

FUNCTION III: OPTICAL FUNCTION

- ❖ The cornea-aqueous interface acts as diverging lens of low power

FUNCTION IV: CLEARING FUNCTION

- ❖ as mechanism to clear blood, macrophages, remnants of lens matter and products of the inflammation from the anterior chamber

5. RATE OF AQUEOUS DRAINAGE

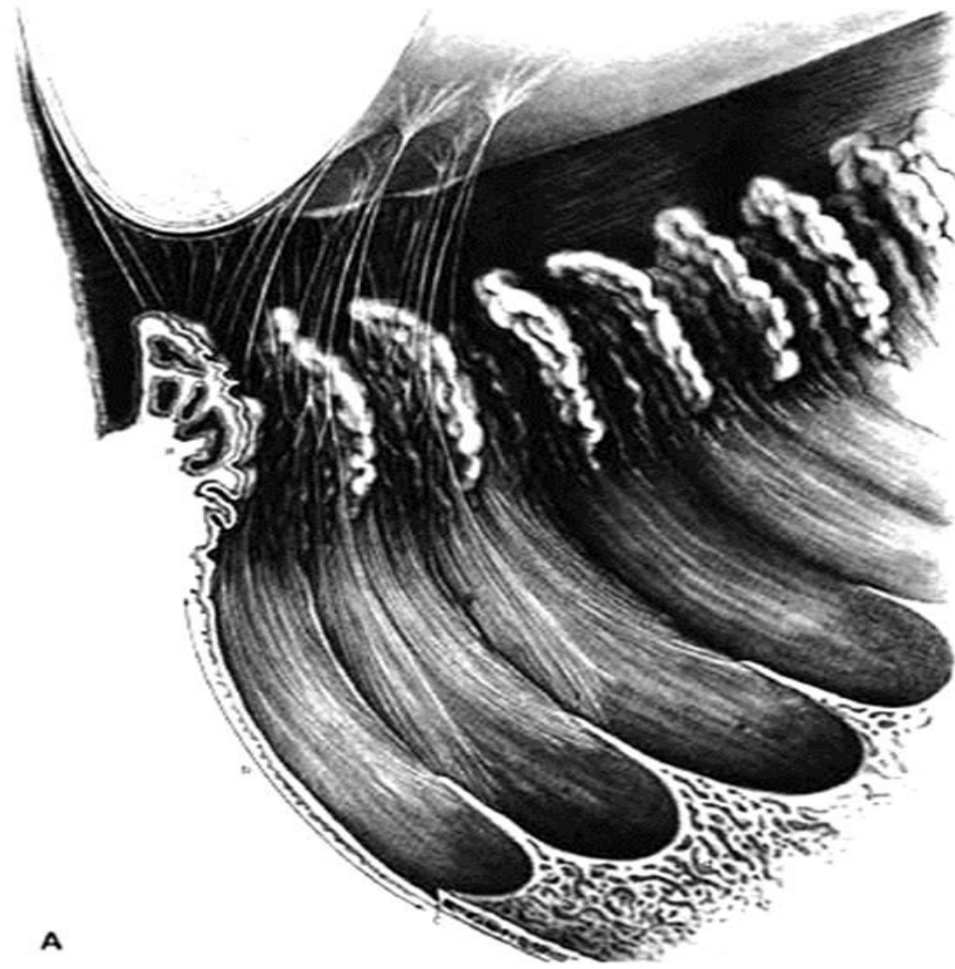
- The decrease or increase in the rate of aqueous drainage will influence the aqueous composition.

6. THE QUALITY OF AQUEOUS

- The formation process and factors regulating this process also influence the aqueous humour composition.

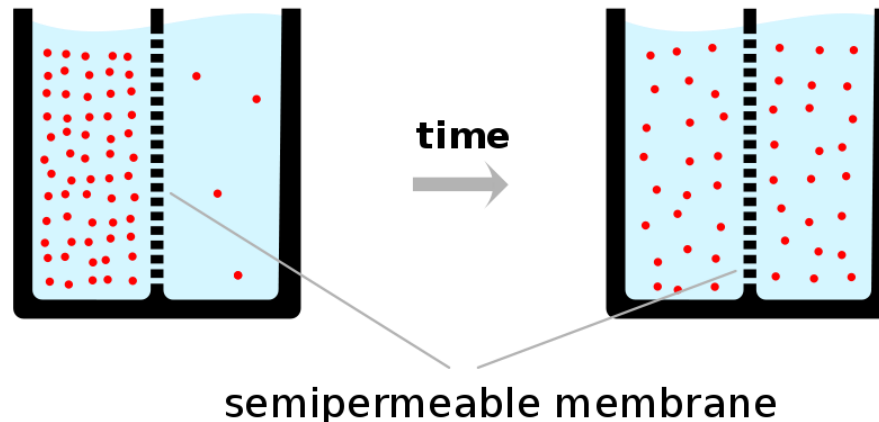
FORMATION PROCESS

- ❖ Produced from pars plicata along the crests of the ciliary processes.
- ❖ Derived from plasma within the capillary network of the ciliary processes.
- ❖ need to traverse 3 tissue layers of the ciliary process (capillary wall, stroma, 2 layer of epithelium) by:
 - I. Diffusion
 - II. Ultrafiltration
 - III. Secretion (active transfer)
- ❖ Rate of production: $2.3\mu\text{l}/\text{min}$



DIFFUSION

- ❖ movement of substance across a membrane along concentration gradient.
- ❖ As aqueous humor passes from the PC to Schlemm's canal, it is in contact with ciliary body, iris, lens, vitreous, cornea, and trabecular meshwork.
- ❖ There is diffusional exchange, so that the AC aqueous humor resembles plasma.



CONT...

Substance actively transported across this barrier:

○ **Sodium**

- 70% was actively being transported by specific secretory pump was found in posterior chamber.
- 30% enters posterior chamber by diffusion and ultrafiltration
- Whether carbonic anhydrase works on sodium pump as a facilitator, catalyst or as part of a parallel, it is possible that it acts to maintain proper pH for the Na^+ - K^+ ATPase system.

○ **Chloride**

- Actively transported and depends upon the presence of sodium as well as pH

RATE OF AQUEOUS HUMOUR PRODUCTION

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- Normal values: about 2 to 2.5µl/min.
- It varies according to measurement.

* 2. TRANSPORT ACROSS INNER WALL OF SCHLEMM'S CANAL

- Trabecular meshwork (TM) endothelial cells have special characteristics, namely active phagocytic properties
- Contains with:
 - High level of cytoskeletal actin
 - Lower levels of microtubules
 - Vimentin
 - Desmin
 - High level of plasminogen activator- important role in maintaining patency and reducing the resistance of outflow
 - Contains free radicals and hydrogen detoxifying enzyme system
- Specialized for endocytic transport of water and solutes and contractility
- Energy metabolism : Glycolytic
- Transportation of water not merely from passive diffusion but through aquaporin 1

POSTURAL VARIATION

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- The IOP increases when changing from the sitting to the supine position, average pressure differences of 0.3 to 6.0 mm Hg.
- The postural influence on IOP is greater in eyes with glaucoma and persists even after a successful trabeculectomy.
- Patients with systemic hypertension have greater IOP increase after 15 minutes in supine

SYSTEMIC CONDITIONS

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- Positive correlation between systemic hypertension,
 - Systemic hyperthermia has been shown to cause an increased IOP.
 - IOP may **increase** in response to ACTH, glucocorticoids, and growth hormone and it may **decrease** in response to progesterone, estrogen, chorionic gonadotropin, and relaxin.
 - It is significantly reduced during pregnancy, may be due excess progesterone.
 - In myotonic dystrophy, the IOP is very low, which may be due to reduced aqueous production & increased outflow.
 - Diabetic patients have higher pressures than the general population, while a fall in IOP is seen during acute hypoglycemia.
 - Patients with HIV have lower than normal mean IOPs

ENVIRONMENTAL CONDITIONS

- IOP had been described with the highest in winter and lowest in summer