

Eye Anatomy and Physiology Review
Review on your own with your assigned readings

- I. Eye- Is an organ that is sensitive and highly specialized and orients us to the world
- II. External Structures: Protection
 1. Eyelashes, eyebrows, conjunctiva, orbit, and the lacrimal system
 2. Orbit-union point of the cranial and facial bones and is the protective socket for the eyeball
 3. Eye Lashes & brows works as physical barriers to dust/foreign particles
 4. Eyelids or Palpebrae-thin elastic folds of skin, muscle and fibrous tissue
 - We blink 15x per minute
 - Blinking help protect eyes from light and prevent evaporation drying of the surface of the eye, blinking keeps eyes moist
 5. Conjunctiva-a thin and transparent mucous membrane that lines the eyelid and extends over the sclera forming a pocket. It secretes mucus and oil to keep cornea moist and free of friction
 6. Lacrimal System
 1. Consists of the lacrimal gland & tear drainage systems
 2. Lacrimal Gland
 - Located above the outer canthus of each eye where tears flow across the outer eye to inner eye and it's function is to produce tears which moisten, give O₂, and a maintain a smooth refractive surface to the cornea. Tears wash out foreign bodies and are bacteriostatic.
 - a. Tear Drainage
 - a. Puncta/Punctum-tiny openings in upper and lower lids that tears drain into. Then tears go into lacrimal canals, then into the lacrimal sac, and then into the nasolacrimal ducts, finally into the nose and out on your face.

III. Vision

1. light is processed by the eye and interpreted by the brain
2. The pathway for this process is:
 - light passes through the CORNEA where it is refracted
 - then through the opening known as the PUPIL which is formed by the IRIS
 - then through the gel-like fluid of the VITREOUS HUMOR
 - then focused on the RETINA where the light is converted into a nerve impulse that is then carried to the brain by the OPTIC NERVE and then we see pretty things.

IV. Ocular Muscles

1. Two Types: Extrinsic & Intrinsic
 - Innervation by cranial nerves III, IV, & VI
 - a. Extrinsic: (voluntary)- 6 extraocular voluntary muscles or 3 pairs which control eye movement.
 - Ocular muscles (extrinsic=voluntary)
 - Superior Rectus, Inferior rectus, Lateral rectus, Medial rectus
 - Inferior oblique, Superior oblique
 - b. Intrinsic muscles: (involuntary)-Muscles inside the eyes themselves
 - Ciliary Muscles within the ciliary body controls lens shape and allow for accommodation (ability of the lens to focus and then refocus)
 - Sphincter & Dilator iris Muscles control dilation and constriction of the pupil thereby affecting the amount of light entering the eye.

V. Eyeball 3 layers

1. Outer Layer (Tough protective layer)
 - Sclera is dense and fibrous. Composed of collagen fibers resulting in the opaque or the "WHITE" of the eye. The sclera maintains shape of the eyeball and protects it from trauma. Like a tough shell.

-Cornea is transparent and avascular. It receives oxygen from tears. The cornea is a domelike structure that is the most anterior portion of the eye. The cornea has refractory power and bends light rays in to focus on the retina.

-Iris provides color, it is the colored portion of the eye and is highly vascular. Donut shaped. The iris contains the pupil which is the black hole opening in the center of the eye. The iris sphincter and dilator muscles help the pupil dilate and constrict.

2. Middle Layer

- Choroid is located beneath the sclera layer and is vascular. Supplies blood to the retinal layer of the eye. It is sandwiched between retina and sclera

-Ciliary Body connects the choroid layer with the iris. The ciliary muscles located here affect lens shape and focusing. The ciliary body produces and secretes aqueous humor

-Lens is directly behind the iris/pupil and is almost completely transparent. It is biconvex and rounded on 2 sides. Its function is to bend light rays so they fall onto the retina/

3. Innermost Layer

-Retina is made up mostly of neurons and is the consistency of wet tissue paper. The retina converts images into a form the brain understands and processes as vision. The retina extends and forms the optic nerve. Has a rich blood supply normally and contains rods and cones which are photoreceptors. Rods are receptors for dim night vision and cones are receptive to colors in bright environments

-Macula is the area of the retina responsible for central vision and is free of blood vessels.

-Fovea Centralis is the center of the retina and is the area of sharpest visual acuity.

-Optic Disc is the point where the optic nerve exits the eye.

VI. Chambers of the Eye

-Anterior Cavity

a. Anterior Chamber-back of cornea to the lens, has aqueous humor in it which is clear watery fluid.

b. Posterior Chamber-between the iris and posterior surface of cornea. Also contains aqueous humor.

-Posterior or Vitreous Cavity- is behind the lens in front of the retina and is filled with vitreous humor which is a thick gel that gives shape to the eye. Humor filling the cavities is important to maintain shape and a normal pressure within the eye.

B. Physiology of the eye

Light rays enter the eye and are refracted through layers and structures as they pass to focus on the retina.....

1. First lands on the cornea and there is major bending of light
2. then travels through the aqueous humor
3. Goes through pupil which dilates and constricts depending on level of illumination
4. Goes to Lens and there is fine bending of light that occurs here and the ciliary muscles bend and bulge the lens to accommodate for distances
5. Goes through Vitreous humor in the posterior cavity
6. Light/image is then focused on the retina

7. Image is inverted and reversed. The object in the upper left will focus on the lower right of the retina upside down as a mirror image. The light is converted into a nerve impulse. The image then flows through the optic disc, the optic nerve, to the optic chiasm.

8. Optic chiasm-fibers of each eye cross over to the other side

a. Left Optic tract fibers from left fields of vision from both eyes – travel to the L occipital cortex

b. Right Optic tract fibers from the right field of vision from both eyes – travel to the right occipital cortex

c. L+R occipital lobes incorporate and interprets the two images as one

Meaning that you need both eyes to see the left field of vision and you need both eyes to see the right field of vision