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Questions and Answers 1

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Questions and Answers

1. Describe how light travels through the eye starting with the cornea and ending in the visual cortex. Be sure to identify the major structures and function of each.

Light reaches the cornea through the sclera. The cornea allows it inside the eye and refracts it towards the aqueous humor. The Aqueous humor upholds the intraocular pressure together with inflating the eye globe. It provides nutrition for various tissues. From the Aqueous humor, it moves to the pupil that permits it to pass into the lens with the regulation of the intrinsic muscles in the iris. It moves further to the lens that aids to refract it for proper focusing at the retina. The lens changes the eye's focal distance in order to focus images at various distances. The light travels to the vitreous humor that through phagocyte cells removes undesirable cellular debris in the field of vision (Juttner 2011). Eventually, the light gets into the photoreceptor cells which are the rods and cones, and they convert light into signals and stimulate absorption of photons thus triggering change in the potential of cell's membrane. The signal is carried through the optic nerve that is used to transmit it to the optic chiasm where they crossover partially then to the optic duct. The optic duct is used to deliver a message to the visual cortex in the occipital lobe that does the message processing.

2. Describe the differences among the various types of ganglion cells. How does the shape of their receptive fields differ from cells later in the visual pathway?

- The ganglion cells include; midget cells that obtain inputs from moderately few cones and rods. Their conduction velocity is slow and responds softly to variations in contrast. They form the highest

percentage of all ganglion cells in the retina.

- Parasol cells are the large sized dendritic trees. They form a lower percentage all ganglion cells in the retina. They are part of magno-cellular pathway. They get inputs from fairly numerous cones and rods. Their conduction velocity is fast and they are able to respond to stimuli of low-contrast (Whikehart 2003).

- Bi-stratified ganglion cells are characterized by their small sizes. They form 10 percent of the ganglion cells in the retina. They go through the pathway of konio-cellular. They take inputs from cones and rods of numbers that are intermediate. Their conduction velocity is moderate and they are able to respond to contrast stimuli that are moderate.

- Photosensitive cells contain photo-pigment, melanopsin. They project to supra-chiasmatic nucleus through the tract of retino-hypothalamic for maintaining and setting circadian rhythms (Kardong 2008).

Midget cells possess modest receptive fields that are center-surround, whereby the center is off or on when the surround is in the opposite.

Parasol cells have much bigger receptive fields that are nonetheless center-surround.

Bi-stratified have extra-large receptive fields and have centers only and have no surrounds. They are ever on to the blue cone and at the same time off to both the green and red cone (Foley 2010).

Photosensitive cells respond straight to light despite the absence of

cones and rods.

3. Explain the process of accommodation that occurs in normal eyes when observing an object that is nearby, and summarize the way the focusing becomes abnormal in the case of farsight edness and nearsightedness.

The process of accommodation befalls when the eye's lens changes in shape thus changing the focal distance. It facilitates focus on imageries at various distances hence allowing a real sharp image to be formed at the retina (Juttner 2011).

The focusing becomes abnormal in nearsightedness in that, the change of the shape of the lens fails for objects that are far apart. The formation of the visual image occurs in the retina in its front instead of appearing directly hence the physical length of the eye seems greater than the optical length.

Focusing becomes abnormal in farsightedness in that, the change of shape of the lens dysfunctions for objects close. The formation visual image occurs behind the retina rather than on it. The physical length of the eye seems smaller than the optical length thus out of the norm.

4. What is visual acuity? What characteristics of the eye affect acuity? How is visual acuity measured?

Visual acuity is the acuteness of vision depending on neural and optical factors that are the sharpness focus of the retina within the eye, the functioning and intactness of the retina and the hypersensitivity of the faculty interpretive of the mind (Duker 2008).

The characteristics of eye effect acuity include refractive error as in

the way light is refracted into the eyeball, optical characteristics like astigmatism and complex irregularities of the corneal.

Visual acuity is measured typically while fixating or as a central measure vision because it is the highest. In the case of acuity in vision of peripheral, it can be higher or equal in importance concerning everyday life. Acuity tends to decline towards the periphery in the case of the hyperbolic or inverse-linear fashion.

References

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