

# VISUAL DEVELOPMENT IN CHILDREN

Vision at birth is not fully mature and continues to develop into the adolescence.

Vision in infants is geared to recognizing large objects, such as mother's face.

After infancy, visual system continues to develop, with children 2-3 years of age resolving fine details closer to what an adult would see.

"Visual Acuity" is a term referring to the measure of how much fine details can be seen in a visual scene.

Normal visual acuity (achieved as the visual system matures) is "6/6", indicating that the viewer can see at 6 metre distance what an adult with normal vision can see at 6 metres.

Requirement for normal visual development is

- Clear image projected within each eye
  - with correction of any visually significant refractive errors or clearance of any visual obstruction, such as congenital cataract
- Straight eyes
  - with correction of visually significant ocular misalignment/strabismus

## Amblyopia

Amblyopia refers to poor vision resulting from abnormal visual experience early in life when the requirements for normal visual developments (noted above) are not met (due to a wide spectrum of causes).

Treatment of amblyopia typically involves

- Glasses: Glasses to be worn FULL time for visually significant refractive errors.
  - Important to avoid unnecessary use of the glasses, such as for non-visually significant refractive errors.
- Patching: Patch the "good" eye to strengthen the "poor"/amblyopic eye
  - Effective patching requires a complete occlusion of the good eye (with adhesive/cloth patch).
  - With the patch in place, child needs to engage in visually active tasks, such as playing with toys, reading, drawing, computer work, iPad, and other close-up activities.
  - Patching during visually inactive periods, such as when asleep or looking out the car window, is not effective. (Atropine penalization is an alternative to patching but potential side effects require caution.)

## Strabismus

Strabismus refers to ocular misalignment such that the eyes are not straight but deviated in, out, up or down.

Eyes may be misaligned in different ways.

- Eyes may be misaligned intermittently or constantly
- One eye may be deviated more often than the fellow eye or deviated to the same degree as the fellow eye in an alternating manner.
- Strabismus may or may not be associated with Amblyopia.
- Strabismus, particularly if constant, needs to be managed early with the following intervention, either alone or in combination:

Glasses

Amblyopia management

Surgical management

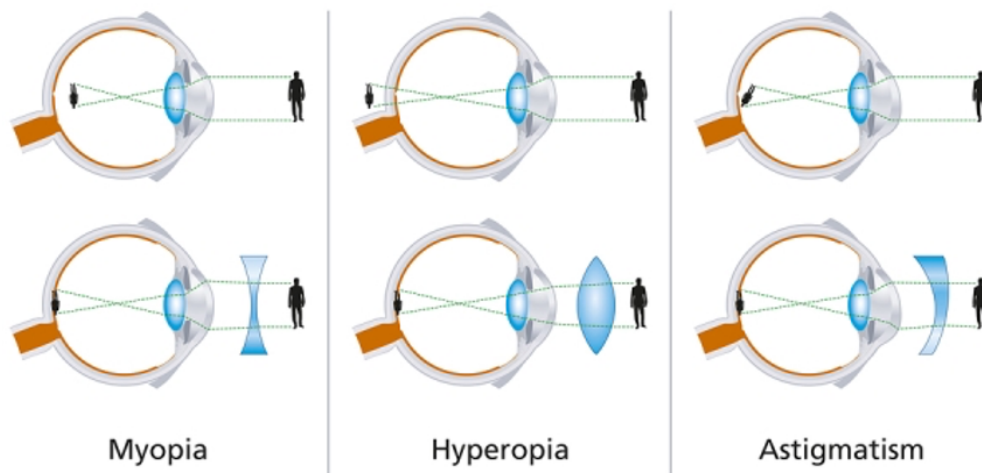
## Anisometropia

- Anisometropia refers to unequal refractive error between the two eyes (for instance, one eye may be more hyperopic than the fellow eye).
- Anisometropia is a significant risk factor for amblyopia and needs to be managed promptly with glasses, if visually significant, and with patching if amblyopia is evident.

## Refractive Error

### Myopia, Hyperopia & Astigmatism

- Clear image projected onto the retina (light sensing part of the eye) is essential for visual development
- When the eye is big (myopia/near sighted), small (hyperopia/far sighted), or oblong rather than spherical (astigmatism), image projected onto the retina is blurred.
- Visually significant refractive errors need to be corrected, typically with glasses, as early as possible.
- Delayed commencement of glasses can lead to amblyopia.



<http://schaeffereyecenter.com/wp-content/uploads/2016/10/52266655.jpg>

### • Myopia:

- Image focused in front of retina minus lens to push image back onto retina

### • Hyperopia:

- Image focused behind the retina plus lens to bring image forward onto retina

### • Astigmatism:

- Image focused at varying position depending on the angle of the light ray
- Typically, due to varying shape of the cornea.) --> cylinder lens (lens with different radii for the X and the Y axis; cylinder-like in shape) to focus the light ray in a single axis

