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A WHIRLWIND TOUR OF OCULAR ANATOMY AND PHYSIOLOGY

The basic anatomy and physiology of the various structures and components of the vertebrate eye will be discussed, following a logical course from front to back and outside to inside of the eye.

The eyelids and tear film have a protective function and are responsible for ,garbage' disposal from the ocular surface. The tear film and conjunctiva play important roles in the innate immune system protection of the eye.

The outer fibrous layers of the eye consist of cornea and sclera and protect the sensitive inner ocular structures from the outside world. The cornea is the clear front window of the eye and therefore needs to be perfectly transparent to visible light, while at the same time filtering out harmful ultraviolet light. In addition to that the cornea is the most important refractive element of the eye, which, together with the crystalline lens, focuses light rays onto the retina.

The vascular structures, iris, ciliary body and choroid, have important transport and nutritive functions. Specific functions of these tissues include the regulation of the amount of incoming light by the iris, the production of aqueous humor by the ciliary body epithelium and the minimization of light scatter by the choroid.

Regulation of the intraocular pressure takes place in the ocular outflow system and abnormal outflow through these structures usually translates into increased intraocular pressures and a disease entity called glaucoma.

The crystalline lens is the second major refractive element of the eye and as such is responsible for image focusing. In mammals the lens is the sole responsible structure for the adjustment of focus to near object and distance vision in a process called accommodation.

The vitreous compartment is the largest compartment of the eye in larger animals and is completely transparent, responsible for a minor proportion of the focusing power of the eye and, importantly, for the stabilization of the retina on the posterior wall of the globe.

Light absorption takes place in the rods and cones of the outer retina, followed by the transformation of light energy into electrical energy (phototransduction). Electrical impulses are then transmitted by second order neurons in the middle retina to inner retinal ganglion cells, whose axons form the optic nerve. The optic nerve then transmits visual information to the visual cortex where information processing and the final process of ,seeing' takes place.

The physiology of vision will be briefly discussed as time permits.