Eyes
(Structure & Function and Disorders)

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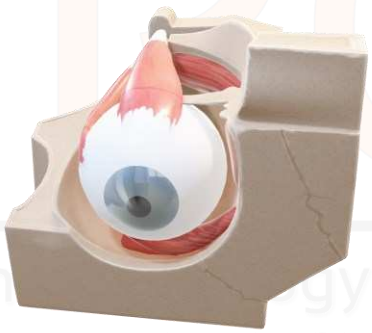
Contents of the Lecture:

- Structure and Functions
- Physiology of vision
- Ocular Disorders



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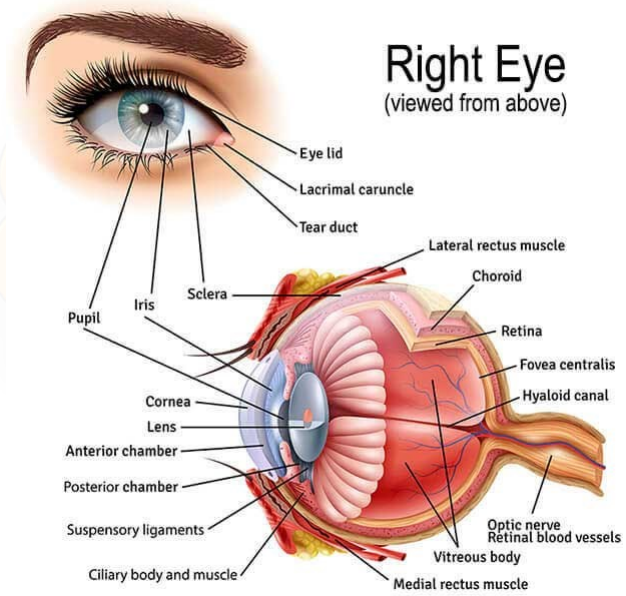
Eyes

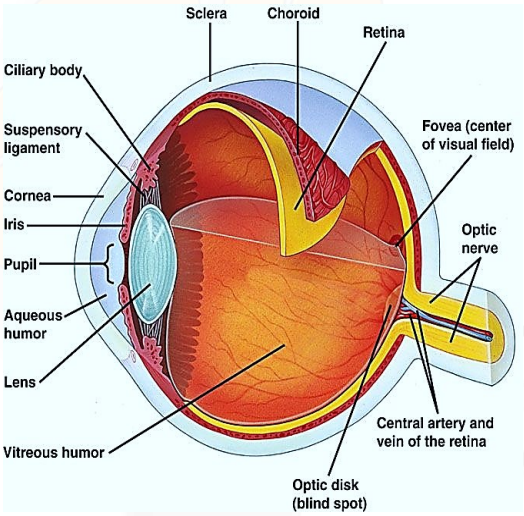


https://www.centralfloridaretina.com/patient-resources/education/eye-anatomy/

Human Eyes

- Sensory organ for Vision
- It is a globe or Spherical in Shape (2.5 cm diameter)
- Made up off 3 Layers: 1. Sclera, 2. Choroid, and 3. Retina

Eyes



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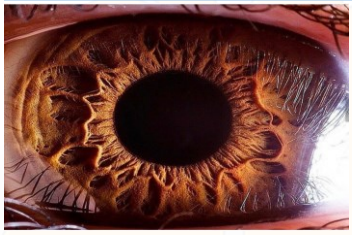
Human Eyes

- **Sclera:** The white protective outer layer of the eye.
- **Cornea:** A clear, transparent front of the eye that covers the iris, pupil and anterior chamber. It allow to transmit and focus light into eye and provide optical powers

Eyes



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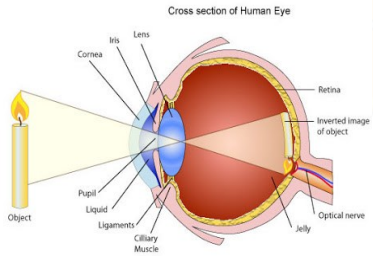
Human Eyes

- **Iris:** colored part of the eye that helps regulate the amount of light that enters (Visual Accommodation). It gives color to the eye (e.g., blue eyes, brown eyes)
- **Pupil:** Dark black circular aperture in the iris that regulate the amount of incoming light. (Visual Accommodation).
- **Lens:** transparent structure inside the eye that focuses light rays onto the retina



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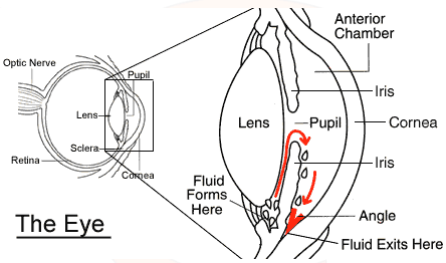
Eyes

Human Eyes

- **Anterior Chamber:** Fluid-filled space inside the eye between the iris and the innermost corneal surface.
- **Anterior Chamber Angle:** Junction of the front surface of the iris and the back surface of the cornea, where aqueous fluid filters out of the eye.
- **Choroid:** The vascular layer of the eye lying between the retina and sclera. This layer furnishes nourishment to outer layers of the retina.
- **Vitreous:** clear, jelly-like substance that fills the middle of the eye



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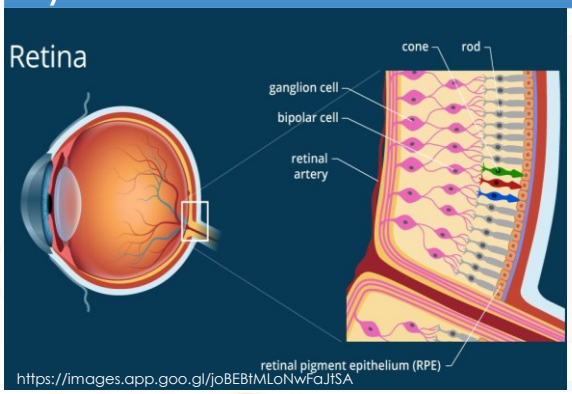
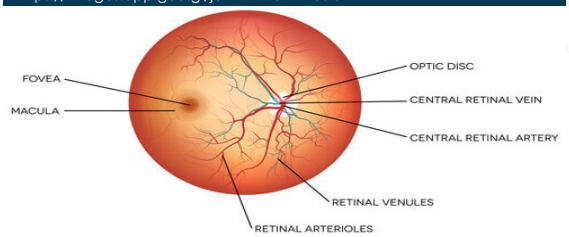
Eyes





Human Eyes

- **Retina:** Inner most nervous coat of the eye. It senses light, and creates electrical impulses that travel through the optic nerve to the brain
- There is very small sensitive central part of retina called Macula (Yellow spot; *Fovea centralis*) that contains special light-sensitive cells, **Cones photoreceptor**, which allows us to see fine details clearly.
- Rest of the retina contains **Rods photoreceptor.**

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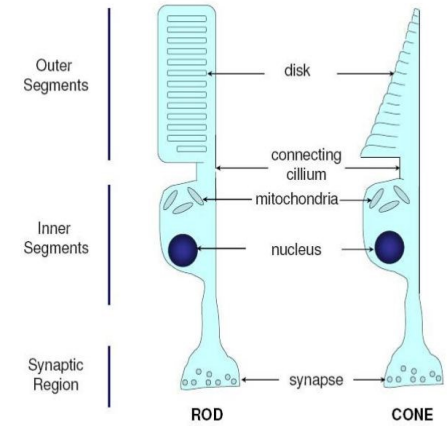
Eyes



Human Eyes

- Each retina contains approximately 6 million **cones** and 120 million **rods**.
- **Rods** gives a purplish tint due to presence for light sensitive pigment **Rhodopsin** (scotopsin protein). The rods ae meant for twilight & night vision
- **Cones** contain the pigment **Iodopsin** (photopsin protein). They are responsible for clear natural color vision (sensitive to **Red**, **Blue**, and **Green**).

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Physiology of Vision

1. **Passing of Light** to retina via through the conjunctiva, cornea, aqueous fluid, lens and vitreous body.
2. **Retinal Image Formation**
   - Light Refraction
   - Accommodation of the lens for clear vision
   - Constriction of pupil accordance to distance and light
   - Convergence of eye (movement of the eye ball towards the object
3. **Stimulation of Photoreceptor**

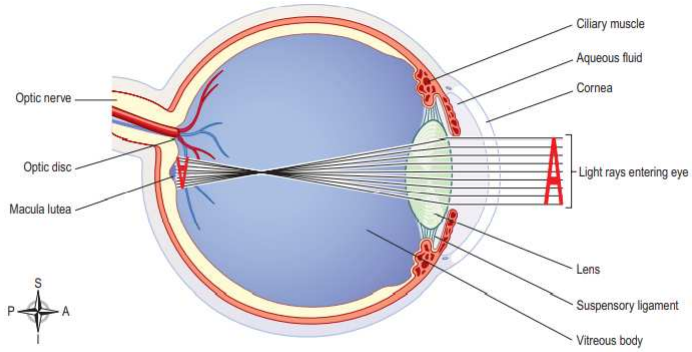
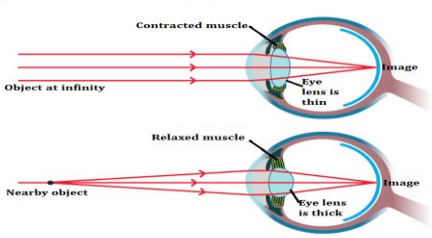


Figure 8.17 Section of the eye showing the focusing of light rays on the retina.

Physiology of Vision

- **Accommodation of Lens**
- Control by **Autonomic nervous system**
- Lens of the eye is biconvex
- It has ability to change in focusing power by changing its curvature. This is known as accommodation.
- **In Near Vision-** ciliary muscle contract and cause thickening and bulging of the lens
- **In Far Vision-** ciliary muscle relaxed and lens is flattened.



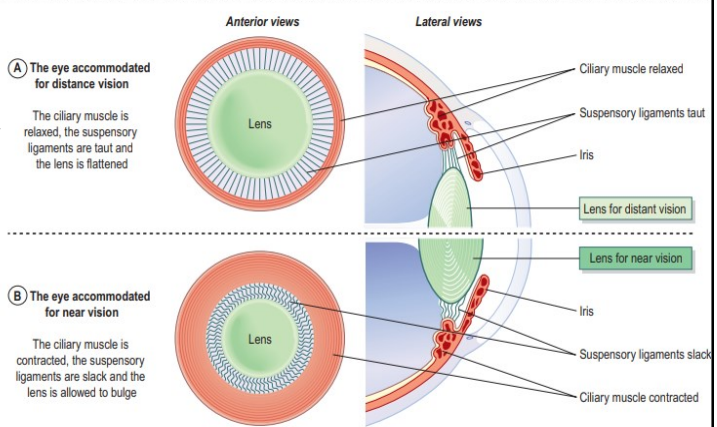
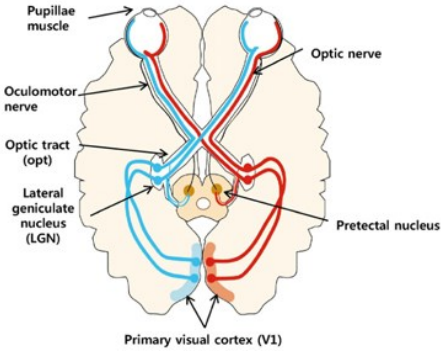


Figure 8.18 Accommodation: action of the ciliary muscle on the shape of the lens. **A.** Distant vision. **B.** Near vision.

Physiology of Vision

- **Stimulation of Photoreceptors**
- Retinal Image converts into nerve impulse
- Activation of rhodopsin and iodopsin of rods and cones.→ Decreased cAMP→ Hyperpolarization
- These impulses passed through optic nerve to the thalamus
- Interpretate the visual in cerebral cortex



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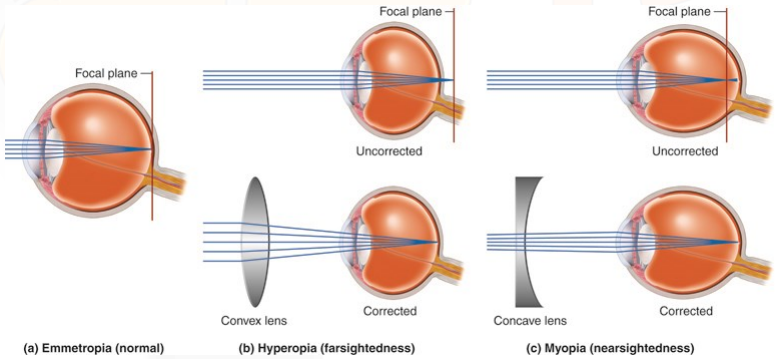
Ocular Disorders

1. Error of Refraction

- **Myopia:** Difficult in seeing the distant objects. Corrected by wearing bi-concave lenses, called –ve lens.
- **Hypermetropia:** Difficult in seeing the near objects. Corrected by wearing convex lenses, called +ve lens.



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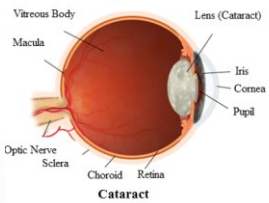
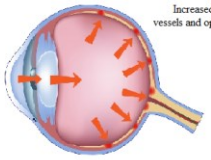
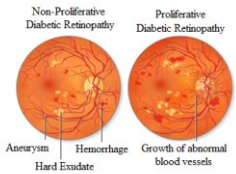
Ocular Disorders



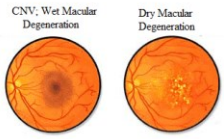
Cataract



Glaucoma



Diabetic Retinopathy



Age Related Macular Degenertion

2. Cataract: Lenticular opacity

3. Glaucoma: Increased intraocular pressure due to excess production or reduced drainage of aqueous humor.

4. Retinal Detachment

5. Color blindness: defect in retina, cant see one or more colors

6. Night blindness: not possible to see in dimlight due to reduced power of dark adaptation.

7. **Retinopathy:** Microvascular disease

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