CovalentCareers | Optometry

IN COLLABORATION WITH

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All About Binocular Vision

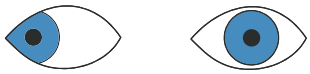
WHAT IS BINOCULAR VISON?

The motor coordination of the two eyes to align the foveas from each eye on an object. This allows for fusion and sensory information from the eyes to be sent to the brain.

ESO

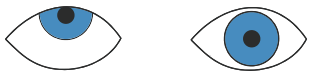
- eye turn in
- normal AC/A
- reduced negative fusional vergences
- reduced PRA
- increased lag of accommodation
- inability to fuse with BI vergence
- inability to clear minus lenses with binocular accommodative facility testing

EXO



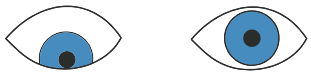
- eye turn out
- normal AC/A
- reduced positive fusional vergences
- reduced NRA
- low lag or lead of accommodation
- inability to fuse with BO vergence
- inability to clear plus lenses with binocular accommodative facility testing

HYPER



- eye is turned up
- neutralize with BD

HYPO



- eye is turned down
- neutralize with BU

COMMON COMPLAINTS FROM PATIENTS

1. COSMESIS
2. ASTHENOPIA → term for group of non-specific symptoms, including eye-strain, diploma, blurred vision, words "moving", HA arter near work

NON STRABISMIC BINOCULAR VISION & ACCOMMODATIVE DISORDERS

CONVERGENCE

INSUFFICIENCY (CI)

- greater EXO at near
- low AC/A
- receded NPC
- ↓ PFV ranges
- low NRA
- Difficulty clearing plus
- ↓ BO vergence amplitude

EXCESS (CE)

- very symptomatic patients
- greater at near
- high AC/A
- reduced NFV
- larger lag or accommodation
- ↓ BI vergence amplitude

DIVERGENCE

INSUFFICIENCY (DI)

- greater ESO at distance
- low AC/A
- reduced NFV
- least common
- ↓ BI ranges at distance

EXCESS (DE)

- greater EXO at distance
- high AC/A
- ↓ BO vergences at distance
- ↓ BI vergences at near

ACCOMMODATIVE

INSUFFICIENCY (AI)

- reduced amplitude of accommodation
- low NRA
- high lag of accommodation
- problem clearing minus lenses

EXCESS (AE)

- trouble relaxing accommodation
- low NRA
- low lag or lead of accomodation
- problem clearing plus lenses

INFACILITY

- reduced NRA and PRA
- difficulty clearing plus and minus lenses

CLINICAL EVALUATION OF STRABISMUS PATIENTS

- case history → **TIME OF ONSET** : crucial for prognosis of condition
  - ↳ INFANTILE : (6months - 1 year)
  - ↳ ACQUIRED : (> 1 year)
- refractive history
- visual acuity
- monocular fixation
- deviation
- correspondence
- sensory motor fusion

TYPE OF ONSET : crucial for prognosis of condition

- ↳ GRADUAL : not pathological /benign
- ↳ SUDDEN : pathological → trauma, vascular, neurological

ASSESSING THE DEVIATION

- frequency → constant or intermittent
- laterality → right, left, alternating
- magnitude → measurement in diopters
- direction → EX/ XT/ HYPER/ HYPO
- conitancy → same or different positions
- cosmesis → < 10-15° usually not noticable

AC/A RATIO

- amount of accommodative convergence that occurs in response to an increase in accommodation

  EXPECTED: 4/1
- high AC/A → "excess", respond well with lenses
- low AC/A → "insufficient", respond well with VT or PRISM

TESTING TO ASSESS DEVIATIONS

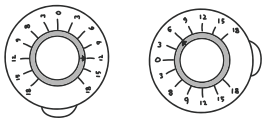
MAGNITUDE OF DEVIATION AT NEAR + DISTANCE → (not an all inclusive list)

COVER TEST

→ UCT = dissociated test, shows: direction, frequency, laterality
ACT = gives the magnitude of the deviation

VON-GRAEFE PHORIA

→ dissociated test (in phoropter), shows: direction & magnitude



MADDOX ROD

→ dissociated test, shows: direction & magnitude

VERTICAL DEVIATION
align occluder vertical to get a horizontal line

HORIZONTAL DEVIATION
align occluder horizontal to get a vertical line

HIRSCHBERG / KRIMSKY → gross determination of ocular misalignment, great for babies!

observe corneal reflex with light, displacement indicates ocular misalignment
1mm shift in corneal light reflex = 22 △

ESO
temporal displacement

HYPER
downward displacement

EXO
nasal displacement

HYPO
upward displacement

TEST ASSESSING ACCOMMODATIVE DISORDERS

HOW MUCH — AMPLITUDE

- **PUSH UP / PULL AWAY** : target brought to patient until blur reported
  - AVERAGE AMP = : 18.5 - 1/3 (age)
  - MINIMUM AMP = : 15 - 1/4 (age)
- **MINUS LENS AMPS** : minus lenses added until patient reports blur
  - AMP = : amount of minus over patients Rx plus 2.50 (working distance)

RESPONSE — ACCURACY

- **NEAR RET: MEM** : ret performed while patient's reading a near card attached to the retinoscope
  - (+) LENSES NEUTRALIZE = LAG of accomodation
    - they accommodate less than the stimulus demands
  - (-) LENSES NEUTRALIZE = LEAD of accommodation
    - they accommodate more than the stimulus demands

EXPECTED FINDINGS
+ 0.25 – + 0.50 LAG

- **NRA / PRA:**
  - **NRA** → plus lenses added until blur reported → indirectly measueres PFV
  - **PRA** → minus lenses added until blur reported → indirectly measueres NFV

EXPECTED FINDINGS
+ 2.50 NRA / - 2.50 PRA

ACCOMMODATION FLEXIBILITY — FACILITY

- **BINOCULAR & MONOCULAR ACCOMMODATIVE FACILITY**

at near, ±2.00 flippers used while patient reads from a card. Forcing the patient to clear the letters after each eyle / flip
recorded how many cycles were performed in 60 seconds

- poor accom. facility : bad with (-) & (+)
  - over accom. : bad with (+)
  - under accom. : bad with (-)
  - vergence problem : bad binocular, good monocular

EXPECTED FINDINGS
8 CPM : BINOCULAR
11 CPM : MONOCULAR

TREATMENT OPTIONS

OPTICAL CORRECTION

- Could help improve the initial complaint of patient
- Astigmatic : give full amount
- ESO respond well to plus
- EXO respond well to plus

VISION THERAPY

- goal : optimize performance efficiency and function
- cannot improve refractive error
- effective for:
  - accommodative disorders
  - ocvio motor dysfunction

PLUS ADD AT NEAR

- useful for patients with:
  - high LAG
  - low accommodative amps
  - high NRA
  - ESO deviation
  - Accommodative insufficiency

SURGERY

- large deviations
- no other options are benefiting patients
- age of patient

PRISM

- will only help motor fusion
- best for patients with:
  - normal AC/A
  - ESO deviation
  - EXO deviation
  - low AC/A