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DEPARTMENT: MBBS

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

The eye is the peripheral organ for vision and photoreception, each eye ball has a lens that produces images of objects that we look at. The images fall on the light sensitive membrane called the retina. The outer wall of the eye ball is formed by a thick white opaque membrane called the sclera. In the anterior one-sixth of the eyeball the sclera is replaced by a transparent disc called the ***cornea*** which is convex forwards. Deep to the sclera there is a ***vascular coat*** (or ***uvea***), which has the following subdivisions:

-The part lining the inner surface of most of the sclera is thin and is called the ***choroid***.

-Near the junction of the sclera with the cornea the vascular coat is thick and forms the ***ciliary body***. The ciliary body is in the form of a ring. The ‘inner’ margin of the ring is continuous with the peripheral margin of a pigmented diaphragm which is called the ***iris***. The iris lies between the cornea (in front) and the lens (behind).

-In the centre of the iris there is an aperture called the ***pupil***. The retina forms the innermost layer of the eyeball.

The space between the iris and the cornea is called the ***anterior chamber***, while the space between the iris and the front of the lens is called the ***posterior chamber***. These chambers are filled by a fluid called the ***aqueous*** ***humour***. The part of the eyeball behind the lens is filled by a jelly-like substance called the **vitreous humour**. The histological importance of the eye in relation to their cellular function includes;

- The cornea serves as a protective covering for the front of the eye and also helps focus light on the retina at the back of the eye.

- The iris controls the amount of light that enters the eye. It carries out this action by dilating the pupil when the environment is dark to allow more light into the eye and allows less light into the eye when the environment is bright by constricting the pupil.

- Through the action of the ciliary muscles, the lens focuses light onto the retina.

- The rod and cone cells found in the retina are photoreceptor cells. The rods are responsible for vision at low levels (scotopic vision), they do not mediate colour vision while the cones are responsible for vision at high levels (photopic vision).

- The ganglion cells extend to form the optic nerve that conveys information to the brain and take the electrical information from the bipolar cells and process it to determine shapes, contrast and colour.

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

**i. Pigment Cell Layer** This consists of a single layer of cells containing pigment. Processes from pigment cells extendinto the next layer. It’s basement membrane forms the innermost layer of the glassy membrane of the choroid.

**ii. Layer of Rods and Cones** It is a photosensitive layer composed of slender rods and thicker cones. The tips of the rods and cones are surrounded by processes of pigment cells.

**iii. External Nuclear Layer** The external nuclear layer contains the cell bodies and nuclei of rod cells and of cone cells. These cells are photoreceptors that convert the stimulus of light into nervous impulses. Each rodcell or cone cell can be regarded as a modified neuron. It consists of a cell body, a peripheral (orexternal) process, and a central (or internal) process. The peripheral process is rod shaped in thecase of rod cells, and cone shaped in the case of cone cells. These processes lie in the layer of rodsand cones described above. The central process of each rod cell or cone cell is an axon. It extendsinto the external plexiform layer where it synapses with dendrites of bipolar neurons**.**

**iv. External Plexiform Layer** (or ***outer synaptic zone***) This layer consists only of nerve fibres that form aplexus. The axons of rods and cones synapse here with dendrites of bipolar neurons.Processes of horizontal cells also take part in these synapses.

**V. Internal Nuclear Layer** The internal nuclear layer contains the cell bodies and nuclei of three types of neurons.(**a**) The ***bipolar neurons*** give off dendrites that enter the external plexiform layer to synapse withthe axons of rod and cone cells; and axons that enter the internal plexiform layer wherethey synapse with dendrites of ganglion cells. (**b**) The ***horizontal neurons*** give off processes that run parallel to the retinal surface. Theseprocesses enter the outer plexiform layer and synapse with rods, cones, and dendrites of bipolar cells.(**c**). The ***amacrine cells*** also lie horizontally in the retina. Their processes enter the inner plexiform layer where they synapse with axons of bipolar cells, and with dendrite of ganglion cells.

**vi. Internal Plexiform Layer** (or ***inner synaptic zone***) This layerconsists of synapsing nerve fibres. The axons of bipolar cells synapse with dendrites of ganglion cells; and both these processes synapse with processes of amacrine cells. The internal plexiform layer also contains some horizontallyplaced ***internal plexiform cells***; and also a few ganglion cells.

**vii. Layer of Ganglion Cells** The layer of ganglion cells contains the cell bodies of ganglion cells, dendritesof these cells enter the internal plexiform layer to synapse with processes of bipolar cells and ofamacrine cells. Each ganglion cell gives off an axon that forms a fibre of the optic nerve.

**viii. Layer of Optic Nerve Fibres** The layer of optic nerve fibres is made up of axons of ganglion cells. The fibres converge on the optic disc where they pass through foramina of the lamina cribrosa to enter the optic nerve.

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