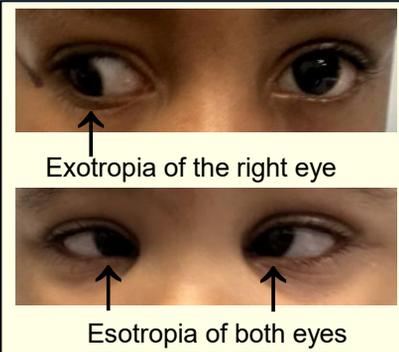


# Strabismus (Misalignment of the Eyes)

Usually, six muscles are involved in eye movements. When they work together properly, the two eyes point in the same direction, and the signals they send to the brain create a clear image.

**Strabismus** is the medical term for **any form of misaligned eyes**. Other names for strabismus include walleye, squint, and cross-eye. People with this condition have eyes that look in different directions at the same time. Two signals are being sent to the brain, resulting in a confusing image. Strabismus needs to be treated early to avoid permanent vision loss.



## Types of Eye Misalignment

Eye misalignment is classified by the direction that the eye turns and the frequency that the misalignment happens (see table below). Each type can be further classified by the eye(s) involved: **unilateral** (always the same eye), **alternating** (sometimes in the left and sometimes in the right), or **bilateral** (both eyes).

| The direction that the eye turns | <b>Tropia</b> – An eye misalignment that happens whether or not the brain is allowed to combine images from both eyes. An intermittent tropia occurs more often when sick or tired. A tropia is constant by definition. | <b>Phoria</b> – An eye misalignment that happens when the brain is <u>not</u> allowed to combine images from both eyes. (“break fusion”, e.g. one eye is covered) |
|----------------------------------|---|---|
| Inward                           | Esotropia / Intermittent Esotropia  | Esophoria   |
| Outward                          | Exotropia / Intermittent Exotropia  | Exophoria   |
| Upward                           | Hypertropia / Intermittent Hypertropia  | Hyperphoria   |
| Downward                         | Hypotropia / Intermittent Hypotropia  | Hypophoria  |

## Symptoms

Eye misalignments, especially phorias and intermittent tropias, may or may not be obvious. Here are additional symptoms:

- **Double vision**
- Headache
- Eye pain
- Closing or covering one eye
- Tilting or turning your head
- Difficulty reading

## Causes

- Uncorrected [refractive errors](#)
- Poor vision in one eye
- Eye muscle problems
- Genetic conditions
- Nerve problems
- Brain problems / cancers
- Stroke
- Head injuries

## Complications

If the eyes look in different directions, the brain receives signals for two images. To avoid seeing double, the brain learns to ignore signals from the misaligned eyes in children less than 7-13 years old. Over time, the vision in the misaligned eye becomes permanently lost. See **Amblyopia** on our sheet on [Reduced Vision](#).

### Strabismus in babies

It is normal for babies up to 6 months of age to have intermittent strabismus. Beyond 6 months, if their eyes are still misaligned, they should be evaluated by an eyecare professional.

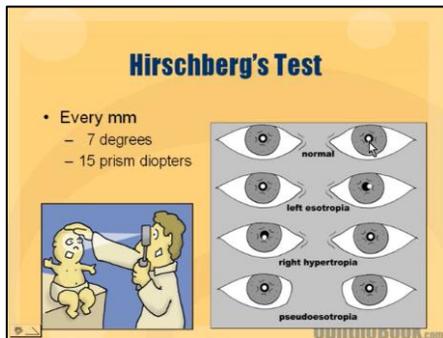
### Sudden misalignment

**If eye misalignment happens within minutes or hours, the patient needs medical care quickly**, especially if he/she has any of: a head injury, balance issues, blurred vision, droopy face (1 or 2 sides), droopy arm (1 side), slurred speech, or trouble with words. Seek medical care soon.

## Strabismus (Misalignment of the Eyes) (continued)

### Checking for Eye Misalignment

Eyecare professionals use various techniques to test how a person's eyes are aligned. Click on the images below to watch the ophthobook.com videos on how these tests work.



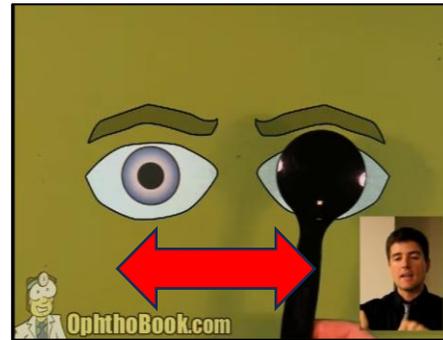
#### Hirschberg Test (Corneal Light Reflex Test)

- The care provider shines light into both eyes
- If an eye is misaligned, light reflection will be off-center
- Used to check for tropias



#### Cover-Uncover Test

- The care provider covers the eye for a few seconds and observe the uncovered eye for any movements.
- Then the cover is removed, and the provider observes the alignment of the previously covered eye.
- Used to check for tropias and phorias



#### Cross-Cover Test

- The care provider moves a barrier left and right to cover the eye
- If the uncovered eye is misaligned, it moves to the center of the eye to focus on the provider
- Used to check for phorias

### Treatment Options

- **Monitoring** – If the alignment situation is acceptable, the care provider may recommend a wait-and-see approach.
- **Eyeglasses** – Worn to correct refractive errors and to correct alignment
- **Prism lenses** – Bends the light before it enters the eye, so that the light can focus on the right place on the retina. These lenses provide relief for double vision and headache but do not correct the actual eye misalignment.
- **Orthoptics** – Eye movement exercises that help the two eyes work together
- **Medications** – Weaken an overactive eye muscle
- **Surgery** – Weaken or strengthen an eye muscle

#### **Pseudostrabismus**

Babies with normal eye alignment may *look like* they have crossed eyes if they have extra skin at the inner corners of the eyes or if their nasal bridge is flat. In fact, they don't have strabismus. Their eye alignment tests would be normal.

#### **Strabismus and 22q Differences**

Strabismus happens in about 12-36% of children with 22q11.2 deletion syndrome and ~32% of those with 22q11.2 duplication syndrome.

### Resources

- [Strabismus \(Eye Misalignment\) | Corneal Light Reflex Test \(Hirschberg Test\)](#) – Cleveland Clinic
- [Strabismus \(crossed eyes\)](#) – American Optometric Association
- [Strabismus | Vision Therapy](#) – American Association for Pediatric Ophthalmology and Strabismus (AAPOS)
- [Ophthalmology: tropias versus phorias | Ophthalmology Lecture - Tropias & Phorias \(part 2/2\)](#) – Ophthobook.com
- [What Is Prism Correction in Eyeglasses?](#) – American Academy of Ophthalmology

- [Ocular findings in the chromosome 22q11.2 deletion syndrome](#) (2007)
- [Ocular findings in 22q11.2 deletion syndrome: A systematic literature review and results of a Dutch multicenter study](#) (2022)
- [Ocular findings associated with chromosome 22q11.2 duplication](#) (2016)
- Updated clinical practice recommendations for managing [\[children | adults\]](#) with 22q11.2 deletion syndrome – 2023 [These documents can also help guide the care of individuals with **22q11.2 duplication syndrome**, as the associated features are quite similar, just with lower frequency.]
- ❖ Images of strabismus – Dr. Brian Forbes, Children's Hospital of Philadelphia
- ❖ Images for Hirschberg's Test and Cover/Uncover Test are extracted from the video [Ophthalmology: tropias versus phorias](#) – Ophthobook.com