Financial Disclosure

Michael Ward is a member of the Education Advisory Board of Vision Expo, and a member of Abbott Medical Optics Advisory Panel

The Present U.S. Contact Lens Market

Category	
SCL	90%

RGP 10%

SCL Type

sphere 75%

toric 20%

Multifocal 5%

Astigmatism

An optical system with **astigmatism** is one where rays that propagate in two perpendicular planes have different foci.

Keratometer

Measures only central 2.6mm to 3.7mm

Range: 38.00 to 52.00 diopters, or

8.88mm to 6.49mm radii

Corneal astigmatism

Corneal astigmatism is indicated by the difference in the keratometer readings, or Sim K

Example:

K: 43.00/45.00 X 90 °, indicates 2 diopters of corneal astigmatism located at 90° (WTR)

millimeters diopters

<u>formula</u>

$$F = \frac{n-1}{R}$$

Where:

F= corneal power (D)
n= index of refraction of the cornea
R= radius of curvature (M)

Or,

$$D = \frac{.3375}{R}$$

EX: 45.00D = $\frac{.3375}{R}$

R= .00750M => **<u>7.50mm</u>**

Astigmatism

Usually occurs in combination with myopia or hyperopia

45 % of the population has 0.75 diopters or more

Image out of focus in different planes / meridians

Normally related to corneal curvature

Considerations

- Prescription
  - Sphere amount
  - Cylinder axis
  - Ratio
- Motivation
- Past lens experience

The Prescription

- Change all prescriptions from plus to minus cylinder
  - Optics are manufactured in minus cylinder form
  - All SCL toric lenses are labeled in minus cylinder
- Use spherical equivalent power

Adjust for vertex distance

Vertex Adjustment

Adjust all powers >-4.00D or >+4.00D

Ex: Cylinder power: -6.00-1.75cx180

vertex distance changes the effect of lenses

1) Increasing the vertex distance of plus lens will increase the effective power of the lens.
2) Decreasing the vertex distance of a plus lens will decrease the effective power of the lens.

3) Increasing the vertex distance of a minus lens will decrease the effective power of the lens.

4) Decreasing the vertex distance of a minus lens will increase the effective power of the lens

Vertex Distance

$D_e = D / 1 + (h_m \times D)$

D_e = effective dioptric power

D = lens dioptric power

1 = constant

h_m = vertex change in meters (move the decimal to the left 3 places)

Vertex Compensation

Formula

Diopters squared, divided by 1000 is the effect per mm for a given power

EX:

If given a -12.00D Rx refracted at 13mm, what would the Rx be at 10mm?

12^2 =144/1000 =>.14D/mm compensation

-12.00 –(.14 X 3=.42) subtracted from 12.00 ~-11.5D

Toric Soft Lens Fitting

Rationale

Toric Opportunity

45% of population has > 0.75D of astigmatism

~75% of SCL wearers use spherical lenses

Only ~ 28% are toric

WHY?

Enhanced Patient Satisfaction

"Negligible vision difference with toric contact lenses"

GP lenses mask

astigmatism

Soft lenses DON’T!

Corneal Masking

What Are We Really Doing?

RGP Vs SCL Rarely Change Lens Type

A previously successful GP lens wearer will rarely be satisfied with the vision from a SCL

A previously successful SCL lens wearer will have continual awareness of GP

lens

Exceptions

GP lens wearer with limited wearing time

SCL lens wearer needing better vision or irregular astigmatism (KC/post refractive)

Lens Fitting

Designs and Stabilization

Available Parameters

Base Curve
Diameter
Power
Axis

Axis Stabilization

Prism ballast
Truncation
Thin zones
Eccentric lenticulation

Axis Orientation Markings

Note:

The scribe mark is *not* the cylinder axis

Lens Fitting

Empirical
Vs.
Diagnostic

Fitting

Diagnostic lens fitting is preferred to evaluate the fit, orientation and stability

Choose Initial

Diagnostic Lens

As with any SCL, we are restricted to available parameters in any given brand

We often choose 2 or 3 workhorse lens types and 1 or 2 custom designs for specialty use

Evaluation of Fit

<u>Push Up Test</u>

Place finger on lower lid margin, applying light pressure

Bump lower edge of CL with lid margin

Observe for proper movement; easy slide and return to original position

Fitting Criteria

Lens Centration

Decentration is NOT the same as Rotation

Axis Orientation Marks

The scribe marks are not (necessarily) location of the cylinder axis!

Axis Orientation

If the lens does not orient at the predetermined location (center hash mark at 6 o’clock), it is

necessary to compensate for the rotation

Lens Stability

It doesn’t matter if the lens is shifted, as long as it is stable in its dislocation!

Account for Rotation

Clockwise add

Counterclockwise subtract

Axis Adjustment

<u>Example</u>:

Rx:

-3.00 –1.75 X 90º

Observed lens rotation: 30º CW

Resultant Rx: -3.00 –1.75 X 120º

Axis Adjustment

Example :

Rx -

-3.00 –1.25 X 180º

Observed lens rotation: 30º CCW

Resultant Rx:

-3.00 –1.25 X 150º

Power Determination

Use spectacle lens power, corrected for vertex

Refract over diagnostic lens

Fitting Summary

Select appropriate lens

Check vision

Perform spherical, cylindrical or spherocylindrical over-refraction

Check lens fit: pushup test
eye movement

Check orientation and

stability

Fitting Summary

Select appropriate lens

Check vision

- Spherical O/R
- Sphero-cylindrical O/R

Evaluate fit

- Orientation – eye movement
- Stability – eye movement
- Pushup test

Soft Toric Lens Diagnostic Lens Selection Silicone Hydrogels

Silicone Hydrogel properties / characteristics

Si-H lens chemistry makes them behave differently:

- Very high gas permeability
- Higher modulus (material stiffness)
- Lower water content; higher bound water
- Low levels of total protein uptake, but higher binding of denatured proteins
- Higher levels of lipid uptake
- Less dehydration

Helpful Web Sites

Calculators
http://www.eyedock.com
General contact lens information / reference
www.clspectrum.com
Contact lenses and solution summary
www.clspectrum.com/class/index.asp
Silicone hydrogel lenses
www.siliconehydrogels.org

Example

Example:
MR: -3.00 + 1.25 X 90°
K: 42.00/43.50 X 86°
Transpose to minus cylinder

Rx: -1.75 -1.25 X 180

Choose lens: 8.8/ -1.75 -1.25 X 180

Orientation: 20° CCW

Adjust for lens orientation

~20 degree CCW rotation

Subtract 20 from 180 = 160

Choose new lens with same Rx but now at 160 degree axis

Resultant

New lens Rx is

8.80/ -1.75 -1.25 X 160

The lens will orient at the same position, but the optics will now be aligned

Rub Vs No Rub

The No Rub moniker was approved by replacing rubbing with extra rinsing

Either rub it off or hose it off

Si-H lenses need to be digitally cleaned to prevent lipid and denatured protein build-up

Recommendations

Lens Care

Wash hands

Replace lenses as prescribed

- Do not store opened, old ‘spare’ lenses; spare lenses should be in unopened original containers
- Rub-n-rinse daily
- Use fresh solutions daily
- Do NOT top-off

Recommendations

Case Care

- Empty/rinse daily
- Clean case with mild detergent and hot water; alternatively H_2O_2
- Air dry daily
- Scald with freshly boiled water weekly
- Replace often