

اخطاء الانكسار

المرحلة الثانية

المحاضرة الثالثة

**Department of Optics Techniques**

**Lecture3**

*Measurement of visual acuity*

**Dr. Dhay ali sabur**

## Measurement of visual acuity in preschool children

---

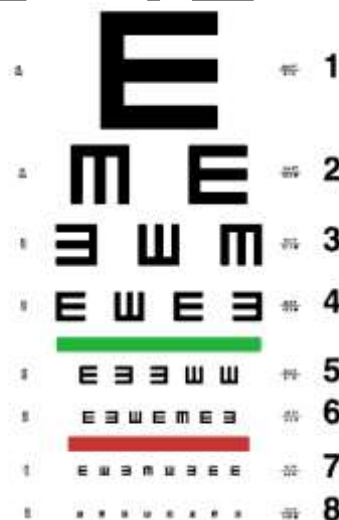
### Vision tests in 3-5 years

#### 1. Illiterate E-cutout test:

- ✓ this test is useful in children between 2.5 and 5 years of age.
- ✓ The child is given a cut out of an E and asked to match this E with isolated Es with varying sizes.
- ✓ The first trial is not always successful.
- ✓ The mother may be instructed to teach E- game at home.
- ✓ When the child starts understanding the orientation of E, a visual acuity chart consisting of Es oriented in various directions may be used.

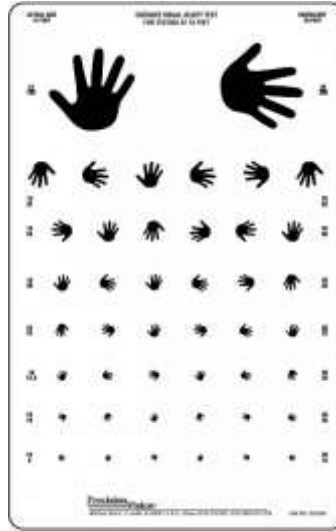
#### 2. Tumbling E-test:

- ✓ it consists of different sizes of E in one of the four positions (right, left, upward and downward)
- ✓ the test is done at distance of 6 meter.



### 3. Isolated hand-figure test:

Sjogren has replaced the E with the isolated figure of a hand, and in some children it works better than Es.



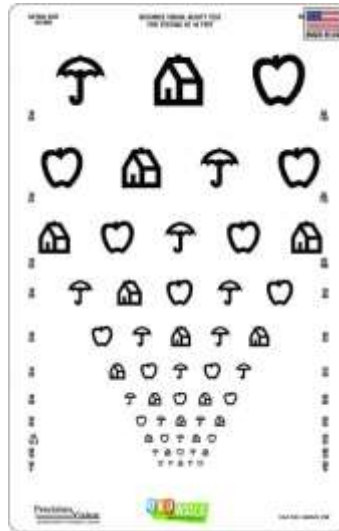
### 4. Sheridan-Gardiner HOTV test:

- ✓ It is used in the age 2-5 years.
- ✓ It is done at 6 meter
- ✓ The child is handed a card with HOTV and is asked to match the letters on the chart. Snellens equivalent of 6/6 - 6/60 can be estimated using this method.



## 5. Pictorial vision charts:

when the child is able to verbalize, visual acuity chart showing pictures, rather than symbols, may be used. Many such charts have been devised, and one should be chosen that presents pictures of object with which the child is likely to be familiar. a chart containing an apple, a house and an umbrella, arranged in Snellens equivalents of 20/200- 20/10 is used, and the child is asked to identify the pictures along the lines. The test is carried out at 10 ft.



## 6. Broken wheel test:

a pair of cars in progressively smaller sizes, one of which has a wheel cut across like Landolt C (broken wheel), is shown to the child and the child is asked to identify the one with the broken wheel.



## 7. Broken candy bead test:

In this test the child is shown candy beads of different sizes at a distance of 40 cm. The child is then expected to pick up the candy beads. The smallest bead that the child can pick up gives the approximate estimation of the visual acuity.



اسٹیج

## Results of VA test

### 1. Normal results

Visual acuity is expressed as a fraction. The top number refers to the distance the patient stand from the chart. This is usually 6 m. the bottom number indicates the distance at which a person with normal eyesight could read the same line you correctly read.

### 2. Abnormal results

Abnormal results may be a sign that the patient needs glasses or contacts or may mean that you have an eye condition that needs further examination by a doctor.

## The Human Eye

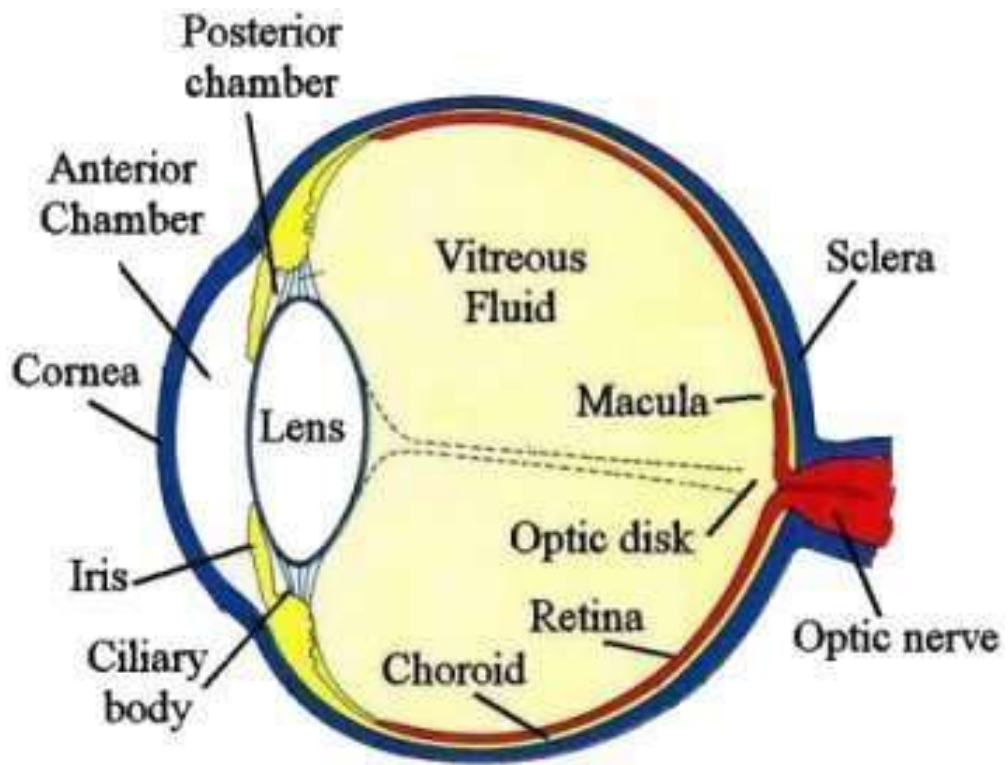
The human eye is a sense organ which is able to produce optical images and sends corresponding nerve signals to the brain. It is in fact the nature optical instrument. A human being has two similar eyes and thus has the advantage of having binocular vision.

### Essential parts of human eye

- 1. Sclerotic:** It is the hard, opaque and white outer protecting layer of the eyeball.
- 2. Cornea:** It is the transparent front part of the eye that covers the iris, pupil, and anterior chamber and provides most of an eye's optical power.  
The light entering the eye is refracted markedly at anterior corneal surface for two reasons:
  - Because of its curvature
  - Because of the big difference in refractive indices of air (1) and cornea (1.37).
- 3. Choroid:** It is the dark brown layer forming the inner surface of the sclerotic.
- 4. Ciliary muscle:** It is the anterior continuation of the choroid and is a seat of muscles.

5. **Iris:** It is a circular diaphragm hanging from the ciliary muscles. Its color (black, brown, Etc.) Gives the color of the eye.
6. **The pupil:** Variable-sized black circular opening in the center of the iris that regulates the amount of light that enters the eye. The pupil size tends to be adjusted automatically to give optimal visual acuity over a wide range of luminance.
7. **The crystalline lens:** The eye-lens is situated behind the iris. It is bi-convex in shape and is more convex at the backsides. It is transparent and is composed of different layers. The refractive index of the outermost shell is equal to that of the surrounding medium, while the refractive indices of the inner shells gradually increase. This makes the eye- lens free from aberrations.
8. **The retina:** Light sensitive nerve tissue in the eye that converts images from the eye's optical system into electrical impulses that are sent along the optic nerve to the brain. Forms a thin membranous lining of the rear two-thirds of the globe.
9. **Anterior chamber, Posterior chamber and aqueous humour:** The space between the cornea and the iris is called the anterior chamber, while the space between the iris and the suspensory ligaments is called the posterior chamber. These two chambers are filled up with a transparent salt solution called the aqueous humour.
10. **Vitreous chamber and vitreous humour:** The space between the eye-lens and the retina is called the vitreous chamber. It is filled up with a transparent jelly- like fluid called the vitreous humour.

**Figure (1): The essential parts of the eye**



سید