



Aqueous humor and IOP

جامعة ساووة

كلية التقنيات الصحية والطبية

قسم البصريات

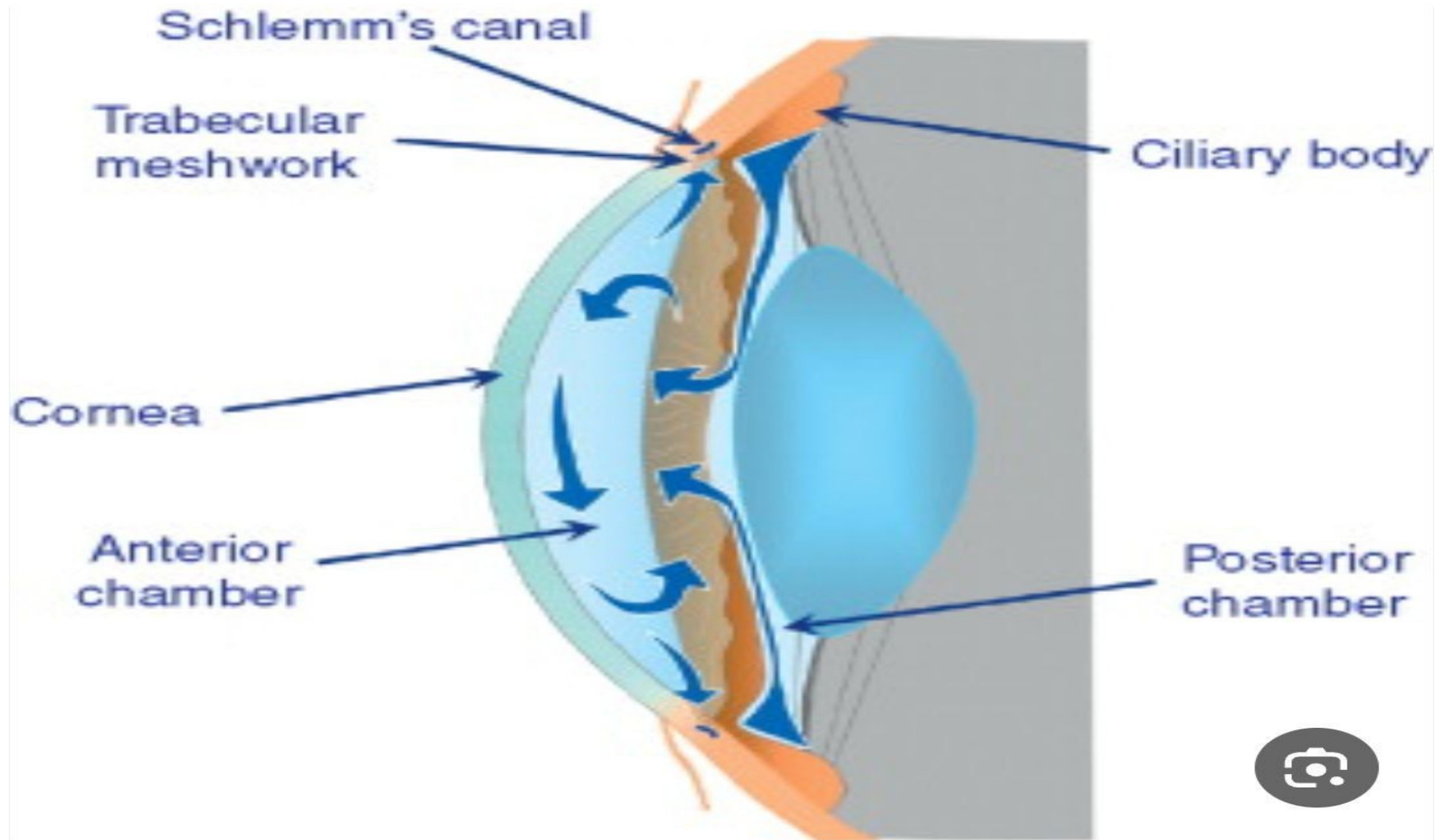
المرحلة الثانية

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AQUEOUS HUMOR

Clear, colorless fluid that fills the anterior and posterior chambers of the eye.



Physiological properties

Volume 0.31ml

Refractive index 1.333

PH 7.2

Hyper osmotic

Rate of formation 1.5 to 4.5 $\mu\text{l}/\text{min}$

Composition of Aqueous humor

A-Water constitutes 99.9% of Normal Aqueous

B-Proteins (5-16mg/100ml) concentration in Aqueous is less than 1% of its plasma concentration

C-Glucose-75% of the plasma concentration.

D-Electrolytes:

Na^+ → similar in plasma and aqueous

Bicarbonate ion: Concentration ↑ in PC & ↓ in AC

Cl ion concentration ↑ than plasma and phosphate concentration than plasma

E-Ascorbic acid concentration is very high in aqueous.

F-Various components of the coagulation and anticoagulation pathways may be present in human aqueous humor.

Functions of aqueous humor

1-Brings oxygen and nutrients to cells of lens, cornea, iris

2-Removes products of metabolism and toxic substances from those structures

3-Provides optically clear medium for vision

4-Inflates globe and provides mechanism for maintaining IOP

5-High ascorbate levels protect against ultraviolet-induced oxidative products, e.g., free radicals

6-Facilitates cellular and humoral responses of eye to inflammation and infection

Aqueous humor dynamics

A-Secreted by ciliary epithelium lining the ciliary processes

2-Enters the posterior chamber.

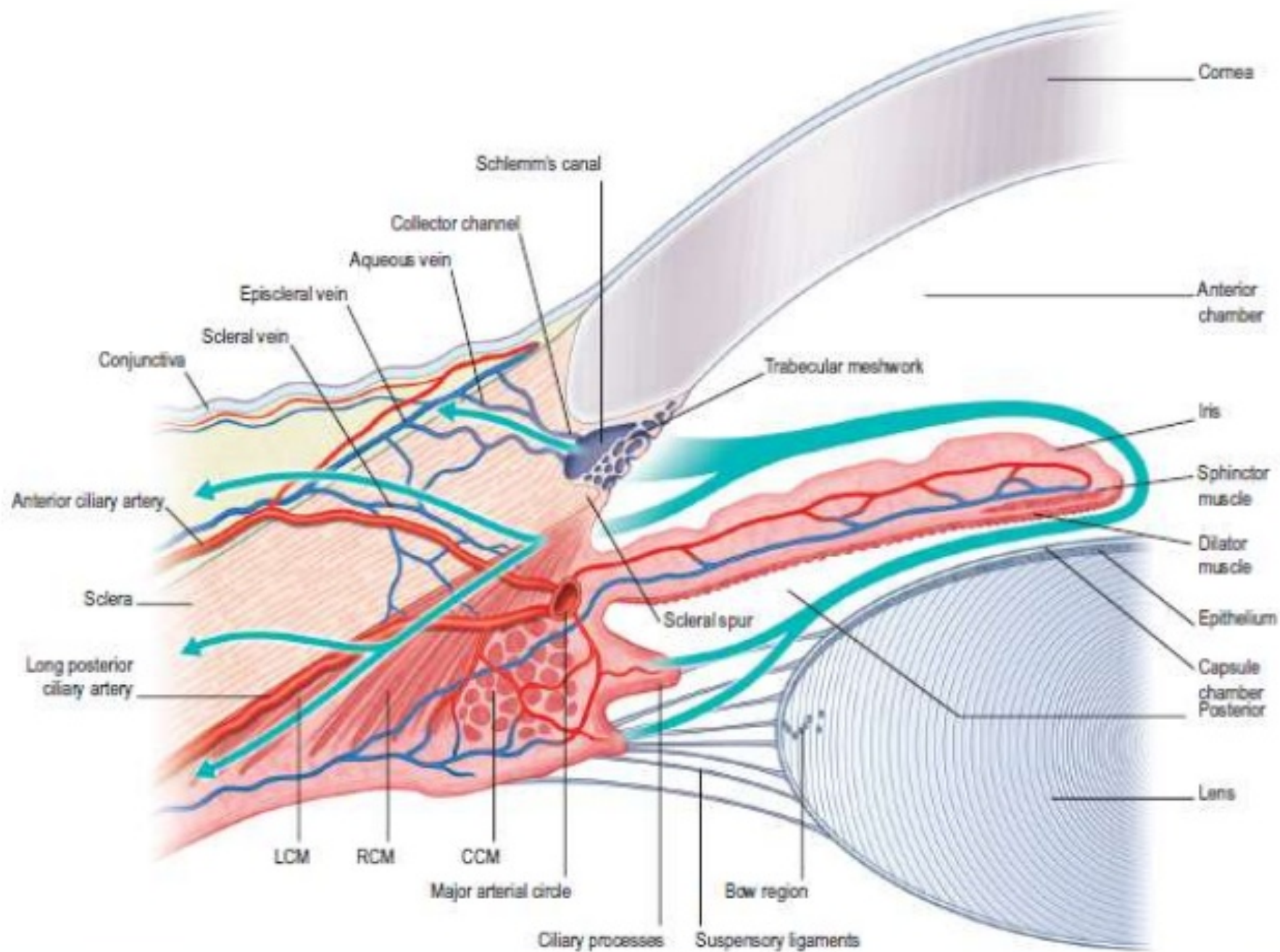
3-It then flows around the lens and through the pupil into the AC.

4-There is convection flow of aqueous in the AC due to temperature gradient.

5-It leaves the eye by two pathways at the anterior chamber angle:

Through the TM, across the inner wall of Schlemm's canal into its lumen, and thence into collector channels, aqueous veins, and the episcleral venous circulation-the trabecular or conventional route

Across the iris root, uveal meshwork, and the anterior face of the ciliary muscle, through the connective tissue between the muscle bundles, the suprachoroidal space, and out through the sclera -the uveoscleral or unconventional route.



AQUEOUS HUMOR OUTFLOW

The aqueous humor leaves the eye at the anterior chamber angle through trabecular meshwork, the Schlemm's canal, intrascleral channels, and episcleral and conjunctival veins.

This pathway is referred to as the conventional or trabecular outflow.

In the unconventional or uveoscleral outflow, aqueous humor exits through the root of iris, between the ciliary muscle bundles, then through the suprachoroidal - scleral tissues.

Trabecular outflow accounts for 70% to 95% of the aqueous outflow.

And remaining 5% to 30% by uveoscleral outflow.

INTRAOCULAR PRESSURE (IOP)

IOP is the pressure exerted by the intraocular contents on the coats of the eyeball.

Normal IOP: 10-21 mm of Hg (mean 16 ± 2.5 mm of Hg)

IOP is essentially maintained by the dynamic equilibrium between formation and outflow of aqueous humour.

Factors influencing IOP

a) Local factors

1. Rate of aqueous formation
2. Resistance to aqueous outflow
3. Increased episcleral venous pressure
4. Dilation of pupil

b) General factors

1. Hereditary
2. Age
3. Sex
4. Diurnal variation
5. Postural variation
6. Seasonal variation
7. Blood pressure
8. Osmotic pressure of blood
9. Effects of Drugs
10. Effects of general anesthesia
11. Systemic hyperthermia
12. Refractive error

Review

Enumerate Factors influencing IOP?

How AQUEOUS HUMOR drainage?

What are the Composition of Aqueous humor

Measurement of IOP

1. Manometry

Manometry is only direct measure of IOP.

In this method, needle is introduced in AC or in vitreous.

It is then connected to mercury or water.

Uses

1-It is used for continuous measurements of IOP

2-Used in experiment, research work on animal eyes

2. Tonometry

It is an indirect method of measuring the IOP

Three basic types of Tonometers:

1-Indentation

2-Applanation

3-Noncontact

