

NCLE Basic Exam Review

Domain V: Diagnostic Fitting



Developed by the National Federation of
Opticianry Schools

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5:00 PM - 6:00 PM

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Mr. Steven B. Indelicato has no financial interests to disclose.

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I. RGP Fitting and Evaluation

A. Rigid Gas Permeable Materials:

- a. PMMA, CAB, Silicone/Acrylate, Silicone, FSA-Fluorocarbon Silicon Acrylate
- b. PMMA – 1947 – 1971
- c. Complications of PMMA-Corneal Edema, Overwear Syndrome, Corneal Anesthesia
- d. Why Gas Permeable? Reduce Corneal Edema, Corneal Warpage, Polymegethsim
- e. Advantages:
 - i. Crisper Vision
 - ii. More Durable than Soft Lenses
 - iii. Aftercare of lenses is easier
 - iv. No need to change lenses every year, lenses can be cleaned and polished
 - v. Patients are more loyal
 - vi. Stabilizes Myopia in teenagers and reduces “Myopic Creep”

B. Oxygen Permeability/Oxygen Transmissibility:

- a. $DK = \text{Oxygen Permeability}$
- b. $DK/L = \text{Oxygen Transmissibility}$
- c. Atmosphere = 21% Oxygen
- d. Thickness affects Oxygen Transmission

C. 1st Generation of GP's:

- a) Classified as Silicone Acrylate except CAB
- b) Boston II
- c) Paraperm O2
- d) Optacryl 60
- e) SGP
- f) Polycon I

D. Second Generation of GP's:

- a) Boston IV
- b) Paraperm O2+
- c) Optacryl K

- d) SGP II
- e) Polycon II

E. Third Generation of GP's - FSA – Fluorinated Silicone Acrylate

- a. Boston ES, EO, XO, RXD
- b. Paragon HDS, HDS 100
- c. Fluorperm 30,60,90,151 & Paragon Thin
- d. Fluorox 300,500,700
- e. SGP III

F. Fourth Generation of GP's

- a. Still classified as FSA - higher DK value, lower wetting angles and more manufacturing stability
- b. Optimum Classic, Comfort, Extra, Extreme
- c. Hybrid FS, Hydro 2, Menicon Z

G. Fitting GP Lenses

- a. Considerations should involve: DK Value, Wetting angle, and Specific Gravity, Tint Availability
- b. Many GP lenses today come with UV absorbers.
- c. **Procedure:**
 - i. Health History
 - ii. Refraction
 - iii. Pre-fitting examination with Slit Lamp
 - iv. Keratometry
 - v. Lens Options (Spherical Lenses, Toric Lenses) (Rigid or Soft?)
- d. **Methods:** Empirical & Trial Lens Fitting
- e. **Intrapalpebral Fitting:**
 - i. Use of Fitting Rules
 - ii. Fit “On K” or “Steeper than “K”
 - iii. Diameters 8.5 – 9.2
 - iv. Edges should be well tapered to minimize edge sensation with the upper lid

H. Parameters:

- a. When designing a spherical contact lens, the contact lens practitioner must have an understanding of how each of the above parameters may affect the fit of the contact lens.
- b. Concerns for a successfully fit contact lens: Vision, Comfort and not affecting Corneal Physiology

- c. **Sagittal Depth:** Measurement from the flat plane at a given diameter to the highest point of a concave surface of the contact lens – also described as the degree of corneal elevation for a given chord diameter
- d. Apical Vault = $S1 - S2$
 $S1$ = Sag of the Cornea
 $S2$ = Sag of the Contact Lens
- e. Apical Vault is formed because the radius of the cornea flattens outside the apical zone but the radius within the POZ remains constant.
- f. As long as the curvature of the cornea is less than the curvature of the contact lens, apical vault will be formed
- g. **CENTRAL POSTERIOR CURVE** – If the POZ is kept constant and the CPC is made steeper, Apical Vault is increased therefore lens movement is decreased forming a tighter fit. Ex. Change base curve from 7.80 to 7.70
Any change in the base curve requires a new lens.
- h. If the POZ is kept constant and the CPC is made flatter, Apical Vault is decreased therefore lens movement is increased forming a looser fit. Ex. Change 7.70 to 7.80
- i. **POSTERIOR OPTICAL ZONE** – If the CPC is kept constant and the POZ is made smaller, Apical Vault will be decreased and therefore increase lens movement. Ex. Change POZ from 8.0 to 7.0 *If you make the POZ smaller, this does not require a new lens and can be made by adjustment of the original lens.*
- j. If the CPC is kept constant and the POZ is made larger, Apical Vault will increase and therefore decrease lens movement. Ex. Change POZ from 7.0 to 8.0 *If you want to make the POZ larger, you have to order a new lens.*
- k. **Small POZ** → decrease sagittal value of the lens, decrease Apical Vault → increase lens movement → loosen the fit of the contact lens.
- l. **Larger POZ** → increase sagittal value of the lens, increase Apical Vault → decrease lens movement → tighten the fit of the contact lens.
- m. **DIAMETER** – As diameter increased, the POZ is usually increased accordingly. As this occurs, apical vault increases increasing therefore tightening the fit of the lens. *If you want to make the diameter larger this will require a new lens.*
- n. As diameter is decreased, the POZ is usually decreased accordingly. As this occurs, apical vault decreases and loosens the fit of the contact lens. *If you want to make the diameter smaller, this can be done by adjustment and does not need a new lens.*
- o. **THICKNESS** – As thickness decreases, surface tension will increase causing a tighter fit. As thickness increases, this will loosen the fit of the lens. *Any change in thickness requires a new lens.*

- p. **PERIPHERAL CURVES** – If peripheral curves are made wider, and will decrease the size of the POZ, apical vault will decrease which will loosen the fit of the contact lens. *Widening peripheral curves can be done by adjustment on the original lens. Peripheral curves cannot be made smaller and will require a new lens. If the fitter wants a larger POZ, a new lens will have to be ordered.*
- q. **POWER** – corrects the patient’s refractive error. In a minus lens, up to 1.00 D of minus can be added to the original lens with reordering a new lens. *It is recommended that no more than .50 D of power be added to an original contact lens.* For plus lenses, up to .50 D of power can be added to the original lens.
- r. When the contact lens fitter uses the terms **TIGHT** and **LOOSE**, this refers to movement of the lens.
- s. When the contact lens fitter uses the terms **STEEP** and **FLAT**, this refers to apical vault and the amount of tears under the lens. A lens that is tight is steep and a lens that is flat is loose. These terms also refer to the central lens corneal relationship that was discussed in previous lectures

I. Fittings:

a. Intrapalpebral Lens:

- b. Transpose Rx in minus cylinder
- c. Compensate for Vertex Distance $> +/- 4.00$
- d. Select a trial lens consistent with a fitting philosophy
- e. Usually On “K” or Steeper than “K”
- f. Ex:
- g. Given the following information: K’s 45.00/44.00 @ 90
- h. Rx -3.00 +1.00 x 180
- i. -2.00 – 1.00 x 90
- j. 44.00, -2.00 starting base curve and power if lens if fit on “K”
- k. Fitting an intrapalebral lens a base curve “on K” or steeper than “K” should be chosen

l. Superior Lid Alignment/Upper Lid Attachment:

- m. Transpose Rx in minus cylinder
- n. Compensate for Vertex Distance $> +/- 4.00$
- o. Select a trial lens consistent with a fitting philosophy

p. Diameter Lens Selection

- i. Lens Diameter is determined by:
- ii. Lid Position
- iii. Pupil Diameter
- iv. Palpebral Fissure Size

- v. Corneal Astigmatism (The greater the astigmatism, the smaller the diameter, the flatter the cornea, the larger the diameter)
- vi. HVID – measure the cornea – Does the patient have a small, average or large cornea?

J. HVID Measurement

- a. Large Cornea > 12 mm – Choose a 9.5 or >
- b. Average Cornea (10.5 – 11.5) – Choose between a 9.2 – 9.4 Diameter
- c. Small Cornea < 10 mm – Choose a 8.8 – 9.0 Diameter

K. SAM – FAP

a. Steeper Add Minus

- i. .05 mm = .25 D in Tear Lens Power
- ii. 7.80, -2.00 → 7.75 = .05 mm steeper → Power needed at cornea = - 2.25 D

b. FAP – Flatter Add Plus

- i. .05 mm - .25 D in Tear Lens Power
- ii. 7.80, -2.00 → = .05 mm flatter → Power needed at cornea = - 1.75D

- c. **Example 1:** If a patient is fit with the following lens, 44.50, -4.50 and the base curve is changed to 45.00, what is the new base curve and power?
- d. 44.50, -4.50 SAM .50 = -.50
- e. New Rx = 45.00, -5.00
- f. **Example 2:** If a patient is fit with a 7.65 mm base curve and the Rx is +4.00. What prescription would be needed if we change the base curve to 7.55?
- g. 7.65, +4.00 D
- h. SAM
- i. 7.55, .10 mm = .50
- j. Answer 7.55, +3.50

L. Base Curve radius is based on Diameter And Corneal Astigmatism

- a. **Example:** -2.00 –1.00 x 180
- b. “K” 42.00@180/43.00@90
- c. If you fit a 9.5 – base curve selection is .50 D flatter than “K” Upper Lid Attachment is achieved
- d. Recommendation: 41.50, -1.50, 9.5

M. Fluorescein Pattern Evaluation:

- a. Fitting Procedure for GP Lenses involves an additional step over Soft Lens Fitting

- b. Pre-fitting and Evaluation
- c. Diagnostic Trial Fitting (Establish Fit first)
- d. Over-Refracton
- e. Fluorescein Evaluation
- f. Write up Lens order
- g. Slit Lamp

N. Correction of a Low Riding Lens (Minus Lens)

- a. Intrapalpebral Fit (Lens may be too flat)
- b. -Steepen base curve
- c. Upper Lid Attachment (Lens may be too steep)
- d. -Flatten base curve or increase lens diameter or combination of both

O. Correction of a High Riding Lens (Minus Lens)

- a. Intrapalpebral Fit (Lens may be too flat) Note: This is if edge of lens is slightly under upper lid
- b. -Steepen base curve or increase lens diameter
- c. Upper Lid Attachment (Lens may be too flat)
- d. -Steepen base curve or increase lens diameter or combination of both
- e. - Thin out edge design (CN Bevel or Hyperflange design)

P. Lens Flexure:

- a. New GP lenses are thinner
- b. If vision fluctuates, either:
- c. Flatten base curve first or
- d. Increase CT by .02 - .04
- e. Depending on corneal toricity sometimes new GP lens materials will bend on the eye after blinking

Q. GP Contact Lens Care:

- a. GP lenses need to be disinfected for a minimum of 4 hours after wearing
- b. Prior to delivering lenses to a patient, GP lenses should soak overnight in order for the lenses to be more wettable prior to the patient wearing their lenses
- c. GP lenses should be cleaned and polished professionally once a year
- d. Solutions – Deposits
- e. Decreased Mucous/Protein Adhesion = Comfort, Wettability and Oxygen Permeability

R. Contact Lens Adjustments:

a. Adjustments to an original lens:

- i. Cut down diameter
- ii. Increase PC width, reduces POZ
- iii. Reduce POZ
- iv. Round out edges
- v. Clean and Polish scratches
- vi. Smooth out peripheral curves
- vii. Add $-.50$ to -1.00 of minus power
- viii. Add $+.50$ to Plus lenses
- ix.

b. Adjustments that require a new lens:

- i. Increase Diameter
- ii. Change Center Thickness
- iii. Make POZ larger
- iv. Add more than 1.00 of minus power
- v. Add more than $+.50$ of plus power
- vi. Change Base Curve

S. Stippling:

- a. Minute air bubbles get trapped under lens
- b. Mucous debris under lens
- c. Check Fit
- d. Clean and Polish lens and review cleaning

T. Punctate Staining:

- a. Air bubbles getting trapped under lens
- b. Dirty lens
- c. Check fit of lens
- d. Review cleaning procedures

U. Abrasion:

- a. Fit of lens that is too flat
- b. Foreign body gets trapped under lens
- c. Eye Patch overnight

V. 3&9 O'clock Staining / Peripheral Staining:

- a. Improper blinking

- b. A low riding RGP lens
- c. Stress the importance of blinking, Blinking exercises, Eye lubricant
- d. Flatten base curve or increase lens diameter

W. Dimple Veil:

- a. Not a stain but excessive air bubbles trapped under a lens
- b. Usually a lens that is too steep or too flat at the edge periphery

X. Arc Stain:

- a. **Crescent shaped stain from improper insertion, rough edge of contact lens or improper recentering of contact lens**