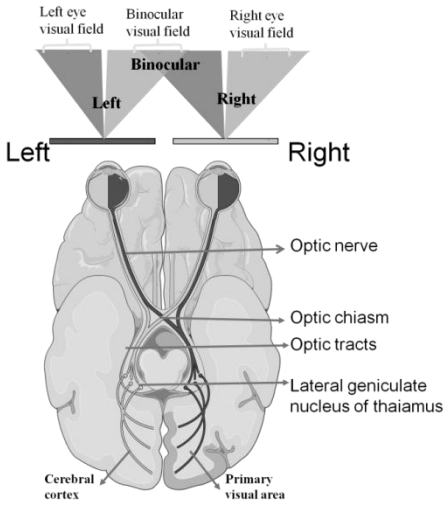
Day - 8

Working of Eye

Human eye acts as a photographic camera in which cornea, conjunctiva, aqueous humor, lens and vitreous humor all act as small lenses. Retina forms the receptive part of eye. Iris acts as a diaphragm and regulates the amount of light. Maximum refraction is done by cornea. The light radiations stimulate the photoreceptors. The image formed s small and inverted.

Mechanism of vision:-

Light induces the photopigments of photoreceptors to dissociate into opsin (a protein) and retinal (an aldehyde of vitamin-A).



- This dissociation brings changes in the three-dimensional structure of opsin which causes activation of a regulatory protein called transducin.
- Transducin activates an enzyme phosphodiesterase which changes C-GMP (which bind Na+ - channels) into 5' – GMP (which does not bind the NA+ channel) so the concentration of C-GMP in the cytosol declines.
- Results in the closure of Na^+ - channels so the photoreceptors become hyperpolarized.
- Hyperpolarized of the cell membrane produces a signal which generates action potential in the ganglion cells through the bipolar neurons.

Focusing part

Receptor part

Eye a photographic camera

Mechanism of vision

Accommodation: Ability of eye to adjust the focal length of the lens to make clear image of the objects lying at varying distances. It is a reflex mechanism and is done with the help of ciliary muscles and suspensory ligaments which collectively form the accommodation apparatus

- Optimal focal length of lens of human eye is 6 metres (20 feet).
- Photoreceptors of human eye are depolarized in darkness while are hyperpolarized in bright light.
- Steps involved in accommodation:

- Contraction of ciliary muscles
- Shrinking of suspensory ligament
- Less tension on the lens.
- Lens becomes more convex

Distant objects In normal condition muscle fibres of ciliary body remain relaxed and lens is stretched by its suspensory ligaments, and due to this lens is flat. A flat lens has more focal length. As a result of this eye can see long distant objects easily.

Near objects To see near by objects, sphincter muscles of ciliary body contract and ciliary body becomes broad, suspensory ligaments becomes loose and relaxed. As a result of this relaxation lens becomes biconvex, and now tis focal length is reduced. Now animal is able to see near by object easily.

Binocular vision: Most of the carnivores mammals have eyes in front of their heads and side by side, so as to focus on one object by both the eyes. It is called binocular vision e.g. Man, monkeys and apes.

Nocturnal and diurnal vision

Protective device

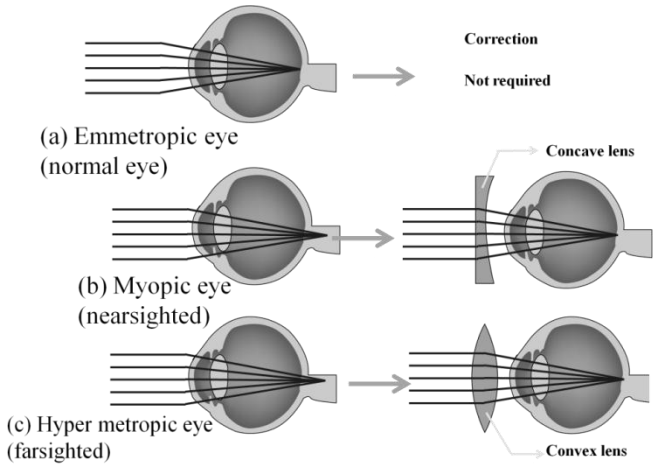
Eyebrows

Eyelids(palpebrae)

Lachrymal gland

Fat

Common Eye Defects



	Eye defect	Symptoms	Correction
1.	Myopia (Near-sightedness)	Eye ball larger than normal or increased convexity of the lens. Image formed in front of retina. Image of distant objects in blurred.	Concave lens which diverges the light rays.
2.	Hypermetropia	Eye ball smaller than normal or	Convex lens which converges the

	(far-sighted-ness)	decreased convexity of the lens. Image formed behind the retina. Image of near objects is blurred.	light rays.
3.	Presbyopia (Far-sightedness of old age)	It is similar to hypermetropia and occurs at any time after the age of 35. It occurs due to loss of elasticity of the lens in old age. Blurred nerve vision.	Convex lens.
4.	Astigmatism	Cornea and lens is curved unequally in different directions. Image of some parts formed in front and of some parts formed behind the retina.	Cylindrical lens
5.	Cataract (Safaid motia)	Lens becomes partially or completely opaque due to injury, congenital factors, diabetes or age factors.	Cataract extraction (replacing defective lens.)
6.	Glaucoma (Kala motia)	Occurs due to increased secretion of aqueous humour due to blockage of canal of Schlemm. The photoreceptors are killed by high intraocular pressure leading to blindness.	To reduce the secretion of humour by use of drugs or to promote outflow of excess of humur.
7.	Srabismus (Squint)	Eye ball is bent on to a side due to increase or decrease in length of extraocular muscle.	Operation at an early stage.
8.	Trachoma (Kukre)	Inflammation of conjunctiva and cornea by Chlamydia trachomatis. It is characterized by pain and watering of eyes and may lead to blindness.	Antibiotics in early stages and surgery in late stages recommended.

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