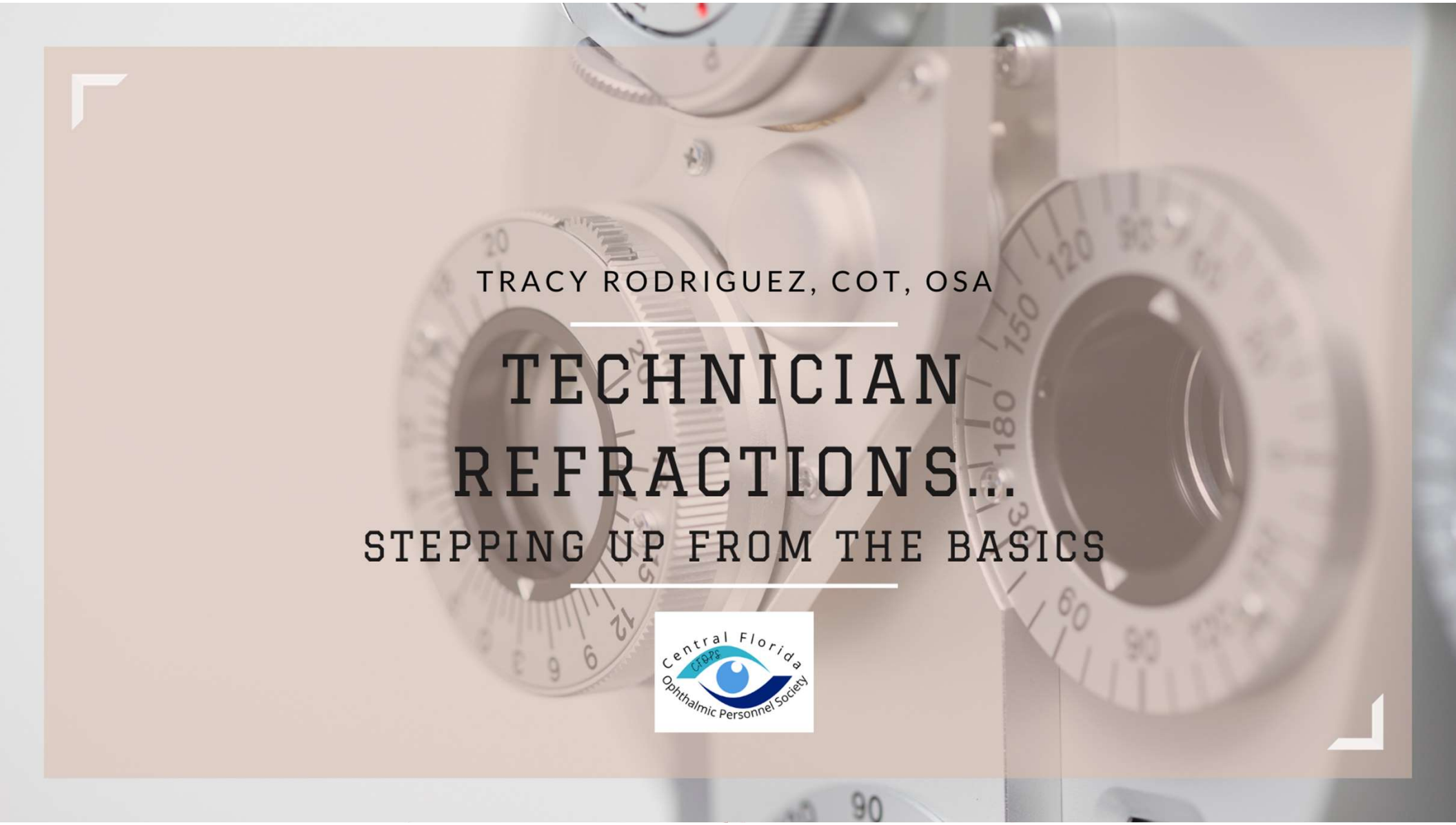


TRACY RODRIGUEZ, COT, OSA

# TECHNICIAN REFRACTIONS...

## STEPPING UP FROM THE BASICS

Central Florida Ophthalmic Personnel Society

# *COURSE OBJECTIVES*

*Provide a review of the basic steps in performing a subjective refraction

*Discuss tips to help with difficult situations

*Stepping it up: Explain and discuss why the following are very important

- Binocular Balancing
- Vertex Distance
- Keratometry
- Auxiliary Cylinders

*Discuss why learning Retinoscopy (Objective) can step up your skills

*Bonus- What are the Risley Prisms and how and why are they used?


**Charles C. Manger III, M.D.**

and the staff of Saddleback Eye Center

# *ABOUT ME*

My Career as an Ophthalmic Technician started in 1986 after falling in love with the idea of working in Ophthalmology starting in 1983 when I worked for a small practice in Fountain Valley, California. (I was literally right out of high school).

Learned to refract and scrub in 1986

C.O.T. in 1987

O.S.A. in 1989

I loved it so much that I started a very small training company in 1996 called High Sights Ophthalmic Services.

BASIC SUBJECTIVE REFRACTIONS

# *WHERE DO YOU START?*

## PATIENTS' GLASSES

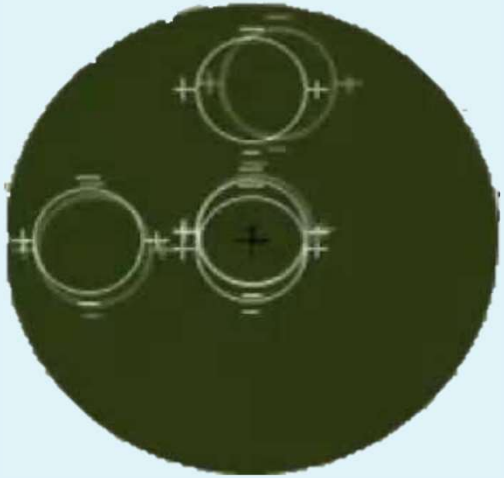
## AUTOMATED REFRACTOR

## RETINOSCOPY

BASIC SUBJECTIVE REFRACTIONS

# *WHERE DO YOU START?*

## K READINGS



## FROM SCRATCH

# *WHERE DO YOU START?*

## FROM SCRATCH

- Take patients BCVA
- Go Up 2 lines and FOG patient
- Bring the patient to a clear image by reducing the PLUS lenses in 0.25D steps until the image is clear
- Find Astigmatism
  - Fish for Cylinder in all 4 quadrants or spin axis dial, then proceed to axis/ cylinder refinement with the JCC.
  - Refine Axis
- Refine Sphere
- Determine ADD Power

# *LET'S TALK ASTIGMATISM & THE JACKSON-CROSS CYLINDER*

What is ASTIGMATISM?

What is the Jackson-Cross Cylinder and how does it work?

A lens with 2 Cylinders placed perpendicular to one another (+0.25/-0.25)

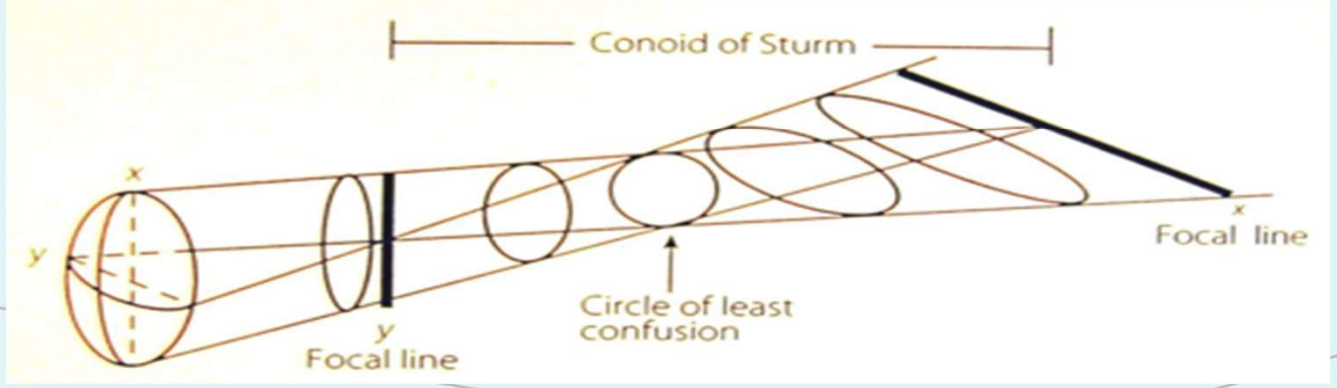
The power is represented by 2 small circles (White for PLUS/ Red for MINUS)

To refine the axis STRADDLE THE DOTS

To refine the power ALIGN THE DOTS WITH THE AXIS

When refining the power of the cylinder you need to be sure to add or subtract 0.25 D of sphere power for every 0.50 D of cylinder

And WHY? TO KEEP THE CIRCLE OF LEAST CONFUSION ON THE RETINA



# *ADD POWER*


- What is the ADD?
- Measuring the ADD- Always make sure you know the patient's preferred reading distance and use this distance to measure on the phoropter.
- Always keep in mind the patient's age
- Learn the average ADD requirements according to age.
- Give the least amount possible.
- IF IN DOUBT USE A TRIAL FRAME TO HAVE THE PATIENT GO FOR A TRIAL RUN!

# *AVERAGE ADD REQUIREMENTS ACCORDING TO THE PATIENT'S AGE*

| AGE | ADD POWER |
|---|---|
| 40-45 | +0.75 to +1.00 |
| 45-50 | +1.00 to +1.25 |
| 50-55 | +1.25 to +1.50 |
| 55-60 | +1.50 to +1.75 |
| 60-65 | +2.00 to +2.25 |
| 65-70 | +2.25 to +2.50 |

# *NOW THAT YOU ARE FINISHED*

- Make sure you look at the patient's glasses and compare with the new RX and BCVA.  DOES IT MAKE SENSE?
- Compare your refraction to the patient's glasses.
  - You can hand-hold loose lenses over their current glasses (not always the easiest to do)
  - Have the patient look through their current glasses then show them phoropter with the new Rx.
  - Make sure they understand what you are trying to accomplish
  - If there is a lot of change, especially in cylinder and axis, use the trial frame and have them determine if they like the new RX.
  - ALWAYS document in your chart if the patient likes the new MRx.

# *DIFFICULT SITUATIONS*

## COMMON MISTAKES

Not understanding the process:

Spending 15 minutes on a refraction
Moving the patient from 20/25 to 20/20
With 2 new diopters of sphere and a 35° axis shift
Then NOT bothering to question the new findings

# *COMMON MISTAKES*

The patient is taking you around the block and back when refining the axis

The patient keeps changing their mind

The patient begins to tell YOU what to do next “Show me that last one again” or tries to take control.

Halt the madness!  Regain control of your refraction

# *COMMON MISTAKES*

The Dreaded Over-Minused Refraction

Over-minusing is not a good practice and you always need to be cognitive of the repercussions the patient might experience.

Possibly can give the patient asthenopia symptoms

Can cause a level of discomfort with the new glasses

Can mimic pre-presbyopia symptoms

# *COMMON MISTAKES*

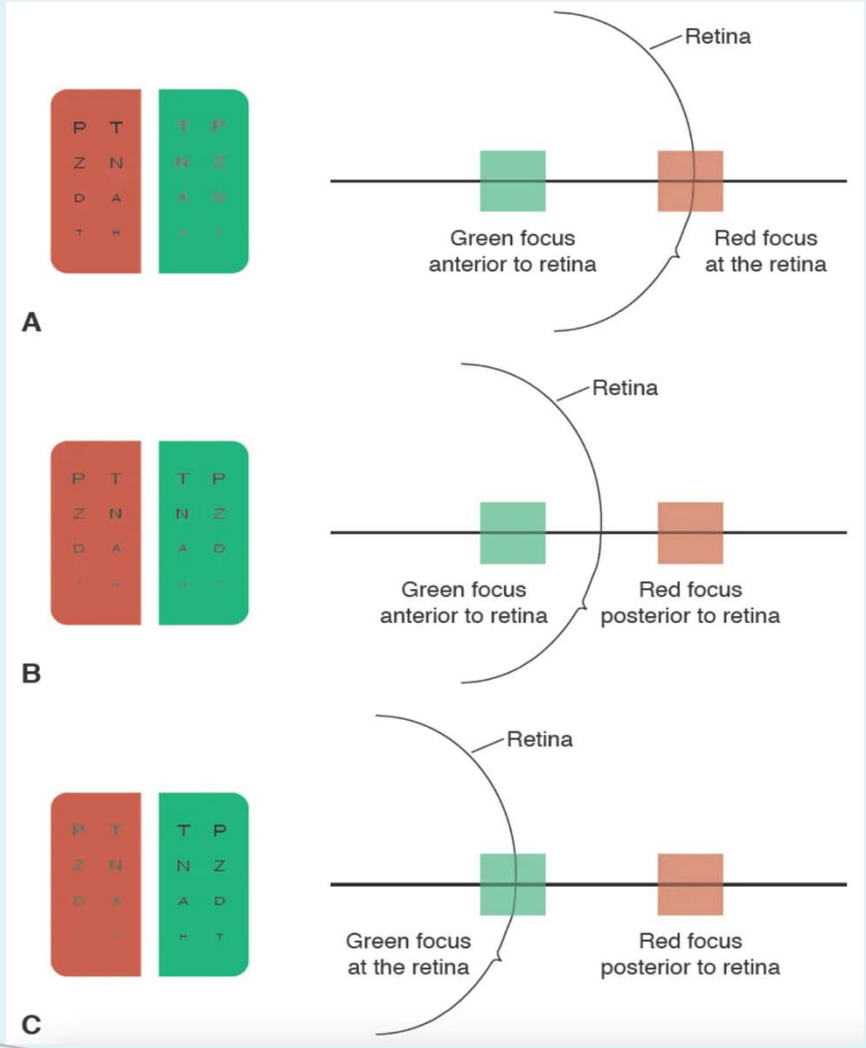
## How do you avoid over-minusing a patient?

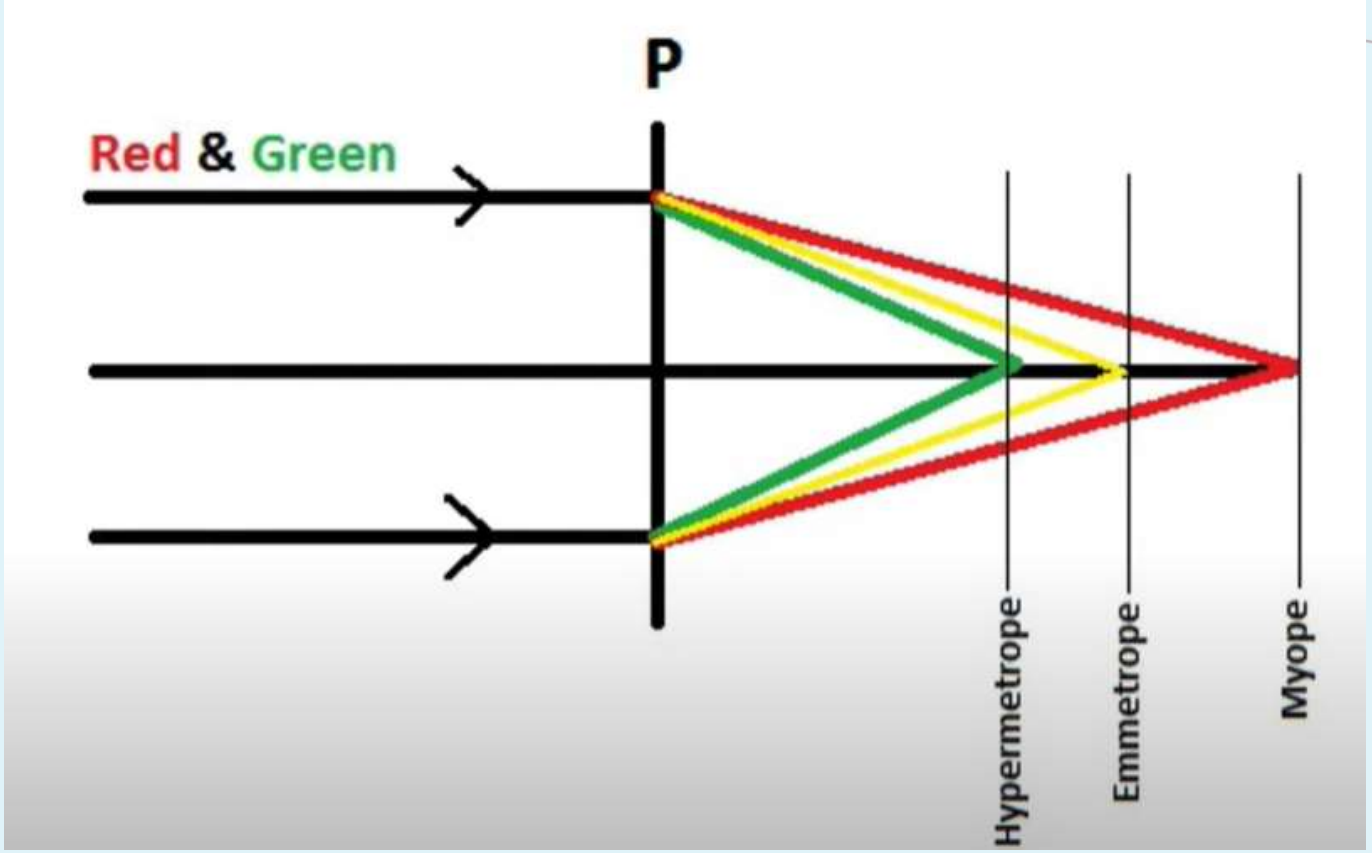
### FOGGING

- Add PLUS (+) power until the letters become blurry.
- Slowly add MINUS (-) until the patient can FIRST start to see the letters.
- Always remember, the letters will look "SMALLER & DARKER" if they are over-minused.

### DUOCHROME TEST

- Show the patient the chart and add the Duochrome test.
- Ask them "Do the letters look sharper and easier to read on the red side or the green side?"
- If the letters are darker and easier to read on the RED side – ADD MINUS
- If the letters are darker and easier to read on the GREEN side- ADD PLUS
- RAMGAP
- It is best to be one click to the RED


Retina
Green focus
anterior to retina
Red focus
at the retina
A
Retina
Green focus
anterior to retina
Red focus
posterior to retina
B
Retina
Green focus
at the retina
Red focus
posterior to retina
C


P
Red & Green
Hypermetrope
Emmetrope
Myope

# *COMMON MISTAKES*

## How do you avoid over-minusing a patient?

### LAST STEP

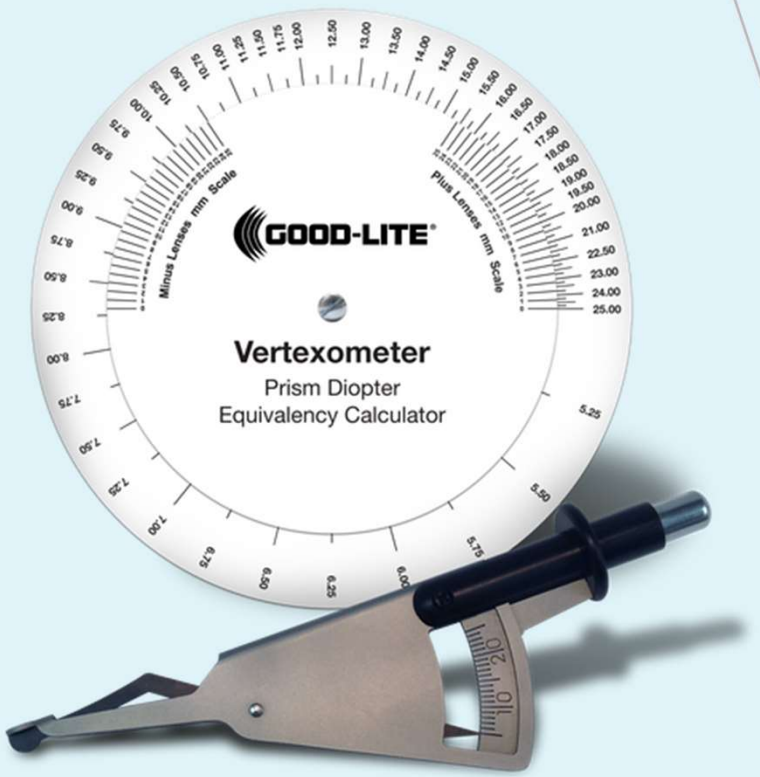
- Back of the minus one click at a time until the patient can not see the 20/20 line (or the smallest line they could read) Then give back the final click.
- You will be surprised that you can sometimes reduce the amount of minus with this last step.

# *STEPPING IT UP*

## VERTEX DISTANCE

- The distance between the back surface of a corrective lens, glasses (spectacles) or contact lenses, and the front of the cornea.
- With glasses it is measured with a DISTOMETER
- This is only applied to corrective errors of + or – 4 Diopters.
- What changes when vertex distance changes?

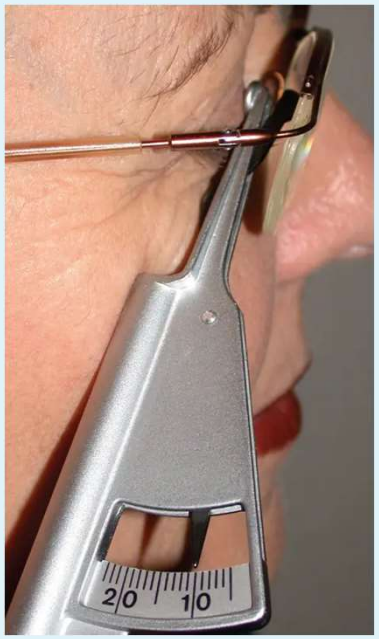
  If there has been a change in the vertex distance from the distance that the patient was refracted, there has been a change in the effective power.



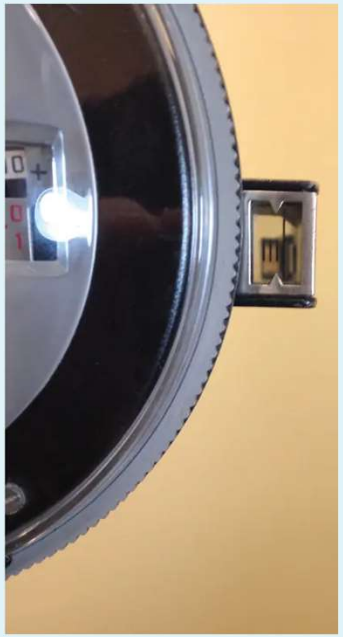
# *STEPPING IT UP*

## VERTEX DISTANCE

### WITH DISTOMETER



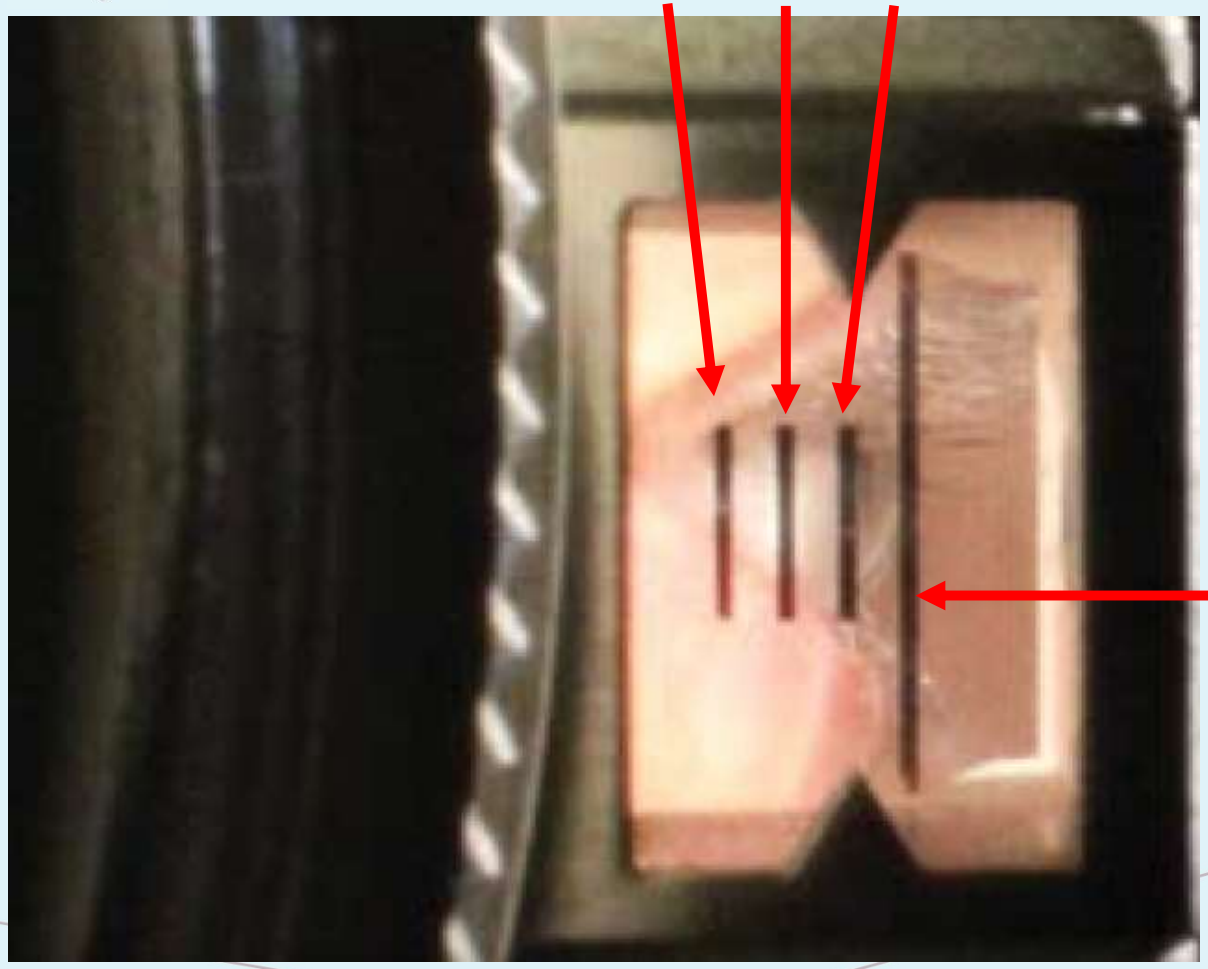

### WITH PHOROPTER



# STEPPING IT UP

## VERTEX DISTANCE

Most phoropters measure 13.75 mm with the headrest fully retracted.



# *STEPPING IT UP*

## Now that you have determined the refraction

### BINOCULAR BALANCING

- Add PLUS (binocularly)
- Slowly bring that patient back and stop when they can read the line

- Using Prism https://www.youtube.com/watch?app=desktop&v=9h9qi8agZBg
- You can use the prism in the phoropter
- (6Δ BU OD/ 6Δ D BD OS)
- Or you can use the Risley prism with 2Δ BU OD/ 2Δ BD OS
- The OD image will be inferior, and the OS image will be superior
- Fog the patient

*STEPPING IT UP*

## KERATOMETRY READINGS

- What are K Readings?
- The measurement of the corneal curvature, measured in diopters or millimeters. Corneal curvature determines the power of the cornea.
- The differences in the 2 meridians of the cornea result in corneal astigmatism.
- One of the very critical measurements done before cataract surgery. The K Readings are 1 to 1 ratio to refractive outcomes. If you are off 1 Diopter you will most likely have a 1 Diopter PO refractive surprise

*STEPPING IT UP*

## HOW K-READINGS CORRELATE TO REFRACTIONS?

- How do K's correlate to a refraction?
- On a phakic patient, they can give you a general idea of the amount and orientation of astigmatism, but due to possible "lenticular changes," they may not be accurate.
- On a pseudophakic patient, the K- readings should equal the astigmatism in the refraction or at least a good place to start.

# *STEPPING IT UP*

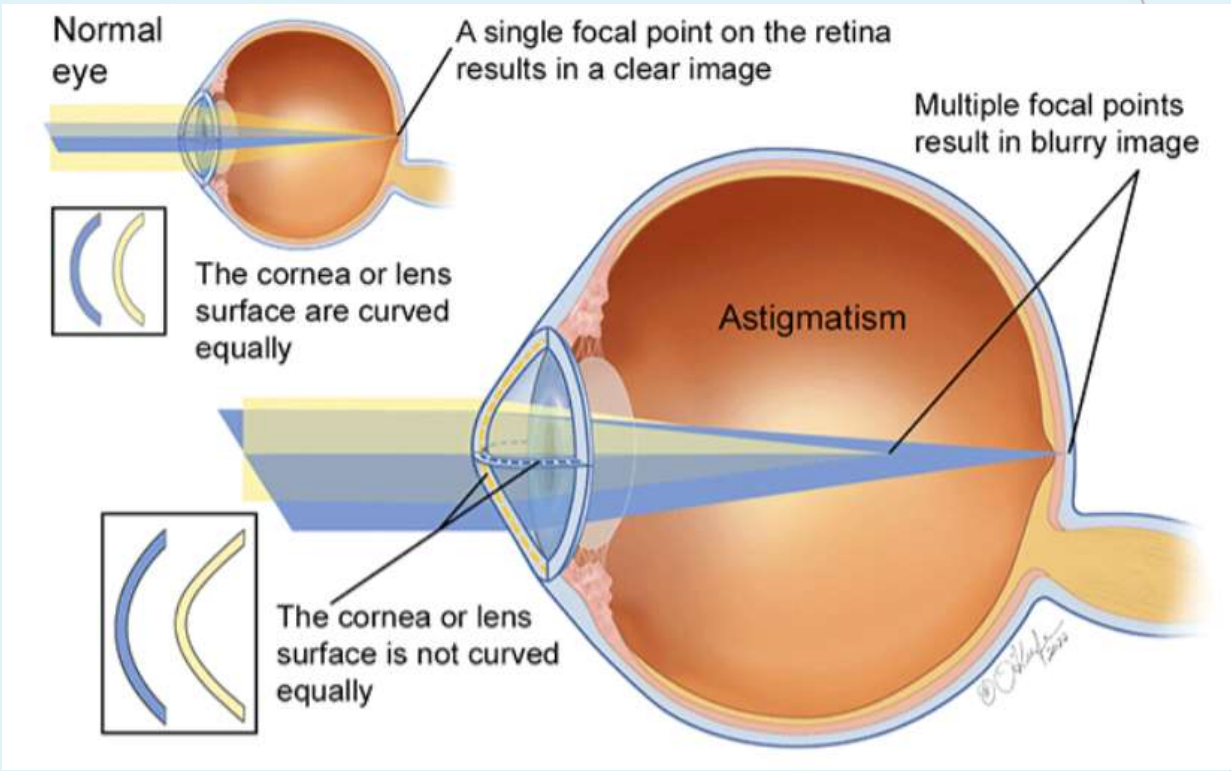
## KERATOMETRY READINGS

K Reading Examples:

43.50/45.75 x 090

Astigmatism=
+2.25 D x 090

*REMEMBER the lower the number the flatter the meridian is.



**METHOD: [Manual] / LenSx - IOL: [Standard] / Toric / PanOptix / Vivity**

**Prism in glasses?** ☐ YES ☒ NO

**Dominant Eye:** [OD] / OS

**Topography K's**

| OD - 0.87 D astig | [OS] - 0.88 D astig |
|---|---|
| 45.10 @ 74 | 45.15 @ 98 |
| 44.23 @ 164 | 44.27 @ 08 |
| (central cyl: 1.15) | (central cyl: 1.50) |

**Other K's:** Argos OD repeated to verify cyl amount compared to other Ks and due to OD Topo appearance

| OD | OS |
|---|---|
| 0.85 @ 82 (44.56) | N/A |

**Auto K's**

| OD - 1.25 D astig | [OS] - 0.75 D astig |
|---|---|
| 44.50 @ 163 | 44.25 @ 22 |
| 45.75 @ 73 | 45.00 @ 112 |

**AXIAL LENGTH [ARGOS] IMM**

| OD | [OS] |
|---|---|
| 23.25 and 23.24 | 23.36 |

TECH CPB-OB

**Pentacam K's**

| OD - 1.0 D astig | [OS] - 1.1 D astig |
|---|---|
| 43.4 @ 171 | 43.4 @ 13 |
| 44.5 @ 81 | 44.5 @ 103 |

**ARGOS K's**

| OD - 0.83 D astig | [OS] - 1.14 D astig |
|---|---|
| 44.16 @ 158 | 44.06 @ 24 |
| 45.00 @ 68 | 45.20 @ 114 |
| (44.58) | |

| | SPH | CYL | AXIS | VA | BAT | PAM |
|---|---|---|---|---|---|---|
| Mrx OD: | +1.50 | sphere | | 20/25 | 20/50 | 20/25 |
| Mrx [OS]: | +1.50 | sphere | | 20/50 | 20/60 | 20/20 |

IOL Opposite Eye: N/A

**Operative Eye:** OD / [OS]

**MIGS:** Goniotomy

**Surgical Plan:** [Phaco/IOL] / Combined / IOL Exchange

**Refractive Goal:** [Plano] / Near / Monovision (Goal: _____)

**Corneal Astig:** +1.14 @ 114

**LRI?** [NO] / YES: LenSx / Manual _____

**ORA?** [NO] / YES

**Anesthesia:** [Topical] / RBB / STI / General

**Other Factors:** Glaucoma / PEX / Diabetes / ARMD / Long Eye / Short Eye / Fuch's / Flomax / Miosis / ERM / Prior Rfx Sx

A-fib

**Date of Operation:** X / 8 / 2024 (5)

**Operative Notes:** Dilates well. NS2/PS2

metric: 4.1.3

Date:

Physician confirmed lens choice: _____

Revised 9.22.23.KR

# *STEPPING IT UP*

## AUXILIARY CYLINDERS

Used to extend the cylinder power of the phoropter.

Most phoropters have 6 diopters of cylinder power available. These will increase the power to 8 diopters.

You will have to adjust the cylinder in the phoropter when you add the 2 Diopters, making sure you are always aware of the combined amount.

Any cylinder above 8 diopters will need to be refined using a trial frame.

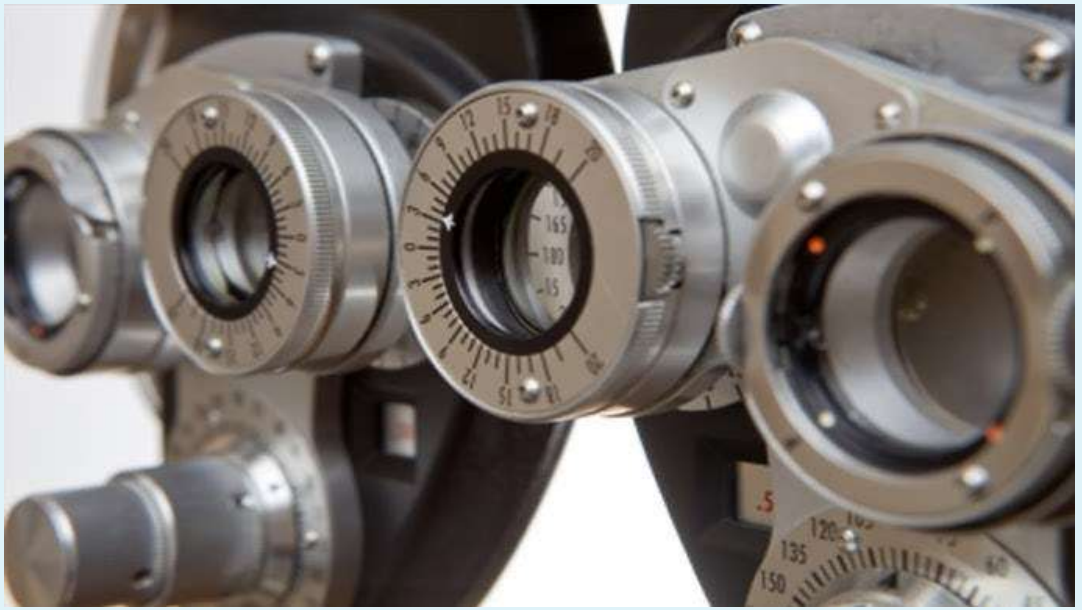
# *STEPPING IT UP*

## RETINOSCOPY

- An OBJECTIVE way to determine the refractive error of an eye
- An excellent way to get a starting point for a refraction.
- The disadvantage of retinoscopy is that it is a complex skill that takes a lot of practice.
- Advantages compared to the AR
  - You can see the media while performing
  - You can see the axis orientation
  - You can do this on non-verbal patients
  - You don't have to wait in line for the AR!!

# *STEPPING IT UP*
## THE RISLEY PRISM

- A rotary prism on the phoropter that can be used for the measurement of muscle imbalances and binocular balancing.
- For muscle imbalances, you can set the base in all 4 directions (BI, BO, BU, BD) and rotate the prisms to find the correct amount of prism needed to correct the imbalance.



# *CARDINAL RULES OF REFRACTING*

- Refracting is as much an ART as it is a SCIENCE
    1. Patients do not always respond as we want them to, which is why starting with an OBJECTIVE assessment with help keep you on target.
    2. Keep it simple
    3. Do your best to maintain your patience- Go slowly when needed and try to make the choices as clear and easy as possible to avoid frustrating the patient (and yourself)
    4. Provide encouragement
    5. Proceed with a purpose- boredom and patient fatigue can result in poor subjective responses

# *CASE STUDIES*

A 27-year-old female with CLs and glasses

VA OD 20/20
OS 20/20

W OD -6.50 +0.50 x005= 20/20
OS -6.50 +0.75 x170 = 20/20

AR OD: -6.25 +0.25 x122
OS: -6.25 +0.25 x118

MRx OD: -5.50 +0.50 x005= 20/20
OS: -5.50 +0.75 x170= 20/20

Rx Given OD: -5.75 +0.50 x005
OS: -5.75 + 0.75 x170

# *CASE STUDIES*

A 59-year-old female with visually significant cataracts OU (Present glasses were 1 year old)

VA OD 20/60
OS CF @5'

W OD -9.25 +0.50 x045= 20/60
OS -8.75 Sph = CF @ 5'

AR Not done

MRx OD: -10.50 +0.50 x045= 20/30
OS: -13.75 +0.50 x020- 20/80

# *CASE STUDIES*

A 70-year-old female with visually significant cataracts OU (refractions performed on the same day

VA OD
OS

W
AR Not done

MRx OD: -0.25 sph = 20/30
OS: -2.25+0.50 x035 = 20/40

2nd MRx OD: -2.25 +1.75 x 110= 20/25
OS: -3.25 +1.25 X 083= 20/40

# *CASE STUDIES*

A 69-year-old male with visually significant cataracts OU

VA OD 20/200
OS 20/30

AR OD: -17.75 +3.25 x050
OS: -2.00 +1.50 x160

MRx OD: -7.25 +4.00 x050= 20/100
OS: -1.50 +1.50 x160 = 20/20

# *CASE STUDIES*

A 91-year-old male with bilateral IOL's with complaints of blurry vision OD (Refraction performed 5 weeks apart)

VA OD 20/200
OS 20/30

MRx from last visit OD: -2.00 +0.50 110= 20/100
OS: -1.00 +2.75 x180= 20/20

MRx2 OD: +9.75 +0.75 x140 = 20/20
OS: -0.75 +1.25 x180 = 20/20

Patient's Dx was a dislocated IOL

# *CASE STUDIES*

A 69-year-old male, bilateral IOL's, with complaints of blurry vision OD after being hit on the head at the gym..

MRx from last visit OD: +0.50 Sph = 20/30
OS: -0.50 +1.00 x080= 20/20

MRx2 OD: +2.50 Sph= 20/20
OS: -0.25 +0.75 x080= 20/20

DX: Patient had a subluxed IOL

# *CASE STUDIES*

A 69-year-old male, with 5+ white cataract OD, visually significant nuclear sclerosis OS

MRx from referring doctor OD: -18.50 Sph= LP
OS: +0.75 +2.25 x157= 20/70

MRx OD: Plano Sph= HM
OS: -0.25 +2.25 x155= 20/40

# *THANK YOU*