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**MATRIC NO:** 17/MHS01/030

**DEPT:** Medicine and Surgery

**COURSE:** Neurohistology

1. Write an essay on the histological importance of the eye in relation to the cellular functions,
2. Corona virus can penetrate the eye and implicate the immune system, briefly discuss the layers of the retina for information penetration.

 **Answers**

1. **Histological Importance of the Eye.**

 The eyes are highly developed photosensitive organs for analyzing the form, intensity and color of light reflected from objects, and providing the sense of sight. Each eye is composed of three concentric tunics:

* A tough external fibrous layer consisting of the sclera and cornea
* A middle vascular layer called uvea consisting of the choroid, ciliary body and iris, and
* An inner sensory layer, the retina

 The layers of the eye perform distinct functions which coalesce to create a unified perceptual experience.

* The fibrous external layer of the eyeball protects the more delicate internal structures and provides sites for muscle insertion. The sclera supports the eye shape, protects delicate internal structures and provides extrinsic eye muscle attachment sites. The cornea protects the anterior surface of the eye; it covers the pupil, iris and anterior chamber. Its main function is to refract or bend light; it is responsible for focusing most of the light that enters the eye.
* The eye’s more vascular middle layer is known as the uvea.
* The choroid supplies nourishment to the retina and its pigment absorbs extraneous light.
* The ciliary body holds suspensory ligaments that attach to the lens and change lens shape for far and near vision, its secretory epithelium secretes aqueous humor.
* The iris controls pupil diameter and thus the amount of light entering the eye.
* The retina, the innermost tunic of the eye develops with two fundamental sub layers from the inner and outer layers of the embryonic optic cup.
* The outer pigmented layer absorbs extraneous light and provides vitamin A for photoreceptor cells.
* The inner neural layer detects incoming light rays; light rays are converted to nerve signals and transmitted to the brain.
1. **Layers of the retina for Information Penetration.**

 The retina is composed of the outer pigmented layer and inner neural layer. The neural retina functions as an outpost of the central nervous system with glia and several interconnected neuronal subtypes in well organized strata. Nine distinct layers comprise the neural retina following the part of light these are:

* **The Inner Limiting Layer (ILL)**: it consists of terminal expansions of other Muller cell processes that cover the collagenous membrane of the vitreous body. It forms a diffusion barrier the neural retina and the vitreous humor.
* **The Nerve Fiber Layer (NFL):** it is the second innermost layer of the retina from the vitreous. It contains the ganglionic cell axons that converge at the optic disc and form the optic nerve.
* **The Ganglionic Layer (GL):** it contains the retinal ganglion cells and displaces amacrine cells. Smaller retinal ganglion cell dendrites arborize in the inner plexiform layer while the larger RGC arborize in other layers.
* **The Inner Plexiform Layer (IPL)**: consists of axons and dendrites connecting neurons of the inner nuclear layer with the ganglion cells.
* **The Inner Nuclear Layer (INL):** contains the nuclei of various neurons, notably the bipolar cells, amacrine cells and the 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.
* **Outer Plexiform Layer (OPL):** contains a neuronal synapse between rods and cones and the footplate of horizontal cells. Capillaries are found to be running primarily through this layer.
* **Outer Nuclear Layer (ONL):** it contains cell bodies of photoreceptors (rod and cone cells)
* **Outer Limiting Layer (OLL):** is a faint but well defined series of tight and adherent junctions that form at the level of the rod and cone inner segments between the photoreceptors and Muller cell processes. The OLL forms one part of the compartment that encloses the rods and cones.
* **Rod and cone layer (RCL):** the rod and cone cells are polarized neurons with their photosensitive portions aligned in this layer. The outer segments of the rod cells are conical. Rods are more sensitive to light and thus are the receptors primarily used in periods of low light intensity but the resulting image is monochromatic. Cones on the other hand are sensitive to specific wavelengths of light allowing you to discern colors and more detailed visual information but they require more intense lighting.