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Question

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

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

Answers:

1. The layers of the eye perform distinct functions which coalesce to create a unified, perpetual experience. They include:
a) The essential role of the external eye structures is to protect the delicate tissue of the internal eye.
b) The eyelid prevents foreign bodies from entering the inner e & helps refresh & distribute the tear film by blinking.
c) Eyelashes are finely sensitive to touch & warn the eye of possible debris & particles that may cause injury.
d) Internal parts of the eye have primarily structural & visual functions.
e) The cornea serves a protective role & is responsible for 2/3rds of the refractive properties of the eye.
f) The remaining one third of refraction is performed by lens which is functionally adjustable through the action of the ocular tissues & ciliary muscles.
g) At the end of the visual process, as rays of light bend through the cornea & lens, photon energy is converted to neurochemical action potentials by cells of the retina, which then sends them to the brain via the optic nerve.
h) The [illegible] of the eye is a crucial mediator of attention &

gas exchange as blood vessels course through the ciliary body & iris, while choriocapillaries in the posterior eye help support the retina. This abundant supply is implicated in the uveitis as inflammatory mediators enter the eye through this vascular network.

2. Layers of Retina for Information Penetration:

The retina develops as an outgrowth from the brain (diencephalon). The retina is approximately 0.5mm thick & lines the back of the eye. The proximal part of the diverticulum remains named & is called the optic stalk, it later becomes the optic nerve. The optic nerve contains the ganglion cell axons running to the brain & additionally, incoming blood vessels that open into the retina to vasculanize the retinal layers & neurons. The distal part of the diverticulum forms a rounded hollow structure called the optic vesicle. This vesicle is invaginated by the developing lens (and other surrounding tissues) so that it gets converted into a two layered optic cup. At first, each layer of the cup is made up of single layer of cells.

The outer layers persists as a single layered epithelium that becomes pigmented. It forms the pigment cell layer of the retina. Over the greater part of the optic cup, the cells of the inner layer multiply to form several layers of cells that become the nervous layer of the retina. In this anterior part, both layers of the optic cup remain single layered. These two layers like:

a) The inner surface of the ciliary body forming the ciliary part of the retina.

b) The posterior surface of the iris forming the iridial part of the retina.

Opposite the posterior pole of the eyeball the retina shows a central region about 6mm in diameter. This region is [illegible] In the centre of the macula lutea is the [illegible] macula lutea is a small depression that

is called the Fovea centralis. The floor of the central is often called the foveola. This is the area of clearest vision. Beginning from the external surface the following layers can be identified:

1) Pigment Cell Layer:
This consists a single layer of cells containing pigments. Processes from pigment cells extend into the next layer.

2) External Nuclear Layer
They are composed of the cell bodies of the rods & cones is about the same thickness in central & peripheral retina. However in the peripheral the rod cell bodies outnumber the cone cell bodies while the reverse is true for central retina. In central retina, the cones have oblique axons displacing their cell bodies from their synaptic pedicles in the external plexiform layer. These oblique axons with accompanying Muller cell processes form a pale staining fibrous looking area known as the Henle fibre layer. The latter layer is absent in peripheral retina.

3) Layers of Rods & Cones
Light must therefore travel though the thickness of the retina before striking & activating the rods & cones. The cones responds best to bright light (photopic vision), they are responsible for sharp vision & for discrimination of colour. Rods can respond to poor light (scotopic vision) & specially to movement across the field of vision.

4) External plexiform layer
The first area of neuropil is the external plexiform layer, where connections between rod & cones & vertically running bipolar cells & horizontally oriented horizontal cells occur. This layer is absent in peripheral retina.

6) Internal plexiform layer

It consists of synapsing nerve fibres. The axons of bipolar cells synapse with dendrites of ganglion cells & both these processes synapse with processes of amacrine cells.

5) Internal Nuclear layer

The inner nuclear layer (INL) is thicker in the central area of the retina compared with peripheral retina due to a greater density of cone-connecting second order neurons (cone bipolar cells) & smaller field & more closely spaced horizontal cells & amacrine cells concerned with the cone pathways.

4) Internal plexiform layer

It consists of synapsing nerve fibres. The

3) Layer of Ganglion cells. Each ganglion cell gives off an axon that forms a fibre of the optic nerve.

2) Layer of optic Nerve Fibres

Made up of axons of ganglion cells. The fibres converge on the optic disc where they pass through the foramina of the lamina cribrosa to enter the optic nerve.