

GP BASICS

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Disclosures

- Precilens
- Bausch and Lomb
- Alcon / Ciba Vision
- Essilor

Why are we here anyways?

- Fitting gas permeable lenses is an essential skill in fitting contact lenses
- There are always going to be patients that are not good candidates for soft contact lenses
 - Eye Disease
 - Astigmatism and High Prescriptions
 - Those not eligible for LASIK

Why are we here anyways?

- What's a GP?
 - GP = Gas Permeable contact lens
- Very customized fitting lens
- Very healthy lenses to wear
- Provides the best quality optics!
 - More rigid than a soft lens
 - Tear film is our secret weapon!

Basic Ocular Anatomy

Basic Ocular Anatomy - Lids

Basic Ocular Anatomy - Lids

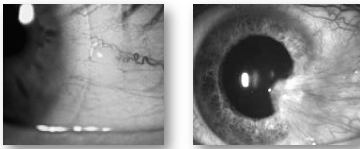
- How do the eyelids affect CL fitting?
 - Lid Tonicity of upper and lower lids
 - Lid Positioning

- Lens Movement
- Lens Positioning

Basic Ocular Anatomy - Conjunctiva

Bulbar and Palpebral


- Structure - opaque
- Produce mucin needed for tear quality
- Limbus produces corneal epithelial cells



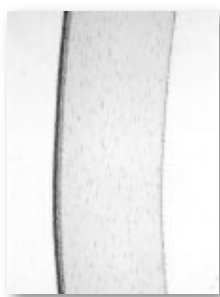
Can the conjunctiva affect a contact lens fitting?

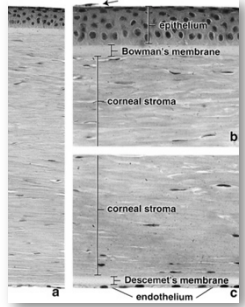
Basic Ocular Anatomy - Cornea

- The Cornea
 - 5 layers
 - Epithelium
 - Bowman's layer
 - Stroma
 - Descemet's Membrane
 - Endothelium



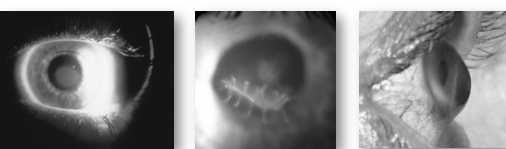
Basic Ocular Anatomy - Cornea






Basic Ocular Anatomy - Cornea

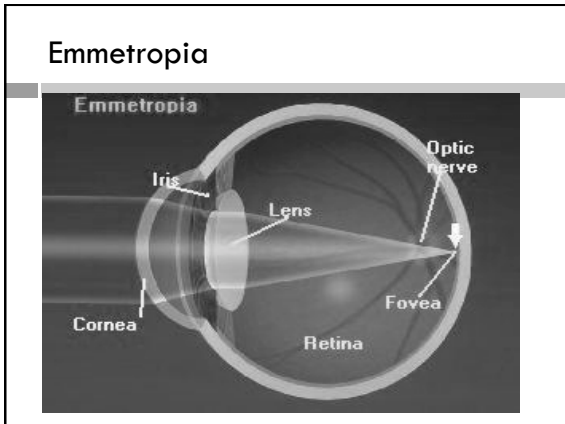
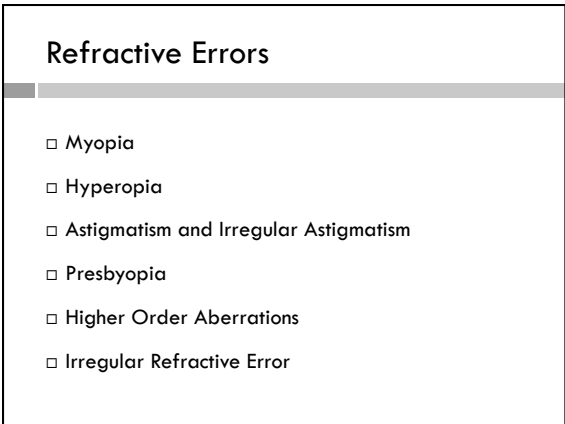
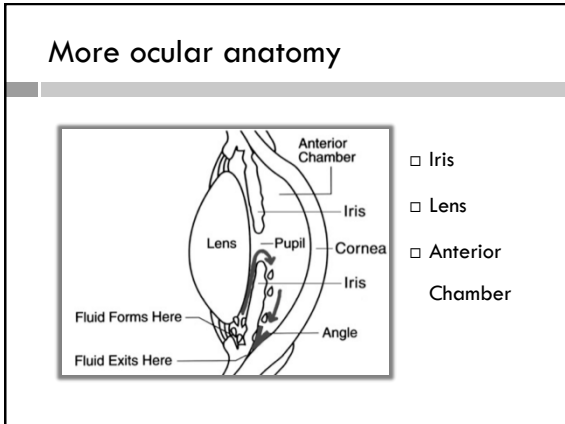
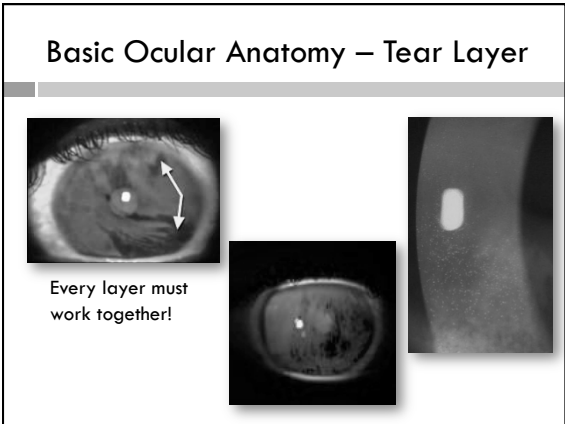
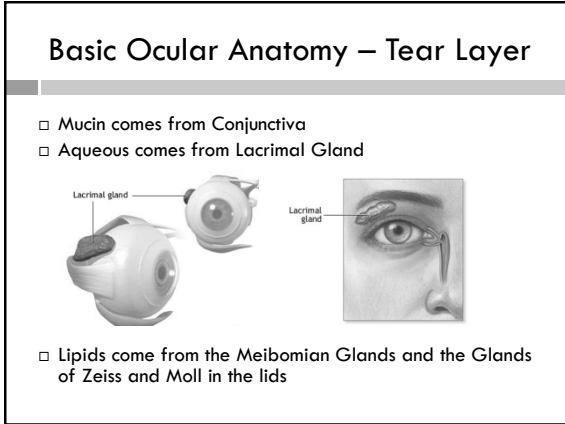
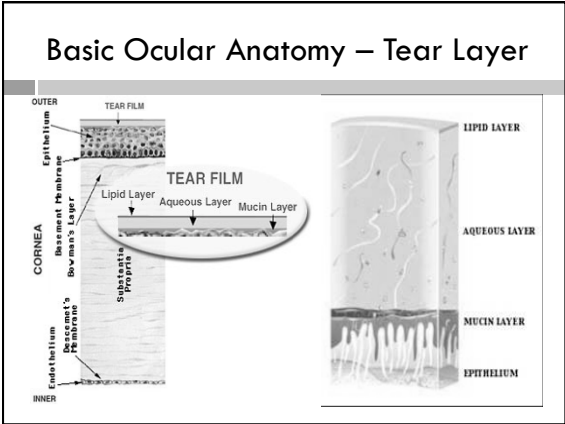
- Main Function = Refractive
- Bends the light as it enters the eye to help focus it
 - Must stay thin and clear!
- Anything that affects the clarity of the cornea or the shape of the cornea can adversely affect the vision

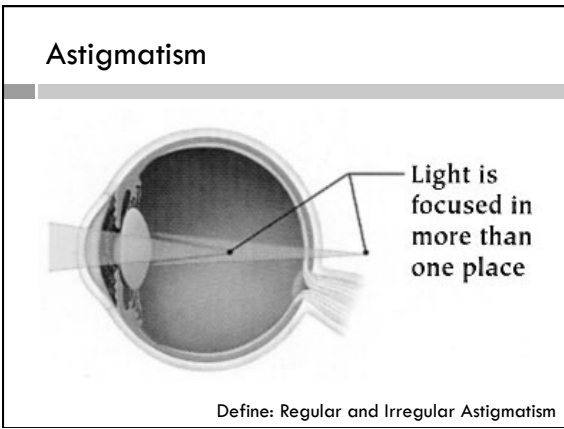
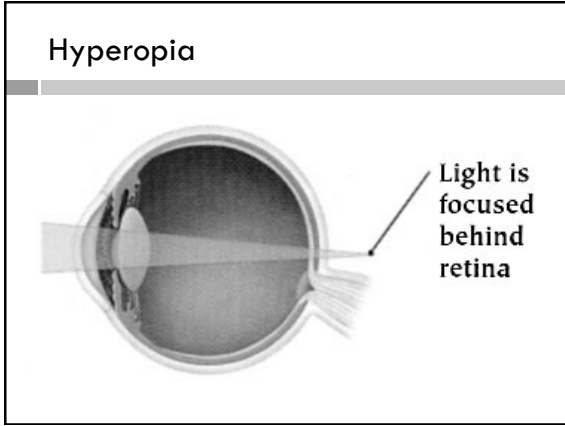
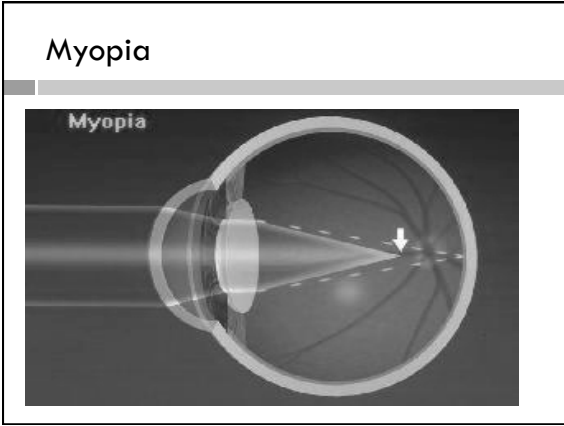


Basic Ocular Anatomy – Tear Layer

- The Tear Layer
 - Vital to ocular health
 - Complex fluid layer
 - Contains aqueous (water)
 - Lipids (oil)
 - Mucin
 - Enzymes
 - Natural antibiotics







Refractive Errors - Recap

- $-3.50 - 1.50 \times 100$
 - Myopia (points to -3.50)
 - Astigmatism (points to -1.50)
 - Reference meridian for astigmatism (points to 100)
- $+3.00$ sph
 - Hyperopia (points to +3.00)

A close-up photograph of a person's eye wearing a contact lens. The lens has markings for astigmatism: a vertical line labeled "3.50" and a horizontal line labeled "5.00".

Transposing Rx's

□ $-7.50 + 1.75 \times 20$

Add the Cyl number to the sphere number

Flip the +/- symbol

The cylinder amount stays the same

The axis number shifts by 90 degrees

$-5.75 - 1.75 \times 110$

Transposing Rx's

□ $+3.75 + 1.25 \times 45 = +5.00 - 1.25 \times 135$

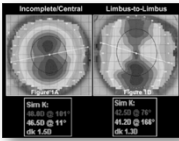
□ $-1.50 + 3.00 \times 170 = +1.50 - 3.00 \times 80$

A black and white photograph of George W. Bush, looking thoughtful with his hand on his head.

Why do we need to know this?

What information do we gain?

- Topography
 - The 'lay of the land'
 - Evaluate curvatures – are they limbus to limbus or just central?
- Keratometry
 - Central curvature readings
- Readings can be expressed in millimeters or diopters



Corneal Curvature

- Learning about corneal curvature
 - Diopters- higher is STEEP CORNEAS, lower is FLAT
 - 40.00 D is FLAT
 - 47.00 D is STEEP
 - KCN can have diopter readings into the 100s!
 - Millimeters- opposite of Diopters
 - High mm is flat (8.5mm)
 - Small mm is steep (6.0mm)

Converting diopters to mm

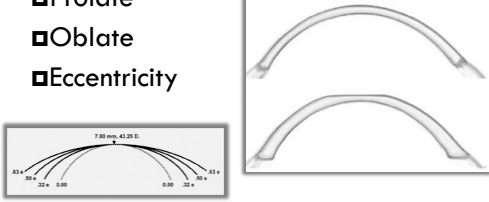
- Formula for converting
 $337.5 / X$

Example: 45.00 D cornea
 $337.5 / 45.00 = 7.5 \text{ mm}$

Example: 7.5 mm cornea
 $337.5 / 7.5 = 45.00 \text{ D}$

Above and beyond

- A little beyond the basics...
 - Corneal shape descriptions
 - Prolate
 - Oblate
 - Eccentricity

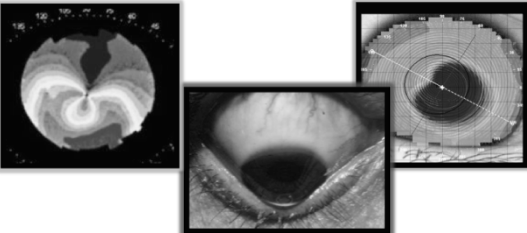


Above and beyond

- A little beyond the basics... Irregular Corneas
 - When corneas are not regular!
 - Keratoconus
 - Pellucid Marginal Degeneration
 - Corneal Transplants
 - Other post-surgical corneas

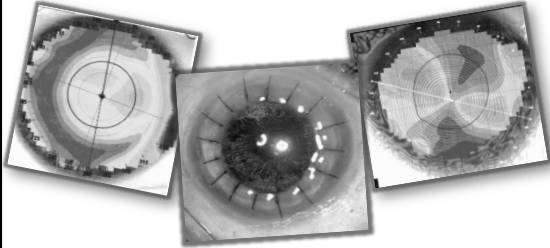
Keratoconus and Pellucid

- A little beyond the basics...
 - Why GPs are applicable for these conditions



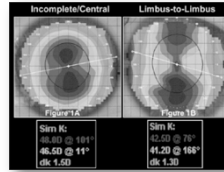
Corneal Transplants and Other Surgeries

- A little beyond the basics...
- ▣ Why GPs are applicable for these conditions

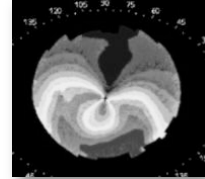


Irregular vs Regular

- How do I know?

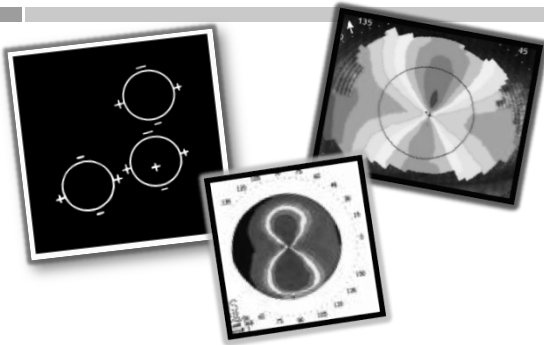


Symmetry and two major meridians of curvature = REGULAR cornea and astigmatism



Minimal symmetry and many meridians of curvature = IRREGULAR cornea and astigmatism

Keratometry and Topography



Next step...

- Now that we know the refractive error and the corneal size and shape, we can look at the health of the eye....

Slit Lamp



You can adjust the height and the width of the beam, as well as the light intensity, to analyze the eye and the contact lens in a variety of ways

Time to fit contacts? ... Almost!

Clinical Work-up for Contact Lenses

- The main purposes of doing an extensive examination prior to fitting contact lenses are to:
 - ▣ consult with the patient as to the suitability, risks, limitations and expectations with contact lens wear.
 - ▣ determine the ocular health and suitability of contact lens wear
 - ▣ obtain baseline data for future reference
 - ▣ determine the best type of contact lens to fit and the parameter of the first diagnostic lens

Case History

- General health history
- Ocular health history
- Occupation, hobbies, recreational activities and visual demands
- Contact lens history
- Patient expectations

General health history

- Allergies?
 - ▣ Allergies can make contact lens wear uncomfortable
 - ▣ Taking antihistamines can dry eyes
- Diabetes?
 - ▣ An corneal abrasion may not heal rapidly with an insulin dependent diabetic
 - ▣ Decreases sensitivity means less awareness of problems
 - ▣ Decreased ocular health in general means CL fit must be optimal
- Cardiovascular disease?
 - ▣ Diuretics (HTN) can cause decreased tearing and photophobia
 - ▣ Beta-adrenergic blocking agents (atenolol, metoprolol, etc.) can cause dry eye.
- Sjogrens' syndrome, Lupus, or other autoimmune disease?
 - ▣ Can lead to very dry eyes
- Other Prescription or OTC medications?
 - ▣ Oral contraceptives-in some cases causes dryness
 - ▣ Meds for anxiety or mental health disorders can cause dry eye symptoms and reduced blinking.
 - ▣ Accutane for acne can cause severe dry eye and blepharoconjunctivitis

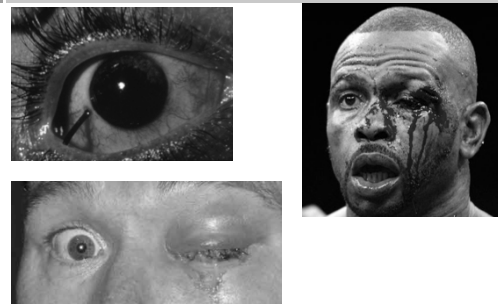
Ocular health history

- Ocular allergies ?
- Previous ocular injuries or surgeries
- Does the patient have any dry eye symptoms?
- Ask if they have or have had any other infections or diseases
 - ▣ Herpes Simplex for example
- Do they use eye drops regularly and if so, what kind?
 - ▣ OTC or RX

Occupation, hobbies, recreational activities and visual demands


- Find out if there are specific uses the patient has in mind
 - ▣ Sports
 - ▣ Evenings and weekends
 - ▣ Sometimes these patients can be easier to work with since they will use the lenses only on occasion
- Find out if there are specific negatives
 - ▣ Do they work around chemicals or fumes that may make lens wear less desirable?
 - ▣ Do they want to use lenses for extended shifts?
 - ▣ Do they work on a computer 8 hours a day?
 - ▣ Are their task related visual demands unrealistic?

Clinical Work-up: Ocular Health



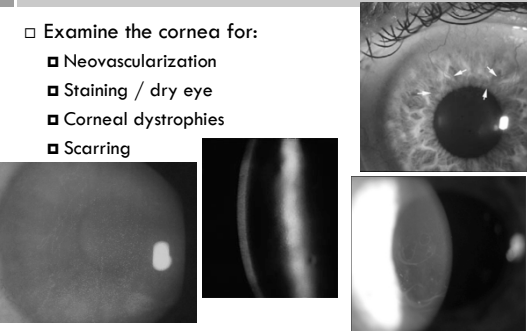
Clinical Work-up: Ocular Health

- Examine the Lids for:
 - Blepharitis
 - Meibomian Gland Dysfunction
 - Ocular Rosacea
 - Incomplete Blink
 - Ectropion
 - Entropion
 - Lid notching
 - Trichiasis



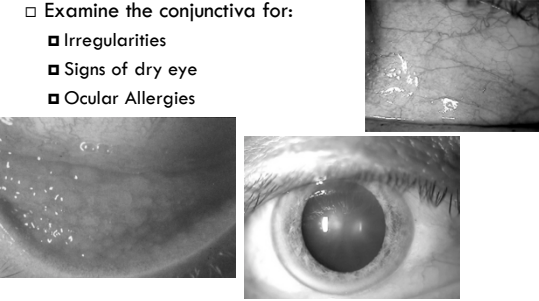
Clinical Work-up: Ocular Health

- Examine the cornea for:
 - Neovascularization
 - Staining / dry eye
 - Corneal dystrophies
 - Scarring



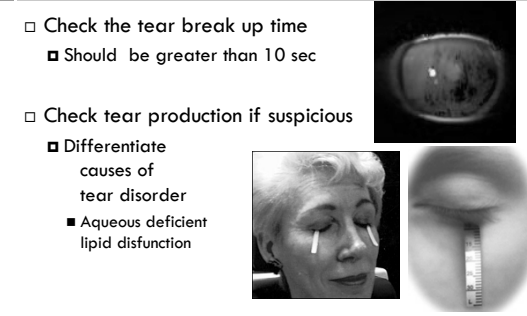
Clinical Work-up: Ocular Health

- Examine the conjunctiva for:
 - Irregularities
 - Signs of dry eye
 - Ocular Allergies



Clinical Ocular Work-up: Tear Layer

- Check the tear break up time
 - Should be greater than 10 sec
- Check tear production if suspicious
 - Differentiate causes of tear disorder
 - Aqueous deficient
 - lipid dysfunction



Time to fit contacts? ...Yes!

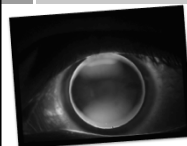
Fitting Techniques

- Empirically
 - Benefits: Great for busy practices, does not require a lot of complex number grinding
 - Downfalls: Do not get to see lenses on eye before committing to an order, little control over specifics
- Fitting sets
 - Ideal for those who really want to specialize
 - Get a better idea of potential outcome in office before order is placed

What do I need?

- Slit lamp or Burton Lamp
- Sodium Fluorescein Strips
- Cobalt blue filter
- Eyeball
- Recommended: Wratten Filter

Types of GP Lenses

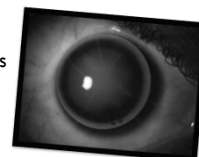


⊙ Corneal gas permeable lenses

- Which patients?
- Benefits
- Limitations

□ Intralimbal gas permeable lenses

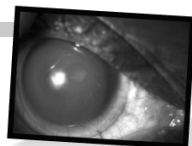
- Which patients?
- Benefits
- Limitations



Types of GP Lenses

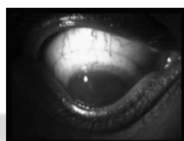
□ Corneo-Scleral lenses

- Which Patients?
- Benefits
- Limitations
- Many designs



□ Scleral lenses

- Which patients?
- Benefits
- Limitations
- Many designs



KEY: Classification of large diameter lenses is based on FIT, not DIAMETER

Choosing a lens type

- Lifestyle of patient - Active and on-the-go?
- Patient dexterity – trouble handling lenses?
- Palpebral fissure – problems getting lens in eye?
- Corneal / pupil size – optimize optics and fit of lens
- Topography – evaluate irregularity, astigmatism

Choosing your first lens

- Use topography and / or keratometry readings
 - Typically need a lens that is slightly flatter than average corneal reading
 - ~9.2 to 10.0 OAD is a good starting point, using HVID as a guide
 - Big corneal diameter – choose a bigger lens OAD
- Example: K's or Topo reads:
 - 42.00 x 43.50 (average = 42.75)
 - Choose a BC of your lens slightly flatter than average, like 42.25

Ultimately....

- Just put a lens on!



Lens Design Basics

- Every lens has
 - Base Curve
 - Goal is to align with the cornea
 - Optic Zone
 - Where the optics are clearest!
 - Curvature of Optic Zone is base curve
 - Peripheral curve system
 - Most of the time there are 2 curves, sometimes more
 - Goal is to align with the peripheral cornea and assist in centration and tear exchange



Lens Design Basics

- Other lens specifications
 - dK
 - Oxygen transmissibility
 - Doesn't affect the fit, but the higher dK makes lenses more 'bendable' and less rigid
 - Higher dK is usually less wetttable
 - Center thickness
 - Sometimes lenses flex on the eye with the weight of the lids
 - Increasing the center thickness can counteract that
 - Decreasing center thickness improves oxygen transmissibility

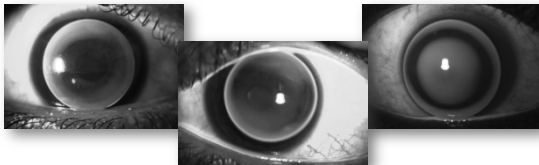
Let's Fit some lenses!!

Speak the language

- Apical clearance / touch / alignment
- Edge lift / Peripheral clearance
- Centration
- Movement
- Tear Exchange
- Documentation

Apical Relationship

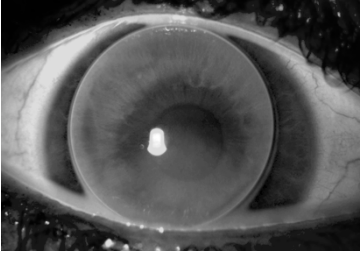
- Apical touch / bearing - epithelial compromise
- Apical Alignment – healthy!
- Apical Clearance – Often a tight, decentered fit



Speak the language

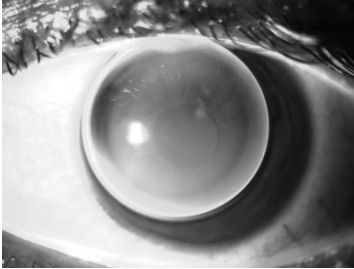
- ~~Apical clearance / touch / alignment~~
- Edge lift / Peripheral Clearance
- Centration
- Movement
- Tear Exchange
- Documentation

Evaluating Peripheral Clearance



Average PC – why do we need it?

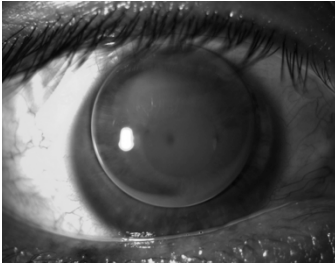
Evaluating Edge Lift / PC



Max PC – what can go wrong?

Evaluating PC / Edge Lift

Minimum PC

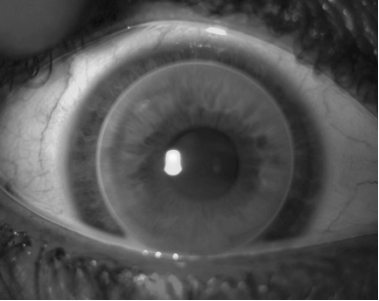


What can go wrong?

Speak the language


- Apical clearance / touch / alignment
- Edge lift / Peripheral Clearance
- Centration
- Movement
- Tear Exchange
- Documentation

Centration



Centration

Superior decentration

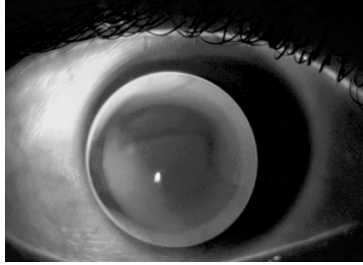


Careful driving
Night time problems

Centration

Blink - ouch...
blink - ouch...
blink - ouch

Best practice
builder! \$\$\$



Inferior decentration

Speak the language

- Apical clearance / touch / alignment
- Edge lift
- Centration
- Movement
- Tear Exchange
- Documentation

Movement

- Should be a high – low movement with blink
- Lens should move 1 mm or more
 - Depends on eye health and tear exchange
- Aids in tear exchange
- Edge lift contributes
- Watch your optic zones compared to pupil location

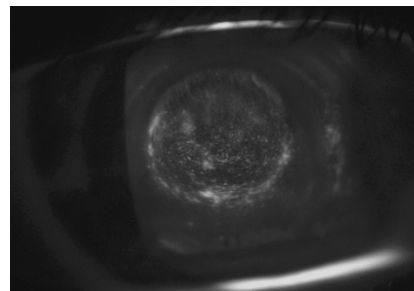
Speak the language

- Apical clearance / touch / alignment
- Edge lift
- Centration
- Movement
- Tear Exchange
- Documentation

Tear Exchange

- Functions to provide nutrients and remove waste
- Keeps underlying cornea healthy
- Good movement usually correlates with good tear exchange
- Lens must have some edge lift to allow for exchange

Toxic Swamp



Speak the language

- Apical clearance and apical bearing
- Edge lift
- Centration
- Movement
- Tear Exchange
- Documentation

Chicken Scratch

- Describe what you see!
 - Apical Relationship
 - Lens Centration
 - Peripheral Clearance
 - Lens Movement
 - Tear Exchange
- AA / Center / Avg PC / Hi-low / +TX
- Or just draw it!

What's next?

- After choosing a well fitting diagnostic lens, check the lens power by performing an over-refraction
- Add the lens power to your over-refraction and voilà!
- Order the lens parameters on the eye with the desired power

Making basic changes

- Changes to the base curve
 - Better align to the central cornea
- Changes to the peripheral system
 - Assist in lens centration and tear exchange
- Changes to lens size
 - Improve centration
- Changes to optic zone size
 - Decrease glare and haloes
- ALL CAN BE DONE INDEPENDANTLY OF EACHOTHER IN GAS PERMS!!!

SAM – FAP Rule

- Steeper add Minus – Flatter add Plus
 - When changing the base curve to better align with the cornea, the power changes too.
 - Change the lens power equal to the amount you changed the lens BC (in diopters)
 - Example: 44.00 D lens, power is -2.00
 - Lens fits too flat, you'd like to order a 45.00 (SAM)
 - Order a 45.00 D lens with a power of -3.00

In the beginning...

- Changes to other lens parameters
 - Get to know your consultants, they are an awesome resource!
 - Draw / video / snap shot your fittings and send them to your consultant to talk through them
 - Listen to your patients!

In closing

- Yes, GPs are complex
- But, TOTALLY worth learning!

- They allow you to provide an extra level of care for your patient
- BFF's for life!

- Practice!!

Thank You

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