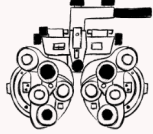**Slide 1**

Visual Assessment:
More Than a Refraction

Michelle J. Hoff, OD, FAAO, ABOM, FNAO
Associate Clinical Professor
University of California Berkeley
Herbert Irtheim School of Optometry and Vision Science
mhoff@berkeley.edu
mhoff@sightlineoc.com

1

Slide 2

Michelle J. Hoff, OD, FAAO, ABOM, FNAO

❖ University of California Berkeley | Associate Professor of Health Sciences
❖ Mindful Eyes Foundation | Founder and Executive Director
❖ SightLine Ophthalmic Consulting | Co-founder and CEO
❖ Doctor of Optometry (OD)
❖ Master in Ophthalmic Optics (ABOM)
❖ Registered Spectacle Lens Dispenser (CA-SLD
❖ Licensed Optometrist (CA-DCA)

linqapp.com/michelle_hoff

2

Slide 3

Course Objectives

● Review visual pathway
● Discuss common tests performed during comprehensive visual evaluation, the purpose and norms of tests
● Review refractive errors, accommodation and vergence conditions
● Discuss treatments for common visual conditions
● Describe components of a spectacle prescription and how to explain them to a patient using layman's terms.
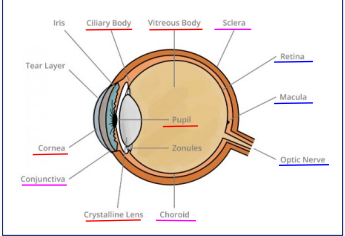
3

Slide 4

Visual Pathway

● ocular anatomy
● steps of visual perception
● trigeminal nerve
● near triad

4

Ocular Anatomy Review
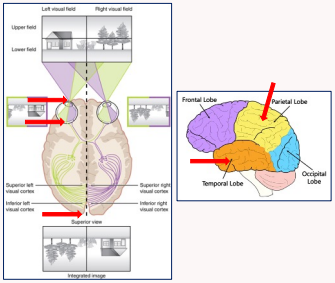
The Eye

- **Refracting Tissues/Structures**
  - Cornea
  - Pupil
  - Crystalline Lens
  - Ciliary Muscle
  - Aqueous & Vitreous Humor
- **Light Sensitive Tissues**
  - Retina/Macula
  - Optic Nerve
- **Supportive Tissues**
  - Conjunctiva
  - Sclera
  - Choroid

5

Visual Perception Steps

- ★ **Reception**
  Light>cornea>pupil
- ★ **Transduction**
  EME>rods/cones>ECl>ON>Brain
- ★ **Transmission**
  ON>1°VC (Occipital Lobe)
- ★ **Selection**
  Feature Detectors break up image
- ★ **Organization**
  Reorganization in visual cortex
- ★ **Interpretation**
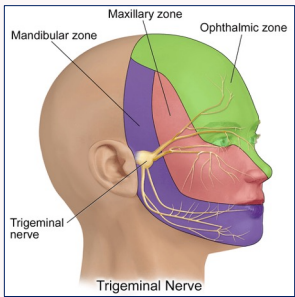 Meaning to visual stimulus/object

6

A Nerve Worth Mentioning

Cranial Nerve V
The Trigeminal Nerve
- Largest/ most complex
- 3 branches
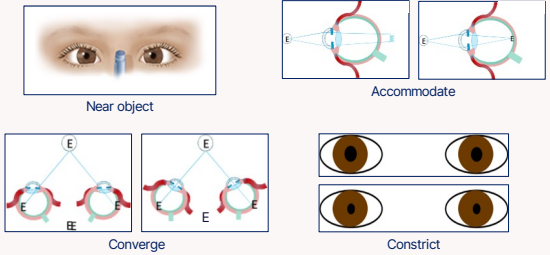- Sensory/motor-eyes, nose, mouth, head, neck
- Trigeminal Dysphoria

Brain Freeze
- Vessels expand = pain

7

Accommodative / Near Triad

Near object

Accommodate

Converge

Constrict

8

Visual Assessment Tests

- components of a comprehensive eye examination
- visual function tests
- pre-exam tests

9

Components of a Comprehensive Eye Examination

- **Patient History**
- **Preliminary Examination**
  - ○ Visual Acuity
  - ○ Autorefraction/Keratometry
  - ○ Tonometry
  - ○ Retinal Imaging
- **Functional Vision Assessment**
  - ○ **Visual Acuity, Color, Contrast Sensitivity**
  - ○ **Refraction**
  - ○ **Eye Focusing**
  - ○ **Eye Teaming**
  - ○ **Eye Movement**
- **Ocular Health Evaluation**
  - ○ Anterior Segment Evaluation
  - ○ Posterior Segment Evaluation
- **Supplemental Testing as Needed**

10

Visual Function Tests

- Pre-examination Tests
- Case History
- Confrontation Tests
- Phoropter Tests
  - ○ Refraction
  - ○ Accommodation
  - ○ Binocular Vision

11

Pre-exam Tests

Multi Diagnostic Instrument
- ★ ● Autorefraction / Keratometry
- ★ ● Corneal topography
- ★ ● Corneal pachymetry
- ★ ● Aberrometry
- ★ ● Non contact tonometry
- ★ ● Anterior chamber
  ★   assessment/angles
  ● Dry eye imaging

12

Case History (most important test)

Chief Concern(s) (CC): What brings you in today?

HPI (History of Present Illness)

Onset: When did the problem start?

Location : Where is the problem? One/both eyes, Distance or Near?

Severity: How bad are the symptoms? Mild, Moderate, Severe? Scale 1-10?

Duration: Are the symptoms constant or intermittent?

Frequency: How often do the symptoms occur? Only once or several times?

Context: Any others symptoms/conditions/activities related to this concern?

Modifying Factors: What makes the symptoms better? Worse?

13

Case History

Personal and Family History

Ocular conditions: Eye injuries / surgeries, Glaucoma, Uveitis, Eye turn

Medical conditions: Diabetes, Hypertension, Cardiovascular, Autoimmune

Medications

Prescribed, OTC, Recreational:
- What are they for?
- How long have you been taking?
- How often do you take them? Dosage/Frequency?

14

Ophthalmic Case History

Visual Case History
- Are you having any problem with your Vision?
  - Quality
  - Comfort

Optical Questions
- How old is your eyeglasses?
- How many pairs do you have/use?
- What do you use them for?
  - Distance / Near
  - Computer
  - Driving

- Is there anything you want to change?
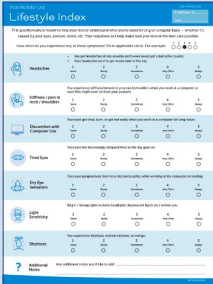
Daily activities?
- Occupation
- Hobbies / Sports
- Digital device usage

15

Dig Deeper into the Concerns

Lifestyle Questionnaire
- Streamline the history
- Create a differential diagnosis
- Problem focused testing

16

4

Confrontation Tests

- External Observations
- Visual Acuities
- Cover Test
- Near Point of Convergence
- Near Point of Accommodation
- Accommodative Amplitude
- Pupils
- Versions and Ductions
- Stereopsis
- Color Vision
- Contrast Sensitivity

17

External Observations

Ptosis = Droopy eyelid

Exophthalmos d/t Thyroid Eye Disease

Head tilt d/t EOM palsy

Red eye d/t subconjunctival hemorrhage

18

Visual Acuity

A threshold measurement of the eye's ability to distinguish an object correctly.

19

Snellen Acuity System

What does 20/20 mean?

The smallest letter a person can read from 20 feet away (test distance) is the 20-foot letter (8.87 mm tall).

$$\tan \theta = h / d$$

8.87 mm

5' arc

20 ft.

Test Distance
20/20
Letter Size

1862 Herman Snellen chose Minutes of Arc from the early astronomers. 1 minute of arc the separation seen between 2 stars.

20

Snellen Acuity

A person with 20/20 acuity stands 40 feet away to read the 20/40 foot size letters.
20/20 = From 20 feet away the smallest letters read correctly are the 20 foot sized letters.

20/20 letter

20/20 acuity
40 ft. away

20/20 acuity

test distance = 20 ft.

20/40 letter

20/40 acuity

test distance = 20 ft.

20/40= From 20 feet away the smallest letters read correctly are the 40 foot sized letters.

21

Visual Acuity Testing

Normal 20/8 to 20/20
Recording
Ex.1 VAsc 20/60 OD, PH 20/25
20/50^{+2} OS, PH 20/25

Ex.2 VAcc 20/25 OD
20/60 OS, PH 20/50^{-2}

22

Contrast Sensitivity

Contrast Sensitivity = ability to detect an object from the background

Normal =	2.0
Moderate loss =	1.5
Severe loss =	less than 1.0

Recording
OD 2.0, OS 1.8

| V R S K D R |
| N H C S O K |
| S C N O Z V |
| C N H Z O K |
| N O D V H R |
| O D N Z S V |
| K C H O D K |

Pelli Robson Chart

Normal Vision | Vision with reduced Contrast Sensitivity

Night Driving

23

Cover Test

Cover Test = measures the alignment of the eyes and how Ill they work together

Unilateral Cover Test

Cover Test
- **Unilateral**
  - Presence or absence of a tropia, frequency, direction, one or both eyes
  - Strabismus, lazy eye, eye turn

24

Cover Test

Cover Test
- **Alternating**
  - ○ Amount of the deviation: tropia or phoria
  - ○ Phoria = natural resting position of the eye
  - ○ Neutralize with prisms
- **Normal Findings**
  - ○ Distance = 0-2 pD XP
  - ○ Near = 0-6 pD XP
  - ○ Tropias, Eso and Vertical deviations are **not** normal
- **Recording**
  - ○ Tropia = Magnitude, Direction, Frequency, Laterality
  - ○ Phoria = Magnitude, Direction
  - ○ Examples
    - Ex. 1   CT cc Ortho @ D/N
    - Ex. 2   CT sc 20 RX(T)@ D; 10 XP @N
    - Ex. 3   CT cc 15 LET w/ 5 LHyperT@ D/N

Alternating Cover Test

25

NPC/NPA/AA

Near Point of Convergence (NPC)
- Binocular convergence
- Norm: < or = 7 cm
- TTN = to the nose

Near Point of Accommodation (NPA)
- Binocular focusing ability
- Minimum expected norm: 15 - (age/4)
  Ex. 8 year old = 15 - (8/4) = 13D

Accommodative Amplitude (AA)
- Monocular focusing ability
- Not affected by convergence
- Minimum expected norm: 15 - (age/4)

cm	100	50	40	33	25	20	17	14	12.5	11	10
D	1	2	2.50	3	4	5	6	7	8	9	10

Converting cm to Diopters
D = cm/100

26

Advanced Technology

DISTANCE MEASUREMENT		NEAR MEASUREMENT	
PUPILLARY DISTANCE	66.60mm	PUPILLARY DISTANCE	64.95mm
MQI	1.00	MQI	1.00
HORIZONTAL	2.41Δ EXO	HORIZONTAL	8.35Δ EXO
VERTICAL	0.12Δ L-HYPER	VERTICAL	0.62Δ L-HYPER
VERTICAL MQI	HIGH	VERTICAL MQI	HIGH

AC/A RATIO 3.24 Δ/D

NEUROLENS VALUE
PRESCRIBE	OD	OS
1.7 BI	0.9 BI	0.9 BI

27

Pupils

Pupil Testing
- optic nerve disease
- retinal disease
- trauma

Iridodialysis = trauma

Anisocoria = unequal pupil sizes

Heterochromia = unequal iris color

28
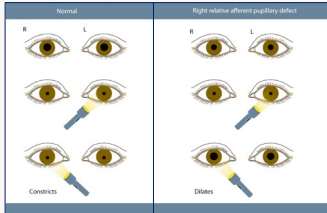
Pupil Testing

PERRL
Pupil **E**qual **R**ound **R**eactive **L**ight
- Efferent pathway = to the brain

RAPD
Relative **A**fferent **P**upillary **D**efect
- Afferent pathway = from the brain
- APD=Relative Afferent Pupillary Defect
- MG=Marcus Gunn

Causes
- Trauma
- Neurological disorders
- Eye drops/Medications
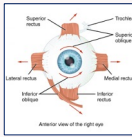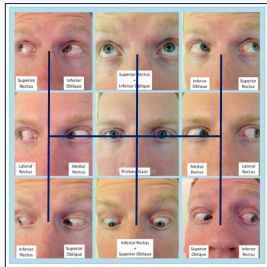- Tumors/Cancers

Recording / Expected Norm
PERRL -APD

Examples of normal vs +APD

29

Extraocular Muscle Evaluation

EOMs = extraocular muscle integrity and innervating nerves

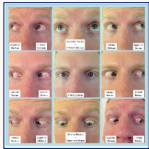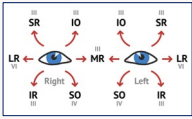**Extraocular Motilities (EOMs)**
- 9 fields of gaze
- Smooth movements
- Over and under actions
- End Point Nystagmus

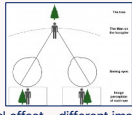30

Extraocular Muscle Evaluation

Recording
- Full
- FESA = Full Extensive Smooth Accurate

31

Stereo Acuity

Stereopsis = Depth perception

Lateral offset = different images

Stereo acuity Smallest amount of depth perceived
Normal   20 sec of arc or better
Borderline 25 - 40 sec of arc
Reduced   50 - 400 sec of arc
Gross   3000 sec of arc

32

Stereo Acuity

Randot Test

Stereofly Test

Recording
Randot 250 sec arc
Animals 200 sec arc
Circles 20 sec arc

RANDOT Forms

ANIMALS
(with random dot ground)

CIRCLES
(with random dot ground)

SCORING KEY

Animals
100 -400 sec arc

Randot Forms
250-500 sec arc

Circles
20-400 sec arc

33

Color Deficiencies

-anomaly = difficulty with (mild)
-anopia = inability to (more severe)

Condition	Affected Colors
Deuter*anomaly*	green red confusion (green looks more red)
Prot*anomaly*	red green confusion (red looks more green)
Prot*anopia*/Deuter*anopia*	red and green look alike
Trit*anomaly*	blue green confusion, yellow red confusion
Trit*anopia*	blue=green, purple=red, yellow=pink
Achromatopsia	see only shades of gray

34

Color Vision Testing

Ishihara Color Plate Test

Red Cap Test

Farnsworth D 15 Arrangement Test
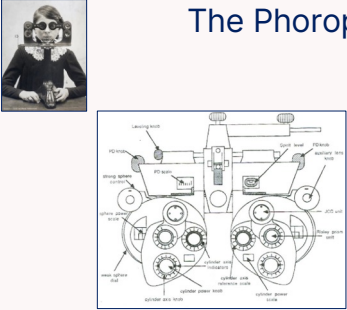
35

Phoropter Testing

- the phoropter
- refraction
  - objective
  - subjective

36
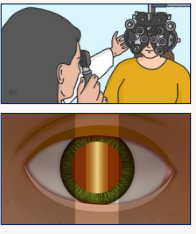
The Phoropter

- 160 lenses
- Sphere -19.00 to +16.75
- Cylinder -0.25 to -6.00
- Maddox rods
- Filtered lenses
- Prisms
- Jackson Cross Cylinders

37

Refraction

Objective:
Retinoscopy
OD -2.00 DS 20/25
OS -1.50 -0.75 x 180 20/20

Subjective:
Monocular Subjective
OD -2.50 -0.50 x 175 20/15
OS -1.75 -0.75 x 005 20/15

Binocular Balance
OD -2.00 -0.50 x 175 20/20
OS -1.75 -0.75 x 005 20/15

Final Rx
OD -2.25 -0.50 x 175 20/15
OS -1.75 -0.75 x 005 20/15
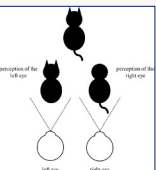
38

Functional Vision Tests

- fusion
- phorias
- vergences
- accommodation

39

Binocular Vision Assessment

Horizontal double vision

Fusion = ability to take the two images from each eye and form one single image

40

10

Slide 41

Binocular Vision Assessment

Phoria Testing
Prism Dissociation

12ΔBI Measuring Prism   6ΔBU Dissociating Prism

D   D

D

12ΔBI Dissociating Prism   6ΔBU Measuring Prism

Normal Vergence Findings
- Horizontal
  - Distance: BI x/5/3, BO 8/15/7
  - Near: BI 11/19/10, BO 14/18/7
- Verical
  - BU: 3/1
  - BD: 3/1

Normal Phoria Findings
- Horizontal
  - Distance = 0-2 pD EXO,
  - Near = 0-6 pD EXO
- Vertical Ortho @ D/N

Vergence Testing
Measurement of muscle strength to maintain fusion

41

Slide 42

Accommodation Assessment

NRA / PRA Test= ability to increase/decrease accommodation under binocular conditions
NRA = Negative Relative Accommodation
PRA = Positive Relative Accommodation

NRA
+ Lenses to blur

Relax Accommodation

Final Rx
Clear Vision

Stimulate Accommodation

PRA
- Lenses to blur

Normal NRA/PRA Findings
- Non-presbyope: NRA +2.00, PRA -2.50
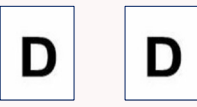
Push Up Test

V H R E Z

Push Up Amplitude of Accommodation
- Monocular focusing ability
- Not affected by convergence
- Minimum expected norm: 15 – (age/4)

42

Slide 43

Refractive Conditions

- refractive error
  - myopia
  - hyperopia
  - astigmatism
  - presbyopia
- elements of a spectacle Rx
- case analysis #1

43

Slide 44

Refractive Error

Refractive Error = light is not focused clearly on the retina.

It is equal but opposite to the spectacle correction.
+2.00DS refractive error (eye)   -2.00DS spectacle Rx

Normal vision   Focal Plane

Emmetropia = light is focused clearly on the retina = no refractive error

44

Myopia

Myopia
- Eye is too long / image focuses in front of retina
- Sx = Distance blur
- Nearsighted
- 40% of U.S.

Correction
- **Minus** or **Concave** lenses diverges light
- Pushes image back onto the retina.

Focal Plane

Myopia

Focal Plane

Myopia corrected

45

Hyperopia

Hyperopia
- eye is too short / image forms behind retina
- Sx = near blur/fatigue in some cases
- Farsighted
- 25% of U.S.

Correction
- **Plus** or **Convex** lenses converge light
- Moves image forward to the retina.

Focal Plane

Hyperopia

Focal Plane

Hyperopia corrected

46

Astigmatism

Astigmatism
- Cornea / lens are ellipsoid shape
- Light rays focus at 2 different points
- Sx = blur at all distances
- 30% of U.S.

Correction
- **Cylinder lens** has 2 different polrs 90 degrees apart

Cornea - oval shape

Astigmatism
Multiple focal points

Focal Plane

Keratoconus

47

Types of Astigmatism

Compound Myopic

Simple Myopic

Mixed

Simple Hyperopic

Compound Hyperopic

48

Presbyopia

- Loss of near focusing
- Associated with age
- 39% pf U.S.

Age	Acc. Amplitude (AA)	Tentative ADD (40cm)
35	+5.50	0.00
40	+5.00	Plano to +0.50
45	+3.50	+0.75 to +1.00
50	+2.50	+1.25 to +1.50
55	+1.75	+1.75 to +2.00
60	+1.00	+2.25 to +2.50

AA = 15 - (age/4)
AA = **15 - (48/4) = 3.00 D**
Use Half = **3.00/2 = 1.50 D**

Min. ADD = Demand - AA/2
Min. ADD @ 40cm= **2.50 - 3.00/2 = +1.00D**

49

Elements of a Spectacle Rx

Myopia, Hyperopia   Astigmatism   Presbyopia

	Sph	Cyl	Axis	Add	Prism
R	-1.25	-0.50	004	+2.25	
L	+0.50	-1.00	177	+2.25	

50

Case 1 Bernie

Bernie 46 yo Softlar marketing and sales manager

CC: Difficulty reading up close
Onset ~3 months ago
Location At near (phone, ipad)
Duration/Frequency/Context With onset of near work
Modifying Factors Increases working distance

Personal and Family History, Medications
        Ocular conditions None
        Medical conditions None

Optical History LEE 2 years ago
SV glasses & CLs, distance vision is good with both
Enjoys tennis and racquetball, uses CL's for sports only

51

Bernie's Confrontation Tests

Gross Observation: normal
DVA cc 20/15, 20/15
NVA cc 20/30, 20/30

CT cc 2XP/3XP
AA 4D/4D
NPA 3.50D
NPC TTN

Pupils: PERRL -APD
EOMS: full
Stereo: Circles 20 sec arc
Color vision: Normal

Data Norms
VA's 20/20 or better at D/N
CT Distance = 0-2 xp Near = 0-6XP
AA/NPA for 46 YO (15-46/4 = 3.50D)
NPC <7 cm

52

Bernie's Treatment Plan

Refraction = Spectacle Rx
OD -6.00 DS 20/15
OS -6.25 DS 20/15

100/40 cm = 2.50D accommodative demand at 40cm
AA/NPA for Bernie is 3.50D, use ½ of 3.50 (1.75D)
2.50D - 1.75D = **+0.75D** tentative Add

	Sph	Cyl	Axis	Add	Prism
R	-6.00	DS		+0.75	
L	-6.25	DS		+0.75	

53

Focusing Conditions

- accommodative
  - insufficiency
  - ill-sustained
  - infacility
  - spasm
  - paralysis
- elements of a spectacle Rx

54

Accommodative Disorders

Accommodative insufficiency = inability to focus based on the age
Tx: (+) lenses, VT (vision therapy)

Ill-sustained accommodation = can focus, but can't hold the focus
Tx: (+) lenses, VT

Accommodative infacility = slow to change focus
Tx: (+) lenses with VT

Accommodative spasm = overstimulation; focusing "cramp"
Tx: (+) lenses, VT, or cycloplegic agent (drops that relax focusing muscles)

Paralysis of accommodation = rare condition, eye can't focus
usually secondary to trauma, systemic disease, drug toxicity, or medication
Tx: Determine underlying cause, (+) lenses

55

Elements of a Spectacle Rx

Hyperopia   Astigmatism   Presbyopia Accommodation

	Sph	Cyl	Axis	Add	Prism
R	+1.50	-1.00	045	+1.00	
L	+1.50	-1.00	135	+1.00	

56

14

Eye Misalignments

- horizontal
  - tropias
  - phorias
- vertical
  - hyper
  - hypo
- correcting misalignments
- elements of a spectacle Rx
- binocular vision conditions
- case analysis #2 & #3

57

Ocular Misalignment

Phoria
- Natural resting position
- Under the cover paddle, eye moves to position of rest
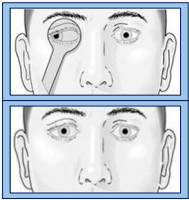
Tropia
- Strabismus, lazy eye, eye turn
- 2-4% general population

58

Horizontal Misalignments

Eso = eye(s) turns **in** towards the nose
Exo = eye(s) turns **out** towards the ear

Eso = turns in
Ex. Right Esotropia
- Infantile
- Accommodative
- Sixth Nerve Palsy

Exo = turns out
Ex. Right Exotropia
- Inherited
- Low Vision
- Stroke
- Convergence Insufficiency

59

Vertical Misalignments

Hyper = eye turns **upward**
Hypo = eye turns **downward**

Hyper = Turns Up
Ex. Right Hypertropia

Hypo= Turns Down
Ex. Right Hypotropia

- Congenital
- Traumatic Brain Injury / Concussion

60

How Do Prisms Work?

Light bends around the base

The image shifts towards the apex
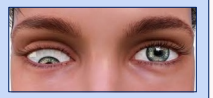
1.00 Base Down

What is the Base direction of the prism?

61

Correcting for Misalignments

Prism base = opposite direction of the deviation

Eso = eye turns in

Exo = eye turns out

Base Out Prism
Shifts the image IN

Base In Prism
Shifts the image OUT

62

Correcting for Misalignments

Right Hyper = OD turns up

Right Hypo = OS turns down

Base Down Prism
shifts the image UP

Base Up Prism
Shifts the image DOWN

Prism base = opposite direction of the deviation

63

Elements of a Spectacle Rx

Myopia, Hyperopia

Astigmatism

Presbyopia Accommodation

Binocular Vision

	Sph	Cyl	Axis	Add	Prism
R	-1.25	-0.50	004	+1.00	2.00BI, 1.00BDn
L	+0.50	-1.00	177	+1.00	2.00BI, 1.00BUp

Horizontal prisms add together when the bases are in the **same** directions
Vertical prisms add together when the bases are **opposite** directions

64

16

Binocular Vision Conditions

Condition	Treatment
Exo	Prism, VT
Eso	(+) Lenses, Prism
Divergence Excess	Prism, VT
Convergence Excess	(+) Lenses, Prism
Vertical Phoria	Prism

65

Case 2 John

John 31 yo Nursing school student

CC: Headaches and eye strain
Onset ~2 months ago
Location At near (reading, computer)
Duration/Frequency/Context With onset of near work

Personal and Family History, Medications
    Ocular conditions None
      Medical conditions Anxiety and depression, taking Zoloft 100mg daily x 3 months

Optical History First eye exam, no HX glasses, distance vision is good.
Enjoys biking and hiking, uses sunglasses/UV protection outdoors

66

John's Confrontation Tests

Gross Observation: normal
DVA sc 20/25, 20/20
NVA sc 20/30, 20/30

CT sc Ortho/8xp
AA 6D/6D
NPA 5D
NPC 10cm

Pupils: PERRL -APD
EOMS: full
Stereo: Circles 20 sec arc
Color vision: Deuteranomaly = green red confusion

> **Data Norms:**
> **VA's** 20/20 or better at D/N
> **CT Distance** = 0-2 xp **Near** = 0-6XP
> **AA/NPA** for 31 YO (15-31/4 = 7D)
> **NPC** <7 cm

67

John's Treatment Plan

Refraction
OD +1.00-0.50x180 20/20
OS +0.75 DS   20/20

Prism Dissociation cc 1xp/12xp
Norm: Distance = 0-2 XP, Near = 0-6XP

	Sph	Cyl	Axis	Add	Prism
R	+1.00	-0.50	180		2.00BI
L	+0.75	DS			2.00BI

DX = Compound hyperopic astigmatism OD, simple hyperopia OS,
accommodative insufficiency, divergence excess

68

17

Case 3 Sally

Sally 6 yo First grader

CC: Left eye turns in, tired when reading
Onset Beginning of school year
Location At near (reading, computer)
Duration/Frequency/Context With onset of near work

Personal and Family History, Medications
    Ocular conditions Father had an eyeturn
    Medical conditions None

Optical History First eye exam, no HX glasses, vision is good.
Goalie on a soccer team, piano lessons

69

Sally's Confrontation Tests

Gross Observation eyes are straight at distance, left eye turns in at near
DVA sc 20/30, 20/50
NVA sc 20/30, 20/50

CT sc 2 EP/15 LET
AA 11D/11D
NPA 12D
NPC TTN

Pupils PERRL -APD
EOMS full
Stereo Animals 400 sec arc
Color vision normal

Data Norms:

VA's 20/20 or better at D/N
CT Distance = 0-2 xp **Near** = 0-6XP
AA/NPA for 6 YO (15-6/4 = 13.50D)
NPC <7 cm
Stereo 20 sec arc or better

70

Sally's Treatment Plan

Auto-refraction   **Retinoscopy**
OD +4.50 -0.75 x 005   OD +5.50 -0.75 x 180
OS +5.00 -0.50 x 178   OS +5.50 -0.50 x 180

Cycloplegic (lt) Retinoscopy
OD +6.50 -0.75 x 180
OS +7.50 -0.50 x 180

	Sph	Cyl	Axis	Add	Prism
R	+6.50	-0.75	180		
L	+7.50	-0.50	180		

DX = Compound hyperopia, Accommodative Esotropia

71

Sally's Follow Up with Glasses

Gross Observation eyes appear straight at distance and near with glasses.
DVA cc 20/20, 20/25+
NVA cc 20/20, 20/25+
AA 14D/14D
NPA 15D
NPC TTN
Stereo cc 80 sec arc
Cover Test cc Ortho/Ortho

	Sph	Cyl	Axis	Add	Prism
R	+6.50	-0.75	180		
L	+7.50	-0.50	180		

72

18

Slide 73

Patient Communication

- power crosses
- explaining plus and minus Rx's
- explaining the spectacle Rx

73

Slide 74

Polr Crosses

Total lens polr = **F1** (Front Surface) + **F2** (Back Surface)

+4.00
+4.00
F1 (Front Surface)

+

-2.00
-5.00
180
090
F2(Back Surface)
[3.00]= amount of cylinder

=

Thin edge
+2.00
Thick edge
-1.00
180
090
Resultant
+2.00 -3.00 x 090
-1.00 +3.00 x 180

74

Slide 75

Minus Cylinder Format
+2.00 -3.00 x 090

Resultant Polr Cross

+2.00
+2.00
0
-3.00
Sphere
− Cylinder

-1.00
-1.00
+3.00
0
Sphere
+ Cylinder

Plus Cylinder Format
-1.00 +3.00 x 180

+2.00
180
-1.00
90
Spherocylinder

75

Slide 76

Patient Communication

	Sph	Cyl	Axis	Add	Prism
R	-1.25	-0.50	004	+1.00	2.00BIn, 1.00BDn
L	+0.50	-1.00	177	+1.00	2.00BIn, 1.00BUp

Right eye Nearsighted
Left eye Farsighted

Causes blur
at all distances

Added
reading
correction

Reduces strain on
eye muscles

76

Key Takeaways

- our eyes are amazing
- the visual system is complex
- tests + critical thinking = visual Tx

77

Visual assessment is more than a refraction

- Understand how the visual system works
- Visual Assessment = Refractive Error, Accommodation, Binocular vision and Eye health
- Multiple data points affect the final spectacle Rx and ocular disease diagnosis
- Understand and communicate the condition and treatment plan

78

At the End of the Day

Sunset over University of California Berkeley

- Did I address the chief concern with appropriate recommendations?
- Is what I am prescribing an improvement over what the patient has or is used to?

79

THANK YOU!

Michelle J. Hoff, OD, FAAO, ABOM, FNAO
Associate Clinical Professor
mhoff@berkeley.edu
mhoff@sightlineoc.com

80