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

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

1. The eye is a highly developed photosensitive organ for analyzing the form, intensity, and color of light reflected from objects and providing sense of sight.

 The eye is composed of three tunics:

1. A tough external fibrous layer consisting of the sclera and the transparent cornea
2. A middle vascular layer, that includes the choroid, ciliary body, and iris; and
3. An inner sensory layer, the retina, which communicates with the cerebrum through the posterior optic nerve.
4. The sclera: it is a dense connective tissue made up of mainly type 1 collagen fibers, oriented in different directions. The four layers of the sclera from external to internal are episclera, stroma, lamina fusca, and endothelium. Collagen of the sclera and cornea are continuous.
5. Cornea: consists of type 1 collagen fibers oriented in a uniform parallel direction to maintain transparency. Consist of 5 layers: non keratinized stratified squamous epitheliu, Bowman layer, stroma, Descemet’s membrane, corneal endothelium.
6. Iris:

- Consists of 1 stromal layer with pigmented, fibrovascular tissue and two pigmented epithelial cells beneath the stroma.

- The sphincter pupillae and dilator pupillae muscles connects 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.

1. Ciliary body: it 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.
* The ciliary epithelium produces aqueous humor which fills the anterior compartment of the eye.
1. Choroid
* Consist of a dense network of blood vessels supplying nourishment to structures of the eye, housed in loose CT.
* The choriocapillary layer is located in the innermost part of the choroid and supplies the retina.
* The brunch membrane is an extracellular matrix layer situated between the retina and the choroid and has significance in age-related macular degeneration.
1. Lens: separates the aqueous and vitreous chambers.
* Consist 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 incorporated peripherally, pushing older lens cells towards the middle.
1. Vitreous: a jelly-like space made of type 2 collagen separating the retina and the lens.
2. Retina: it is the nervous tissue of the eye where photons of light convert to neurochemical energy via action potentials.

2. The retina has two major parts derived from the embryonic optic cup: the pigmented epithelium and the thicker neural retina.

Retina Pigmented Epithelium.

 The pigmented layer consist of cuboidal or low columnar cells with basal nuclei and surrounds the neural layer of retina. The cells have well-developed junctional complexes, gap junctions, and numerous invaginations of the basal memebranes associated with mitochondria. The apical ends of the cells extend processes and sheath-like projections that surround the tips of photoreceptors. Melanin granules are numerous in extensions and in the apical cytoplasm. This cellular region also contains numerous phagocytotic vacuoles and secondary lysosomes, peroxisomes, and abundant smooth ER specialized for retinal isomerization.

 Cells of the pigmented epithelium absorb scattered light, form part of a blood-retina barrier, regenerate 11-cis-retinal, phagocytose shed discs from rods, and support the rod and cone cells.

Neural Retina.

 It consists of nine distinct layers, three major layer contains the nuclei of the interconnected neurons.

* Outer nuclear layer; contains cell bodies of photoreceptors (the rod and cone cells).
* The inner nuclear layer; contains the nuclei of various neurons, notably the bipolar cells, amacrine cells, and horizontal cells, all of which make specific connections with other neurons and integrate signals from rods and cones over a wide area of the retina.
* The ganglionic layer has neurons with much longer axons. These axons make up the nerve fiber layer and converge to form the optic nerve which leaves the eye and passes through the brain.

Between the three layers of nuclei are two plexiform regions containing only axon and dendrites connected by synapses.

* The outer plexiform layer includes axons of the photoreceptors and dendrites of association neurons in the INL.
* The inner plexiform layer includes axon and dendrites connecting neurons of the inner nuclear layer with the ganglion cells.