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DEPARTMENT: MEDICINE AND SURGERY

COLLEGE: MEDICINE AND HEALTH SCIENCES

Level: 300level

Course: Histology of Special Senses and Neurohistology

Course Code: ANA 305

Assignment

1 Write an essay on the histological importance of the eye based on their cellular function.

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

Answer

1. The eyes are highly developed photosensitive organ for, the form, intensity and color of light reflected from objects and providing the sense of light. Protected within the orbits of which contain adipose cushion each eyeball consists externally of a tough, fibrous globe that maintains overall shape. Internally the eye contain transparent tissue that can refract light to focus image, a layer of photosensitive cell and a system of neurons that collect, process and transmit vital information to the brain. The eye is made up of 3 basic layers: the outer corneo-scleral layer, the intermediate uveal layer and the inner retinal layer

* Corneo-scleral layer: This layer forms a tough, fibroblastic capsule which supports the eye. The posterior 5/6th, the sclera, is opaque and provides insertion for extra ocular muscles. The anterior 1/6th the cornea, is transparent and has a smaller radius of curvature than sclera. The cornea is the principal refracting medium of the eye and roughly focuses an image onto the retina; the focusing power of the cornea depends mainly on the radius of curvature of its external surface, the corneo-scleral junction is known as the limbus and is marked internally and externally by a shallow depression. Running from the junction of the cornea and limbus the surface of the eye is covered by conjunctiva which is reflected into the eyelids.
* Uveal layer: the middle layer, the uvea or uveal tract, is highly vascular which is made up of three components: the choroid, ciliary body and the iris. The choroid lies between the sclera and retina in the posterior 5/6th of the eye. It provides support for the retina and is highly pigmented, thus absorbing light which has passed through the retina. Anteriorly, the choroid merges with the ciliary body which is circumferential thickening of the uvea lying beneath the limbus. The ciliary body surrounds the coronal equator of the lens and is attached to it by the suspensory ligament or zonule. The lens is a biconvex transparent structure, the shape of which can be varied to provide fine focus of the corneal image upon the retina. The ciliary body contains smooth muscle, the tone of which controls the shape of the lens via suspensory ligament. The lens suspensory ligament and ciliary body divide the eye into a large compartment containing a thick gel called the vitreous body and compartment part in front containing a watery fluid called aqueous humor. The iris, the third component of the uvea, forms a diaphragm extending in front of the lens from the ciliary body so as to incompletely divide the anterior compartment into two chambers: these are known by the terms anterior and posterior chamber. The highly pigmented iris as an adjustable diaphragm which regulates the amount of light reaching the retina. The aperture of iris is called the pupil. the posterior and anterior chamber contain the aqueous humor, which is secreted into the posterior chamber by ciliary body and circulated through the pupil to drain into a canal at the angle of the anterior chamber, the canal of schlemm. The aqueous humor is the source of nutrients for non-vascular lens and cornea. The pressure of the aqueous humor maintains the shape of the cornea. The large posterior compartment of the eye contain a specialized connective tissue largely composed of a transparent gel known as vitreous body which supports the lens and retina from within as well as providing an optical medium is non-refractive with respect to lens. The vitreous body contains a canal which extends from the exit of the optic nerve to the posterior surface of the lens; hyaloid canal represents the course of the hyaloid artery which supplies the vitreous body in embryological development
* Retinal layer: The photosensitive retina forms the inner lining of most of the posterior compartment of the eye and terminates along a scalloped line, the ora serrata, behind the ciliary body. Anterior to the ora serrata, the retinal layer continues as a non-photosensitive epithelial which lines the ciliary body and the posterior surface of iris. The visual axis of the eye passes through a depression in the retina called the fovea which is surrounded by a yellow pigmented zone, the macula lutea. The fovea is the area of greatest visual activity. Afferent nerve fibres from the retina coverage to form the optic nerve which leaves the eye through a part of the sclera known as the lamina cribrosa. The retina overlying the cribosa. The retina overlying the cribrosa, the optic papilla (optic disc), is devoid of photoreceptor and thus represent a blind spot.

1. Between the vitreous body (**VB**) and the choroid (**C**), the retina

can usually be seen to consist of nine neural layers and a pigmented

layer.

Layers of the retina–from outer to inner, Composed of 10 layers. The naming of the layers is based on their position relative to the path of the neural conduction, not the path of light.

* *Pigment epithelium:* Cytoplasm contains numerous melanin granules to absorb lightand reduce reflection Columnar epithelial cells with apical microvilli whose bases areadherent to Bruch’s membrane in the choroid Cells possess a cylindrical sheath that surrounds the apical tipsof the photoreceptors; these sheaths aid in phagocytosis anddigestion of membranous discs shed by the photoreceptors.
* *Photoreceptor layer* Composed of *rods* and *cones.* Rods are sensitive to low light intensity, outnumber cones andare located throughout the retina*.* Cones are less numerous than rods, sensitive to high intensity light and respond to color. Cones provide greater visual acuity and are concentrated in the *fovea centralis*. (see below)

1. *Outer segment:* Contains flattened, membranous discs that contain the visual pigments rhodopsin (rods) and iodopsins (cones).
2. *Inner segment:* Separated from the outer segment by a constriction, contains the major synthetic and energy-producing organelles.

* *External limiting membrane:* Not a true membrane; formed by adherent junctions of Mueller cells, modified astrocytes, with the photoreceptors
* *Outer nuclear layer:* Location of the nuclei of rods and cones
* *Outer plexiform layer:* Region of synaptic contacts between photoreceptor axons and bipolar cell dendrites
* *Inner nuclear layer:* Location of cell bodies of bipolar cells. Also present are additional neurons, amacrine and horizontal cells.
* *Inner plexiform layer:* Location of synaptic contacts between bipolar cell axons and ganglion cell dendrites
* *Ganglion cell layer:* Location of cell bodies of ganglion cells
* *Optic nerve fiber layer:* Collections of unmyelinated ganglion cell axons that pass toward the *optic disc*, the head of the optic nerve, where they exit to form the optic nerve (cranial nerve II).
* *Internal limiting membrane:* Formed by the basal portions of Mueller