

CORNEA and SCLERA

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Bulbus oculi has 3 layers

1. Tunica fibrosa bulbi
2. Tunica vasculoza bulbi
3. Tunica nervosa bulbi

Fibrous coat of the eye (tunica fibrosa bulbi) consists of sclera, posterior opaque structure and cornea, anterior transparent structure.

The cornea, sclera and bulbar conjunctiva merge is called the limbus

CORNEA

The cornea has 4 layers

1. Stratified epithelium

consists of stratified, squamous non-keratinized cells)

2. Collagenous stroma

composed of keratocytes, collagen and ground substance

Collagen fibrils are parallel. This regular spacing of fibrils maintains corneal transparency

3. Descemet's membrane

Basement membrane of the endothelium

It thickens with age, because it is continuously secreted by endothelial cells throughout life.

It does not stain with fluorescein, therefore it appears as a dark, transparent structure in the center of deep corneal ulcer.

4. Endothelium

One cell layer thick and lies Descemet's membrane posteriorly

Its role is to pump ions from the stroma into the aqueous

Endothelial cells have a limited capacity to replicate

CORNEA

Corneal transparency is maintained by several specialized anatomic and physiologic features.

1. Lack of keratinization
2. Lack of melanin pigments
3. Lack of blood vessels
4. Regular arrangement of collagen fibrils
5. Maintenance of a relatively dehydrated state
6. Relatively low cell density
7. Smooth optical surface providing by PTF

CORNEA

Corneal Healing

➤ Epithelium

Great regenerative capacity

Reepithelization within 4 to 7 days in normal circumstances

➤ Stroma

Stromal keratocytes are capable of synthesizing collagen

Collagen replacement rate and repair vary and may extend to years

➤ Descemet's membrane and Endothelium

Endothelial regeneration is generally minimal

In extensive lesions, cells may not cover the lesion and edematous stroma persists.

Topical corticosteroids inhibit epithelial regeneration, fibroblastic activity and endothelial regeneration

SCLERA

The sclera is composed of three layers.

1. Episclera
2. Sclera proper
3. Scleral stroma

Many channels exist in the sclera through which vessels and nerves pass.

The optic nerve leaves the bulbus oculi through a posterior pole called the lamina cribrosa on scleral surface.

The short posterior ciliary arteries and nerves pierce the sclera near the optic nerve and enter the choroid. The long posterior ciliary arteries pass around the bulbus to the ciliary body.

CORNEAL REACTIONS

CORNEAL EDEMA

Corneal edema occurs as the result of abnormal accumulation of fluids in the cornea. Excess fluid forces the collagens apart and leads to loss of transparency.

Epithelial cells prevent tears from entering the stroma.

Endothelial cells play critical role by controlling stromal fluid balance by moving solutes from the stroma to the aqueous.

Dysfunction of these cell layers leads to corneal edema and loss of transparency.

CORNEAL REACTIONS

CORNEAL VASCULARIZATION

Corneal vascularization may be superficial, deep and both. Depth of the invading vessels indicates depth of the lesions.

➤ Superficial vessels appear 'treelike'

begin at the limbus

induced by surface disease (usually corneal epithelial)

➤ Deep vessels appear 'hedgelike', they are shorter

induced by stromal or intraocular disease

Corneal vascularization is beneficial and shows stromal repair.

CORNEAL REACTIONS

CORNEAL MELANOSIS

- Corneal pigmentation / pigmentary keratitis
- Nonspecific response to chronic corneal irritation
- Underlying cause should be removed
- Removal of this stimulus (causes) prevents or slows progression of melanosis.

CORNEAL ACCUMULATIONS (LIPID OR MINERAL)

- ✓ Abnormal substances accumulation appears as crystalline or shiny white areas
- ✓ These accumulations generally contain calcium and cholesterol.
- ✓ Cornea does not stain with fluorescein, because deposits are usually subepithelial
- ✓ Investigate the underlying causes (such as hyperadrenocorticism, diabetes mellitus)

CONGENITAL CORNEAL DISORDERS

MICROCORNEA: It is diagnosed by measurement of the horizontal and vertical diameters of the cornea.

DERMOID: It contains hair follicles in conjunctiva, third eyelid, eyelid margin or cornea. Treatment requires surgical excision.

PERSISTENT PUPILLARY MEMBRANES: It is a failure of the uveal tract to regress during embryologic development. They are noninflammatory. Therapy is not necessary, but affected animals should not be bred.

CORNEAL LIPID DYSTROPHY: Deposition lipid in the anterior stroma. Check the serum cholesterol and triglyceride concentrations.