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1. Write an essay on the histological importance of the eye in relation to their cellular functions

The **human eye** is an organ that reacts to [light](/wiki/Light%22%20%5Co%20%22Light) and allows [vision](/wiki/Visual_perception%22%20%5Co%20%22Visual%20perception).

The following parts help with the functioning of the eyes:



The external features of the eyes which include the :-

​⁃​Tear film : composed of deep aqueous mucin phase that supports a thin superficial lipid phase, the fluid produced helps in lubrication and protection

​⁃​Accessary glands : apocrine glands of moll, meibomain glands, lacrimal glands all help produce secretions which lubricates the eye

​⁃​Muscles : smooth muscles located around the eye help in movement and protection of the eye

*- Eyelid:* The eyelid, likewise known as the cover of the eye, a mobile layer made up of skin and also muscular tissue and also covers the eyeball.

Internal structures of the eyes

Outermost part: it consists of the Sclera, Cornea,

The sclera: It is a tough and thick white sheath that protects the inner parts of the eye. We know it as the ‘White of the eye’. It consists of tough, dense connective tissue made up flat collagen bundles intersecting in various directions while remaining parallel to the surface of the organ.

* The cornea: It is the transparent layer of skin that is spread over the pupil and the iris. The main role of the cornea is to refract the light that enters the eyes. Consists of type I 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), Descemet’s membrane, corneal endothelium.
* Limbus : forms border between transparent cornea & opaque sclera , contains pathway for aqueous humor outflow which helps to nourish the lens and maintain pressure in the eye

The middle layer (the uvea: iris, ciliary body and choroid)

* The iris:- Consists of stromal layer with pigmented, fibrovascular tissue and pigmented epithelial cells beneath the stroma. The pigmented layer of cells blocks rays of light and ensures that light must move through the pupil to reach the retina. The angle formed by the iris and cornea contains connective tissue with endothelial channels called the trabecular meshwork, which drains aqueous humor in the anterior chamber into the venous canal of Schlemm. From here, fluid drains into episcleral veins.
* Ciliary body: The tissue that divides the posterior chamber and vitreous body. Consists of the ciliary muscle and the ciliary 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 ciliary muscle and lens.The ciliary epithelium produces aqueous humor which fills the anterior compartment of the eye.

Choroid: The choroid is comprised of blood vessels, melanocytes, fibroblasts, resident immunocompetent cells and supporting collagenous and elastic connective tissue. This dense network of blood vessels supply nourishment to structures of the eye, housed in loose connective tissues. A choriocapillary layer is located in the innermost part of the choroid and supplies the retina. Along with the [ciliary body](/wiki/Ciliary_body%22%20%5Co%20%22Ciliary%20body) and [iris](/wiki/Iris_%28anatomy%29%22%20%5Co%20%22Iris%20%28anatomy%29), the choroid forms the [uveal tract](/wiki/Uvea%22%20%5Co%20%22Uvea).

The innermost part of the eye

Consists of the lens, vitreous and retina

* The lens- separates 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.
* Vitreous- a jelly-like space made of type II collagen separating the retina and the lens. It is normally avascular and does not contain nerves or lymphatics.
* Retina: consists of a pigmented epithelium adjacent to the choroid which helps absorb light and reduce back reflection of light onto the retina, the photoreceptor contains segments of rods and cones which respond to dark and bright light respectively. Presence of bipolar cells which convert photon of light to neurochemical energy via action potentials

2. Corona virus can penetrate the body through the eyes and implicate the immune system, briefly discuss the layers of the retina for information penetration

The retina actually consists of two components: an outermost layer of **retinal pigment epithelium**(RPE), which is composed of single layer of cuboidal melanin-containing cells and the **neural retina** which is a multilayered structure containing photoreceptors as well as neurons and glia. These 2 components would then fuse to form the retina and it is subdivided into 10 recognizable layers.



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The pigmented layer(RPE): made of cuboidal cells containing melanin which absorbs light. It is involved in photoreceptor metabolism and that it comprises which captures light not picked up by the photoreceptors.

The photoreceptors layer of rods and cones: the layer of cells with photoreceptors and glial cells. Rods are located peripherally and are more sensitive to light and motion than cones. Cones have higher visual acuity and specificity for color vision. It is involved in light capture and phototransduction.

 External limiting membrane: a layer of Muller cells and rod/cone junctions which serves to separate the photosensitive regions of the retina from the areas that transmit the electrical signals.

Outer nuclear layer This layer consists of nuclei of rod and cone cells.

Outer plexiform layer: This layer contains synaptic processes of rod and cone cells.

Inner nuclear layer: This layer contains the cell body of glial, amacrine, bipolar, and horizontal cells

Inner plexiform layer: This layer relays information from cells of the inner nuclear layer. Thus, this layer has axons of amacrine, bipolar, and glial cells and dendrites of retinal ganglion cells. It comprises a thick synaptic zone.

Ganglion cell layer: This layer contains nuclei of retinal ganglion cells. The ganglion cell dendrites help form the inner plexiform layer, and the axons form the nerve fiber layer.

Nerve fiber layer: This layer contains axons of retinal ganglion cells and he astroglia which support them. Collectively, these axons constitute the optic nerve. It comprises axons of the ganglion cells, which are unmyelinated.

Internal limiting membrane: A thin layer of Muller glial cells and basement membrane which demarcates the vitreous anteriorly from the retina posteriorly.