جامعة المستقبل

كلية التقنيات الصحية والطبية

قسم تقنيات البصريات

Second Stage 2025-2026

REFRACTIVE ERRORS 3

Lecture Title

ANISOMETROPIA

Lecture Number: 5 / course 1

Prepared by

Hassan A. Aljaberi

OPTOMETRIST

ANISOMETROPIA

Examination

1. History

- Onset, duration, and context (post-surgery, trauma).
- Prior correction history and adaptation to previous prescriptions.
- Near-work demands (study/occupation).
- Symptoms in new vs old spectacles/CLs; tasks that worsen symptoms.

2. Visual function

- Visual acuity (monocular & binocular) with and without correction.
- Stereoacuity (e.g., TNO, Titmus) and suppression checks (Worth/Friend/Bagolini).
- Contrast sensitivity when symptoms persist despite good VA.

- **TNO Test**: This test uses **red–green anaglyph glasses** and presents **random-dot stereograms**. The patient cannot perceive the hidden shapes unless **true binocular fusion** is present.
- **Titmus Test (Fly test)**: This test uses **polarized glasses** and displays figures such as the large **fly** or sets of circles. The patient is asked to identify which figures appear to "stand out" from the page, indicating depth perception.

3. Refraction

- ***Objective***: retinoscopy or autorefractor; verify keratometry for corneal contribution.
- ***Subjective refinement***: maintain binocular balance where possible.
- ***Children or suspected latent hyperopia***: cycloplegic refraction is essential.

4. Alignment & vergence

- Cover/alternate cover tests at distance and near; prism neutralization.
- Near point of convergence; fusional reserves (base-in/base-out).

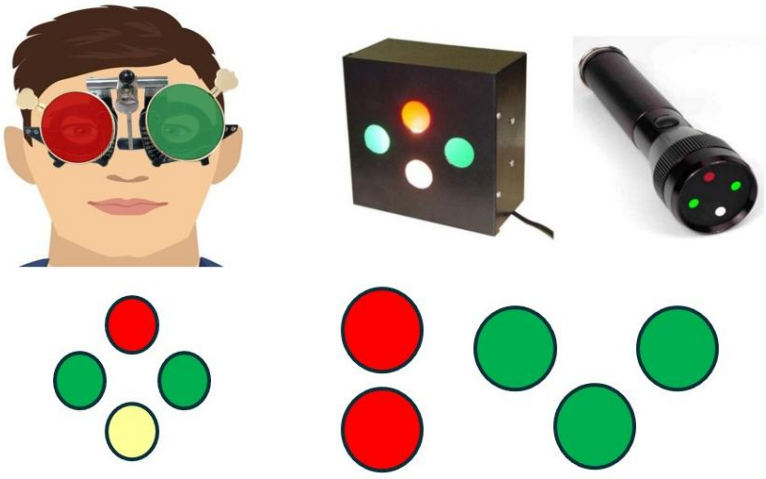
5. Sensory status tests

- **FRIEND test (distance 6 m)**

1. With red/green goggles (red over right, green over left), seat the patient at 6 m.
2. Display the FRIEND target and ask the patient to read what is seen.
3. Interpretation: FRIEND → binocular single vision; FIN or RED only → uniocular (suppression); alternation between FIN and RED → alternate vision.

- **Worth four-dot (distance and near)**

1. With red/green goggles, present a target containing one red, two green, and one white light.
2. Interpretation at a distance (6 m) and repeat at near:
   - Sees four lights without manifest tropia → normal BSV.
   - Sees four lights with manifest tropia → abnormal retinal correspondence (ARC).
   - Sees two red only → left eye suppression.
   - Sees three green only → right eye suppression.
   - Alternates between red and green → alternating vision.
   - Sees five lights (2 red + 3 green) → diplopia.



6. Management

6.1 Decision principles by context

- Treat optics first; address sensory/binocular sequelae second.
- Children: correct fully and reassess; add amblyopia therapy if VA asymmetry persists.
- Adults: prioritize comfort and task performance; escalate to contact lenses earlier for high differences or poor spectacle tolerance.

6.2 Spectacle strategies

- Reasonable up to ~4 D if the patient tolerates them; beyond this, spectacle magnification difference often causes symptoms.

- Anisometropic spectacles: modify the margin of the stronger lens to reduce peripheral prismatic annoyance.

6.3 Contact lenses (SCL, RGP, scleral)

- First-line for high anisometropia (minimizes vertex distance and size difference).
- Toric soft lenses for aniso-astigmatism; RGP/scleral for irregular corneas and superior optical quality.
- Pediatric use: often the most practical solution in unilateral aphakia or large differences; requires education and follow-up.

6.4 Pediatric pathway (anisometropic amblyopia risk)

- Cycloplegic refraction → prescribe full optical correction.
- Reassess VA and stereo after 6–12 weeks.
- If residual amblyopia persists, introduce occlusion therapy (patching) or pharmacologic penalization as age-appropriate.
- Maintain close follow-up to monitor adherence and prevent regression.

7. Case Series (Worked Examples)

Case 1: Simple Hypermetropic Anisometropia

- OD (Right eye): +3.50 DS
- OS (Left eye): Plano (0.00)
- Difference: 3.50 D (all hyperopic vs emmetropic)
- Notes: Often seen in children → high risk of amblyopia in the more hyperopic eye if left uncorrected.

- **Case 2: Simple Myopic Anisometropia**
  - OD: −4.00 DS
  - OS: Plano (0.00)
  - Difference: 4.00 D
  - Notes: The myopic eye may be used for near vision while the emmetropic eye is used for distance → “natural monovision, but this may reduce stereopsis.

- **Case 3: Compound Myopic Anisometropia**
  - OD: −6.00 DS
  - OS: −2.00 DS
  - Difference: 4.00 D (both myopic, unequal degree)
  - Notes: Common in teenagers/young adults; often poorly tolerated with spectacles if difference >3 D → contact lenses preferred.

- **Case 4: Compound Aniso-Astigmatism**
  - OD: −1.00 / −3.00 × 180
  - OS: −1.00 / −0.50 × 180
  - Notes: Both eyes have astigmatism, but with different amounts → causing unequal blur and potential discomfort in fusion.

- **Case 5: Mixed Anisometropia (Antimetropia)**
  - OD: −2.00 DS
  - OS: +2.50 DS
  - Notes: One eye is myopic, the other hyperopic → images differ in size *and* focus direction. Frequently leads to alternate fixation (myopic eye for near objects, hyperopic for distant objects).

🔹 Case 6: Mixed Aniso-Astigmatism

- OD: +3.00 / −1.50 × 180
- OS: −2.50 / −0.75 × 180
- Notes: One eye's principal meridians are hyperopic, while the other's are myopic. This produces significant image disparity and **symptoms, especially with spectacles.**

🔹 Case 7: Post-Surgical Anisometropia

- History: A patient underwent unilateral cataract extraction with IOL implantation.
- OD: +0.50 DS (pseudophakic eye)
- OS: +4.00 DS (phakic eye with cataract not yet operated)
- Notes: Temporary anisometropia until second eye surgery; contact lens for the phakic eye or interim refractive correction may be used.

✨ Teaching Point

- <1 D difference: usually not clinically significant.
- 1–3 D: may be tolerated, but monitor carefully in children.
- >3 D: often symptomatic with spectacles; contact lenses or surgical solutions are preferred.

Questions

1. What key history elements should be asked when examining a patient with suspected anisometropia?
2. Why is cycloplegic refraction essential in children with suspected anisometropia?
3. What is the role of stereoacuity tests (TNO, Titmus) and suppression tests (Worth, Friend, Bagolini)?
4. How do cover tests and prism neutralization help in anisometropia?
5. In the FRIEND test at 6 m, the patient reports seeing only “FIN”. What does this indicate?
6. In the Worth Four-Dot test, the patient sees five lights (2 red, 3 green). What does this mean?
7. Why are contact lenses considered first-line for high anisometropia?
8. What is the pediatric management pathway for anisometropic amblyopia?
9. List two spectacle strategies to reduce interocular size difference.
10. A 7-year-old child with OD +3.50 DS and OS Plano. Classification and risk?
11. A 20-year-old with OD −6.00 DS, OS −2.00 DS reports spectacle discomfort. Classification and correction?
12. Patient with OD −2.00 DS and OS +2.50 DS. Classification and binocular vision pattern?
13. Post-unilateral cataract surgery: OD +0.50 DS, OS +4.00 DS. Best short-term management?