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1. HISTOLOGY IMPORTANCE OF EYE

A histological understanding of the layers of the eye is essential for appreciating disease pathophysiology and also understanding certain therapeutic approaches. Broadly, from an anatomical perspective, the eye can be viewed as a series of overlapping layers of tissue.

External structures of the eye include the eyelashes, lids, muscles, accessory glands and conjunctiva.

The internal structures of the eye consist of three layers of tissue arranged concentrically:

* The sclera and cornea make up the exterior layers.
* The uvea is the vascular layer in the middle , subdivided into the iris , ciliary body and choroid.
* The retina constitutes the innermost layer and is made up of nervous tissue.

STRUCTURE

EXTERNAL STRUCTURES OF THE EYE

1.) Conjuctiva

-The conjunctiva lines the inner part of the eyelids.

- The tarsal plate lies beneath the conjunctiva and contains meibomain glands, which secrete an oily substance to decrease the evaporation of the tear film.

2.) Tear film: The tear film consists of aqueous ,mucus and oily secretions.

3.) Eyelid: a mobile layer up of skin and also muscular tissue and also covers the eyeballs.

INTERNAL STRUCTURES OF THE EYE :The innermost structure of the eye are organized in the three layers as follows

1. Outermost Layer : Sclera and Cornea
2. ‘The sclera( white of the eye)

The sclera is dense connective tissue made of mainly type 1 collagen fibers , oriented in different directions.The lack of parallel orientation of collagen fibers gives the sclera its white appearance , as opposed to the transparent nature of the cornea.

* The four layers of the sclera from external to internal are episclera, stroma ,lamina fusca, endothelium.
* The episclera is the external surface of the sclera. It is connected to the Tenon capsule by thin collagen fibers. At the corneoscleral junction, also known as the limbus, the Tenon capsule contacts stroma of the conjunctiva.

1. ‘Cornea ( transparent front layer of the eye )

* Consists of type 1 collagen fibers oriented in a uniform parallel direction to maintain transparency
* Consists of five layers : epithelium ( non-keratinized ,stratified squamous epithelium), Bowman layer, stroma( also called substantia propria), Descement’s membrane , corneal endothelium.
* Corneal epithelium : fast growing, regenerating multicellular layer which interacts directly with the tear film.
* Bowman layer : This is a layer of subepithelial basement membrane protecting the underlying
* stroma. It is composed of type 1 collagen , laminin and several other heparansulfate proteoglycans.
* Stroma : The largest layer of the cornea, the stroma has collagen fibers arranged in a regular pattern. Keratocytes maintain the integrity of this layer.
* Descemet’s membrane: an acellular layer made up of type IV collagen that serves as a modified basement membrane of the corneal endothelium.
* Corneal endothelium: a one cell thick layer made of either simple squamous or cuboidal cells.

1. Middle layer: Uvea( Iris, Cilliary Body, Choroid )
2. ‘Iris’

* Consists of stromal layer with pigmented , fibrovascular tissue and pigmented epithelial cells beneath the stroma.
* The sphincter pupillae and dilator pupillae muscles connect to the stroma

1. ‘Cilliary Body’: The tissues that divides the posterior chamber and vitreous body

* Consists of the cilliary muscle and the cilliary epithelium. The ciliary muscle, via the lens zonules, controls the structure of the lens, which is vital for accommodation . Zonules are connective tissue fibers that connect the cilliary muscle ad lens.
* The ciliary epithelium produces aqueous humor which fills the anterior compartment of the eye.

1. ‘Choroid’

* Consists of a dense network of blood vessels supplying nourishment to structures of the eye , housed in loose connective tissue.
* The choriocapillary layer is located in the innermost part of the choroid and supplies the retina.

c.) Innermost layer : Lens, Vitreous , Retina

1.) Lens: seperates the aqueous and vitreous chambers

- Consists of an outer capsule , a middle layer called cortex ,and an inner layer called the nucleus.

- The capsule is the basement membrane of the lens epithelium which lies below

- New lens cells differentiate from the lens epithelium and are incorporayed peripherally , pushing older lens cells towards the middle.

2.) Vitreous : a jelly- like space made of type II collagen separating the retina and the lens.

3.) Retina: nervous tissue of the eye where photons of light convert to neurochemical energy via action potential

2.) Briefly discuss the layers of retina

This is the innermost layer of the wall of the eye consisting of 8 layers, namely from outer to inner

* Pigmented epithelium :cuboidal cells that absorb light not captured by photoreceptors , also contributes to maintenance of rods and cone outer segments. It establishes a blood-retina barrier through tight junctions.
* Receptor layer: layer is cells with photoreceptors cells . Rods are more peripheral and more sensitive to light & motion while cones have higher visual acuity and specificity for color vision. Outer limiting membrane : layer of muller cells & rod/cone junctions which serve to separate the photosensitive region of retina from areas that transmit the electrical signals.
* Outer nuclear layer : layer of nuclei of rods and cone cells .
* Plexiform layer : contains dendrites of bipolar cells synapsing with axons of photoreceptor cells.
* Inner nuclear layer : contain cell bodies glial, amacrine, bipolar cells.
* Inner plexiform layer : contains axons of amacrine ,bipolar cells & glial cells of inner nuclear layer
* Ganglion cell layer : contain cell bodies of ganglion cells , whose axons projects to the brain.
* Nerve fiber layer : contains axons from ganglion cells which travel across to retina to the optic nerve to pass the optic chiasm and optic tract to the thalamus.
* Inner limiting membrane : A thin layer of muller glial cells & basement membrane which demarcates the vitreous anterior you from retina posteriorly.