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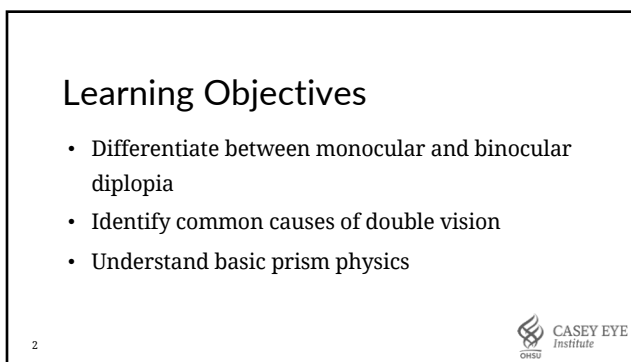
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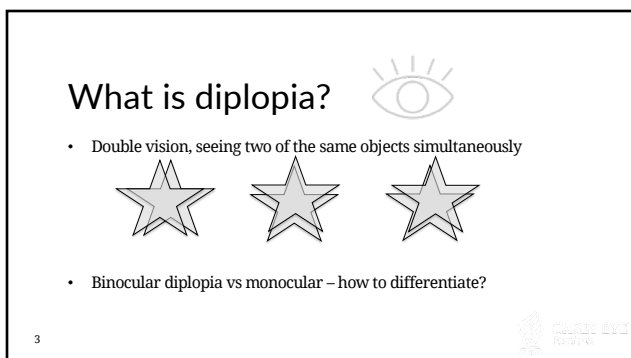
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## Monocular vs Binocular?

- Take turns covering each eye!



- Binocular diplopia – double vision resolves by covering either eye
- Monocular diplopia - double vision resolves when the affected eye is covered

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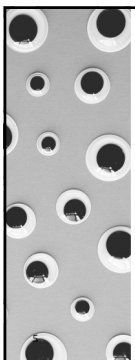
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## Monocular Diplopia

- Diagnostic clue: double vision persists with one eye closed
- Common causes:
  - Refractive error
  - Cornea – dry eye  ←
  - Lens
  - Retina
- Treatment: PFATS, glasses, contact lenses, surgical intervention of affected eye
- I.e. not neuro-ophthalmology problem!



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## Binocular Diplopia

- Common causes:
  - Supranuclear
    - Parkinson's, Progressive Supranuclear Palsy
  - Nuclear
    - Oculomotor, trochlear, abducens
  - Infranuclear
    - CN lesions in the cavernous sinus, muscular and neuromuscular junction
- Treatment: varies depending on cause



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**CC: "I'm seeing double."**

- How do you begin to approach this patient?

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**CC: "I'm seeing double."**

- History is KEY!
  - Monocular vs binocular
  - Direction
  - Duration
  - Location
  - Associated symptoms
  - History of eye turn or abnormal head position

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


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**Exam Tools and Techniques**

- Sensory
  - A 
  - B 
  - C 
- Motor
  - EOM
  - Cover testing or Maddox rod


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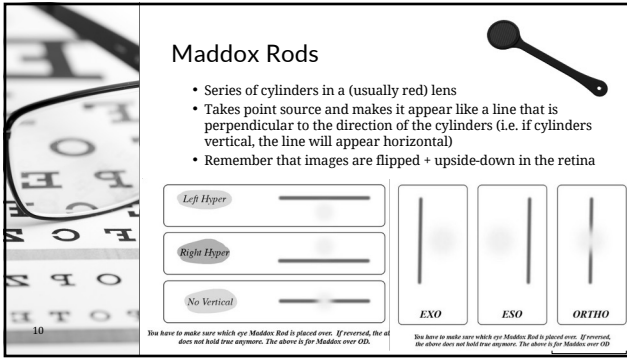
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**Maddox Rods**

- Series of cylinders in a (usually red) lens
- Takes point source and makes it appear like a line that is perpendicular to the direction of the cylinders (i.e. if cylinders vertical, the line will appear horizontal)
- Remember that images are flipped + upside-down in the retina

Left Hyper  
Right Hyper  
No Vertical

EXO ESO ORTHO

You have to make sure which eye Maddox Rod is placed over. If reversed, the slide does not hold true anymore. The above is for Maddox over OD.

You have to make sure which eye Maddox Rod is placed over. If reversed, the slide does not hold true anymore. The above is for Maddox over OD.

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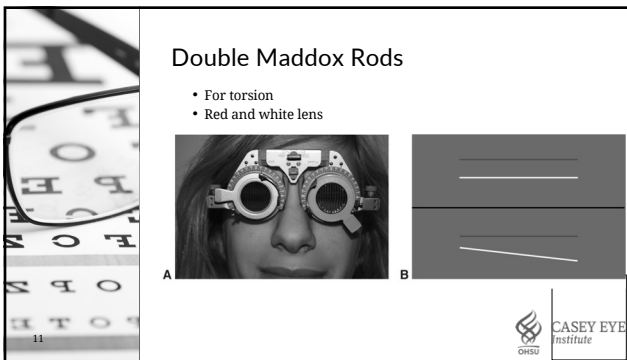
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**Double Maddox Rods**

- For torsion
- Red and white lens

A B

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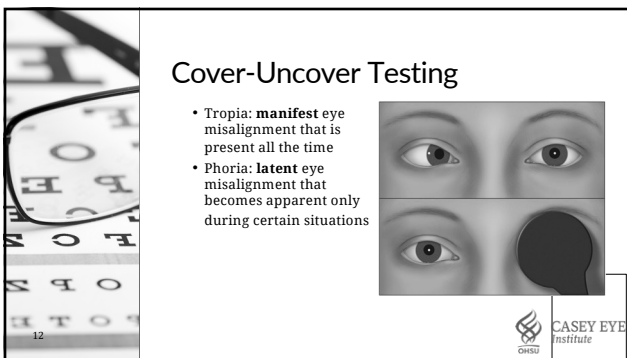
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**Cover-Uncover Testing**

- Tropia: **manifest** eye misalignment that is present all the time
- Phoria: **latent** eye misalignment that becomes apparent only during certain situations

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### Alternate Cover Testing

- Using a prism over one eye can quantify the misalignment

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### Prisms

- Prism: object used to deviate direction of light
- One prism diopter: deviation of 1 cm at a distance of 1 m from a prism.

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### Prisms

- Goal: binocular vision in primary gaze
- Orientation: Apex (point) in direction where eye is (or base is direction you want eye to go)
  - i.e. For exotropia: base in prism to correct
- Image goes towards apex

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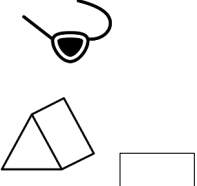

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### Nonsurgical Treatment

- Occlusion
- Prisms
  - Fresnel - temporary
  - Ground-in - permanent

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### When is diplopia an emergency?

- Anytime you suspect GCA
- Acute 3<sup>rd</sup> nerve palsy
  - Esp. pupil-involving



Right eye: Downward and outward gaze, dilated pupil, eyelid manually elevated due to ptosis

Left: Normal



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## Thank You




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