# Prescribing Prism for Strabismus: My Top 10 Clinical Tips
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I. Diagnostic Evaluation
   A. Confirm binocular (vs. monocular) diplopia
   B. Determine characteristics of diplopia
      - Orientation of image separation and if tilt/torsional component
      - Frequency
      - Distance/near/other gaze positions
      - Recent onset or longstanding
      - Stable or worsening
      - Anything that eliminates diplopia
   C. Ocular motility: versions/ductions
   **D. Ocular alignment: Determination of angle of deviation at distance/ near / other positions of gaze as necessary**
      - **Prism and alternate cover testing in different positions of gaze (including up-and down)**
      - **Do not stack 2 loose prisms together in the same direction before one eye**
      - **If anomalous head posture: measure with desired head posture and with head straight**

II. Management
   A. First Things First: Consider if medical referral or imaging is necessary for treatment of underlying cause

   B. Goals: To improve patient comfort and daily functioning by eliminating diplopia (and in some cases, associated anomalous head posture)

   C. Types of Prism Corrections to Consider
      - Full (corrective or neutralizing): Eliminate demand for controlling fusional vergence
      - Partial (relieving): Reduce demand for controlling fusional vergence
      - Yoked (version): Direct eyes into specific gaze direction
      - Sector (regional): Eliminate or reduce vergence demand in specific field of gaze

   D. Patient Selection
      – **Prism is most effective for patients with normal sensory fusion (normal retinal correspondence and little / no suppression)**
      - Intermittent strabismus (including paretic deviations with fusion in 1 or more fields)
      - Recent-onset strabismus (assuming does not have sensory fusion disruption syndrome)
      - Long-standing strabismus but with normal sensory fusion when some or all of deviation is neutralized (with prism or in major amblyoscope)

E. Determining the Amount of Prism
- Full correction: often required for constant strabismus
- Partial correction: typical for intermittent strabismus (some cases of constant)
  1. Simple % of magnitude based on a rule of thumb (50% does not always work)
  2. **Caloroso's Residual Vergence Demand**

| Residual Vergence Demand (RVD) Criterion (Caloroso, 1993) | | |
|---|---|---|
| **Direction** | **Magnitude(Δ)** | **RVD (Δ)** |
| Eso | 6 to 20 | 4 to 6 |
| Hyper | 3 to 10 | 2 to 4 |
| Exo | 20 to 30 | 10 to 15 |

*3. **Fusion Prism Methods: minimum prism that results in measurable improvement in binocular function on a clinical test of fusion**
- Diplopia manifest at time of exam – minimum Δ for stable fusion in free space at far and near
- No diplopia at time of exam but complaining of diplopia: Try muscle light & red lens /Worth dot (more dissociative)
  - Intermittent diplopia: ambient room lighting
  - Constant diplopia: dark room
  - Add minimum Δ until 'stable' fusion
- Other fusion methods:
  - Change from no stereo to some stereo, or an improvement in stereo
  - Change from suppression or diplopia on Worth dot to normal fusion
  - Change on unilateral cover test from constant strabismus to low frequency strabismus or phoria only
- Horizontal & vertical components: one may take care of the other, particularly for intermittent tropias. Consider trial framing vertical prism alone to determine effect.
- **If a smaller vertical deviation together with a larger horizontal deviation, only prescribe prism if the vertical is a 'primary' vertical deviation.**
  - **For IXT's: make sure eyes aligned and then measure for fixation disparity. If vertical FD seen, then primary; if no vertical FD, then secondary.**
  - **Can Rx the "associated phoria" (i.e., least prism to eliminate the vertical FD) for primary intermittent verticals and vertical phorias**
- If both horizontal and vertical needed: Laboratories will calculate appropriate oblique prism to grind in if provided separate horizontal and vertical components
- Determine Δ for both distance and near fixation: when different, determine if single compromise prism is possible or if 2 different prism prescriptions necessary
- Trial frame tentative prism amount (or place Fresnel on in-office): assess eye alignment, comfort, and function

F. **Titration / Weaning of Prism** (if want to decrease or eliminate prism)
- Often start with neutralizing prism but can also be relieving prism
- Once normal sensory fusion achieved for several weeks – can attempt prism titration
- W4D or red lens in dark room → **if fused, add 2-4Δ prism in opposite direction of current prismatic correction (less with verticals) → if still fused (no tropia present; W4D or RL fusion also helpful) → decrease prism by that amount**
- **Continue to monitor and wean prism over time**, if possible
- Decreasing the prism amount over time results in a gradual increase in vergence demand; thus, essentially passive VT; can also do active vision therapy to increase compensating fusional vergence ability and overall sensorimotor fusion
- Sometimes can wean off prism completely; AND sometimes deviation decreases in size!

G. Considerations for **Noncomitant Strabismus**
- Often need to address head posture as well as diplopia
- Determine prism powers for positions of gaze that are most important for patient
- Ergonomic advice often helpful
- **If cause is motility limitation (paresis or restriction): consider unequal prism with more over eye with motility defect. The greater the UA, the more of the total Δ should be placed before the affected eye (correcting smaller primary angle of deviation vs. larger secondary angle or deviation) and less total Δ will be needed.**
- For recent-onset paresis: lessen chance of secondary contractures by not wearing Δ-SRx full-time; also Rx periods of patching of non-paretic eye and ocular motility exercises; consider leaving patient diplopic for a few hours per day.
- **Anomalous head postures: consider yoked (version) prisms that shift apparent images of viewed objects toward apices of prisms; generally, determined prism amount empirically**
- Consider sector prism or 2 pairs specs if single Δ-SRx not suitable for >1 gaze position

H. Implementation of Prism

– **Provide optimum refractive correction; special attention to uncorrected anisometropia and astigmatism; equally clear retinal images promote sensory fusion**

1. Clip-on prism: place prism (rather than sunglass lenses) into clip-on sunglass frames
2. Decentration
   - Most productive when need small Δ in moderate to high power Rx
   - Limitations: problems with plano or low power; bifocals
3. Ground-in
   - Advantages - can use Plano or low power lens
   - Upper limit ~ 12Δ for Plano lens, ~ 10Δ for -5.00 D lens
   - Small eye size and plastic lenses minimize weight
   - High-index and small eye size reduce lens thickness
   - Edge treatments and anti-reflective coating helpful
   - Generally, split prism equally
4. **Fresnel Press-On (Membrane) Prisms**
   - Thin, lightweight, powers of 1 - 10, 12, 15, 20, 25, 30, 35, 40Δ
   - Only option if need >25-30Δ
   - Easy application to ocular surface; in-office application & modification; avoid bubbles by immersing in a bowl water for application
   - Ideal for temporary application and for sector application; inexpensive

- Decreased visual acuity & contrast sensitivity, particularly with higher powers
- Ridges visible to observers up close
- Some reflections & scattered light from Δ facets; ↓overhead reflection with BD (vs. BU)
- Tinted carrier lens may lessen reflections, glare, and contrast reduction
- **Adults often prefer total prism over one eye rather than split between eyes**

5. **Slab-off**
   - Conventional – BU, Reverse slab-off - BD
   - ~ 1.5Δ to 7Δ limit
   - **Vertical deviation at near only or unequal vertical Δ needed at distance and near**

6. Contact lenses (rigid and soft)
   - BD only; 3-4Δ limit

III. References:


1. Cotter SA, Frantz KA. Therapeutic Uses of Prism for Binocular Vision Disorders. In: *Duane's Ophthalmology* (9th Edition) Volume 1, Chapter 57. Tasman, W, Jaeger EA (ed). Philadelphia: Lippincott Williams & Wilkins 2009.
2. Caloroso E, Cotter SA. Prescribing Prisms for Strabismus. In: Cotter SA (ed). Clinical Uses of Prism: A Spectrum of Applications. St. Louis: Mosby, 1995.