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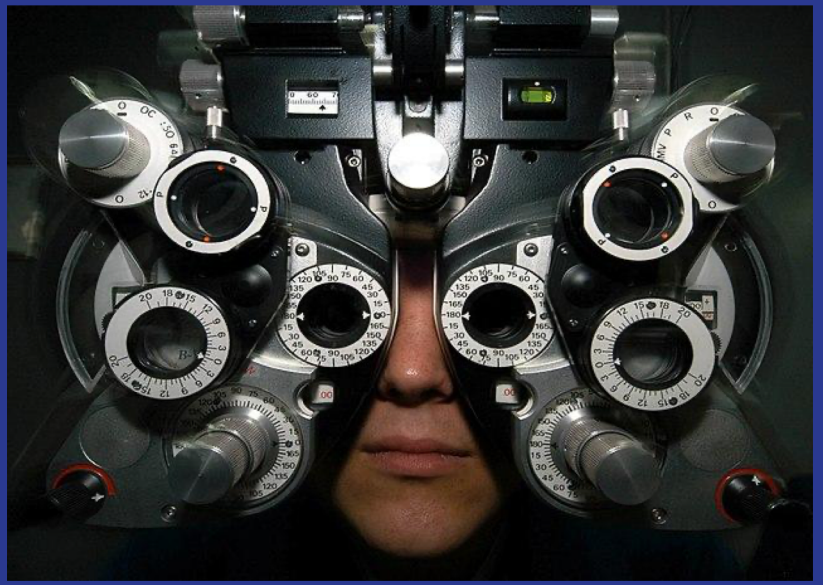
Managing Difficult Refractions



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I have no financial disclosures for today’s lecture

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Refractive Error Stats

- Poll question 1 and 2
- Over 2 billion people globally have some sort of refractive error (¼ of the world population)
  - 8 billion total on Earth
- The population is aging due to the baby boomer generation aging
  - 1-in-4 adults over 71 have VI, defined as VA >20/40
- 60 million adults over 65 yo have some sort of visual impairment (VI) in USA
  - Number is expected to increase to 82 million by 2050
- In school aged children 6-15yo most prevalent refractive error is myopia. Possible increase due to increased screen use and time spent indoors

Causes of Visual Impairment

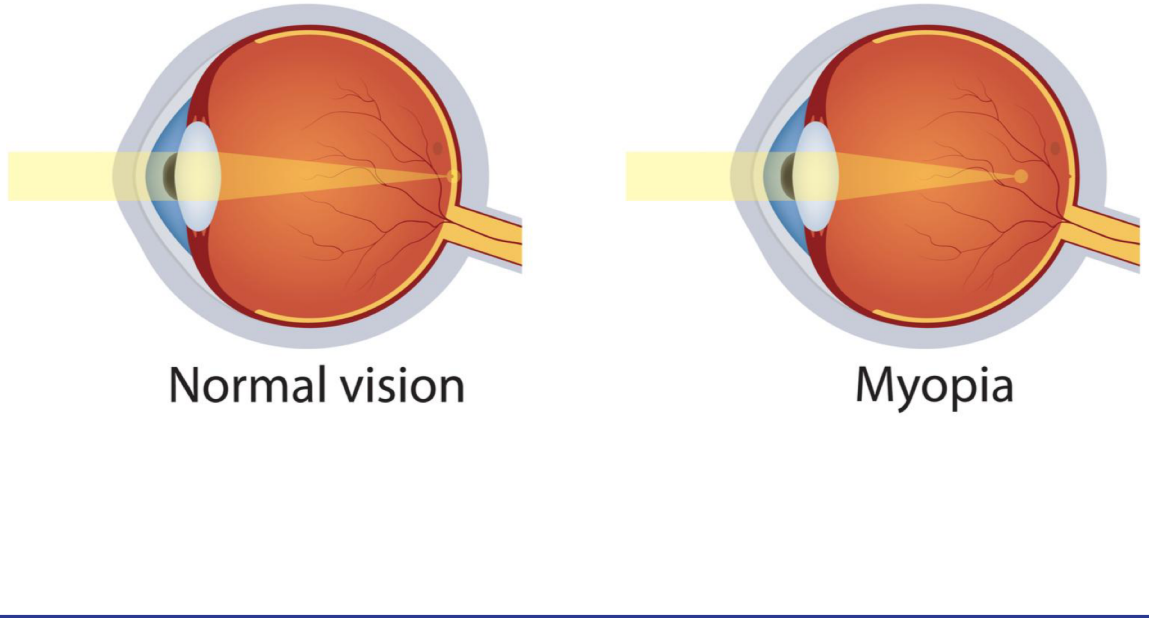
- Poll question 3
- Refractive error: myopia, hyperopia, presbyopia
- Dry eye or ocular surface disease
- Ocular pathology
  - Cataracts, macular degeneration, glaucoma, corneal scarring, corneal dystrophies, corneal ectasias, etc

Refractive Error Stats

- 135 million people in the USA have some sort of dry eye symptoms (270 million population)
- Studies indicate only 5-30% of people have dry eye
- Under-reported due to patients not reporting their symptoms or being seen, doctors under-diagnosing condition, patients being misdiagnosed

Myopia

- Myopia- also called nearsightedness, or short sightedness, is a refractive error in which light produces image focus in front of the retina
  - Typically can see nearby images clearly, but distance images blur
  - Usually these patients have “long eyes”
  - Normal axial length of eye is between 23-25mm- typically myopes have a longer axial length than this
    - Each 0.33mm increase in axial length accounts for about 1D of refractive error

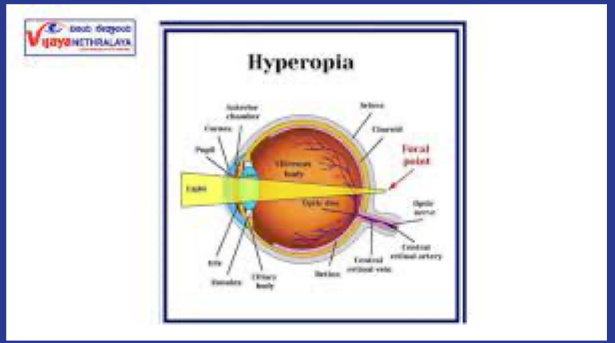

Normal vision
Myopia

Hyperopia

- Hyperopia- also known as hypermetropia, farsightedness, or long-sightedness is a visual defect caused by the inability of the eye to focus on near objects
  - Often due to shorter eye
  - Light rays focused behind retina
  - Kids often can focus, “accommodate” through hyperopia to actively focus light on the retina

Hyperopia continued

- This is where detailed questions come into play
- Because kids can accommodate to compensate for their hyperopia we need to ask about eye strain, squinting, avoidance of near work at school, lack of attention, frequent eye rubbing, headaches, etc.



Presbyopia

- Presbyopia- defined as the eyes inability to accommodate on near objects with aging
  - Not a disease process necessarily as everyone goes through presbyopia at some point in their life
  - Typical age of onset is around 40-45 yo
  - Add power usually is Age over 40 x 0.1 + 0.75
    - For example a 44 year old = 4 x 0.1 + 0.75 = ~1.15D or a +1.00 to +1.25D add
    - Poll question 5

Amblyopia

- Amblyopia- or lazy eye is typically defined as an eye with poor or blurry vision in a relatively healthy eye overall
  - Problem is usually caused by poor transmission or no transmission of the visual image to the brain for a sustained period of dysfunction or during early childhood
  - Usually occurs at a young age as the visual pathway is typically fully developed by the age of 8-10 yo
  - Typically affects one eye but can affect both if both eyes are similarly deprived of a clear image

Amblyopia

- Types of amblyopia
- Strabismic amblyopia - eye misalignment leads to brain suppression of the blurry image from the misaligned eye, leading to poor vision in this eye
- Anisometropic amblyopia - significant difference in refractive error leads to brain “choosing” to use image of the stronger eye and suppress the weaker eye
- Deprivational amblyopia - something is blocking the eye from producing a clear image
    - Congenital cataract, eyelid droop, corneal opacity, etc

Anisometropic Amblyopia

children	
Isometropic	Diopters
Astigmatism	>2.50
Hyperopia	>4.50
Anisometropic	
Astigmatism	>1.50
Hyperopia	>1.50
Myopia	>3.00

Start of Exam/Work-up

- Ask detailed questions about patient symptoms
- Chief complaints can help determine a lot with what is going on with the patient
- What are some questions we should be asking the patient when they come to see us?

Start of Exam/Work-up

- Think about what their answers are telling you. A lot of pathology can be ruled out just by their responses
  - Do they complain of dry eye symptoms:
    - Irritation, redness, foreign body sensation, intermittent blur, etc
    - Patient may benefit from artificial tears prior to refraction - may make refraction easier: sometimes I will put a drop of Miebo in the patient's eye or some AT to alleviate blur. Remind patient to blink throughout. If the patient has a mask on beware of lens fogging

Start of Exam/Work-Up

- Good questions on patient history are key
  - Do they complain of night vision? Increased glare? Color contrast decreases? Overall reduction in vision?
- What could these symptoms indicate?
  - These symptoms should key you to thinking about cataracts
    - Don’t waste too much time going back and forth behind the phoropter
    - Remember to perform a glare acuity and super pinhole- these 2 findings can tell us a lot about how severe their cataracts are

Start of Exam/Work-up

- What are some other questions we could ask?
  - Any previous eye surgeries/injuries? Lazy eye, strabismus? Previous history of LASIK/PRK?
  - Do you wear contact lenses
    - If so what brand? Do you replace them daily, bi-weekly, or monthly? Do you sleep in them? What solution do you use to disinfect them?

Diabetics

- ~10% of Americans (24.7 million) have diabetes
- If patient is diabetic it is important to obtain most recent A1c and blood sugar
- Elevated A1c or hyperglycemia can cause lens-induced changes and cause hyperopic or myopic shifts in refractive error
- Typically I don’t dispense a spec Rx to patient with an A1c above 9
- Diabetic retinopathy risk also increases with poor diabetic control

Checking Vision

- Determine monocular vision with best-corrected lenses
  - Make sure to ask how old their current spectacle Rx or CL Rx is

- If VA isn't better than 20/40, or 2 lines reduced from previous visits, pinhole can help us determine a lot about their condition
  - Improvement on pinhole by a line or better could indicate that the Rx needs updated
  - No improvement on PH could indicate pathology
  - Look at previous history- if cataracts have been mentioned in the past and PH doesn't improve, super-pinhole and glare could be a useful tool to determine if the patient has a visually significant cataract

Pinhole

- This size pinhole will be effective for refractive errors of +/- 5.00D
- A pinhole improves visual acuity by decreasing the size of the blur circle on the retina resulting in an improvement of the individual's visual acuity
- If the pinhole aperture is smaller than 1.2 millimeters, the blurring effects of diffraction around the edges of the aperture will actually increase the blur circle, causing the vision to be worse

- In old days the lights needed to be dimmed with projector screen charts due to poor contrast
- With new LED charts room lighting can be left on
- Make sure to check vision with lights on if your office has LED charts in rooms
- Room lighting should be dimmed with old projector charts

Checking Vision

1. How much prescription change is needed to reduce Visual Acuity by 1 line

With Accommodation	Without Accommodation
Hyperopia >2.00 D	Hyperopia +0.25 D
Myopia -0.25 D	Myopia -0.25 D
Astigmatism -0.50 D	Astigmatism -0.50 D

2. How types of refractive error primarily effects the location of reduced acuity

With Accommodation	Without Accommodation
Hyperopia Near (Depending upon the amount)	Hyperopia Near>Distance
Myopia Distance	Myopia Distance
Astigmatism Both	Astigmatism Both

Conversion Chart: Refractive State to "estimated" Visual Acuity[1][2]

Myopia		Hyperopia			
Nearsighted		*Farsighted*			
Minus (-) Sphere		Plus (+) Sphere	Plus (+) Sphere	Plus (+) Sphere	
Ages: All	**Estimated Visual Acuity**	***Ages: 5y to 15y***	***Ages: 25y to 35y***	***Ages: 45y to 55y***	**Estimated Visual Acuity**
-0.5	20/30-40	+2.00	+1.25	+1.00	20/20
-0.75	20/50	+3.00	+1.75	+1.25	20/25
-1	20/60	+3.25	+2.50	+1.50	20/30
-1.25	20/70	+3.75	+3.00	+1.75	20/40
-1.5	20/100	+4.25	+3.50	+2.00	20/50
-2.5	20/200	+4.75	+4.00	+2.50	20/70

[1] Spherical results are based upon minus (-) cylinder convention.

[2] Source: "Composite Chart of Refractive State to V.A." Derived from Peter's multiple tables. *Peters, H.B. (1961): The Relationship between Refractive Error and Visual Acuity at Three Age Levels. A.A.A.O., 38:4.*

Not Recommended for conversion of screening results for children screened for amblyopic risk factors

Checking vision/Near vision

- Distance should be set at 16in/40cm
- Presbyopia begins developing ~40 yo
- Consider checking near vision in anyone over the age of 40 or people with asthenopia (eyestrain and fatigue) complaints especially with near work or computer work

Checking Vision

- If patient unable to see big E on eye chart (20/400):
  - Switch to counting fingers- at what distance are they able to count fingers
    - If patient can see fingers up to 5 feet away, mark CF5’
  - If unable to count fingers check for HM and mark at what distance they can see your hand waving
  - If unable to interpret HM check light projection and light perception

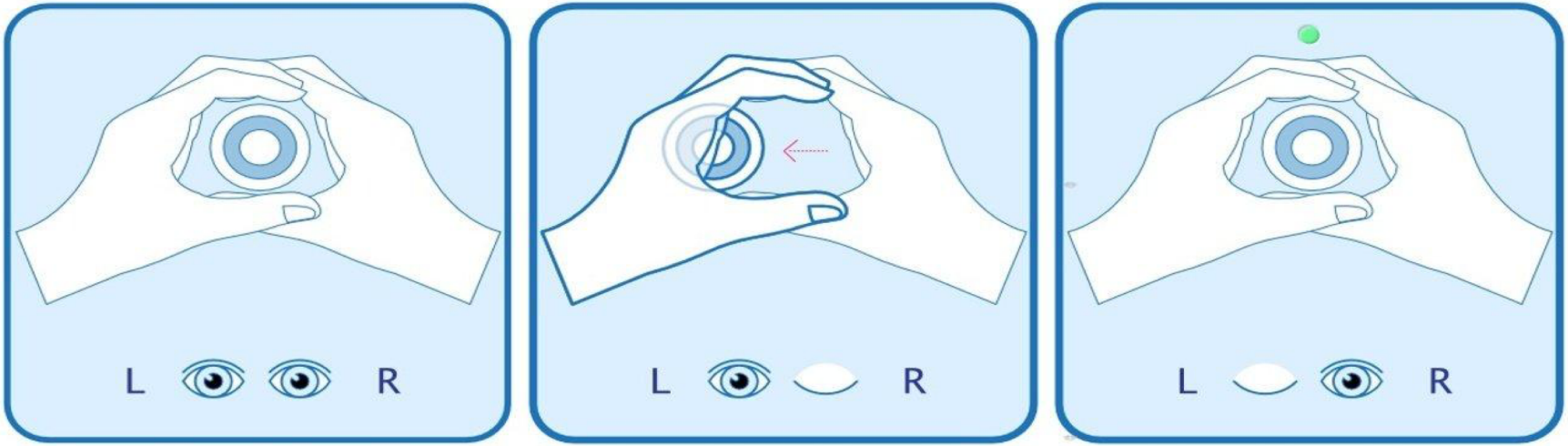
Checking Vision- Contact Lenses

- If patient has contact lenses in treat the vision check the same way
  - Pinhole if vision isn't better than 20/40 or vision has decreased by more than a line from their previous visit
- Loose lens over-refraction is the most efficient way to check for any refractive change
  - +/-0.50 D changes at most at a time
  - Patients with multifocal contacts- check vision binocularly

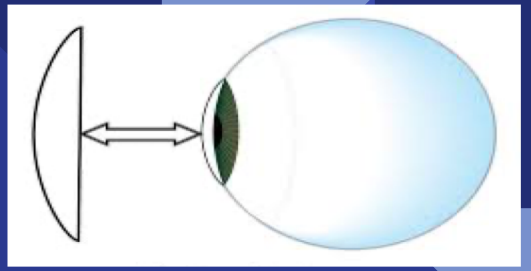
Contact Lenses Continued

- Monovision contact lens wearers- dominant eye is set for distance, non-dominant eye is set for near vision
- May occlude 1 eye at a time and check distance and near vision
- Determining eye dominance
  - Sighting technique - less accurate, but quicker
  - Blur tolerance- add +1.50D to phoropter with patients CL in their eye- increase chart 2 lines from best corrected and check monocularly
  - Add minus sph in -0.25D steps, whichever eye can see the line with less minus added is non-dominant- eye that can tolerate more blur

Eye Dominance Testing



Vertex Distance



- Vertex distance is the distance between the back surface of the spectacle lens and front surface of the cornea
  - This measurement is vital because it can affect the effective add of the lens
  - When lenses are positioned further from the eye they display different optical properties to lenses closer to the eye
  - Closer to the eye, effectively less minus
  - A -4.25sph glasses Rx is essentially -4.00sph in CL
  - The effective power is miniscule in prescriptions less than +/-4.00D

Poll 6 and 7

Vertex Conversion Chart						
If Minus	**|Sphere|**	**If Plus**		**If Minus**	**|Sphere|**	**If Plus**
-4.00	4.00	+4.25		-9.37	10.5	+12.00
-4.00	4.25	+4.50		-9.75	11	+12.75
-4.25	4.50	+4.75		-10.12	11.5	+13.37
-4.50	4.75	+5.00		-10.5	12	+14.00
-4.75	5.00	+5.25		-10.87	12.5	+14.75
-5.00	5.25	+5.62		-11.25	13	+15.50
-5.12	5.50	+5.87		-11.62	13.5	+16.12
-5.37	5.75	+6.12		-12	14	+16.75
-5.62	6.00	+6.50		-12.37	14.5	+17.50
-5.75	6.25	+6.75		-12.75	15	+18.25
-6.00	6.50	+7.00		-13	15.5	+19.00
-6.25	6.75	+7.37		-13.5	16	+19.75
-6.50	7.00	+7.62		-13.75	16.5	+20.50
-6.62	7.25	+8.00		-14.12	17	+21.50
-6.87	7.50	+8.25		-14.5	17.5	+22.25
-7.12	7.75	+8.50		-14.75	18	+23.00
-7.25	8.00	+8.87		-15.12	18.5	+23.75
-7.50	8.25	+9.12		-15.5	19	+24.75
-7.75	8.50	+9.50		-15.87	19.5	+25.50
-7.87	8.75	+9.75		-16.12	20	+26.37
-8.12	9.00	+10.12		-16.5	20.5	+27.11
-8.37	9.25	+10.37		-16.75	21	+28.12
-8.50	9.50	+10.75		-17.12	21.5	+29.00
-8.75	9.75	+11.00		-17.37	22	+29.87
-8.87	10.00	+11.37		-17.75	22.5	+30.87

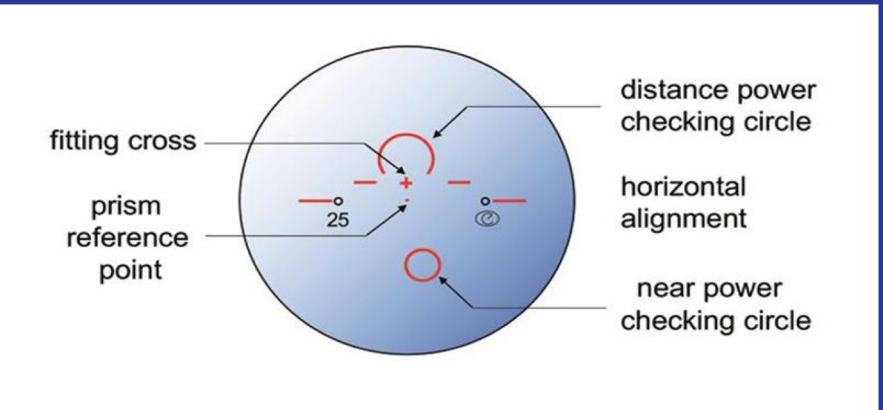
|Sphere|	The absolute value of the 'sphere' number on your eyeglass prescription
If Minus	If the sign of the 'sphere' number on your eyeglass prescription is 'minus'
If Plus	If the sign of the 'sphere' number on your eyeglass prescription is 'plus'

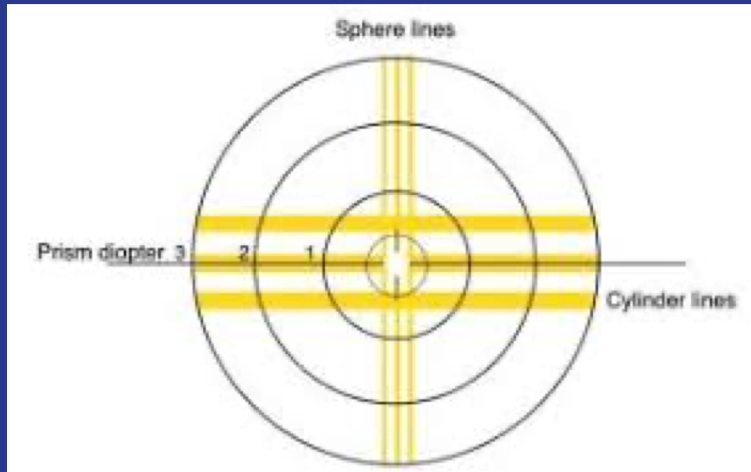
www.contactsadvice.com

Manufacturer	Brand ↓ / Website →	Vision Direct	Coastal	1800Contacts	DCL	LensMart	ContactsDirect	Walmart	Lens	CLK	Walgreens
Johnson & Johnson	Acuvue Vita 6 Pk	$60.00	$52.00	$45.49	$44.99	NA	$45.49	$54.94	$45.99	$62.95	$60.00
	Acuvue Vita 12 Pk	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acuvue Oasys 12 Pk	$70.00	$66.00	$60.00	$48.99	$70.00	$70.00	$70.00	$70.00	$56.00	$70.00
	Acuvue Oasys 24 Pk	$114.50	$104.00	$119.50	$84.99	$114.50	$114.50	$114.50	$114.50	$99.80	$114.50
	Acuvue Oasys for Astigmatism	$41.50	$39.99	$41.37	$28.99	$39.00	$41.50	$41.50	$41.50	$36.50	$41.50
	Acuvue Oasys 1-day	$88.50	$84.99	$77.25	$67.99	$88.50	$88.50	$88.50	$88.50	$88.50	$88.50
	Acuvue 1-Day Moist 30 Pk	$33.00	$31.99	$29.25	$25.99	$33.00	$33.00	$33.00	$33.00	$28.40	$33.00
	Acuvue 1-Day Moist 90 Pk	$66.00	$63.99	$61.00	$48.99	$66.00	$66.00	$66.00	$66.00	$60.70	$66.00
	Acuvue 1-Day Moist for Astig. 30 Pk	$36.00	$34.00	$32.25	$31.99	$36.00	$36.00	$36.00	$36.00	$30.25	$36.00
	Acuvue 1-Day Moist for Astig. 90 Pk	$85.50	$82.50	$74.25	$74.99	$85.50	$85.50	$85.50	$85.50	$95.75	$85.50
	Acuvue 1-Day TruEye 30 Pk	$36.00	NA	$32.25	NA	NA	NA	NA	NA	NA	NA
	Acuvue 1-Day TruEye 90 Pk	$82.50	$77.99	$71.25	$62.99	$82.50	$82.50	$82.50	$82.50	$73.45	$82.50
	Acuvue 1-Day Define 30 Pk	$40.00	$39.99	$35.83	$41.99	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00
	Acuvue 1-Day Define 90 Pk	$94.00	$94.99	$81.50	$101.99	$94.00	$94.00	$94.00	$94.00	$94.00	$94.00
Alcon	Air Optix Aqua	$25.24	$39.99	$44.99	$25.24	$25.24	$34.99	$37.75	$24.99	$26.45	$44.99
	Air Optix Plus HydraGlyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Air Optix for Astigmatism	$89.74	$53.99	$59.99	$45.99	$42.24	$48.24	$49.75	$87.95	$42.50	$60.99
	Air Optix Night&Day	$42.74	$54.99	$59.99	$43.24	$48.24	$59.99	$61.25	$37.99	$46.15	$66.99
	Air Optix Color	$84.00	$84.00	$75.50	$75.25	$84.00	$84.00	$75.25	$84.00	$78.10	$84.00
	Focus Dailies 90 Pk	$45.99	$50.00	$42.74	$38.99	$46.99	$57.49	$38.00	$34.99	$40.25	$53.99
	Focus Dailies Toric 90 Pk	$69.99	$75.99	$88.74	$72.99	$68.49	$57.49	$90.00	$55.95	$68.35	$87.99
	Dailies Aqua Comfort Plus 30 Pk	$24.99	$21.99	$28.07	$15.74	$24.99	$27.86	$19.75	NA	$35.05	$28.99
	Dailies Aqua Comfort Plus 90 Pk	$48.99	$47.99	$49.49	$28.24	$55.49	$49.49	$41.25	$39.99	$47.95	$60.99
	Dailies Aqua Comfort Plus Toric 30 Pk	$34.00	$34.00	$31.12	$27.75	$34.00	$33.00	$27.75	NA	$34.70	$34.00
	Dailies Aqua Comfort Plus Toric 90 Pk	$79.00	$79.00	$72.37	$60.25	$79.00	$79.00	$60.25	$78.95	$82.95	$79.00
	Dailies TOTAL1 30 Pk	$39.00	$39.00	$34.87	$32.75	$39.00	$36.75	$32.75	NA	$31.6	$39.00
	Dailies TOTAL1 90 Pk	$95.00	$95.00	$84.62	$76.25	$95.00	$90.25	$76.25	$76.99	$74.95	$95.00
	FreshLook Colorblends	$38.99	$38.99	$49.74	$45.99	$36.99	$48.49	$55.00	$34.99	$40.95	$54.99
	FreshLook ONE-DAY	$15.99	$14.99	$18.99	$17.99	$15.99	$17.99	$10.00	$12.99	$18.75	$17.99
CooperVision	Biofinity	$30.99	$32.99	$32.99	$33.99	$30.99	$37.49	$45.00	$21.50	$30.75	$47.99
	Biofinity Toric	$49.49	$58.99	$52.99	$44.99	$49.49	$57.49	$55.00	$38.99	$44.20	$67.99
	Biofinity XR	$49.99	NA	$57.99	$47.99	$49.99	$0.99	$50.00	NA	$42.95	$55.99
	MyDay 90 Pk	NA	NA	$73.37	$85.00	NA	85	$85.00	$85.00	$85.00	NA
	clariti 1day 90 Pk	NA	NA	$56.50	$85.00	NA	$65.00	$65.00	$65.00	$65.00	NA
	clariti 1day toric 30 Pk	NA	NA	$30.71	$34.00	NA	34	$34.00	NA	NA	NA
	Proclear	$29.99	86.99	$54.99	$42.99	$29.99	$44.99	$51.88	$19.99	$24.85	$49.99
	Proclear Toric	$46.99	$53.99	$81.49	$49.99	$46.99	$79.99	$65.00	$39.99	$48.45	$67.99
	Proclear 1-Day 30 Pk	$31.99	$30.99	$31.66	$27.99	$31.99	29.82	$31.24	NA	$22.35	$34.99
	Proclear 1-Day 90 Pk	$50.99	$60.99	$62.99	$52.99	$50.99	$60.49	$60.00	$38.99	$49.50	$72.99
	Biomedic Toric	$33.99	$33.99	$36.24	$32.99	$33.99	$34.24	NA	$27.50	$34.95	$38.99
Bausch + Lomb	ULTRA	$60.00	$60.00	$42.00	$60.00	$60.00	$60.00	$60.00	$60.00	$78.00	$60.00
	Purevision 2	$36.99	$38.99	$42.49	$37.99	$39.99	$37.49	$53.46	$28.99	$30.40	$52.99
	Purevision 2 Toric	$54.99	$52.99	$42.49	$47.99	$54.99	$44.99	$54.88	$43.99	$48.75	$58.99
	Biotrue 1-Day 30 Pk	$29.50	$30.99	$30.82	$28.99	$33.00	$30.82	$24.00	NA	NA	$36.99
	Biotrue 1-Day 90 Pk	$60.99	$63.99	$57.49	$57.99	$60.99	$62.49	$60.00	$49.99	$58.25	$74.99
	Soflens 38	$16.49	$17.00	$24.86	$21.99	$16.49	$21.86	$22.00	$13.99	$17.20	$21.99
	Soflens Toric (For Astigmatism)	$29.49	$30.99	$40.36	$32.99	$29.49	$35.49	$35.00	$20.99	$31.30	$40.99
	Soflens Daily Disposable 90 Pk	$39.49	$42.99	$42.99	$42.99	$39.49	$44.99	$45.00	$29.99	$46.35	$47.99

Lensometry

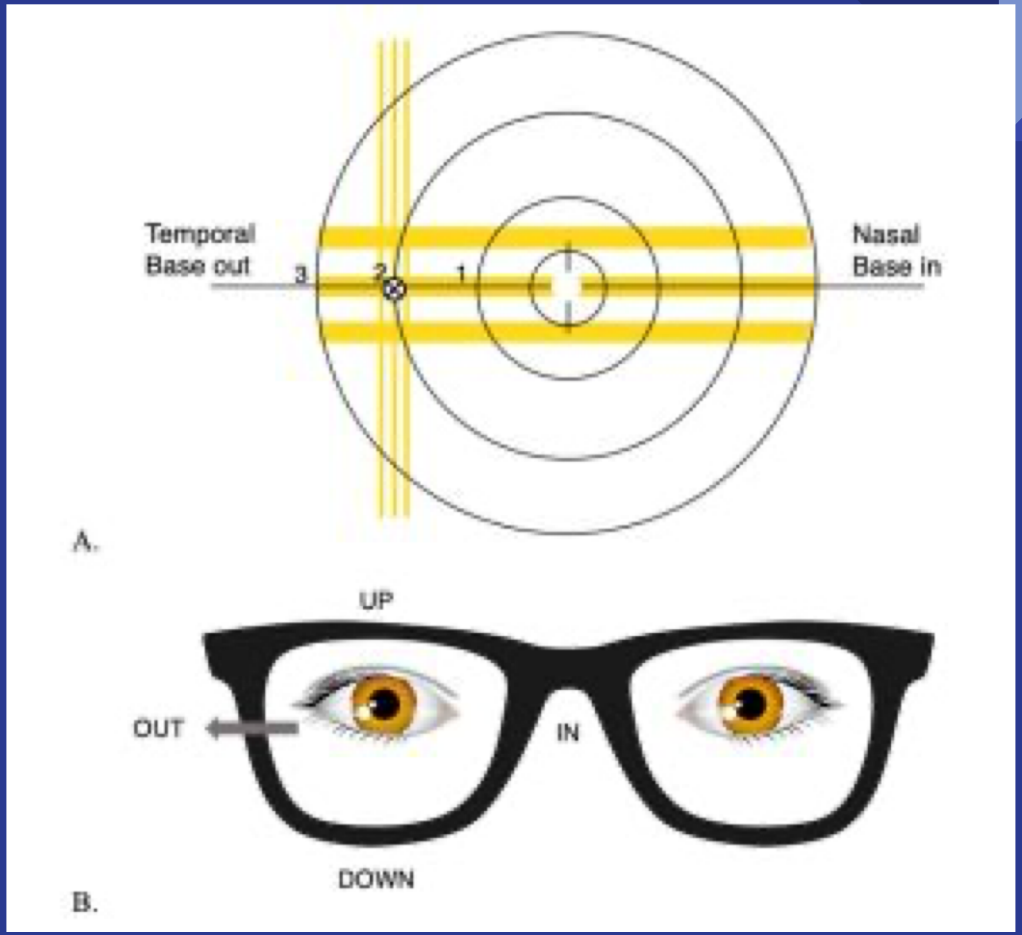
- Make sure to check most up-to-date glasses
- If patient walks in with 20/20 vision in current glasses you can reasonably assume the new MRx has not changed much from current spectacle Rx
- Check for add power even in young patients
- Progressives have markings on lens





Lensometry and Prism

- If patient states they have prism in their glasses it is important to ask follow-up questions on this subject
  - Do they still see double in their current glasses? Is the diplopia vertical, horizontal, or diagonal
  - Is it there all the time?
  - Does it go away if they cover one eye?
    - If it does it is binocular diplopia and most likely due to eye alignment, muscle, or neuro issue
    - If it does not- could be monocular diplopia- think dry eye, cataract, some sort of ocular surface issue
    - Poll question 8

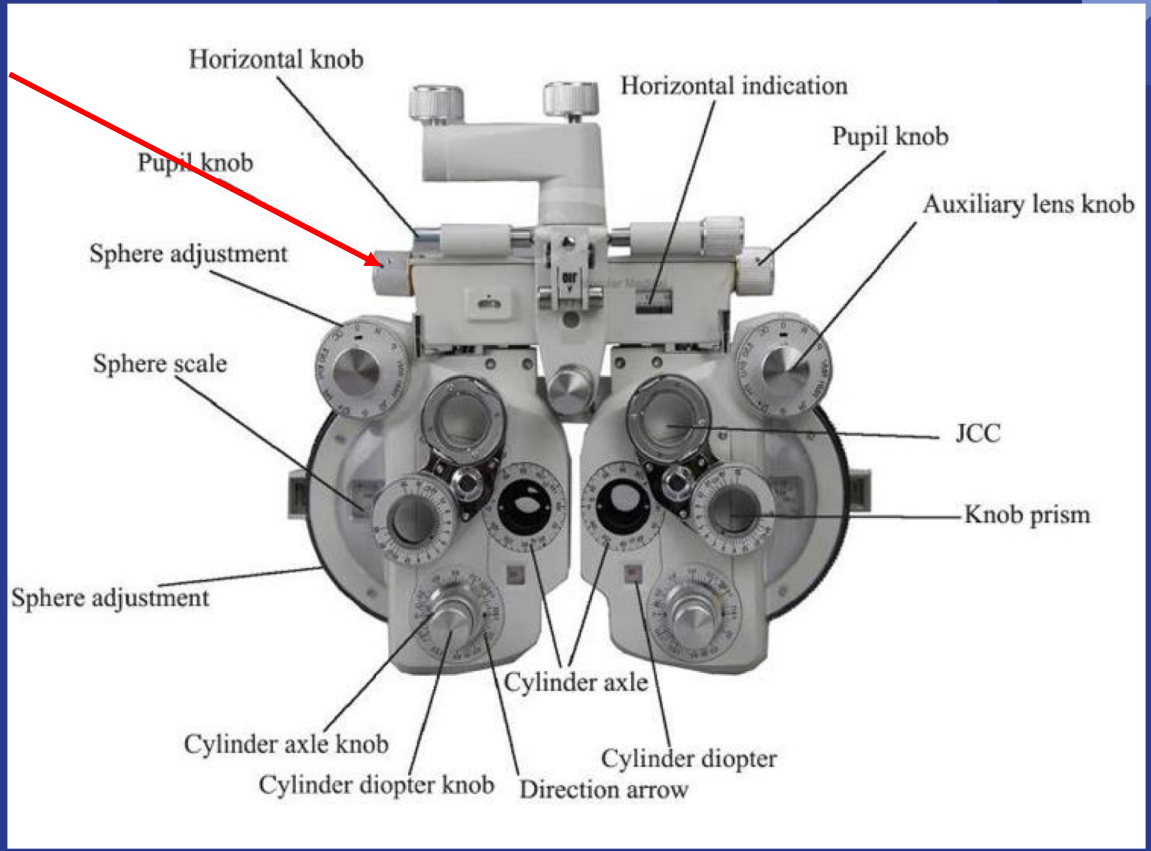

Temporal
Base out
3
2
1
Nasal
Base in
A.
UP
OUT
IN
DOWN
B.

Autorefraction

- If patient is new and doesn’t have a current Rx or pair of glasses or contacts with them an autorefraction can be a valuable tool and rough estimate as to what the refractive error is
- Patient may blink in between measurements, but make sure they are opening wide
- Note if mires are distorted as this could indicate tear film instability or dryness

Starting the Refraction

- Make sure patient's forehead is firmly against the forehead rest and that it stays against the rest
  - During COVID pandemic difficulty with lenses in phoropter fogging. Pay attention to this especially if your patient is wearing a mask
- Make sure pupillary distance is accurate and patients pupils are lined up in the phoropter


Horizontal knob
Horizontal indication
Pupil knob
Pupil knob
Auxiliary lens knob
Sphere adjustment
Sphere scale
JCC
Knob prism
Sphere adjustment
Cylinder axle
Cylinder axle knob
Cylinder diopter
Cylinder diopter knob
Direction arrow

Pupillary Distance

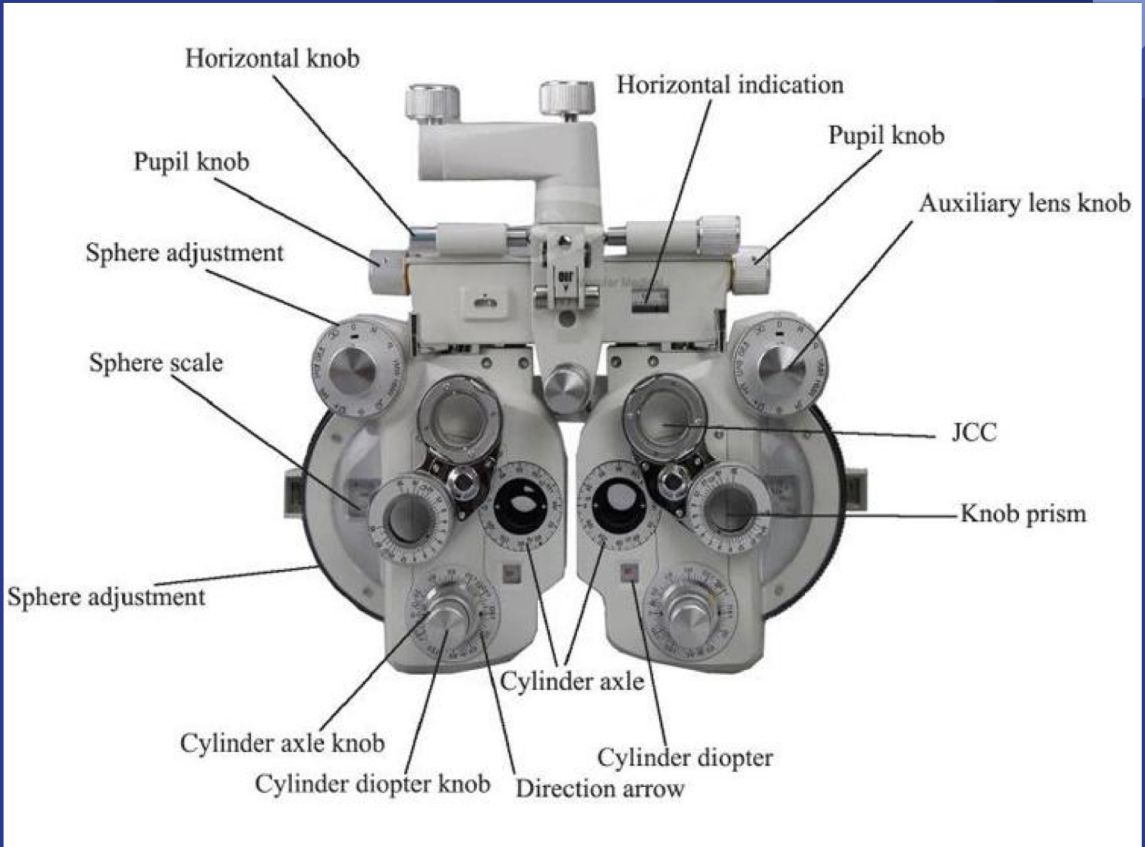
https://youtube.com/clip/UgkxhvySTy5N15oFFMr7WhwCAIAeEELaQpIM?si=gc5Dr2gwaHRN-K7t

Refraction

- MAXIMUM PLUS TO REACH MAXIMUM VISUAL ACUITY
  - Over-minusing a patient is a common mistake we make when refracting
    - Remember the chart from earlier, for every quarter change of myopia should be about a line of change on the chart
    - If the patient is seeing 20/20 initially I wouldn't change the Rx by more than +/-0.50sph
- Start with current Rx, occlude the left eye, and add +0.75sph to the right eye
  - This should result in a loss of 2-3 lines of vision

Refraction continued

- Slowly add more minus in -0.25D intervals, asking the patient which is better until you reach maximum visual acuity of 20/15-20/20 vision
  - Expect about 1 line of improvement for every -0.25D change
- Once the spherical correction has been identified you may go on to the cylinder correction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Sphere scale
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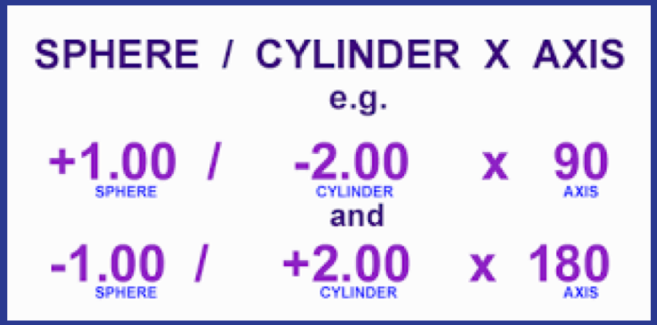
Knob prism
Sphere adjustment
Cylinder axle
Cylinder axle knob
Cylinder diopter
Cylinder diopter knob
Direction arrow

Cylinder correction/Jackson Cross Cylinder

- Place the JCC lens over the patient's open eye
  - General rule of thumb- if the patients cylinder correction is +/-1.00 or greater, fine tune the axis first
  - If less than +/-1.00D, fine tune the power of the cylinder first
- Optometry offices work in - cylinder form
- Chase the white in + cyl, chase the red in - cyl

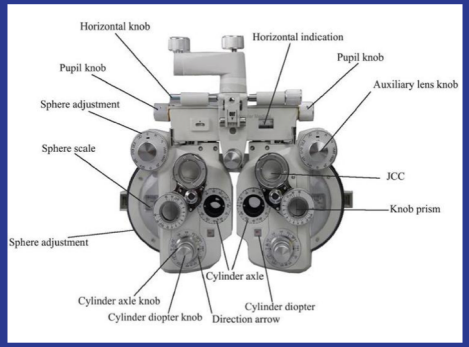


Cylinder Correction/JCC

- If correcting the axis first consider how much astigmatism the patient has
  - The higher the amount, the less I would shift the axis
  - 10 degree steps in patients with +/-2.00D cyl or more
  - 15 degree steps with less than 2.00D cyl
- Chase the white!
- Make sure cylinder is oriented 45 degrees from either side of the axis of their astigmatism
- I like to isolate a 20/40 line if the patient has normal vision and have the patient focus on the B of the FZBDE line
- Make sure to tell patient to ignore color, brightness, or size changes and solely focus on sharpness of the edges of the B

Cylinder Correction/JCC

- Decrease the increments size following a reversal (15 to 10 to 5 to 3 to 1 etc)
- Once the axis has been refined, you may move on to the cylinder power if this hasn't been addressed yet
- If the axis has changed > 15 degrees and the cyl power was checked first, pull the JCC away and refine the power with the cylinder knob



Cylinder Correction/JCC

- When ready to check the cylinder power rotate the JCC so the white and red dots align with the axis now
- Ask the patient which option is better, 1 or 2?
- If patient chooses the option with the white dot, add +0.50cyl to the Rx and -0.25sph to the sphere correction
  - Subtract +0.50cyl if they choose the red and add +0.25sph to the sphere correction to maintain balance
  - Once they reverse remove the JCC and use the knob to fine tune the Rx


12CYL
12CYL
8CYL
8CYL

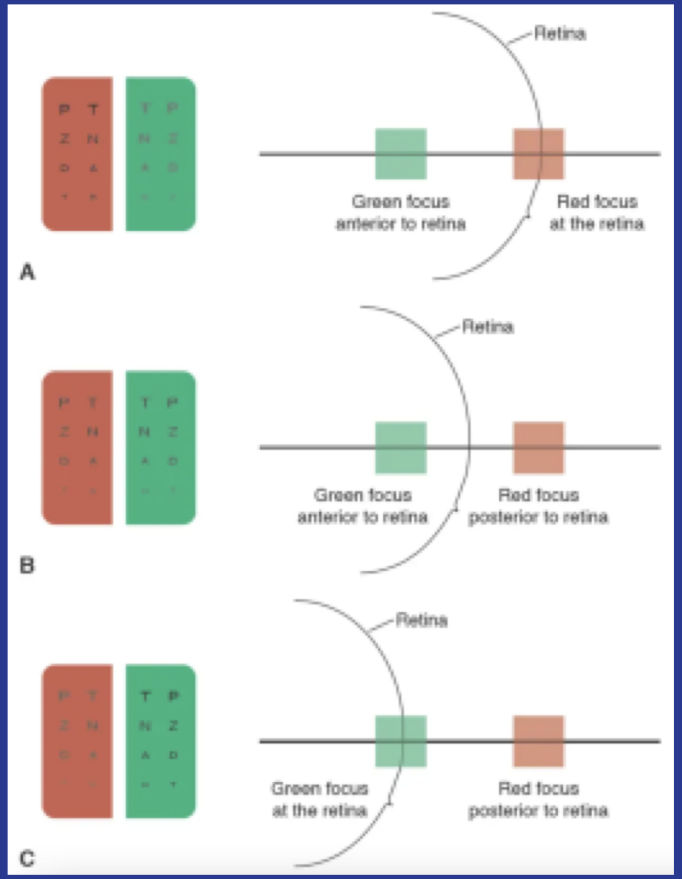
Phoropter

- Cylinder only goes to +/-6.00D
- May need auxiliary lens added. Will give +/-2.00D additional cylinder
- Sphere only reached +16.00D, or -19.00D
- Anything exceeding this will need a loose lens refraction

Fine-tuning Refraction

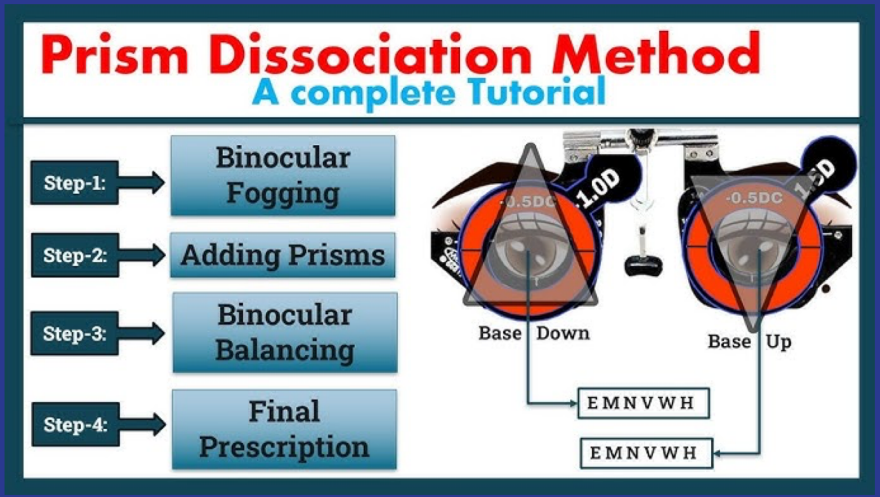
- Remember most plus Rx that gives BCVA is the goal
  - DO NOT OVER-MINUS - this is a very common mistake and more likely to happen in younger individuals
- If patient has 20/20 vision coming into the exam there shouldn't be more than a -0.50D spherical equivalent change in the Rx
- Binocular blur-balance vs red-green color balance

Red-Green Blur Balance



- RAM-GAP- red add minus, green add plus
- Monocular test
- Assures Rx is within area of proper blur balance

Binocular Blur Balance



- Place base down prism in front of OD, base up in front of OS
- Have 20/30 line on chart
- Add +0.75sph over both eyes
- Ask patient if top or bottom 20/30 line is clearer
- Add + to clearer line until both are equally blurry
- Remove prism, have patient read line, add minus in 0.25D steps up to -0.75sph over both eyes

Loose Lens Refraction

- Usually used in situations where patients best corrected vision is greatly reduced
- Trial frame and loose lenses are more natural and easier for patients with high refractive errors, are difficult to refract, and have visual impairment
  - May also be better for patients with eccentric viewing due to macular damage or those with a nystagmus who would have a hard time looking through the phoropter
- If patient is 20/50 or worse and not improving with regular refractive techniques this may be a good option

Loose Lens Refraction

- Just Noticeable Difference (JND) is an important tool to use in patients with visual impairment
- Just divide their BCVA by 100 to get the diopter difference that patient should be able to appreciate
  - Ex: BCVA is 20/200, 200/100 = 2.00D, show them a +1.00 and a -1.00 D lens and ask which option is better
    - If they can't tell a difference with the JND then they probably won't appreciate a change in their MRx
    - Poll question 9

Loose Lens Refraction

- Patient comes in with no spectacle Rx and has a BCVA of 20/400 in the right eye
  - JND 400/100 = 4.00D, start with a trial frame with no lenses in it and show patient a +2.00D and -2.00D lens
  - Patient states +2.00D is clearer- place +4.00sph lens in trial frame and show patient a +/-2.00D lens again
  - Patient states once again the +2.00D lens is clearer - exchange the +4.00sph lens with a +8.00sph lens and show the patient a +/-2.00D lens once again
  - Patient now says -2.00D lens is clearer- exchange the +8.00sph with a +6.00Dsph lens

Loose Lens Refraction

- Re-check vision - in this example patient has now improved to 20/200
- If vision has improved change the JND- in this case JND is now 2.00D- show patient +/-1.00D lenses now
- Continue to decrease the lens intervals as vision improves until you find the best spherical correction

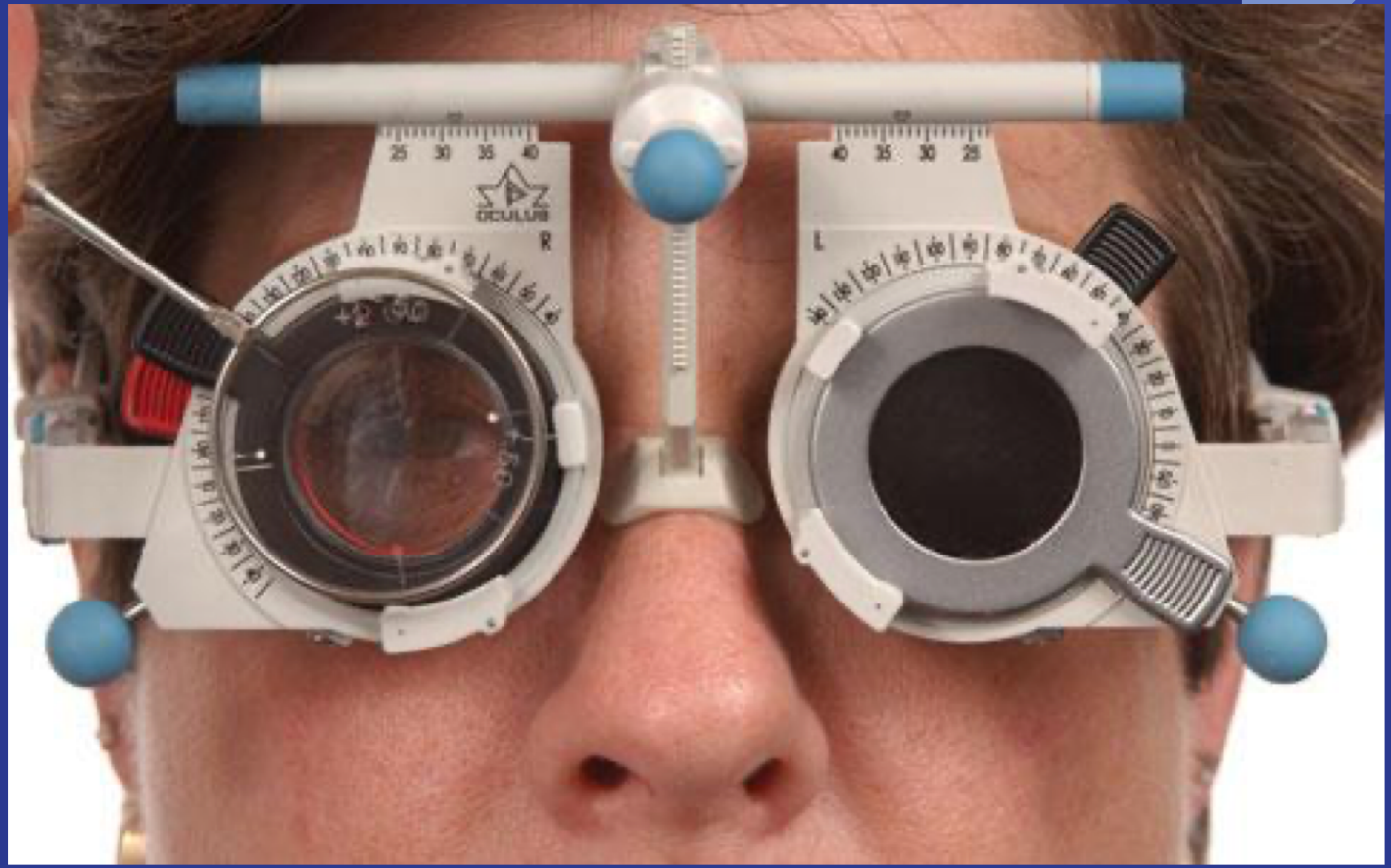
Loose Lens Refraction

- Do the same process with JCC loose lens to check for astigmatism
- If the best vision you can get the patient in that eye is 20/200, start with a +/-1.00 JCC lens based on JND
- Start with the +/-1.00 JCC lens oriented at 90 and 180 degrees
- If patient prefers +1.00D at 180, place a +2.00cyl lens at 180 and don’t forget to add -1.00sph to the spherical lens in place to maintain proper balance
    - If the sphere correction settled on was +6.00D, change it to +5.00D with +2.00D of cyl

Loose Lens Refraction

- If patient again says +1.00D JCC is better at 180, change the cyl lens to +4.00D and add another -1.00 spherical correction to the current sphere
- Patient now says -1.00D cyl at 180 is better - replace the +4.00cyl with a +3.00D cyl and check vision
  - Say vision is now 20/100, change the JND to +/-0.50D and refine the cylinder with this lens
  - Once the cyl power is determined, refine the axis in 15 degree steps until reversal, and then in 5-7 degree steps


=1.00


OCULUS

Summary

- Visual impairment is very prevalent and will only continue to become more prevalent as the population ages
- DO NOT over-minus patients. The most plus Rx that gives you BCVA is the proper Rx
- Use all the tools in clinic at your disposal: AR, lensometers, NIDEK, old records, etc
- Loose lens refractions may be beneficial in patients with VI
- Use JND to determine what lens differences to show the patient
- Don’t be afraid to ask questions

Questions?

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