Myopic Lens Drawings





Hyperopic Lens Drawings





Optical zone & Base curve

- K-code → define LSD or lens tightness
- Power-code →define Target Power
- Over target → Ensure sufficient reduction
  - -0.25 ~ -1.00: = Target power
  - -1.25 ~ -5.00: +1.25
  - -5.25: +1.75
  - ≥ -5.50: +2.00
  - Hyperopia: -0.75

Optical zone & Base curve

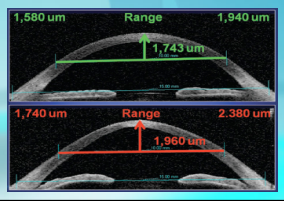
- Determine B.C. by
  - BOZR (D) = K-code – (Target power + Over target)
    - Vertex Target power
    - Available from B.C. table
  - Compensate Over target in front (Lens power)
  - eg. / K-code = 44.0 / Power-code = -3.00
    - B.C.= 44 – Vertex (3.00) - 1.25 = 39.85D (8.47mm)
    - Lens power = +1.25
- Optical zone: 5.2 ~ 6.0mm

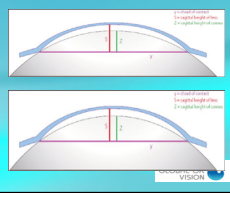
Fitting Sagittal Depth (SD)

- Corneal contour reconstruction (KSD)

  KSD : R_0 & eccentricity
- Determine lens sagittal depth (LSD)

  LSD = KSD + Tear allowance

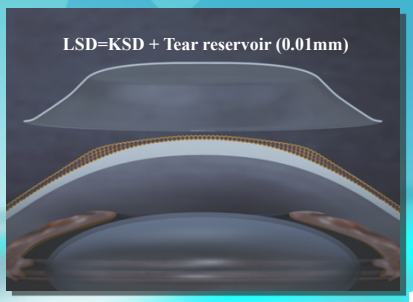




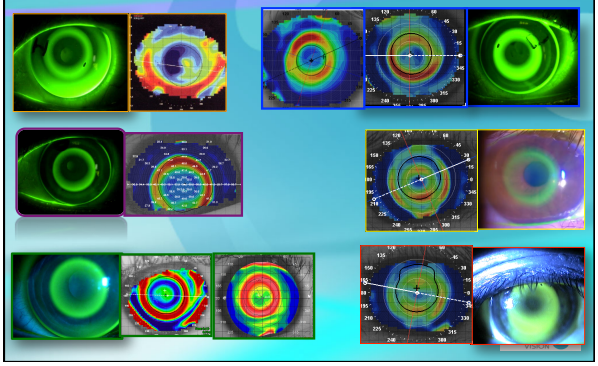
E-value & R_0 for KSD

R_0 \ e	e=0.4	e=0.5	(per 0.1 e-value)
43.00	1.727	1.691	0.036 mm
43.25	1.740	1.703	0.037 mm
43.50	1.751	1.713	0.038 mm
43.75	1.765	1.726	0.039 mm
44.00	1.776	1.736	0.040 mm
44.25	1.787	1.747	0.040 mm
per 0.25D	0.012 mm	0.011 mm	Tolerable if <0.01

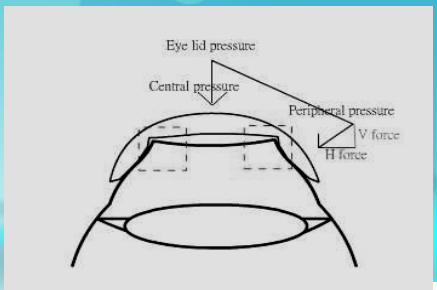
Matching LSD to KSD



Mismatch of LSD with KSD



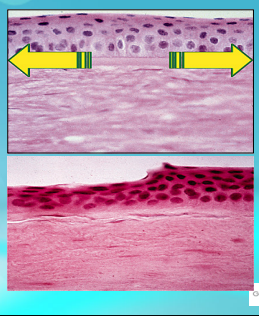
Hydraulic Massage



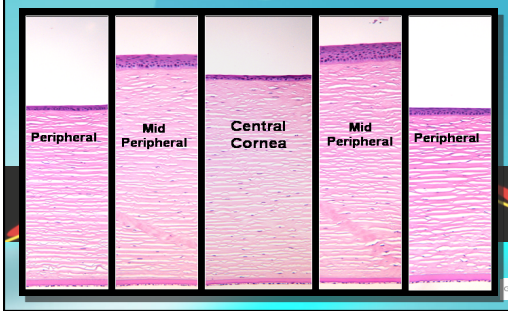
Tissue change

Before Ortho-k

After Ortho-k



Tissue change

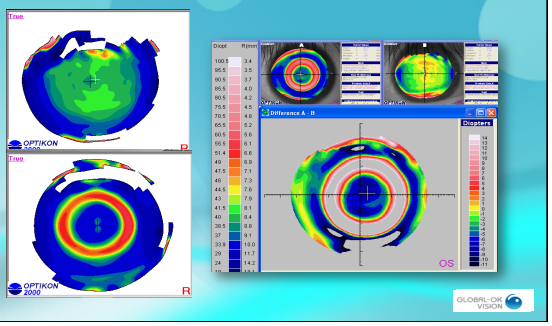


Reformulate Munnerlyn's formula

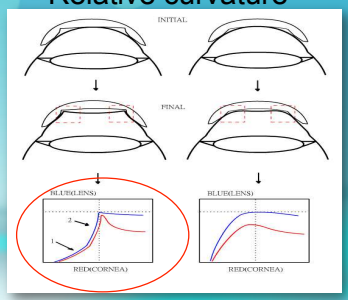
- *Tung's formula*:
  - Epithelial thinning = $(RD^2 / 3) * (1/2) = RD^2 / 6$

Target power	Munnerlyn's	Tung' s
3 D	4.5 mm	6.3 mm
4 D	3.9 mm	5.5 mm
6 D	3.2 mm	4.5 mm
8 D	2.7 mm	3.9 mm
10 D	2.4 mm	3.5 mm
12 D	2.2 mm	3.2 mm

Ortho-K Topography

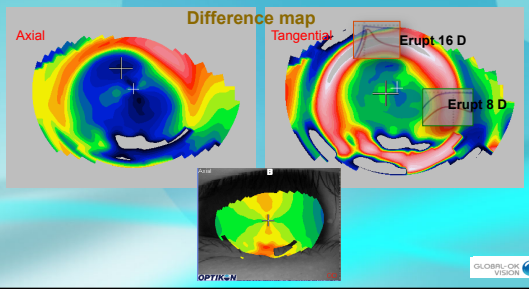


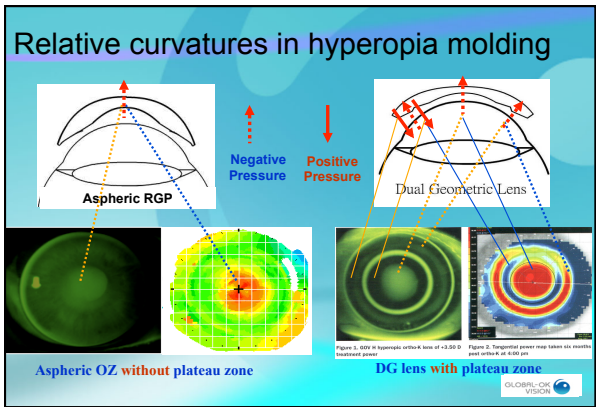
Steepen periphery to flatten center – Relative curvature

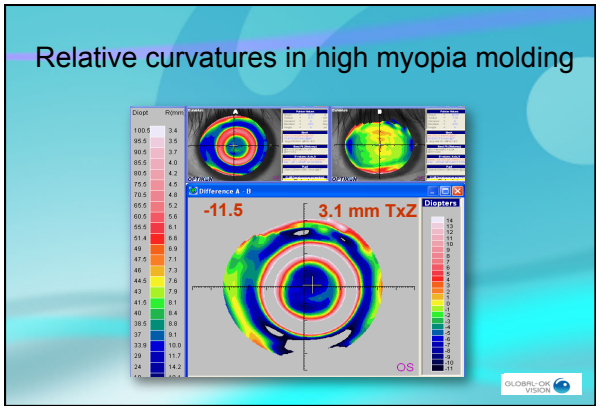


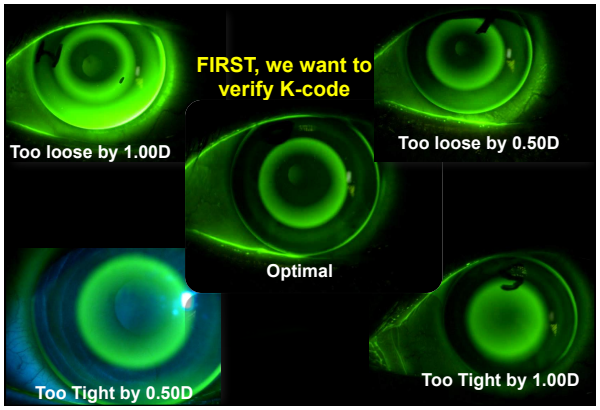
Relative curvatures in toric molding

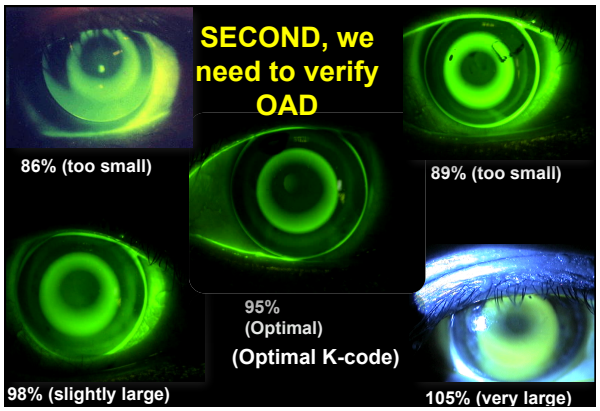
Does toric design help or pull back the peripheral eruption?

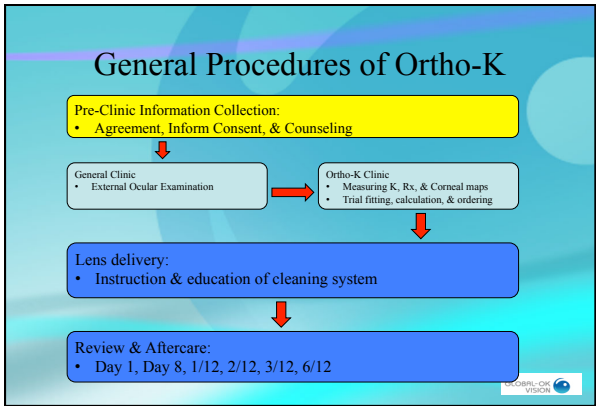


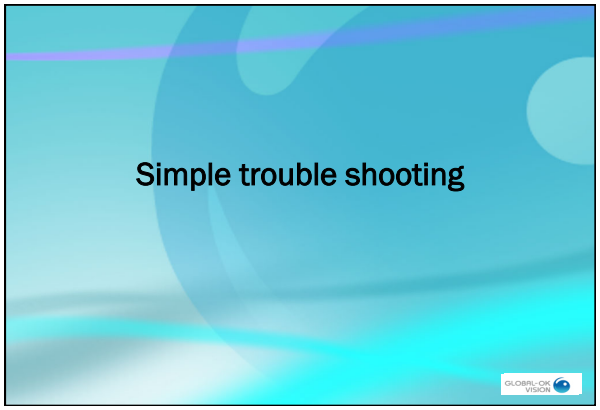

Relative curvatures in hyperopia molding
Aspheric RGP
Negative Pressure
Positive Pressure
Dual Geometric Lens
Aspheric OZ without plateau zone
DG lens with plateau zone


Relative curvatures in high myopia molding
-11.5
3.1 mm TxZ
Diopters
OS

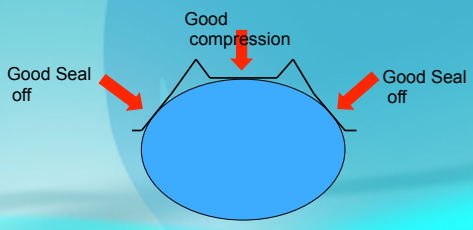

FIRST, we want to verify K-code
Too loose by 1.00D
Too loose by 0.50D
Optimal
Too Tight by 0.50D
Too Tight by 1.00D


SECOND, we need to verify OAD
86% (too small)
89% (too small)
95%
(Optimal)
(Optimal K-code)
98% (slightly large)
105% (very large)


General Procedures of Ortho-K
Pre-Clinic Information Collection:
• Agreement, Inform Consent, & Counseling
General Clinic
• External Ocular Examination
Ortho-K Clinic
• Measuring K, Rx, & Corneal maps
• Trial fitting, calculation, & ordering
Lens delivery:
• Instruction & education of cleaning system
Review & Aftercare:
• Day 1, Day 8, 1/12, 2/12, 3/12, 6/12

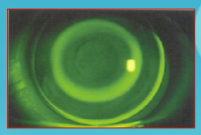

Simple trouble shooting

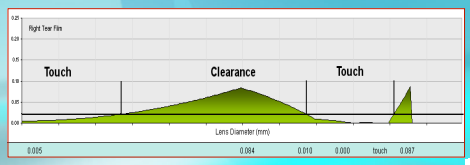
Aligned Fit



Ideal fit

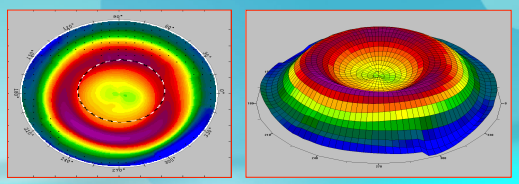
Ideal fit





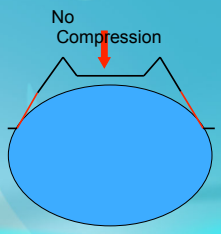
Trouble Shooting

Bull's Eye Pattern



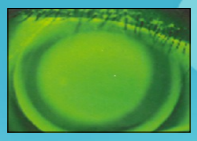
Too Steep Fit

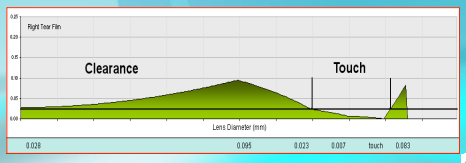
Steep Fit



Trouble Shooting

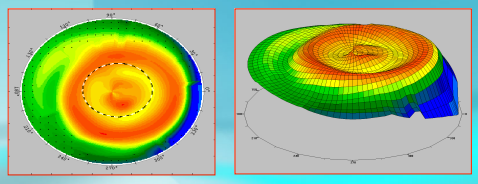
Central Islands





Central Island

Small areas of distortion along or near the visual axis



Central Island

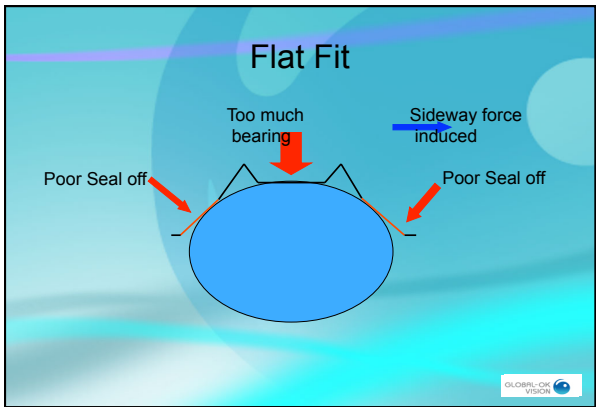
Cause:

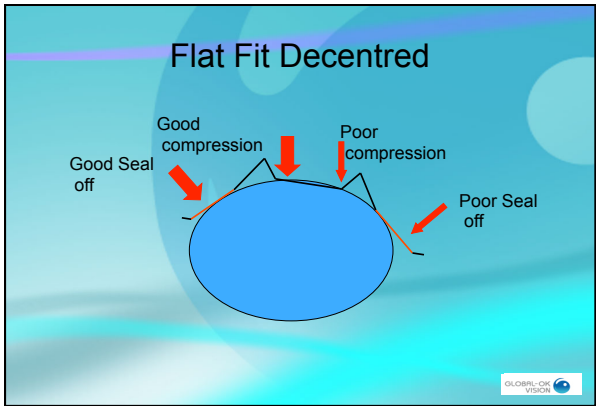
- Alignment curve too tight
- Excessive uncorrected astigmatism resulting in unequal forces on the cornea

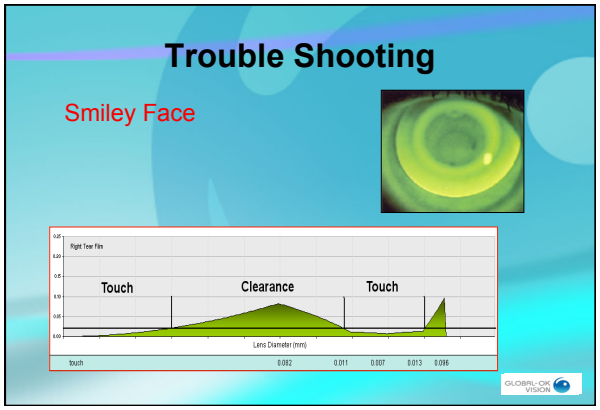
Solution:

- Decrease sagittal depth of lens by flattening alignment curve
  - move up the column
- Decentered lens must be centered
- Flatten the BC if caused by uncorrected astigmatism
  - move one column right.

Too Flat Fit


Flat Fit
Too much bearing
Sideway force induced
Poor Seal off
Poor Seal off

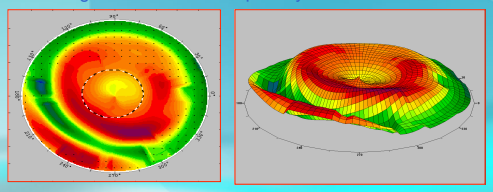

Flat Fit Decentred
Good compression
Poor compression
Good Seal off
Poor Seal off


Trouble Shooting
Smiley Face
Touch
Clearance
Touch

Flat Fit

Smiley Face

Flat fitting lens decentered superiorly



Flat Fit

Smiley Face

Cause:

- Alignment curve too loose

Solution:

- Increase sagittal depth of lens by steepening alignment curve
  - move down the column