

# Pharmacology of the Eye

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## Pharmacology of the Eye

"The eye is a good example of an organ with multiple ANS functions, controlled by several different autonomic receptors." (Katzung)

Increased intraocular pressure: Untreated → blindness

### Glaucoma:

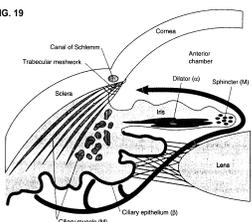
- Open-angle (wide, chronic) – treated with beta-blockers and other agents
- Closed-angle (narrow-angle) – dilated iris can occlude outflow. Pilocarpine or surgical removal of part of iris (iridectomy)

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FIG. 19



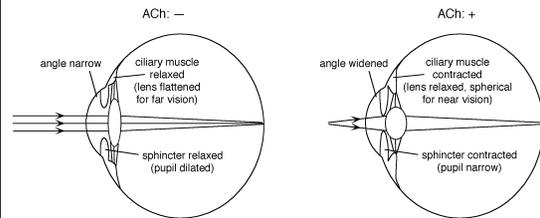
### Glaucoma treatment

1. α-Agonist: ↑Outflow
2. M-Agonists: ↑Outflow
3. β-Blocker: ↓Secretion
4. α2-Agonist: ↓Secretion
5. Prostaglandins: ↑Outflow
6. Carbonic acid inhibitors: ↓Secretion

## Ach effects on smooth muscle in the eye

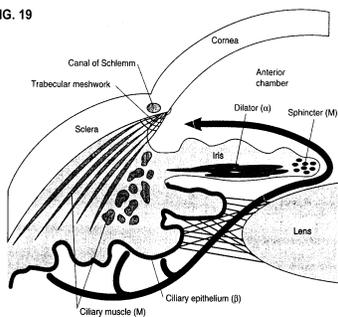
Contraction of sphincter muscle @ miosis

Contraction of ciliary muscle for near vision



## Actions on the Eye

FIG. 19

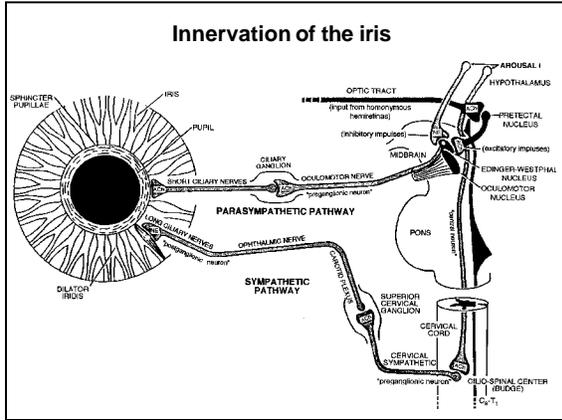


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## Drugs used in glaucoma

<b>Cholinomimetics</b> Pilocarpine, physostigmine, echothiophate	Ciliary muscle contraction → opening of trabecular meshwork → ↑outflow	Topical
<b>Alpha Agonists: Unselective:</b> Epinephrine	↑ Outflow	Tropical
<b>Alpha2-Selective Agonists:</b> Apraclonidine	↓ Aqueous secretion from the ciliary epithelium	Topical
<b>Beta-Blockers:</b> Timolol, betaxolol, carteolol	↓ Aqueous secretion from the ciliary epithelium	Topical
<b>Diuretics: Carbonic acid inhib.</b> Acetazolamide, Methazolamide, Dorzolamide, Brinzolamide	↓ Secretion due to lack of HCO <sub>3</sub> <sup>-</sup>	Oral Topical
<b>Prostaglandins:</b> Latanoprost	↑ Outflow	Topical



### Effects of pharmacological agents on the pupil

Clinical Setting	Drug	Pupillary Response
Normal	Sympathomimetic ie. phenylephrine	Dilation (mydriasis)
Normal	Parasympathomimetic ie. pilocarpine	Constriction (miosis)
Normal	Parasympatholytic ie. atropine	Mydriasis, cyclopegia
Homer's syndrome	Cocaine 4-10%	No dilation
Preganglionic Homer's	Hydroxyamphetamine	Dilation
Postganglionic Homer's	Hydroxyamphetamine	No dilation
Adie's pupil	Pilocarpine 0.05-0.1%	Constriction
Normal	Opioids (oral or intravenous)	Pinpoint pupils

### Eye - Horner's Syndrome

**Destruction of Sympathetic innervation to the iris**

- loss of preganglionic fibers
- loss of postganglionic fibers
- parasympathetic innervation left unopposed

Horner's Syndrome (note sagging left eyelid and miosis)

### Adies Pupil & Iritis

**Adies Pupil**  
Poor light reflex

**Iritis**

Muscarinic blocker to dilate pupil to prevent attachment to lens.  
Steroid to treat inflammation.

**Fig. 12.9** Tonic pupil: the left pupil is dilated compared to the right.

This 31 year old woman had been aware of pupillary asymmetry for some time. She presented with left facial numbness, the aetiology of which was not established. It rapidly resolved. Examination showed a typical left tonic pupil. The triceps and ankle jerks were depressed.

