Course Objective:
- To learn the prevalence of common accommodative and binocular vision disorders, common symptoms for these conditions.
- To discuss testing that can be performed to diagnose these conditions, particularly how it applies to primary vision care.
- Treatment of these conditions.
- Cases.

Common Accommodative and Binocular Vision Disorders:
- Accommodative
  - Accommodative insufficiency, accommodative spasm, accommodative infacility
- Phoria
  - Convergence insufficiency, convergence excess
- Tropia
  - Intermittent exotropia, accommodative/refractive exotropia, infantile exotropia
Common Accommodative and Binocular Vision Disorders

- Vertical Phorias
- Nerve Palsies
  - CN 3,4,6
- Accommodative/Binocular Vision Disorders after Brain Injury

Common Accommodative and Binocular Vision Disorders

- Amblyopia
  - Refractive & strabismic
- Oculomotor dysfunction

Why is It Important?

- Vision is involved in 80% of learning
- 20% of children have a visual disorder
- Children on IEPs have a greater chance of having a visual hurdle to learning.
- Increase near demands in adult patients
Vision problems can and often do interfere with learning.
People at risk for learning-related vision problems should be evaluated by an optometrist who provides diagnostic and management services in this area.
The goal of optometric intervention is to improve visual function and alleviate associated signs and symptoms.
Prompt remediation of learning-related vision problems enhances the ability of children and adults to perform to their full potential.
People with learning problems require help from many disciplines to meet the learning challenges they face. Optometric involvement constitutes one aspect of the multidisciplinary management approach required to prepare the individual for lifelong learning.

Testing in a Primary Vision Care Setting

- Goals: efficient to run and interpret within constraints of a primary care exam
- Can a technician perform the technique?
- Are these procedures you already perform during the exam, but may not interpret the results efficiently?

Determining Symptoms in the Exam

- History
- Common EHR Questions:
  - Diplopia, asthenopia
  - Time spent on the computer?
  - Work situations/jobs
  - School Performance
  - IEP
  - Convergence Insufficiency Survey Score (CISS)
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**Convergence Insufficiency Symptom Survey**

- Symptomatic Convergence Insufficiency
  - Adult: >21
  - Child: >16
- Normal Binocular Vision Value
  - Average: 9 or less

Rouse et al. Optometry and Vision Science

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**Stereoacuity**

- Global
- Local
- Common Tests booklets
  - Randot Stereo Book, Stereofly Book, Lang, PASS

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**Cover Test**

- Unilateral vs. Alternate Cover Test
- Latent components
  - 5 reversals with prism
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Cover Test
- Near
  - 20/30 target for near
- Unilateral vs. Alternate Cover Test
- Latent components
  - 5 reversals with prism

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von Graefe phoria

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Versions
- Traditional looking for under/overactions
- Under/overactions
  - 1 to grading score
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Versions

- Gross ocular alignment: Hirschberg
- Monitor fixation: excessive refixations/head movement
- Gross look at oculomotor skills

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Accommodative Testing

- Binocular Cross Cylinder
- NRA/PRA
- Amplitudes of Accommodation
  - Minimum expected: 15 – 0.25(age)
  - Monocular estimation method (MEM) retinoscopy

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Near Point of Convergence (NPC)

- Normal value: closer than 6 cm
- Penlight target vs. vertical column of 20/30 letters
- Break/recovery issues
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Suppression Testing

- Worth Dot
  - Suppression, fusion, diplopia
- Suppression checks in stereo books

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Maddox Rod

- Variable Maddox Rod
- Modified Thorington

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Fixation Disparity/Associated Phoria
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Cycloplegic Retinoscopy/Refraction

- 1% cyclopentolate
- 1% tropicamide
- Prescribing for hyperopia

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Vision in Preschoolers-Hyperopia in Preschoolers (VIP-HIP) Study

- 4-5 year olds in preschool or kindergarten
- Uncorrected hyperopia 3.00D to 6.00D
- Associated with significantly worse performance on test of early literacy

Kulp, M et al. Ophthalmology.

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Accommodative Disorders

- Accommodative Disorders: 6-17% prevalence
- Accommodative Insufficiency: 2.3%
- Accommodative Excess/Spasm: 2.2%
- Accommodative Infacility: 1.5%
- Common Symptoms: blurry vision, asthenopia, headaches
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Lateral Phoria Disorders

- Convergence Insufficiency
  - Prevalence: 3-7%
- Convergence Excess
  - Prevalence: 1-8%
- Common Symptoms: eyestrain and headaches, blurred vision, dizziness, difficulty with near tasks, inability to read or work, inability to read or work for extended periods, avoidance of reading or near tasks
- CI: also movement of print and pulling sensation

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What add power?

- FAR/NEAR AC/A
  - Determine vergence demand: PD (cm)/D(m)
  - Determine in change in vergence from D to N
  - Divide by change in Accommodation
- Gradient AC/A
  - perform CT or MT w/ -1.00 or +1.00

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Lateral Tropias

- In young children strabismus prevalence 3.7-5.3%
- Esotropia 3x more often than Exotropia
- Intermittent Exotropia
  - Basic Exos vs. Divergence Excess
  - Accommodative Refractive Exotropia
  - Uncorrected hyperopia, high AC/A or both
  - Average age range of onset 2.5-3 yo
- Infantile Exotropia
  - Of esotropias, 28-48% infantile
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**Vertical Phorias**

- Hyper/Hypophorias
- Prevalence: 7-52%
- Most latent
- Symptoms: loss of place with reading, eyes tired, skip lines, slow reading, headaches, blood injections, asthenopia, burning sensation

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**Cranial Nerve Palsies**

- CN 3
- CN 4
- CN 6

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**Accommodative/Binocular Vision Disorders after Brain Injury**

- Traumatic brain injury (90% manifest dysfunction of oculomotor system)
  - Accommodative and vergence deficits most common

- Acquired brain injury (86.7% manifest dysfunction of oculomotor system)
  - Strabismus and CN palsy were most common
Photosensitivity after Brain Injury

- Photosensitivity is a common complaint after traumatic brain injury.
- Amber tint has been shown to be successful in alleviating symptoms.

Amblyopia

- Prevalence 1-3%
- Refractive
- Strabismic
- Remember to look for amblyogenic risk factor during the critical period.

Testing Summary

- Ask pertinent History questions
  - Diplopia, fatigue, headaches with visual tasks, loss of place with reading
- Determine if an accommodative or binocular problem exists
- Phoria evaluation with detailed near targets
- Accommodation abilities
- Check for a vertical deviation
- Treat with spectacles or ads if appropriate or patient does not want to pursue vision therapy
- Schedule for an in depth binocular vision evaluation
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Treatments
- Vision therapy
- Referral vs. in house
- Prism
- Occlusion
- Amblyopia vs. diplopia

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Vision Therapy
- Most common treatment for accommodative, phoria and oculomotor conditions
- Treatment of some tropia conditions
- If you do not perform in your office, find someone in your area to work with

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Vision Therapy
- IT IS MORE THAN JUST PENCIL PUSH UPS!!!!
- GOAL: to treat the condition and then the patient returns to your office for regular exams, spectacles and contact lenses
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Prescribing Prism

- What is the preferred method?
- Goal: achieve fusion, reduce asthenopia symptoms

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Prescribing Prism

- Sheard's criteria: 2/3 phoria-1/3 compensating fusional vergence
- Perceival's criteria: 1/3 greater lateral range-2/3 lesser lateral range
- Associated Phoria: Borish card
- Vertical phoria: equalize the supra and infra duction ranges
- TRIAL and ERROR?

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Fresnel Prisms:

- Advantage: temporary and easily removal, able to set large amounts up to 40 prism diopters
- Disadvantage: blur vision
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**Adds**

- High AC/A ratio conditions
  - Accommodative excess
- Accommodative conditions
  - Accommodative insufficiency

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**Occlusion**

- Traditional treatment for amblyopia: severity determines length of time occluded (ATS studies by PEDIG)
- Diplopia: optokinetic, Bangerter forks, satin Scotch tape, pirate patch

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**Oculomotor dysfunction**

- Eye movement disorders:
  - 95% kids with learning problems, 24% with no learning problems
- Often found in conjunction with accommodative and/or binocular vision problems
Summary

- If you look for these conditions you will find them by performing a binocular test and accommodative test.
- You don't have to run every Binocular/Accommodative test you know.
- Multitask certain exam elements such as Versions.

Summary

- Utilize your technicians to inform you of things such as difficulty with stereoacuity, reading left to right on the acuity chart, eyestrain with near visual acuity.
- Include symptoms such as eyestrain, diplopia and skipping words on your history form.
- Ask about poor school performance and IEPs for kids.
- Ask your patients if they are experiencing symptoms if you have an abnormal finding.

Thank You!

Michelle J. Buckland, OD, MS
Buckland.14@osu.edu
The Ohio State University College of Optometry
Columbus, OH 43210