Dr. Yousaf Jamal Mahsood

MBBS, CHPE, CMEJ, FICO (UK),
MRCSEd (UK), FRCS (Glasg), FCPS

Fellowship in Glaucoma (Al-Shifa Trust, Pak)
Fellowship in Glaucoma (Univ. of Toronto, Canada)
Advance Fellowship in Glaucoma (BPOS, UK)

Assistant Professor Glaucoma
Department of Ophthalmology
Khyber Girls Medical College
Peshawar

Treatment Options in Glaucoma

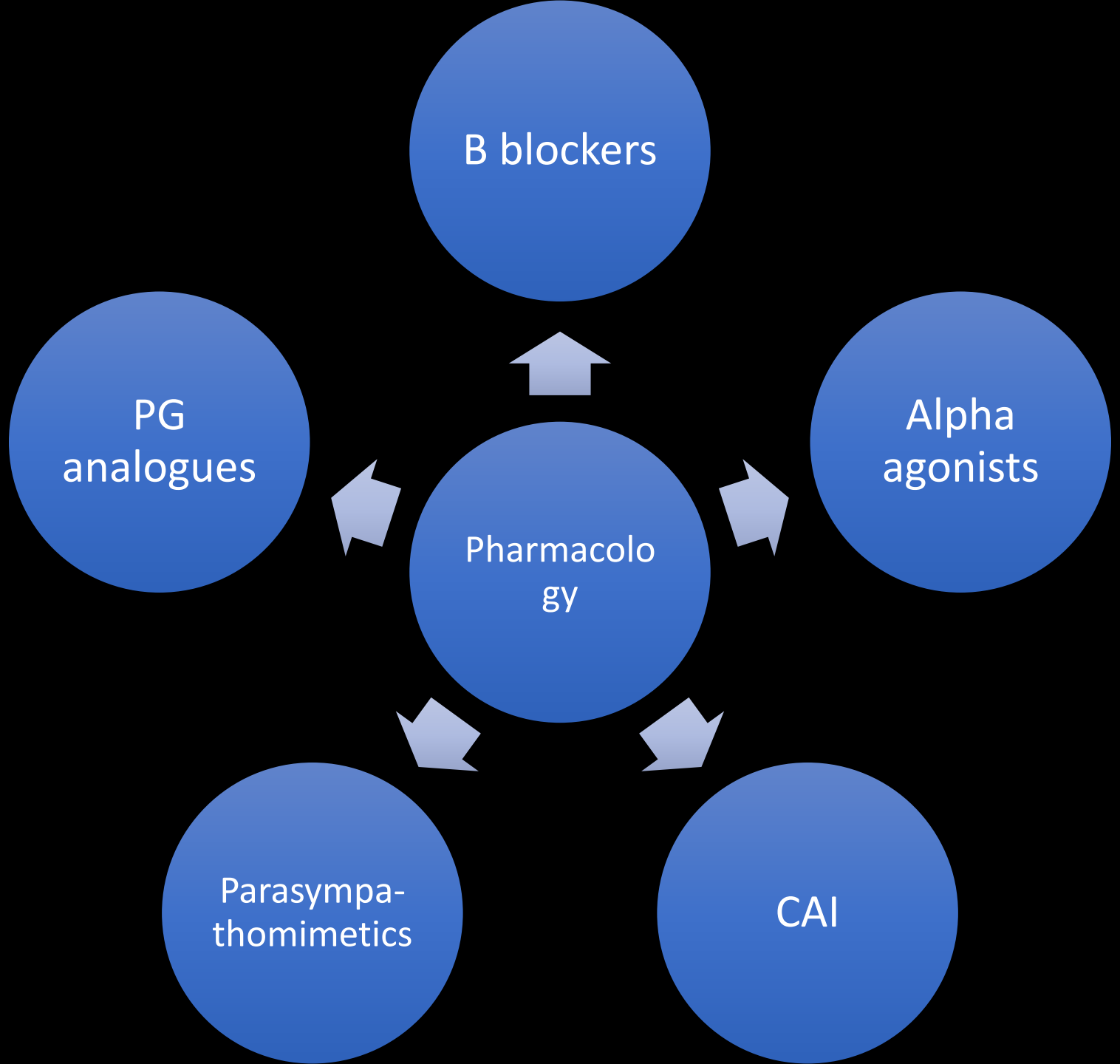
Learning Objectives

- Enumerate
  - Different treatment options in glaucoma
- Discuss
  - Indications of each treatment option

Treatment Options

- Medical
- Lasers
- Surgery

Medical Tx


B blockers
PG analogues
Alpha agonists
Pharmacology
Parasympa-thomimetics
CAI

Drug Classes

Drug class	Medication	Mean ↓ IOP	Percent ↓ IOP
PGF2 analogue	Latanoprost Bimatoprost Travoprost	6-8 mm Hg 7-8 mm Hg 7-8 mm Hg	25-30%
Beta-blocker (non selective)	Timolol	~ 6mm Hg	20-30%
Beta-blocker (selective)	Betaxolol	4-5 mm Hg	15-20%
Alpha-2 agonist	Brimonidine	2-6 mm Hg	15-20%
CAI	Dorzolamide	3-5 mm Hg	15-20%

Lasers

- Laser Peripheral Iridotomy (LPI)
- Argon Laser Trabeculoplasty (ALT)
- Selective Laser Trabeculoplasty (SLT)
- Diode cyclodestruction
  - Trans-Scleral Diode (TSD)
  - Endoscopic Cyclo-Photoablation (ECP)

Thermal Effects

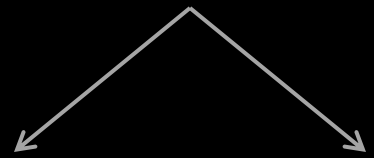
Target tissue absorbs laser E

↓

↑ temp

↓

Induced chemical changes



Local inflammation + scarring (photocoagulation)

Vaporizes intra+extra- cellular fluids →incision in tissue (photocoagulation)

Q Which laser is the photo**coagulator** prototype?

Q Which laser is the photo**disruptor** prototype?

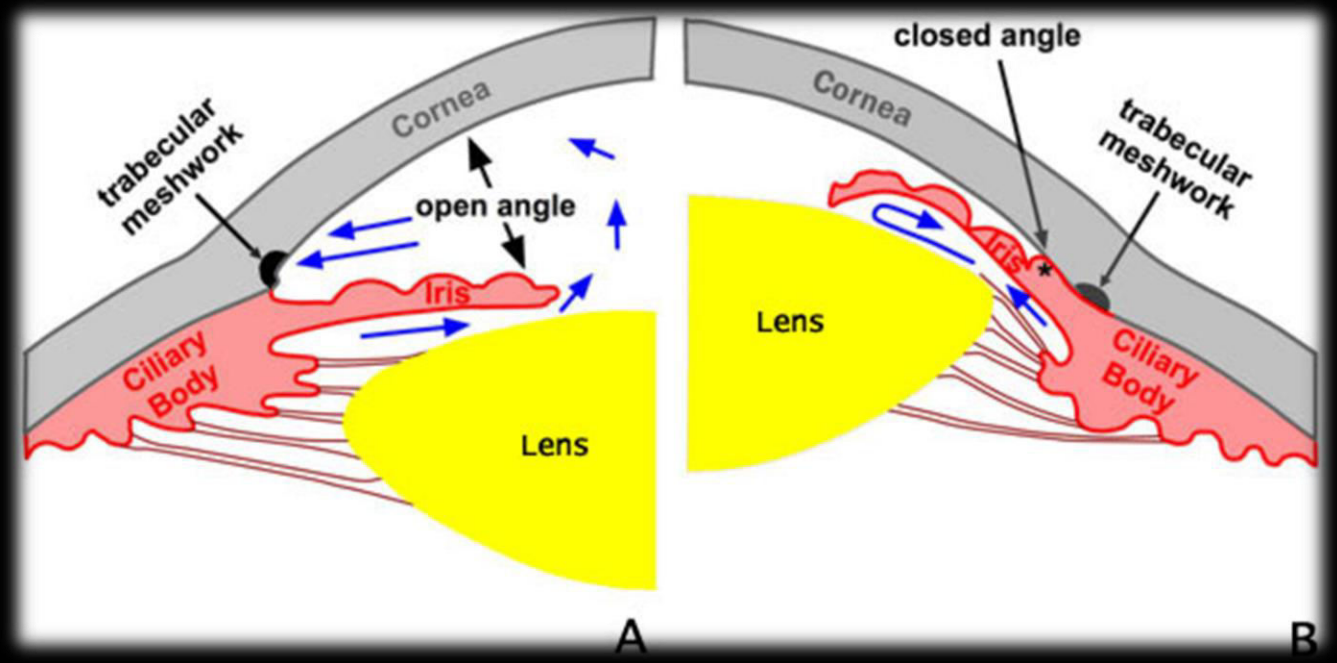
Q Which laser is the photo**coagulator** prototype?

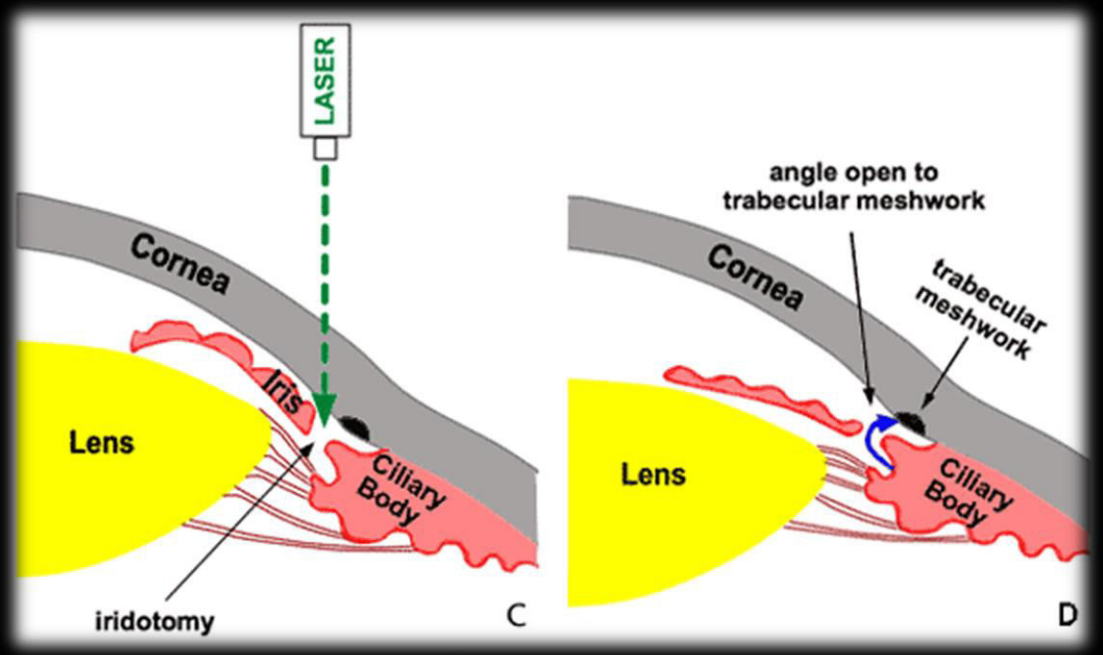
A Argon Laser

Q Which laser is the photo**disruptor** prototype?

A Neodymium:YAG laser

Laser Peripheral Iridotomy

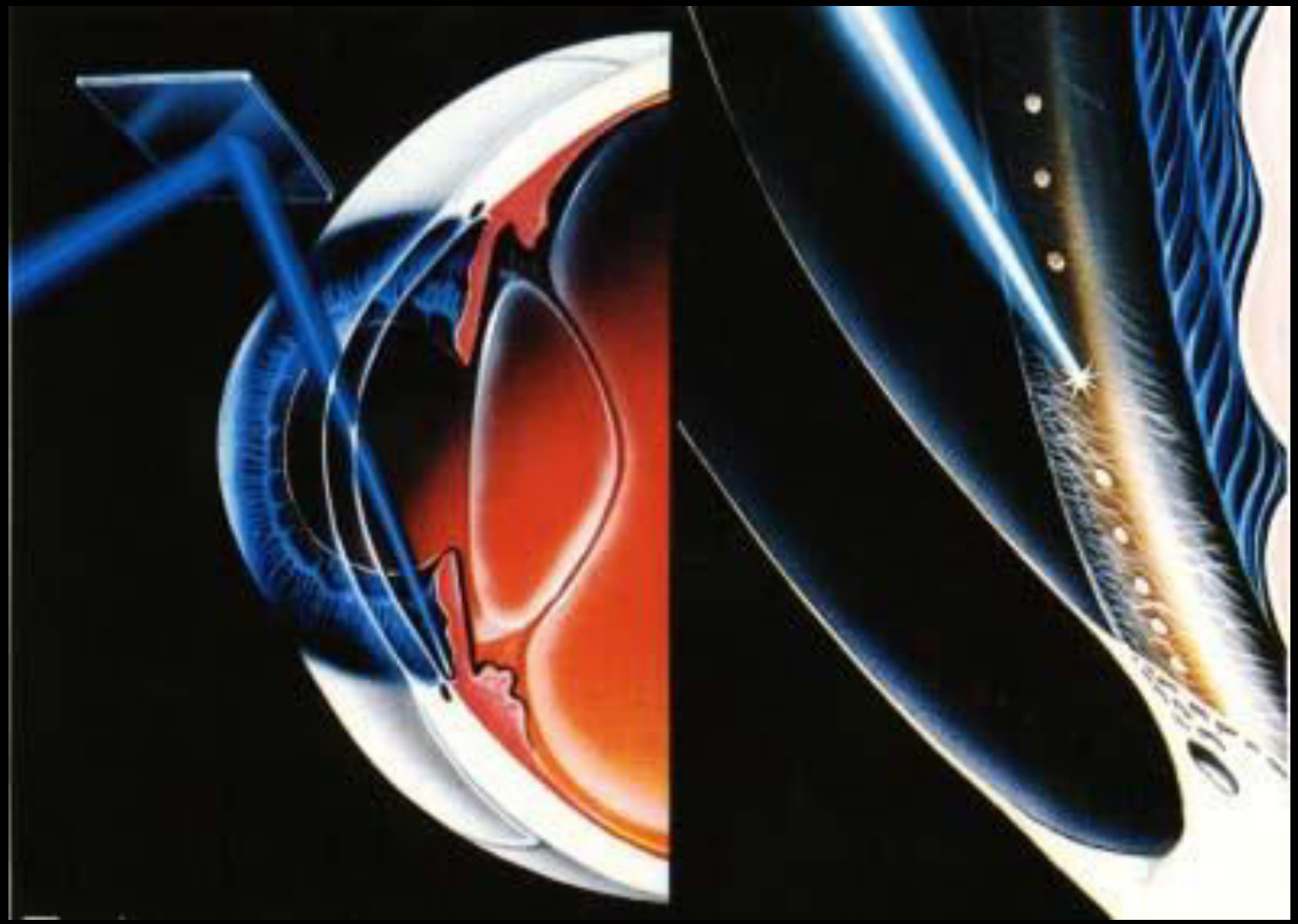




Glaucoma Laser Trial

(Ophthalmology 97:1403,1990)

Demonstrated that ALT was an alternative to topical medical therapy in patients with newly diagnosed POAG.



Glaucoma Laser Trial

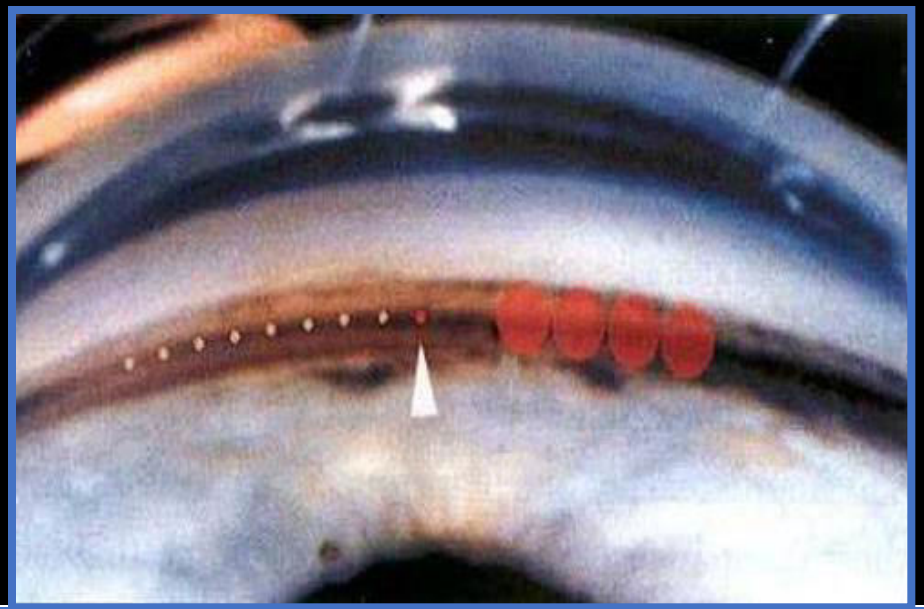
(Ophthalmology 97:1403,1990)

Demonstrated that ALT was an alternative to topical medical therapy in patients with newly diagnosed POAG:

- IOP controlled at 2 years:
  - Laser: 44% ALT alone
    70% ALT + timolol
    89% ALT + meds
  - Medication: 30% timolol alone
    66% multiple meds

- **BUT** ALT is not used as a primary treatment option for glaucoma

- Why?
  - ALT requires operator expertise
    - MUST identify the TM
    - hitting other structures significant consequences such as PAS and K endothelial cell loss
  - Waning effect with longer follow-up (50% at 5years, 75% at 10 years)
  - Structural changes are permanent ∴ repeatability is a problem



ALT

- Argon laser (514nm)
- Spot size = 50um
- 50 spots
- Energy = 500 mW
- Fluence = 40,000 mj/mm²
- Exposure Time = 0.1 s
- **Thermal Damage**

SLT

- Frequency doubled YAG (532nm)
- Spot size = 400um
- 50-60 spots
- Energy < 1% of ALT
- Fluence < .00015% of ALT
- Exp T = 0.0000000003 s
- **No Thermal Damage**

ALT & SLT

- Application of laser energy to the trabecular meshwork
- Result in an improvement in aqueous outflow facility (mechanism still not well understood)
- Has no influence on aqueous production

1. Mechanical theory: thermal burn contracts tissue and stretches open adjacent, untreated regions of the meshwork to increase outflow (ALT only)

2. Cellular model suggests that laser stimulates the replication of trabecular endothelial cells that normally do not divide

3. Biochemical mediators (cytokines) are released and macrophages are recruited into the laser treatment zone

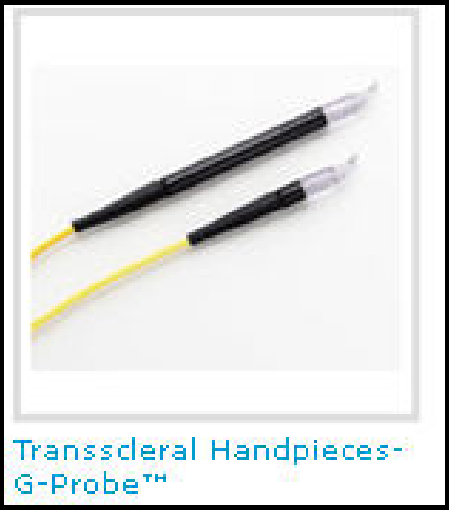
Mean IOP	ALT	SLT
baseline	22.5	22.8
1 mo.	19.5	20.1
6 mos.	17.7	17.8

- SLT has an equal IOP lowering effect to ALT
- SLT is easy to administer
- SLT does not cause structural damage
- SLT is theoretically repeatable

Trans-Scleral Diode Indications

- Refractory glaucomas:
  - NVG, trauma, aphakia, congenital, uveitis, PKP, silicon oil, conjunctival scarring, multiple tubes
- Glaucoma and low vision (worse than 6/60)
- Blind painful eye with high IOP

Diode laser



Transscleral Handpieces-G-Probe™

TSD - Mechanism of Action

- Destruction of ciliary epithelium
- Vascular supply destruction
- Increased outflow through pars plicata

TSD - Complications

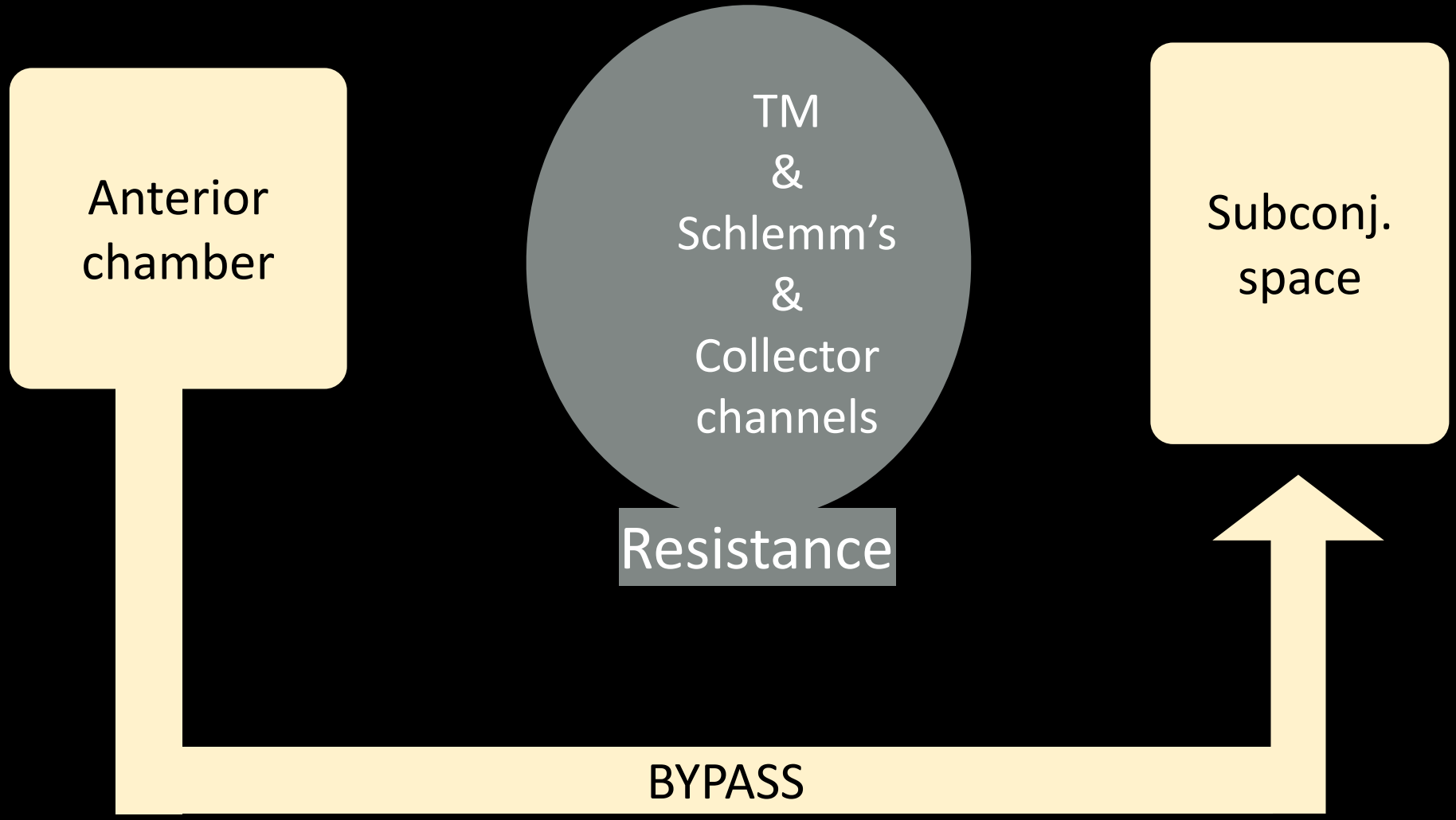
- Phthisis
- Hypotony
- Uveitis
- Pain
- Transient IOP rise
- Vision loss
- Hyphema
- Choroidal detachment
- Choroidal neovascularization
- Malignant glaucoma
- Ant segment ischemia
- Sub retinal fibrosis
- Lens subluxation
- Cataracts
- Sympathetic ophthalmia

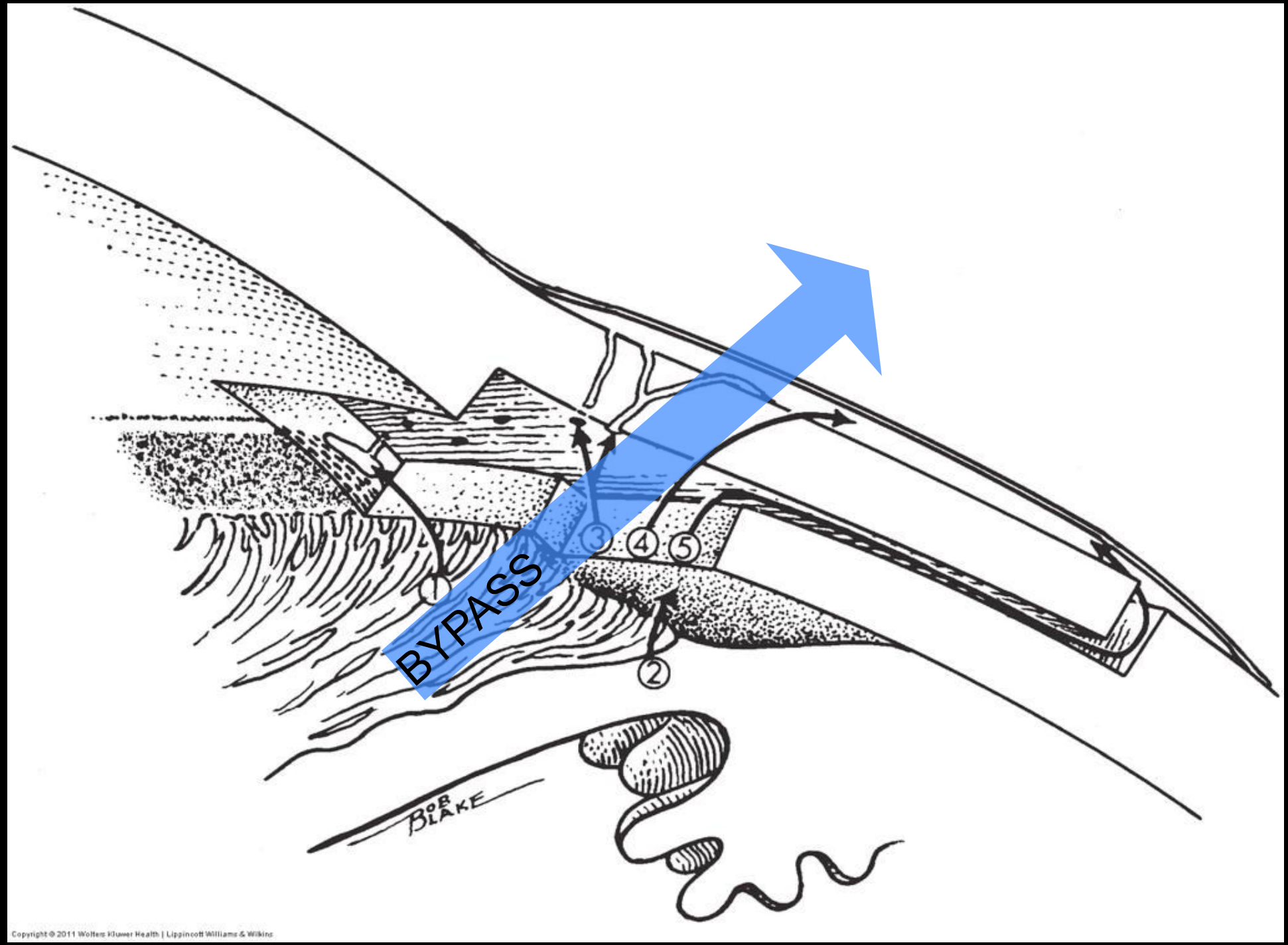
Surgery

Glaucoma Surgeries

- Trabeculectomy
- Combined procedure= Trab+ Phaco
- Glaucoma valve implant
- Non penetrating filteration surgeries
- Goniotomy
- Trabeculotomy
- Surgical Iridectomy

PRINCIPLE


Anterior chamber
TM & Schlemm's & Collector channels
Resistance
Subconj. space
BYPASS



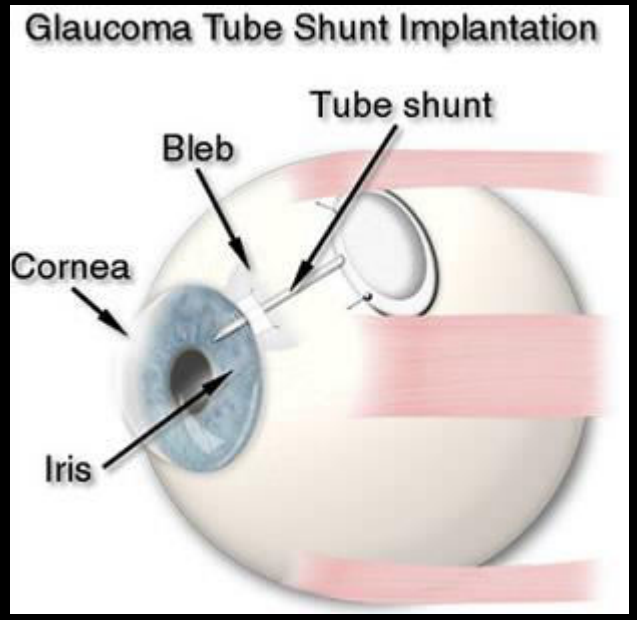
Trabeculectomy (Indications)

- Uncontrolled high IOP
- IOP above target in spite of maximum tolerated medical therapy (with progression)
- Documented glaucomatous progression with IOP below target
- Diurnal variation of >5 mm of Hg in spite of maximum Rx

  (Mederios FA et al, J Ocul Pharmacol Ther 2002; 18:489-98)
- Poor compliance with medical therapy: relative indication

Glaucoma Drainage Implant

- Previous failed trabeculectomy
- Superior conjunctival scarring due to Cataract sx
- Neovascular glaucoma
- Congenital glaucoma
- Uveitic glaucoma



Glaucoma Drainage Devices

Summary

- Medical Tx
- Lasers Tx
- Surgical Tx

Thank you All