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**ANSWER**

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

Different parts of the eye have distinct specialized functions which coalesce to give rise to a unified perpetual experience and I’ll be talking about those parts and their various function.

**EXTERNAL PART OF THE EYE**: The primary function of this part is to protect the delicate tissue of the inner eye (PROTECTIVE FUNCTION).

1. EYELASHES: It is highly sensitive to touch providing danger warning on objects in close proximity to the eye protecting the eye against small particles and debris.
2. EYELID: It prevents foreign bodies from entering the inner eye and helps refreshing and distributing tear film by blinking.
3. CONJUCTIVA: It keeps the front surface of the eye moist and lubricated as they open and close easily without friction, which if not available could cause an eye irritation.

**INTERNAL PART OF THE EYE**: It’s primary role is geared towards structural and visual function. It is further divided into three parts:

1. Fibrous Tunic/External layer
2. Vascular Tunic/Middle layer
3. Innermost layer

FIBROUS TUNIC/EXTERNAL LAYER: It consists of the Sclera and Cornea.

SCLERA: This is also known as WHITE OF THE EYE, is a dense irregular connective tissue layer

* FUNCTIONS:
1. Gives support to the eye shape/form
2. Protects delicate internal organs
3. Site of extrinsic muscle attachment

CORNEA: It has five layers (two layers of epithelium with three delicate connective tissue layer in between them)

* FUNCTION:
1. Responsible for refracting light (2/3 of the eye’s refractive power), which contributed greatly by the corneal stroma.

VASCULAR TUNIC/MIDDLE LAYER/UVEA: It is a crucial mediator of nutrition and gaseous exchange as blood vessels course through the iris and ciliary body. It is further divided into Iris, Ciliary body and Choroid.

IRIS: It has two smooth muscle layers (Sphincter pupillae and dilator pupillae) connected to the stroma with a central pupil. They control the diameter of the pupil, thus the amount of light entering the eye. Its pigmented layer of cells blocks rays of light and ensures light must enter the pupil to reach the retina.

CILIARY BODY: It is a circular band of muscle that is connected to and sits behind the iris.

* FUNCTION:
1. Controls lens shape by pulling or relaxing the lens zonules.
2. Provides aqueous humour that fills the posterior and anterior chamber of the eye.
3. Provides nutrition for avascular tissue such as the cornea.

CHOROID:

* FUNCTION:
1. Its areolar connective tissue is highly vascularized, providing nourishment to the retina.
2. Its pigment layer absorbs extraneous light.

INNERMOST LAYER: This consists of the Lens, Vitreous and Retina.

LENS:

* FUNCTION: Responsible for the remaining 1/3 portion of the eye’s refractive power.

VITREOUS:

* FUNCTIONS:
1. Protection of the eye.
2. Helps hold the spherical shape of the eye.

RETINA:

* FUNCTIONS:
1. The pigment layer provides melanin that absorbs extraneous light.
2. The photoreceptor, bipolar, horizontal and Muller cells detect incoming light rays (photon energy). These light rays are then converted into neurochemical action potential (nerve signals), then these impulses are sent to the brain via the optic nerve to create visual perception.
3. Coronavirus can penetrate the body through eye and implicate the immune system, briefly discuss layers of the retina for information penetration.

Indeed, the coronavirus has been said to penetrate the body through the eye by passing through the nasolacrimal duct (tear duct, which is a site for virus transmission into the body) after passing the various layers of the eye e.g. Sclera, Choroid and the Retina (for which I will be talking about its various layers) into the respiratory system causing some damages.

The layers of the retina from the outermost to the innermost layer (closest to the vitreous humour) are as follows:

1. The Pigment epithelium
2. The Rod and Cone layer
3. The Outer limiting membrane
4. The Outer nuclear layer
5. The Outer plexiform layer
6. The Inner nuclear layer
7. The Inner plexiform layer
8. The Ganglionic cell layer
9. The Nerve Fiber layer
10. The Inner limiting membrane

THE PIGMENT EPITHELIUM: It is the outermost layer of the retina. It is continuous with the choroidal layer. It consists of a single layer of cuboidal-supporting cells for the neural portion of the retina, which secretes melanin that functions in light absorption and decrease of light scattered in the eye.

THE ROD AND CONE LAYER: It is also known as the BACILLARY LAYER. It contains inner and outer segment of rods and cone photoreceptor cells.

THE OUTER LIMITING MEMBRANE: It is also known as EXTERNAL LIMITING MEMBRANE. It separates the inner segment portions of the photoreceptors from cell nuclei.

THE OUTER NUCLEAR LAYER: It consists of the cell bodies of the retinal rods and cones

**N.B.**: In peripheral retina: Rod cell bodies > Cone cell bodies while, In the central retina: Cone cell bodies > Rod cell bodies.

THE OUTER PLEXIFORM LAYER: It is also known as OUTER SYNAPTIC LAYER. It contains axons of rods and cones and dendrites of horizontal and bipolar cells. Synapses between these structures occur here.

THE INNER NUCLEAR LAYER: It contains nuclei of horizontal, bipolar, Amacrine and some Muller cells. This layer is thicker at the central retina compared to the peripheral retina due to greater density of cone-connecting second-order neurons (cone bipolar neurons) and smaller and more closely packed horizontal and amacrine cells concerned with the cone pathways.

THE INNER PLEXIFORM LAYER: It contains synapses between dendrites of ganglionic and amacrine cells and axons of bipolar cells.

THE GANGLIONIC CELL LAYER: It contains nuclei of ganglionic cells, axons of which become nerve fibers for messages and some displaced amacrine cells. It contains non-rod and non-cone photoreceptors, THE PHOTOSENSITIVE GANGLIONIC CELL responsible for reflexive response to broad/bright daylight.

THE NERVE FIBER LAYER: It is a layer of optic nerve fibers consisting of ganglionic cell axon fibers which courses through to the optic nerve head.

THE INNER LIMITING MEMBRANE: It is a boundary between retina and vitreous humour formed by astrocytes, footplate of Muller cells together with the basal lamina.