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~~LENS & CATARACT~~ Drugs

NAME: _____ STD.: _____ SEC.: _____ ROLL NO.: _____ SUB.: _____

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Antiglaucoma Drugs.

- Parasympathomimetics
- Adrenergic Antag
- Sympathomimetics
- PG & Hypotensive lipids
- Carbonic Anhydrase Inhibitors

MOA

- ↓ Secretion
  - α Agonist
  - β blockers
  - Carbonic Anhydrase Inh.
- ↑ Outflow
  - Trabecular
    - cholinergic agents
    - α Agonists
  - Uveoscleral
    - Brimonidine
    - PG Analogues

Name of drug	Side effects	Systemic SE
Pilocarpine 2-4%	Blurred vision	↑ Sweating
Parasympathomimetic	Miosis	↑ Salivation
6- Hrly	Headache	↑ Urinary fr
	Accomodative Spasm	Diarrhoea
		Bronchospas
Timolol 0.25-0.5%	Stinging	Bronchospasm
Non selective β blocker.	Local Anaesthesia	Bradycardia
	Tachyphylaxis	↓ CO
		Hypotension
		Depression
		Impotence
		Alt lipid pro
Levobunolol 0.25-5%.		
Carteolol 1-2%		
Bet axalol 0.25-0.5%	"	↓ Pulm side eff
Selective β blocker	Tachyphylaxis	↑ Perfusion of

Available forms

C/I

Uveitis

MOA

Begin ½ Hr
Peaks 2 Hr
18-24 Hrs (4% Pilo + Ag)

3d

- 4% Pilo in high viscosity acrylic gel
- Ocusert 20µg/40 µg/Hr x 1 wk

18-25% ↓ IOP

on PK, – dilate Ocular BV ∴ Chronic Iridocyclitis
+ Aphakic – ↑ risk of tear & RD.

Asthma
Bradycardia
COPD
CHF
AV blocks

4wk

drops – BD
gel – OD

↳ Timolol action

↓ "

2. Bradycardia
AV blocks
Optic Nerve Head

>> ½ life than Timolol

Intrinsic sympathomimetic activity so ↓ Bradycardia

↓ effective than Timo, Levo

Name of drug	Ocular S.E	Systemic SE	CI
Dipivefrine 0.1%	Follicular Conj Rebound Congestion. Macular Edema in aphakes	↑ BP Arrhythmias	ACG CVS
Brimonidine 0.1-0.2% BD/TDS	Conj. blanching Ocular allergy Contact allergy	Drowsiness fatigue BP changes	Use of MAO I Parkinson Dis HTN Cerebro Infants (Respi
Clonidine 0.06-0.125%. 6-8hrly	Conj blanching	Sedation ↓ BP Dryness of mouth	Only in Europe
Apraclonidine 0.25-1%.	Allergies fluctuation in VA. Conj blanching follicular Conjunctivitis	Headache Drowsiness fatigue. Dry Mouth	↓
Dozolamide 2% BD, TDS	Punctate keratitis Ocular allergies - Possible corneal decomposition.	Bitter taste Headache Asthenia Renal Calculi	Test to Sulp Eye Injury
Prodrug Latanoprost 0.005% OD Travaprost 0.004%. Bimatoprost = 0.03%.	Iris Pigmentation Punctate keratitis Conj hyperaemia SPK	Headache URTI symptoms	Ocular Infection

→ Pigmentation of skin —— ↓ L, T

Wash out time

α2 Receptor Agonist

↓ CVS & Pulm S.E

20-25% fall

- Unresolved Inflam
- Pr. of GA—AMD
- after/before LASER procedure (neuroprotective

3wk

+ Drowsi)
α Agonists

Mixed α1 & α2 Agonist

Starts in 2hrs
lasts for 12hrs

Px for spikes of ↑IOP after laser or surgical procedure

13-24%

1st topical

1-2wk

4-6wk

↓IOP 25-30% (in Timolol)
Additive action on Timolol
Theoretically Induce graft rejection

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Acetazolamide	Hypokalemia Metabolic Acidosis Renal Stones ↓ Bld dyscrasia	Altered taste loss of appetite Paraesthesia of hands feet Depression Transient myopia
Methazolamide	↓↓ (Acidosis, Renal stones)	
~~Dorzolamide~~		
Brinzolamide (Azopt)	1%	↓ S.E.
Mannitol	5-25% I.V 1-2g/kg	CI Uncontrolled HTN Pulm Cardiac BPH - UREt
Glycerol	0.6g/ml 1-1.5g/kg BD or TDS	Sickening sweet Induces Nausea Vomiting ↓ for DM

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2hrs comes ↓30-40%. ↑IOP in ACG 250mg QID
4-6hrs lasts 2° glaucoma 500mg SR
18hrs SR. Systemic in PK – Hyalause
500mg iv → ≤ in 20min symptoms & Ass risk.

× Topical CA inh → interfere ≤
endothelial fxn.
↓
Resulted in prolonged
Corneal edema

Treatment of Nystagmus

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MOA of Cholinergics

Long fibres of ciliary mus att to scleral spur

↓

Contraction

↓

Pull on TM

↓

↑ Size of Pores

MOA of β blockers

- Non specific: β_1 & β_2
  - Timolol
  - Levobunolol
  - Carteolol
  - Metipronolol
- Specific β_1
  - Betaxolol

>> Pulm pt / Asthma / Emphysema

↓ BP less

↓

Tachyphylaxis

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Effect of Sumatriptan, CA 3rd came from the alteration in proprioceptive sensation from mid insertion area (enthesis) where fxn of K^+ channels is altered. This ↓ potentials from mid enthesis cause reduced trigger feed. Smooth pursuit generator in BS responsible for Nystagmus.

PG Analogues

Ciliary Muscle

Prostanoid receptor → MMP

↓ IOP

↑ UV scleral flow

Latanoprost		
Bimatoprost		
Travoprost	0.004%.	
Tafluprost	0.0015%.	— Preservative free ✓
Unoprostone	0.12%.	↓ T.

Hyperosmotic Agents

↑ Osmolality of Serum

↓

H_2O to leave from Vitreous

↓

↓ IOP

↓ Vitreous volume

Deepening of AC

Ideal → Rapidly absorbed
Distributed
↑ Mol wt.

Carbonic Anhydrase Inhibitors

$H_2O + CO_2 \rightleftharpoons H_2CO_3 \overset{CA}{\rightleftharpoons} H^+ + HCO_3^-$

Enz in Renal Tubular Cell (PT)
Gastric Mucosa
Exocrine Pancreas
Ciliary Body of eye
Brain
RBC

Acetazolamide (Diamox)

Sulphonamide derivative
Non Comp but reversible Inh
Aq rich in HCO_3^-
↓ formation of Aq
↓
↓ IOP

for short term or adjuncts (β block)
↓
× effect in sleep

Diamox — ✓ sleep also (24%)
+
↓ 64% in sleep

↓ CME, RP, Pars planitis

Side effects of Acetazolamide

	Systemic	Ocular
1.	Numbness & tingling of fingers toes and peri-oral region	1. Transient Myopia Mech :- Ciliary body edema ↓ forward displacement of lens iris diaphragm ↓ Myopia occurs.
2.	Alteration in gustation resulting in metallic taste	
3.	Symptom complex Decreased libido Depression fatigue. Malaise Wt loss	
4.	Gastro-intestinal irritation	
5	Metabolic acidosis	
6	Hypokalemia	
7	Renal Calculi	
8	Blood Dyscrasia	
9.	Dermatitis	

Drugs affecting Pupil

- Cycloplegics
  - PNS — Contraction of Pupil
  - " of Ciliary Body
  - CB contraction
  - ↓
  - Zonular Laxity
  - ↓
  - Thickening & foreward movement of lens
  - ↓
  - Accomodation
  - ↓
  - Anticholinergics
    - Atropine 1%
    - Homatropine 2%
    - Cyclopentolate 1%
    - Tropicamide 0.5%
  - - Children
    - Hypermetropes
    - Undergoing Laser RS.
    - ↓ Ciliary Spasm in Ant Uveitis
- Mydriatics
  - SNS — Dilation of pupil
  - ↓
  - α1 Agonist.
  - ↓
  - Phenylephrine
  - ↓
  - Uveitis
  - Refraction.
  - Prior to Sx
  - Blanching test
  - POAG ↑ Aq Outflow ≤ Miotic
  - 0.12%. as decongestant

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	%	dose	Characteristic	Ocular S.E	Systemic
Atropine	1%	BD x 3d Last 7 days	Most potent Longest duration		Facial flushing (Oint » Drops) Contact derm
Homatropine	2%	4-5 days	↓ potetent		
Cyclopentolate	1%	5min apart 3times 1day	Short durat"		Beh Abn Psychotic Rxn Tropica also Extrapyramidal
Tropicamide	0.5%, 1%	three times 5 min apart	Shorter duration of actron 0.85% in Tropica +		

30 min start · 3hrs
Max ↳ Last 10-15 min

Common S.E – Blurred Vision
Photophobia
x Driving
Acc — Hypermetropes >60yrs
Shallow AC

→ ~~ARP~~ diff b/t ARP & Tonic pupil

- Component of Mydricaine

Uses **Deduction**

CI

Acg ✓

Sowen synd

Children

Darkly pigmented pupil

< 5yrs of age

Penalization therapy in Better Eye

- Amblyopia
- Accomodative Spasm (Relieve)

0.01% Atropin. (Myopia Rx) progression

x. for dilation in KC — Uveet.

Lavalia Syndrome.

Refraction in children

Uveitis

Optical aid in

- Lens opacities

Atropine Ointment for Rx of Posner Schlossman Syndrome

Refraction (office)

Fundus Exam.

Symptoms	ARP.	Tonic
	x Atropine	dilates.
	x. 0.1% Phenylephrine	Constricts

- Cycloplegics — Also relieves Inverse. (RPB) glaucoma. due to lens dislocation

Elderly → Accelated HTN

Caution

Phenylephrine 5-10%
α_1 Agonist.

↓ IOP (By constricting vessels)

Cardiac HTN Atherosc DM

Stinging ↑ BP (Reflex Bradycardia) floaters in elderly

XC MAO inh, TCA Rebound mucosa

• ROP pt — Paralytic ileus. Sulphite sensi

Mech of Action — Muscarinic Antagonist
Atropine drugs
Parasympatholytics
Competitive Antagonist

Classification

Naturals | Semi Synthetic | Synthetic

Naturals
↓
Atropine
Hyoscine (Scopolamine)

Semi Synthetic
HA 924

Synthetic
Cyclopentolate
Tropicamide

Atropine
Racemic

Hyoscine
Levo

CNS Stimulant depressor

Duration of Action

Anti Sch property

Anti Motion sickness +

Eyes +++

Paremyd → ~~Hydroxy~~ Amphetamine 1% + Tropic 0.25%.

⇩

PE – 2.5%. " 0.5%.

Fundus Exam

+ Cycloplegic in Pre-Op Cataract Dx

Retinal Laser Procedure

1% → Horner Synd. Dx.

Mydrin – 10%.

2.5%.

10%.

0.125%.-1% — Decongestant

Eye action of Atropine

CNS – depressant

CVS – ↑HR, ✕BP.

Eye – Mydriasis

Smooth Msl → ↓ msl action

Local Anaesthetic – On Cornea

Lungs – Bronchodilation.

U.B – Urinary retention

Glands → ↓.

Body temp – ↑

↳ Inhib^{n} of sweat^{n}

↳ Stimulat^{n} of temp regulation.

- Cycloplegia – Kids – Hypermetrope – Esotropia – Myopia (Pseudomyope) due to Acc Spasm.
- Uveitis – ✕ Spasm of Eom, Corneal Anaesthesia, Breaks Synechiae

α1 Agonist → Dilation Pupillary Blanching of Conj.

Stimulat^{n} of muller's msl of Upper eyelid

↑ Palpebral fissure Ht

Diagnosis of Horner Synd 1% — Post-ganglionic lesion — Mydriasis occurs

✕ Atropine – Post PK patient — else permanent pupillary dilatation (Uveitis, Iridis Synd.)

classmate
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Esotropia — Uncover full amount of hyperopia in young patients
Myopia for first time to rule out acc spasm
Cycloplegia → Malingers, Conversion Reaction

Rx of Overdose — Physostigmine — 0.5 mg IV

How to release Synechiae

PE → 1 drop 2.5% or 10% in upper surf of cornea
↓ Hot compression 5-10 min
3 times daily

(Spontaneous) angle 1% or 2% - 1 drop of Atropine before & after compression

Drug	Mydriasis		Cycloplegia		Solution
	Peak (min)	Recovery (D)	P (m)	R (D)	
Atropine	30-40	7-10	60-180	6-12	0.5-2%
Cyclopentolate	30-60	1	25-75	0.25-1	0.5-2%
Homatropine	40-60	1-3	30-60	1-3	2-5%
Scopolamine	20-30	3-7	30-60	3-7	0.25%
Tropicamide	20-40	0.25	25-35	0.25	0.25-1%

Study

ATOM 1 — Placebo vs 1% Atropine — 77% ↓

ATOM 2 — Atropine 1%, 0.01%, 0.5%

LAMP — Atropine 0.01, 0.025, 0.05%

Viscosurgical devices

Def — Inert, viscous, non toxic fluids that assists surgeon in different intraocular surgeries.

Uses
- Manipulating tissues
- Isolating compartment of eyes
- Intra-Op complications
- Protective for delicate structure (C. Endothelium)

Classification

Cohesive	Dispersive	Adaptive
Adhere to each other	Coats Ocular surfaces	
Useful as spacers	- Remain in position during irrigation	
Tissue Manipulation	- Protect C. Endo in Phaco.	
Easy to remove		
Capsulorhexis		
IOL implantation		
Na hyaluronate 1%	3%. NaH	
	4% Cheondroitan Sulphate	

Cohesive

Hydroxypropylmethylcellulose

3%

- Visalon
- Maisol
- Ocucoat

Dispersive

Hydroxypropylmethylcellulose

3%

Visalon

~~Maisol~~

Ocucoat

Adaptive

NaH 1% — Healon ⟷

NaH 1.4% — Healon GV

NaH 2.4%

L Healon 5

NaH – 3%

Es – 4%

L Viscoat

NaH

- 1% Healon → C+D
- 1.4% Healon GV → C
- 2.4% Healon 5 → Adaptive
- 3% → D → (Viscoat)

Viscosx — Endre Balazs

Viscosity — Properties of OVD

1. ~~Viscoelasticity~~ - V∝ maintain ∝ 1/shape — displace

Ideal - suff space for manipulation
of resistance to flow ∝ Conc ∝ Mwt ∝ Age

2. Visco-elasticity - resume shape after being stretched
∝ Mwt ∝ chain of Length
↓ freq ↑ freq of force ∴ protect tissue against shearing
(vibration in Phaco)
NaH > Chr > HPMC.

3. Pseudoplasticity — gel — liq under pressure
NaH ⇒ ∴ easy to inj thr 30G needle

4. Surface Tension - Coat a surface ∝ 1/ST ∝ Contact ∠
HPMC < NaH ∴ better coats Cornea.

5. Cohesiveness — tedency to adhere & form mass
∝ Mwt ∝ ST ∝ Pseudoplasticity
NaH
Aspiration - single slab

Dispersiveness — ↓ adhesiveness
∝ 1/Mwt ∝ 1/ST ∝ better coating ∝ 1/Pseu
HPMC
Breaks & takes longe

6. Viscoadaptability — Duprolviscous Cohesive → (at low shear rate) → Fractionable Pseudo dispersive
Healon 5

7. Rigidity - Sensation of resistance felt by surgeon to move an obj through the subs

Ideal

Optical clarity
Chemically inert
Ability of retention under pressure
∴ to protect endothelium ↑
Interference ≤ Instruments & IOL ↓
Removal — easy
* Obst to Aq outflow
↓ Cost

NaH < Chondroitin Sulphate

Connective tissue — lip
Synovial fl or Vitreous: ↓ ↓ ↓

HPMC

× natural. prepared from cellulose — cotton, wood
cellulose polymer + Hydroxy propyl
chg grp. | Hydro philicity

Vis 3000 - 4000 centipoise × true VE.

mwt- 86000

Osm 285 mOsm pH = 7.2

shelf life - 2yr Ster. by Autoclave

OVD

- V adaptive
- Cohesive
  - Super.
  - Viscous
  - Medium Viscosity.
- Dispersive

Visco Removal Tech

- Rock & Roll Tech
  - Cohesive >>
- 2 Comp Bimanual I/A Tech

Visco

Adaptive | Supercohesive | Cohesive | Medium. | 1 - V. dispersive

shear rate
↓ cohesi ↑ Pseudo disp

extremely ↑ deep shear viscosity

110c - 10loc m/a · s

↓ visc
>> Dispersive

Healon 5
NaH = 2.3%

Healon GV
1.4%

Healon Hyal 2000 Provisc 1%

Viscoat 3%

HPMC 2%.

✓

Sup space maintainence
30c Pnt
Trapped in C. concavity
∴ Endo protect

Space maintain
L Capsular
L shallow
hypercope
Pated cases → ↑ C. rigidity
↓ Solubl ..
↑ IV pressure
L Topical anesth

Remain. adj to endothel
Button spaces
Selectively moves & isolates

✗
Post op removal
» time & attention
Pt dose ↑ shear rates

✗
displaces & mobilize
loss ∴ IO stability
AC pe properly
PC clear view
* Endothel remove end diff

✗
* Space maintain
Reduces easily
∴ removal diff
↓
PC view obstructed

Date
Page
CLASSMATE

Uses

↳ Cataract
↳ Capsulorrhexis — ↑ Vis, Mwt — to maintain AC
— ↑ Transparency
↑ elasticity. Pseudo.
good Capsular flap

Healon

- Hard Cases
- Visco Canalostomy.
- PK — Open sky procedure
- PCR occurs
- Capsulorrhexis
- Suprachoroidal space → Buckle (tamponade)
  - ↳ SAIK Tech
- Viscodispersive
  - Visco-expression of Nucleus in AC
  - Gonioscopy / LASER
  - Retcam / Imaging
  - Extracellular
  - Intracellular
- Non Operative
- Operative uses
  - Visco assisted — Vitrectomy
  - Lens loading
- Sub Squint
  - Trabeculectomy

- Cornea Glaucoma Lens Post Seg
- Soft shell Tech
- Recent Advances

Anti VEGF

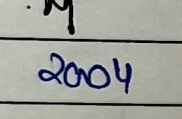
Indication — Retinal Ischaemia

- DR
- Retinal Venous Occlusions
- NVD
- NVE & ~~Macular Edema~~
- ARMD
- ROP

- Pegaptanib — Macugen
- Bevacizumab — Avastin
- Ranibizumab — Lucentis
- Aflibercept — Eylea.

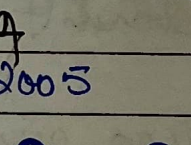
MOA

M
2004



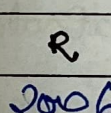
Aptamer
↓
Binds specifically
VEGF-A
↓
form
165

B
2005



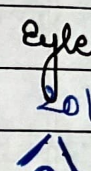
Monoclonal
Ab
↓
A
all forms

R
2006



Ab fragment
↓
Binds VEGF A
form with high
affinity

Eylea
2011



fusion
protein
VEGFA
B
PlGF
↳ had to
& ⇒ affinit

Brolucizumab — single dose

Uses of OVD

Cataract Sx
- Capsulorhexis
- Hydraulic seperation of Nucleus & Cortex
- Nuclear Emulsification
- I & A
- IOL Implant
- Visco Expression

Corneal Sx
- PK
- DALK
- femtosec

Intracameal Anaesthesia
- + lidocaine
- Viscoanaesthesia

VR Sx
- Levitation
- Seperate Memb.

Glaucoma
- Trabeculectomy
- ViscoCanalostomy

Strabismus
- Coat's
- Adjustment suture

Oculoplasty
- Probing of CNLDO
- DCR Sx
- Repair of Canalicular cut ends
- Fasntales / sling Sx for Ptosis

Harms (Pg 17)

Dose	0.3 ↷ 1 ↷ 3	100mg vial 25mg/ml Total 4ml 0.05ml
	Macugen	Avastin
Uses	CNV 2° AMD	↙ Metastatic colorectal Ca
Structure	Short single stranded oligonucleotide sequence	~~Humanized~~ full length humanized Murine Mab
Pharmaco kinetics	28 Base RNA oligoNucl. 2 (20)KD + PEG moieties to ↑ ½ life.	Larger wt → ½ life vitreous ∴ ↓ freq. injections 4-3 days in vitreous
Binding	Heparin binding domain of VEGF 165 & Larger isoforms	VEGF A (all forms)
		AE - 24%
Disadv	∴ Smaller isoforms Proteolytic fragments not inhibited	Stability concerns
Studies	VISION 0.3 — 1 — 3mg	
	VERITAS → PDT + Triamci / PDT + Macugen.	

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0.3mg vs 0.5mg
Beloaded – Accentrix.
Lucentis

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Eylea

✓ CRVO
✓ DME
✓ AMD

POV

FDA approved

•) ROP	Intravitreal Inj.
•) Myopic CNVM	Vascular endothelial growth
•) NVG	Before TRD operation

Humanized affinity matured fusion protein of key domains
Fab fragment of murine from Human VEGF recep 1 & 2 &
monoclonal Ab. → VEGF (A) Human IgG Fc portion.

designed ↓ size as ↑ size unable
to cross Inner Retinal barrier &.
choroid 1/2 life – 3 days

PCV

potent, non selective Pt'n of all
VEGF A Isoforms & Bioactive
proteolytic products
– 19%

trial

MARINA – Neovascular CNV VIEW 1
ANCHOR – classic CNV / ~~PDT~~ vs
PIER – dosing 1/m – 3m 1/3mth * 2yrs
PRONTO – OCT

VIEW 2

Focus (PDT + Lucentis (7d)
PDT

Complications of OVD

- ↑ IOP
- Capsular Blockage Syndrome
- Post op Inflammation
- C. Edema & decompensation
- HSV rxn

RA — NaH — 1.8%.
2.3%.

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26g Needle

- Cystitome
- Scraping of Cornea
- Bleb Needling
- Stromal puncture. for Recurrent Epithelial erosions
- SubConj Injection
- Local Anaesthesia in Oculoplasty
- Making tunnel in glued IOL
- To pull straight 10-0 Prolene suture in SFIOL.
- To pull DSEK lenticule/adjust after placing in AC.

30g Needle

- PST
- Intravitreal Injection
- Intrastromal Injection.
- For Injecting air in AC/PC.

⇒ Torpedo Bandage

⇒ BCL uses →

Protect the bleb frm trauma generated by blinking upper lid and aids epi migration & repair.

Antifungal Classification

- Griseofulvin
- Flucytosine

Imidazoles (AMC)

- Clotrimazole
- Miconazole
- Ketoconazole

Triazoles (VIPU)

- Fluconazole
- Itraconazole
- Voriconazole

Echinocandins

- Caspofungin
- Micafungin

Allylamines

- Amorolfin
- Terbinafine

Polyenes (Nat)

- Natamycin
- Nystatin
- Amphotericin B

Lanosterol → (Lan. 14α demethylases) → Ergosterol

Cell wall syn. glucans

Squalene epoxidase

Griseofulvin → Inhibits Mitosis

Flucytosine → Pyrimidine Analogue → 5FU.

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IS

- Steroid
- Steroid sparing

IS drugs

- Calcineurin inh
- mTOR inh
- Biologicals

Antiproliferative drugs

- Alkylating
  - Cyclophosphamide
  - Chlorambucil
- Antimetabolites
  - Folate Antag
    - Methotrexate
  - Purine Antag
    - Azathioprine
  - Pyrimidine
    - 5FU.
- Antibiotics
  - Mitomycin C
- Harmonal drug
  - Cs

Immunosuppressants

- Calcineurin Inhibitor
  - Cyclosporin
  - Tacrolimus
- mTOR Inh
  - Sirolimus
  - Everolimus
  - Temsirolimus
- Antiproliferative
  - Azathioprine
  - Methotrexate.
  - Cyclophosphamide
  - Chlorambucil
  - MMF
- gluco-Corticoi
  - Prednisolone

Biological Agents

- TNF α. Inh
  - Etanercept
  - Infliximab
  - Adalimumab
- IL-1 Recep Antag
  - Anakinra
- IL-2 Recep Inh
  - Basiliximab
  - Daclizumab
- Polyclonal Ab
  - Anti thymocyte Ab (ATG)
  - Rho Immun glob
- Anti CD3 Ab
  - Muromonab CD3

Cyclosporin

- Dry Eye disease
- ↑ graft ~~failure~~ rejection → topical steroids fail → Cyclosporin
- Post blepharitis & Ocular Rosacea
- In keratitis pt → Post PK

MMF → x affect salvage pathway of purine nucleotide synthesis ↓. Inhibition of T & B lymphocyte is selective

∴ ↓ Side effects than Azathio

Study

- Syst Immunosx & for Eye disease — SITE.
- Adalimumab in Uveitis refractory ADUR.
  to Conventional Rx
- Interferon α 2α vs Cyclosporin A for Severe Ocular Behcet's disease INCYTOR.

classmate
Date 26
Page

Antihelmintic drugs

- Roundworm, Hookworm, Pinworm → Albendazole.
- Whipworm, Trichenella → Albendazole.
- Hydatid → Albendazole.
- Tapeworm → Praziquantel, Nidosamide, Albendazole
- Threadworm → Ivermectin, Albendazole
- Filariasis → DEC, Ivermectin, Albendazole

Praziquantel

Leakage of intracellular Ca^{2+} from membs producing contracture & paralysis of worms

↓

Loose grip — expelled

↓

Vacoulization of tegument

↓ Phenytoin
Carbamazepine
Dexa

Albendazole

Benzimidazole

Broad spectrum
Tolerability
Single dose adm.

β tubulin of parasite → binds to → Inhibits polymerisation

↓

Intracellular microtubule lost

- blocks glucose uptake
- Inhibits uptake into Enz
- depletes its glycogen stored

↑ ⊆ fatty meal

Alb — A. sulfoxide — wide dist ∴ effective in tissue also

S/E — GI, Headache jaundice

Neurocysticercosis

8-15 days — 900mg BD (15mg/kg/day)

Albendazole		Praziquantel
8-15 d	Course	15-30 d
75-85 % chance	Cure rate	50-60 % ↓ Levels
cheaper	CS	
	Cost	

Steroids — Prednisolone 40-60 mg/day
Dexa 8-12 mg/day

2 days earlier ← Cysticidal therapy → 15 days later (Block)

Anaesthesia

Local Anaesthetic

- Injectable
  - Potency ↓ Duration ↓
    - Procaine
    - Chloroprocaine
  - Intermediate
    - Lidocaine
    - Prilocaine
  - Potency ↑ Duration ↑
    - Bupivacaine
    - Ropivacaine
    - Tetracaine
    - Dibucaine
- Surface
  - Soluble
    - Cocaine
    - Lignocaine
    - Tetracaine
    - Proparacaine
    - Ester linked
      - Cocaine
      - Procaine
      - Chloroprocaine
      - Tetracaine
      - Benzocaine
    - Amide linked
      - Lignocaine
      - Bupivacaine
      - Dibucaine
      - Prilocaine
      - Ropivacaine
  - Insoluble
    - Benzocaine
    - Oxethazaine.

Ester | Amide

» Intense
» Longer
Bind to α_1 Acid glycopr

Hydrolysed by plasma esterase.
✓ HSI Rxn
✓ Cross sensativity ✗

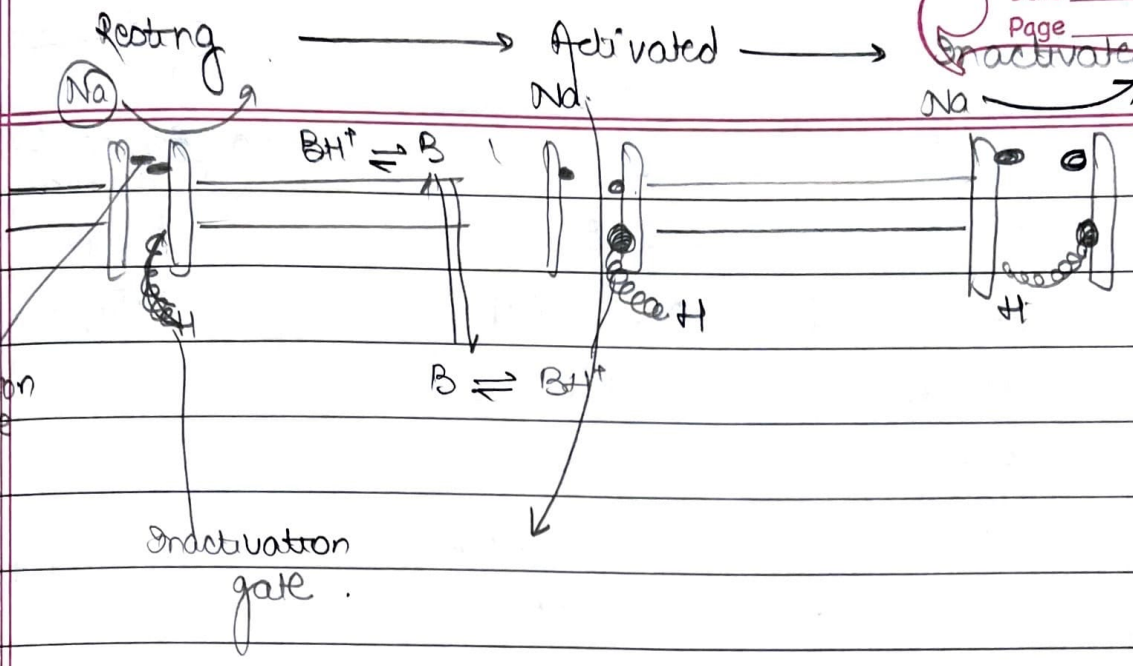
Mech of action

Block Nerve Conduction by
↓
↓ entry of Na^+ ions (during upstroke of AP)
↓
finally fails to reach threshold potential & conduction block ensues

LA + Voltage sensative Na^+ channel
↓
↑ threshold of channel opening

Potency α lipid solubility
degree of blockage α freq dependant
Onset α pKa

30-40% Unions	↓ pKa	↑ 15%
	fast acting	↓
	↓	Procaine
	Lidocaine Mepivacaine	Bupivacaine



Ptosis → Anaesthesia → Akinesia.

S.E

CNS effects — Light headed → Confusion
CVS toxicity ↓HR, ↓BP, arrythmia
Painful inj
HST rxn. — ≫ esters
Cross reactivity
due to CH_3 paraben

Dizziness
Circum-oral paraesthesia
Visual dysfxn
Tinnitus
Convulsion

Mydicaine

No1	0.3ml	No2
0.5 mg	Atropine	1mg
0.06 ml	Adrenaline (1:1000)	0.12 ml
108μ		216μ
3mg	Procaine	6mg.

Ligno-Adre dose -2

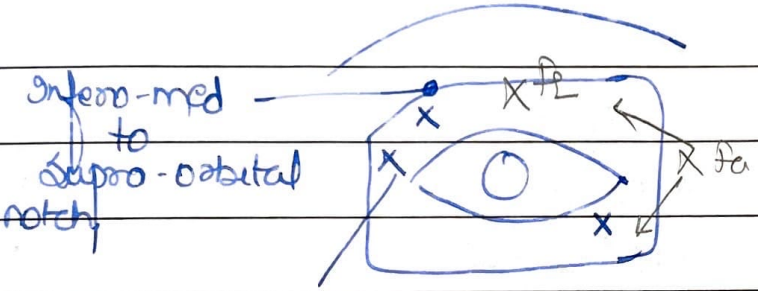
max 3mg/kg | 2mg/kg

	Lignocaine	Bupivacaine	Paracaine
Surf Anaes	+	-	Meta-Amino Benzoic acid derivative
Rel potency	1	4-5	
Conc used	0.5-2 %.	0.25 - 0.75 %.	0.5 %.
max dose	300mg	150mg	
Onset	fast	Intermi.	
Durat^n	1-2hr	2hr - 6 hr	
Cardiotoxi	+	+++	
Onset	3min		15 min
		more lipophilic more potent	Ophthal
	depr, decrease, dysphoria, Alt taste, tinnitus	» QTc prolong VT or Cardiac depr	Ocular irritation severe Immediate corneal exn.
	Xylocaine 2%.		

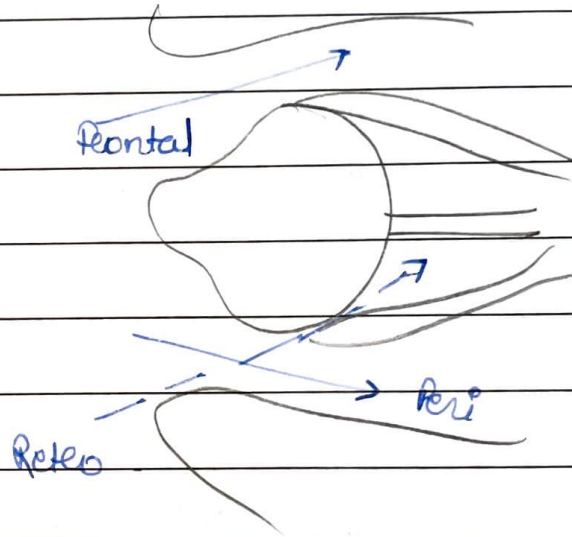
- Tonometry - 3 drops
  last 10-20 min.
  Max 3 app
- foreign body removal
- gonioscopy
- Short corneal & Conj procedures

Modes

- Topical
  - Lignocaine 4%.
  - Bupivacaine 0.5%.
  - Benoxinate 0.4%. (Bactericidal)
  - + fluorescein → Tonometry
- Intracameral
  - 4g 1%.
  - ↓
  - Phaco.
- Peribulbar
  - B - 0.75%.
  - L - 2%.
  - 75U Hyalase
  - 25g 2.5cm.
  - Middle 2/3 - 1/3.
  - Aspirate
  - Medial



Medial to middle canthus



Honan pressure cuff.

- Retro
  - 22g
  - 3.5cm. (15mm - L)
  - 10 & 2 o'c s/t
  - + facial block
  - x affect SO as 4N outside globe
- Para / Sub Tenon.
  - 2-3mm Conj incision b/t inf limbus & fornix
  - Canula
- Frontal
  - Ptosis
  - Upper lid
  - 4cm
  - 2nd Injected.

Inferior margin of zygomatic bone

Atkinson block

Facial block (+ Peteo)

Van Lint
224
3.5 cm
Brow
Lat Canthus
Infraorbital foramen

Nadbath
↓
stylomastoid foramen

O' Brien
Ant to Condyloid process

✓ of Substenon
x Vasc injury
ON injury
↓ vol of Anaesthetic

—x
Post op morbidity

Blocks Harm

Chemosis
Peteobulbar hmg
Penetratn in globe
Inadvertent IV & Intrathecal inj c ON damage

Sulfacetamide Sodium → Nocardia, Atypical Mycobac

Ophthalmia Neonatorum, Trachoma, Inclusion Conj

Locula./Albucid — 10%, 20%, 30% E/D.
6% E/Oint

+ Systemic Azithro/Doxycycline

PABA —(PS)→ DHFA
(E)

Ocular irritation.

+ steroid — anti inflam effect

Trimetho + Polymxin — Gram -ve Pseudo ops.
└ Gram +ve bact conj

Adv Eff — Contact dermatitis
Transient myopia
Local irritation.

Cotrimoxazole

Synergistic action. — fixed dose combinat^{n}

MOA

Sequential block of folate synthesis

PABA
↓ — Folate Synthase → Sulfamethoxazole
DHFA
↓ — Dihydrofolate reductase → Trimethoprim
THFA.

Co-Trim + oxazole
↓
Trimethoprim + Sulfamethazole
↓
cidal

Dose ratio	:	1 :	5
Plasma "	:	1 :	20
80mg + 400mg			2 BD
DS 160mg + 800mg			1 BD
Paed. 20mg + 100mg			

Adv Eff — N/V
Folate def.
Blood dyscrasia
× Preg — Teratogenic
N. hemolysis
CH_3Hb
× in Newborn.

classmate
Date
Page

Caution

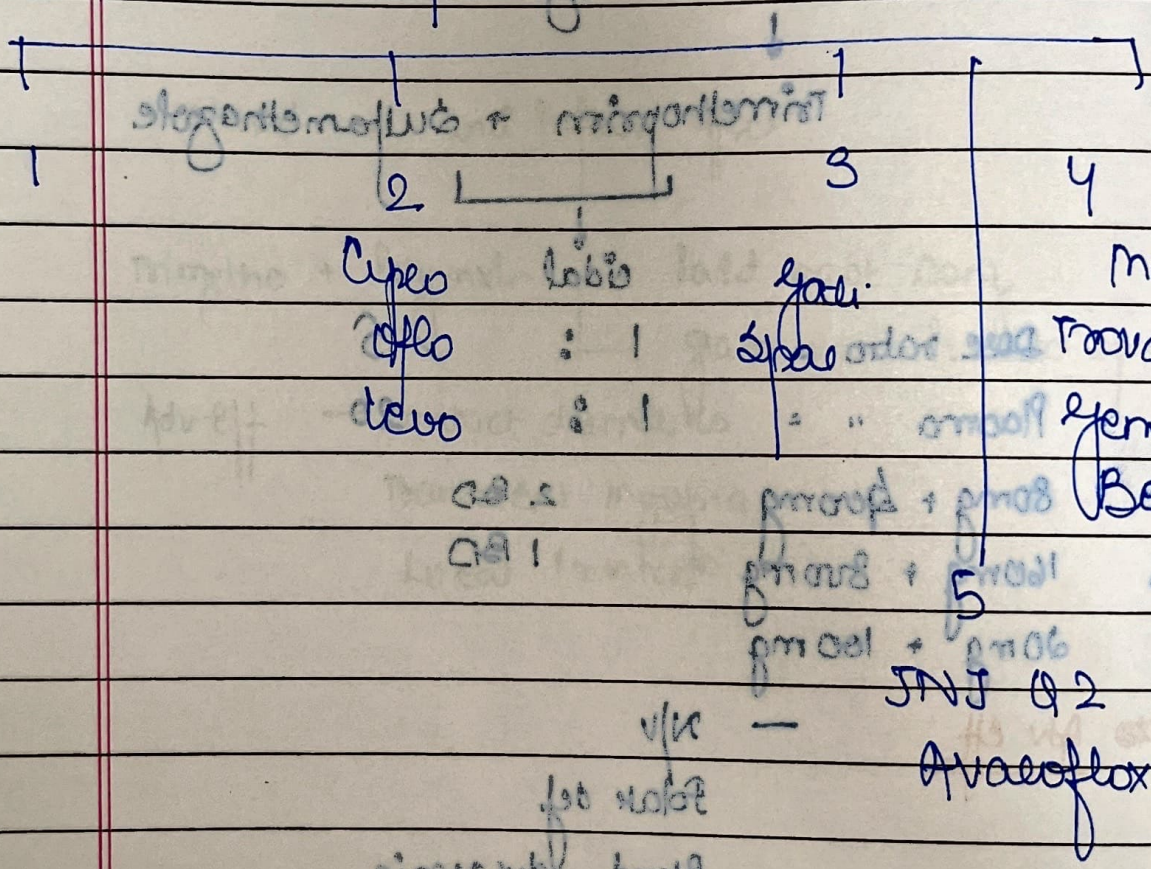
Renal dis — Uraemia

AIDS & PnJ — ↑ fever, rash

Elderly — BM toxicity

+ Diuretics — Thrombocytopenia

Rx = Toxoplasma.



PAE ← + & − Cidal

classmate
Date
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Flouroquinolones

Quinolones → gram -ve

F⁺ → +ve, Anaerobes

Enteric gram -ve rods — Pseudo, Hemo, Neiss G.

Classification

Targets DNA gyrase & Topo IV

1st gen.

2nd gen

2nd
- Nor
- Cipro
- Oflox
- Peflox

→ Target DNA gyrase (neg)

3
- Levo
- Moxi
- Gemi
- Pruli
- Lome
- Spar.

- Pagu.
- Balo.

→ India.

4th
- Trovafloxacin
- Moxi
- Clina
- Gati

MOA

gram

-ve → Bact DNA gyrases (Topo IV)

- Neisseria
- Hemophilus
- Pseudo

+ve → Topo IV

Mammals → Topo II ∴ × action

(Topo IV)

A → nicking of DNA → reseals

B → Introduces neg supercoils

Intracellular org
- Legio
- Salmonella
- Mycobact.

↓

as 4* conc in neutrophils & macrophages

Resistance → Chromosomal Mutation

✓ Depot drug
[x – x entrization
Ciproflox – crystal deposit on superficial portion of C. defect

Adv Eff – N/V
CNS ⊥ dizz
Skin Hsr
✓ Tendonitis/Tendon Rupture (x <12yrs)
Interstitial Nephritis

Interactions – Theophylline — Cnss toxicity
NSAIDs
↓ Istep mutation.

Cipro
neg –
0.3%
» Pseudomonas

Oflox
Steep pyo
+
Chlamydia
0.3%

Levoflox
Steep, MTB
+, –
Quixin
Levo – 0.5%
1.5% — Bacterial Keratitis

Lomeflox
Lox, Lomebact
0.3%
–ve
Photo-toxic
Q-T prolong

Preservative – NaCl
Benzylalkonium Chloride

Date
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Moxifloxacin

+ β lactam/Macrolide resistant

Steep pn

MTB, atypical also

4th gen

Topo IV

0.5%. Higher IntraOcular Conc

× Vitr Penetra

Only preservative free (Vigamox)

Gatifloxacin.

» neg, atypical

Chl trachomatis

→

3rd gen

0.3%

× Oral gati ✓

Zymar

Required 2 step mutation to develop resistance

Ofloxacin 0.6%

Flumequine (used in Europe) — Macular bullo formatn

Perfloxacin → Cataract in Cats

Earlier gen

DNA gyrase targeted

Moxi/gati

DNA gyrase & topoisomerase IV

+

staph ↙ aureus
↘ epidermidis

Atypical Myco bac
↳ marinum
↳ Ch elonei

C_8 Methoxy FQ.

↓

» gram +ve, Atypical

↳ Protection from bact resistance

↳ ↑ cidal properties

↳ binding to 2 Enz — DNA gyrase
Topo IV

1 step mutation.

2 mutation.

Bulky chain ∴ × out of bact

↓. Resp ⇒ Steep, Viridans, MRSA, Anaerobes, Pseudo

Cidal

β lactam Abs

classmate
Date
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Classification

- Penicillins
- Cephalosporin.
- Monobactam
  - Aztreonam
    - Pt allergic to P & Cephal.
- Carbepenem *
  - Imipenem
  - Meropenem
  - Faropenem
  - Doripenem
  - Ertapenem.

β Lactamase Inh →
- Clavulanic Acid
- Sulbactam.
- Tazobactam

Penicillins

- Natural
  - P. G (Benzyl P)
- Synthetic
  - Acid resistant
    - P. V (Phenoxy Meth)
  - Penicillinase Resistant
    - Methicillin
    - Cloxacillin
    - Dicloxacillin
  - Extended Spectrum
    - Amino
      - Amp
      - Bacamp
      - Amoxi
    - Carboxy
      - Carbeni
      - Ticarci
    - Ureido
      - Pipera
      - Mezlo

* — gram +ve, enterococci, Ps Aeruginosa, Listeria. Anaerobes like B. fragilis, Cl. difficile ✗MRSA

Cephalosporins

1st
P Cefazolin ✓
O – Cephalexin
Cefadroxil
+ve

2nd
P – Cefuroxime
Cefoxitin
O – Cefaclor
Cefuroxime axetil
Cefprozil
-ve

3rd
P – Cefotaxime
Ceftizoxime
Ceftriaxone
BLA Ceftazidime ✓
Cefoperazone
O
-ve
Pseudomonas
good BBB permeability

4th
Cefixime
Cefpodoxime
Cefdinir
Ceftibuten
Ceftamet

5th
C ≤ Anti MRSA activity
P –
CAP – Ceftaroline f
HAP – Ceftobiprole M.
Kill MRSA & penicillin resist by producing altered PBPs

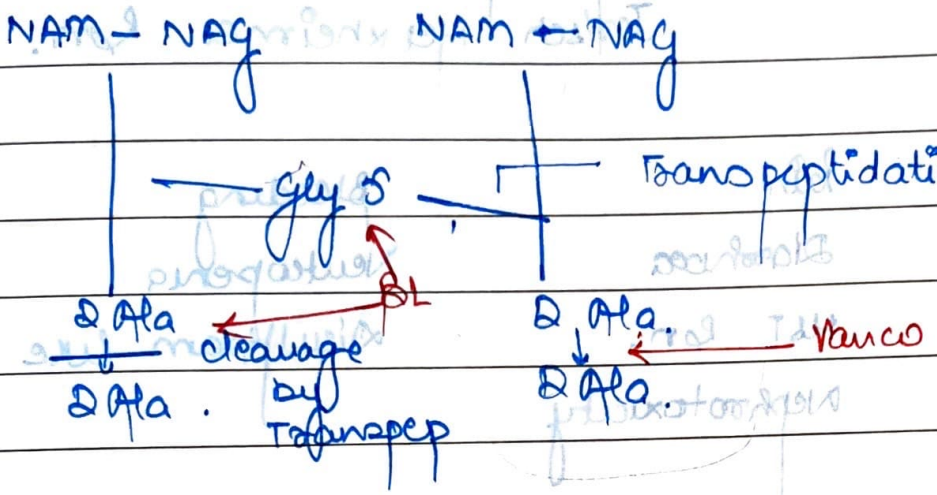
P – Cefepime
Ceftiprome
Pseudomonas non susc to inducible Chr β lactamases along with high potency agains

MOA

Interfere with synthesis of Bact Cell Wall

UDP - NAM (Park Nucleotide)

UDP - NAG



β lactam → Block cleavage of terminal D-Ala & transpeptidation

Glycopeptide

Vancomycin → binds tightly to terminal D Ala – D Ala sequence & prevents its release from carrier (Bactoprenol) so further transpeptidation cannot take place ∴ × assembly, cross linking

β Cidal

× Peptidoglycan in human ∴ no harm

gram +ve → >50 layers thick

gram -ve → 1-2 layers

∴ gram +ve > susceptible

Resistance — Penicillinase

Adv effects — Local irritancy & direct toxicity

(P) HST
Superinfection
Jarisch Herxheimer Rxn.

(C) Pain — Bleeding
Diarrhoea — Neutropenia
HST Rxn. — Disulfiram like interaction
Nephrotoxicity

Ceftazidime

3rd gen.
» Pseudomonas, Enterobacteriace ↓ / +ve Staph.
Anaer — B. fragilis
Ix — febrile N, Buen.
t½ — 1.5 - 1.8 hrs

Cefazolin

1st gen RNG sensitive Org. ← Strep. gon. Meningo. diph H. Inf, Clostri, Actino.

Broad (-f-v)
Static

Tetracyclines

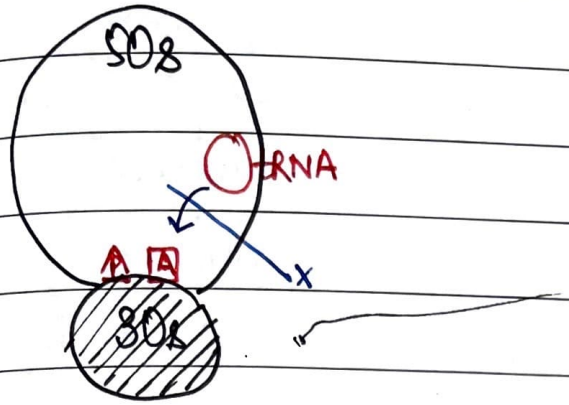
- Tetracycline
- Oxy "
- Demeclocycline
- Doxycycline
- Minocycline

MOA

- 30s → Tetra
- 50s → Chloramphenicol, Erythromycin, Clindamycin
- Aminoglycosides

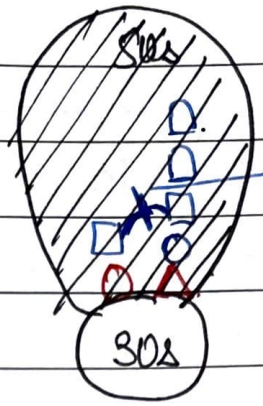
MOA – Selective toxicity for microbes
- porin channels
- Protein synthesizing apparatus diff

Elongation



Tetracycline
30s

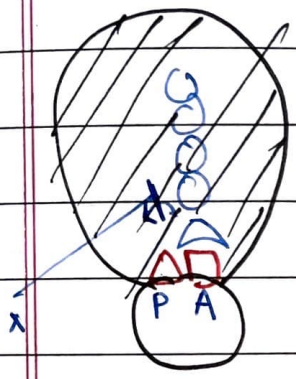
tRNA to A site.



CAM ///
50s

Peptide bond formation.

Translocation



Erythromycin
Clindamycin
50s

Transfer of peptide chain back from A to P site

Aminoglycoside
30 + 50s

- freeze initiation
- Interfere ⊆ polysome formation
- Misreading of mRNA code.

cidal

Aerobic gram neg & Staph. aureus

Aminoglycoside Antibiotics

× Anaerobes.

- Systemic
  - Streptomycin
  - Gentamycin
  - Kanamycin
  - Tobramycin
  - Amikacin
  - Sisomicin
  - Netilmicin
  - Paromomycin
- Topical
  - Neomycin
  - Framycetin.

- MOA affecting bact cell wall enhance entry of aminoglycoside (β lactams, Vancomycin)

Side effects

- Ototoxicity
  - Vestibular
  - Cochlear
- Nephrotoxicity
- NM Blockade

Tobramycin 0.3%

S. tenebrarius

2-4 hr > Proteus, pseudomonas

> Pseudomonas

0.3%

Gentamycin

Micromonospora purpurea

» potency, broader spectrum of activity

Aerobic gram neg bacilli - E Coli, Klebs, H. Inf
Proteus, Pseudo

× TB

Synergistic with β lactam / Enterococcus
Pseudomonas

× CAP — ~~As~~ by gram +ve, aerobes

~~Ana — Ana~~

» Sepsis

↓ in ~~renal toxicity~~
~~Nerve deafness~~
~~Skin~~ all.

AE - fortified topical — Pseudomembranous Conjunctivitis

classmate
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Page

Of. Tetracycline

Adv effects – Irritative effects
Organ toxicity
- Liver damage
- Kidney damage
- Phototoxicity
- Teeth & bones
- ↑ ICT
- Diabetes insipidus
- Vestibular toxicity.

Amikacin. Hearing
It is resistant to Bact aminoglycoside modifying enz
where Genta/Tobra can't be used
✓ TB.

Resist to G/T + Mycobacterium

Neomycin.

2. feature — gram neg bacilli
gram +ve cocci
× Pseudo × Steep
Only topical due to toxicity

Neomycin Eye Oint — 0.3%

Neosporin

Neomycin	3400 IU	→
Polymyxin B	5000 IU	→
Bacitracin	400 IU	× — ×

Hydrocort 10mg/ml.

Bartonella
anaerobes.

↓ Conc Static
↑ cidal

Macrolides

Macrocyclic lactone ring with attached sugars

Erythromycin
Roxithromycin
Clarithro.

Azithro.
Telithro.

» gram +ve accumulate intracellularly
Translocation affected, premature termination.
Synthesis of bacter protein affected

» gram +ve

A.E – gastrointestinal
Hearing imp.
HST.
Hepatitis

Clindamycin

gram +ve cocci — Strep
In producing staph
× MRSA
» Aerobes
Anaerobic, mixed Inf

S.E - Pseudomembs colitis

Vancomycin

gram +ve cidal — × gram neg

glycopeptide 4°B

MRSA., S. Viridans, Enterococ
Cl. difficile
gram +ve cocci, VRSA, VRE, Pseudo enterococcus, MRSA

Skin allergy
Nerve deafness
Renal toxicity
↓ BP (Histamine release)
Redman Syndrome

cidal

Polymyxin B.

Polypeptide AB B. polymyxa

gram neg

detergent like act^n on cell Memb

high affinity for PL ∴ gram-ve cell wall

distortion → pseudopore format^n — ions leak

∴ Synergism ⊆ other AMAs

cidal

Bacitracin

B. subtilis gram +ve

on incubation at step earlier than penicillin

eff

Antifungal

Fungus classification

- Taxonomical
- Morphological

Taxonomical

- Pigmented #
- Non Pig *
  - * Aspergillus
- Aseptate
  - Mycelium
    - ✗ Synchytrium
    - ✓
      - Oomycota
        - Phytophthora
        - Pythium
      - Zygomycota
        - Mucor.
        - Rhizopus
        - Lichtheimia.
- Septate
  - Ascomycetes
  - Basidio
  - Deuteromycetes
    - * Fusarium
    - Alternaria #
    - Cercospora
    - Mucospora
    - Trichophyton
    - # Curvularia
      - Cladosporium.

Asco.

- Round
  - Esspharae
  - Penicillium
- Cup
  - Ascobolus
  - Peziza
- Flask
  - Neurospora
  - Saldenia

Basidio

- Puccinia.
- Agaricus
  - Coprinus
- Ustilago

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Morphological

Yeast → Cryptococcus

Yeast like → Candida albicans

Moulds/filament
- Dermatophytes
- Aspergillus
- Penicillium
- Rhizopus
- Fusarium

Dimorphic fungi
- Blastomyce
- Sporothrix
- Coccidioid
- Para "
- Histoplas

Topical Amphotericin. 0.075 - 0.15%.

Natamycin 5%.

x

Voriconazole — 200mg BD PO
1% topical
1% fortified.
Intrasternal 50 µg/0.1ml.
Intracameral 100 µg/0.1ml
Intravitreal — 50 µg

Antifungal

- Antibiotics
  - Polyenes
    - Nystatin
    - Amphotericin B
- Anti metabolite
  - Flucytosine
- Echinocandins
  - Caspofungin
  - Micafungin
  - Anidula
- Heterocyclic Benzofuran
  - griseofulvin
- Azole
  - Imidazoles
    - Topical
      - Clotrimazole
      - Econazole
      - Miconazole
      - Oxiconazole
    - Systemic
      - Ketoconazole
  - Triazoles
    - Fluconazole
    - Itraconazole
    - Voriconazole
    - Posaconazole
- Allylamine
  - Terbinafine
- Topical agents
  - Tolnaftate

Newer Triazole
Butaconazole
Oxiconazole
Sulconazole

fungicidal in high
static at low

Amphotericin B . Steptomyces Nodosus

High affinity for ergosterol in fungal cell ~~wall~~ memb.

form a micropore hydrophilic — Interior cell permeability is markedly increased

- AmB is most toxic as cholesterol has resemblence like Ergosterol
As no sterol in bact ∴ ✗ effect

Candida
Histoplasma.
Cryptococcus
Blastomyces.
Coccidioides

Uses → Leishmania

Torulopsis.
Aspergillus.
Sporothrix.

✗ for fusarium.

prepared ⊆ dextrose — or distilled water.

Administered i.v — as suspension ⊆ help of deoxycholate.

Conventional formulation →

Liposomal → L-AMB. → ↓ acute rxn. ↓ Anaemia.
↓ Nephrotoxic RE cells

Proven Cases of Candida

Adv effects — Acute Rxn.
Long term toxicity — Nephrotoxicity
Anaemia
CNS toxicity

Liposomal 5-10mg/kg BW → 4 wk

Fluconazole = 3.5mg/ml

Sinus Inj = 1mg/ml

- Systemic Mycoses but Azoles better.
- Febrile Neutropenia
- Leishmaniasis

Fluconazole = 1ml of 3.5mg/ml

Posaconazole — 40mg/ml (Oral Susp)

Inj :→ 300mg 12hrly

Other resistance. if

300mg BD D1
300mg OD D2
] 6wk

Caspofungin → Alt to polyene Monof

Isavuconazole — 200mg TDS → 6 Doses
200mg OD after 12-24hrs

200mg TDS D1,2.
200mg OD Day 3
] 6wk

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Nystatin

S. noursei
higher toxicity
Superficial candidiasis

Eye Oint - 1 lakh U/g.

Fluconazole

Water soluble azole
94% absorbed. oral Bio Availability
fungal meningitis

Adv eff GI intolerability
No. anti-androgenic effect like KTZ
↑ hepatic transaminases
× preg & lactating

fungal keratitis
× → Aspergillosis & Mucormycosis
0.3% Eye drops.

Candidiasis	Coccidioidal
Tinea	Cryptococcus

Voriconazole

2nd generation broad spectrum triazole

Invasive aspergillosis
disseminated Inf caused by fluconazole resistant candida, fusarium, febrile neutropenia
histoplasmosis, blastomycosis

CYP3A4 isoenz Inh.

- Rashes, photosensitivity, ↑ liver Enz
- QTc prolongation
- Short lasting visual disturbances after I.V Inj

200 mg BD

50-100µg/0.1ml — Intravitreal

1% — fortified

100µg/0.1ml — Intracameral

50µg/0.1ml — Intrastromal

Squalene.

Terbinafine ⊣ Sq. epoxidase

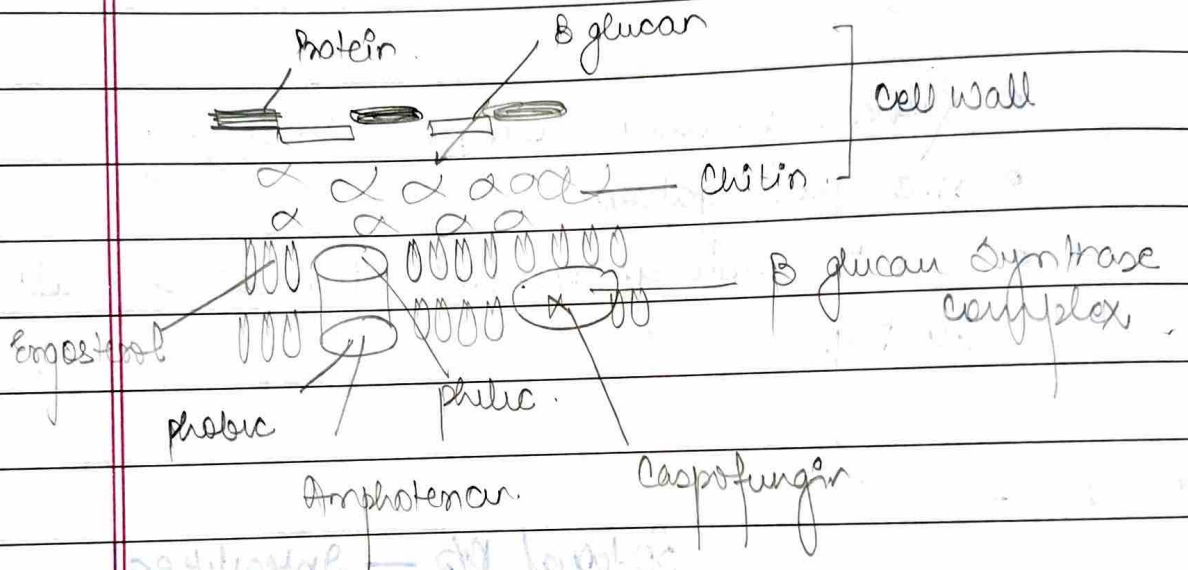
Sq. epoxide

↓

Lanosterol

Azole ⊣ L. 14-demethylase

Ergosterol



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Natamycin

Broad Spectrum . 5%

day - 1drly

Night - 2drly

Suspension

Acyclovir

acyclovir.

← Herpes virus specific thymidine kinase

acyclovir MP

← Cellular kinases

A. triphosphate

→ inhibits herpes virus DNA polymerase competitively

→ gets incorporated in viral DNA & stops lengthening of DNA strand the terminated DNA inhibits DNA polymerase irreversibly

Acyclovir taken up by virus infected cells
↓ host toxicity

HSV1 > HSV2 > VZV = EBV

(X) → CMV

HSV, VZV – resistance to acyclovir due to mutants deficient in thymidine kinase

20% oral dose absorbed

csf - 50% of plasma

3% eyeOint 5 times daily till 3days after healing

2g/day in 5 divided doses
800mg TDS x 10days

Recurrence - 400mg BD

Continous prophylaxis - > 6 recurrences/yr.

HS keratitis - = Idoxuridine = Superficial dendritic corneal ulcer

Better for deep stromal infection bcos of good corneal penetration

HZ - 10mg/kg/8hr i.v for 7days.
800mg 5 times daily

Poor effect on Post Herpetic Neuralgia :-
for HZV - famciclovir / valaciclovir] drug of choice

Adv effects

- Topical
  - Stinging
  - Burning sensation
- Oral
  - headache
  - Nausea
  - Malaise
- Intravenous
  - Rashes
  - Sweating
  - Emesis
  - ↓ BP
  - dose dependant ↓ GFR
  - Reversible neurological manifestation

Ix for Oral Acyclovir

- 1° HSK
- Recurrent EK ≤ Atopic disease
- Immuno Compromised pt.
- Unable to instill topical Antiviral
  - L RA
  - Psychologically disturbed

200 mg 5 TID

400 mg BD

- Recurrent infection
- Keratoplasty in HSK - Etio of

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Idoxuridine — competes ≤ thymidine.

HSV Keratitis

Superficial Keratitis — ↓ Virus selectivity
higher local toxicity
rapid development of viral resist.

Act faster than acyclovir (» Stromal Keratitis)

0.1 % Eye drops — Ocular irritation. ✓

Trifluridine → DNA synthesis defective
- Incorporate
- Cellular kinases

higher efficacy than idoxuridine
Ocular irritation
Lid Edema.

Acyclovir 800mg 5TID × 7-10 d.
Oral

↓

If Immuno Compromised. → I.V dose
~~Immuno Competent pt~~ · 3-5 mg/kg i.v TDS

Famciclovir (prodrug) → Penciclovir
77% BA: 500mg TDS × 7d

Valacyclovir — L-valine ester
80% BA.
1g TDS

↓

Shown to significantly accelate resolution of pain when compared ≤ Acyclovir.

Rx of PH Neuralgia

~~Palliative Rx~~
~~Oral Acyclovir~~
~~Topical steroids~~

→ Capsaicin Cream
→ systemic steroids
→ ~~Amitriptyline~~
→ Percutaneous electrical Nerve stimulation

Corticosteroids

Anti inflammatory & Immunosuppesive

Induction of Annexins in mϕ, endo, fibroblast

↓

A. inhibit phospholipase A_2.

↓

↓ Pg, LT, PAF

neg reg of Cox2

↓

↓ Pg

↓ prod of APR from mϕ & endothelial cells.

↓

Complement fxn interfered

↓ prod of ELAM 1 & ICAM-1 in endothelial cells

↓

Adhesion & localization of leucocytes in interfered

↓ prod of collagenase & steamolysin

↓

prevention of tissue destruct"

Ideal steroid shd be biphasic Cornea both layers

PO_4^{3-}, HCl — hydrophilic - H_2O sol

Acetate & alcohol — lipophobic — penetrate

cornea » PO_4^{3-}

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CS

- Glucocosticoid
  - Short t½ <12hr — Hydrocortisone
  - Intermediate 12-36hrs — Prednisolone, CH_3 ", Triamcinolone, Deflazacort
  - long acting >36hrs — Dexamethasone, Beta "
- Mineralocostcoids
  - DOCA
  - Fludrocortisone
  - Aldosterone

Compound	Rel activity Gluco	Rel activity Mineralo	Equiv Dose Anti-inflam
Hydrocortisone	1	1	20mg
Prednisolone	4	0.8	5mg
CH_3 "	5	0.5	4mg
Triamcinolone	5	x	4mg
Deflazacort	3-4	x	6mg
Dexa	25	x	0.75mg
Beta	25	x	0.75mg

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Adv Effects

Mineralocorticoids — Na^+, H_2O retention
edema
Hypok⁺ alkalosis
↑ BP.

Gluco-corticoids — Cushing's habitus
Feagle, skin purple striae
Cutaneous atrophy
Hyperglycaemia
Msl Weakness
susc to infection
delayed healing of wound
Peptic Ulceration
Osteoporosis - AVN
PSC.
Glaucoma
Growth retardation.
Foetal abnormalities
Psychiatric disturbances
Suppression of HPA axis

CI — Peptic Ulcer
DM
HTN
T.B
Osteo.
TUSK.

Hydrocort

Rapid & short

100 mg/3ml 200 mg/5ml

Lotepred Etabonate

Steroid responder ∴ → Novel steroid using steroid metabolic drug design

- appropriate drug delivery
- limited side effects

Lotepednol Etabonate — ↓ Ketone Cs but ⊆ 17β chloro CH_2 ester in place of C_{20}

↳ active at site

but undergo predictable hydrolysis by naturally occuring ocular esterases ∴ ↓ side effect of ↑IOP

As Non Ketonic Cs → do not form schiff base intermediate ∴ ↓ Cataract formation too.

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Bednisolone

4* »

5-60mg/day oral

CH3 Bed

Pulse therapy — Ig i.v

Initial action — Anti inflammatory act"
Long term — switching off of immunodamage processes as a consequence of lymphopenia & ↓ Ig synthesis

a) graft rejection — 500 mg stat dose
» Endothelial rejection

b) TON

c) ONTT — ON.

d) fovea thickening choroiditis

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Soft steroids

FML 0.1%

acetate alcohol

» Prednisolone 1%.
acetate

↓ epi toxic
↓ IOP rise

NaP — Not potent

» Potent — Fimexolone 1%.

Kenalog
↓
✓ Preservative
Benzyl Alcohol

Alcon - Triesence
Allergan - Trivaris
Triamcinolone

No preservative

40mg/ml as acetonide

- IVTA — 1mg/0.1ml
- stain vitreous
- PST — 40mg/ml
- PCR — To check vitreous in OC.

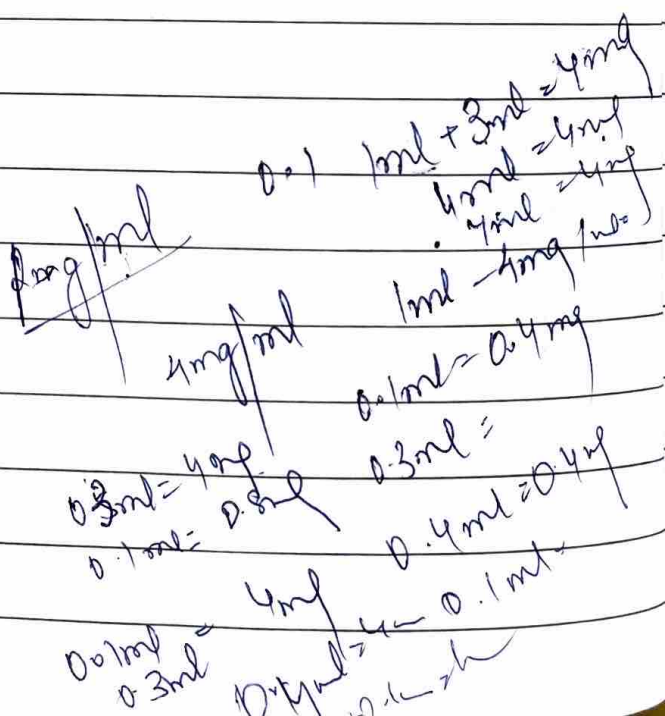
Ivation

- inj in fornix — ↓ CPS
  ↓ Adverse action

active red

VKC — Supratarsal injection

Studies



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Dexamethasone

× problem of fluid retention & HTN
0.4mg/ml

MEAD study — DME
PLACID — Ozu + LASER vs LASER

CHAMLAIN study → Refractory DME.
OPERA Study — DME — ~~EC~~ PPV & Memb removal

MOA of Corticosteroids

- Anti Inflammatory
  - Production of potent chemical mediators
    - 100 ech
      - ↓ Construction of BV
        - ↓ Leakage into Target
      - Stabilizat^{n} of Intracellular lysosomal mem.
        - ↓ PMN cell degranulat^{n} Inhibited
      - Stab. of Mast cell
        - ↓ Histamine, Bradykinin, PAF, ECFs
      - Mobilizat^{n} of [illegible] from Bone M
        - ↓ Neutro leucocytosis
      - Suppress^{n} of Lympho [illegible]
        - ↓ Lymphocytes
  - Leucocyte Chemotaxis
    - ↓ Circulat^{n} of eosino & Monocytes
    - Inhibition of mφ recruit & migrat^{n}
    - Suppression of fibroplasia
    - Bactericidal activity of Mono/mφ
    - Inhibit phospholipase A2 via Macrocortin
- Immunosuppressant

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In of steroids

Conj
- Allergic
- Viral
- Chemical burns
- SJS
- C. pemphigoid

Cornea
- HZ, HSV, Disciform
- Tx.
- PUK
- Abscess.
- graft rejection.

Trauma / Post Sx

Lids
- Blepharitis
- Atopic dermatitis

Uvea
- Iridocyclitis
- Post Uveitis
- Sympathetic
- VKH
- Pars Planitis
- Endophthalmitis

Retina
- Vasculitides
- Chorioditis
- Retinitis
- CME
- ARN

Nerve
- Optic Neuritis
- Temporal Arteritis

Orbit
- Graves
- PseudoTx

EOM
- MG
- Myositis

Sclera
- Scleritis
- Episcleritis

GCs complications

Musculoskel
Myopathy
Osteoporosis
Aseptic Necrosis of bone

GI
Peptic ulcer
GI bleeding
Intestinal perf
Pancreatitis

CNS
Psychiatric
Pseudotumor

CVS
HTN
Na^+, H_2O ret
Hypok^e Alk

Metab
Ipt Ketoacidosis
~~Hyperglycemia~~
Hyperosmolar
~~Non Ketotic Coma~~
↑ lipidemia
Centripetal obesity

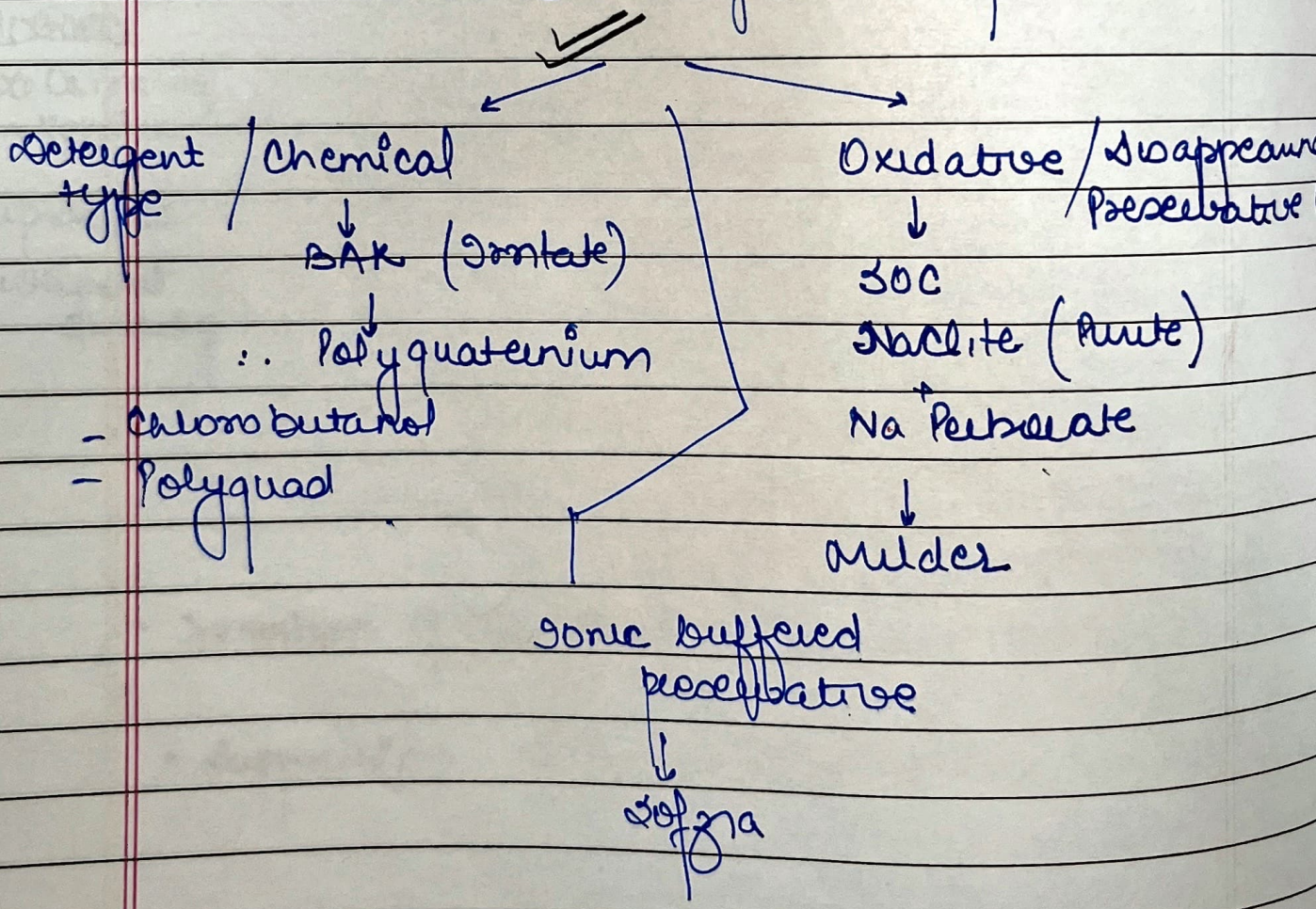
Endocrine
growth fail
2° Amenorrhea
Suppression of HPA axis

Ocular
Cataract
Glaucoma
2° inf
Retard of wound healing
Uveitis
Mydriasis
Ptosis
Exophthalmos
Pseudotumor Cerebri

- Inhibition of fibroplasia. → Impaired wound healing
  ↳ SC. tissue atrophy
- Suppression of immune response

Preservatives

Benzalkonium Chloride , Polyquaternium.
Cetylpyridinium
Thimersal
Chlorobutanol.
Chlorhexinide digluconate
H_2O_2
Sorbic acid
Sodium Bisulfite
EDTA.
SOC - Stabilized oxychloro complex.



Suspensions

Cyclodextrins

β "

eg Norgox → Norgolamide + CH_3 β dextrins

Viscosity

Polyvinyl alcohol
Polyvinyl pyrrolidone
] Spreading characteristics

- Timoptic XE — gelrite ⇒ Phase changer
  ↓
  eg Systane also
-

Injectable Therapeutic Implants

Vitrasert — ganciclovir — AIDS related CMV retinitis — 7½ mth

Retisert — fluocinolone acetonide. (Illuvein) — 36 mths — Post Uveitis, DM, AMD

I-vation — Triamcinolone acetonide — 6mths - 2yrs — AMD

Septocare — Prednisolone Acetate 15mg — Posterior Juxtascleral depot. (Synthetic Cortisol & Angiostatic Vx. gluco-corticoid)

Ozurdex — 350-700µg [dexamethasone

Posurdex

Systane

2 demulcents ⌐ Propylene glycol
⌙ PEG-400

1 gelling agent → Hydroxypropyl guar

≠ 0 (Neutral)

Neutral + Alkaline (tear) + BO_3^{3-} ⇒ Cross linked lattice

↓

Mucin layer adhere

Protects endothelium from dessication.

Anti Virals

Virus classification

- RNA Virus
  - Toga
    - Rubella
  - Paramyxo
    - Measles
    - Mumps
    - New Castle virus
  - Orthomyxo
    - Influenza
  - Picorna.
    - Entero-70
  - Rhabdo
    - Rabies.
- DNA Virus
  - Herpes
    - 1 – HSV1
    - 2 – Zoster
    - 3 →
    - 4 EBV
    - 5 CMV
  - Adeno
    - AFC → 3, 7
    - EKC – 8, 19, 37.
  - Pox
    - Molluscum
    - Vaccinia
    - Variola

9 approved drugs

Idoxuridine
Vidarabine
Acyclovir
Famciclovir
Valacyclovir
Bromovinyldeoxyuridine
Ganciclovir
Foscarnet
Cidofovir

TOXO

Toxoplasma — Pyrimethamine + Sulphadiazine + a ✓

└ Quadruple therapy — Clindamycin + Pyrimethamine + Sulfonamide + Prednisolone + b.

Mild — a . . . . b.

Mod- — a . b Steroids

Macula involving — a b c steroid.

In India

As Cotrimoxazole BD | - 8-12 wks.

↑ &

160 800 mg

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Acanthamoeba

Bootene (Propamidine Isethionate) 0.1%.

Neosporin (Neomycin - Polymyxin - Bacitracin)
0.175%.

Polyhexamethylene Biguanide (PHMB) - 0.02%.
↳ High consistent cysticidal activity
↳ No toxicity

Chlorhexidine — 0.02%.

NSAIDs

Prevent Macular Edema – Post Cataract Sx

Ketorolac – 0.4 %.
Flur – 0.03 %.
Diclofenac – 0.1 %.
Nepafenac – 0.1 %.
Bromfac – 0.09 %.

Prevent Intra-op miosis → Iris is released.
pre-op Rx is key as once PG released. then can't act

Nepa – ↓ Trauma Induced Inflammation.
↓ Inflammation mediated Retinal edema
Amfenac Ocular NV.

Corneal melt

* Protect against Cataract – Aspirin acetylation of Lens protein.

Mast Cell Stabiliger

Cromal - 4% (DSCG)
Nedeocromil - 2%.
Lodoxamide tromethamine 1%.
Spaglumic Acid 4%.
Pemirolast K - 0.1%. QID
NAAGA ⁂ N acetyl aspartyl glutamic acid
DSCG, Lodoxa — VKC

Cromal

Nedeocromil
» potent.
BD

Stabilize both CT & Mucosal mast cell as opposed to Cromyl
Inhibit common pathway
Mastcells, Eosino, epithelial cells, Sensory Nerve

NAAGA — Leukotene Inh.

Olopatadine — OXA
Ketotifen
Azelastine
{Dual} Mast Cell. Inh. Antihist
— Epinastine

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Advantage → Rapid relief by immediate histamine antag
↓.
Alleviate itching & redness
↓.
Long term. disease modifying using mast cell stabilization.

Olopat – 0.1% → also ICAM expression.

Azelastine – ↓ ICAM 1 exp on conj epi, inflam cell infil
Unpleasant taste following instillation

Antihistamine Decongestant Combi

Antazoline – 0.5%
Naphazoline HCl – 0.05%
↳ 0.025%
Pheniramine – 0.3%
Pyrilamine – 0.1%
Phenylephrine – 0.12%

0.012% 0.1%

Oxymetazoline = 0.025%
Phenylephrine = 0.12%
Tetrahydrozoline = 0.05%

Decongestants

Phenylephrine
Imidazole
Naphazoline
Oxymetazoline
Tetrahydrozoline

H1 Recep Antag.

Levocabastine
Emedastine

Dual action

Olopatadin
Ketotifen
Azeldotin
Epinastin

NSAIDS

Ketorolac
(for itching in seasonal)

Fast

Lotepred

Mast cell stabilizer

VKC
Cromal
Lodoxamide.

Seasonal.
Nedocromil
Pemirolast

c in 15 mi
days-wk

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Decongestant

CI – pt ≤ Aneurysm

Adv Rxn	Warning	Precautions
Rebound miosis	Anaesthetic.	Narrow ∠ glau.
CVS risk	Local Anaesthesia	Rebound Congest
↳ Arrythmia	Ventricular arrythmia	Syst Abs.
Aneurysm		Pigment floaters
		Sulfite sensitivity

Ocular Protection Index.

Interblink Interval (IBI)

IBI > TBUT → then day eye i.e ↓. replenish of tear film.

Tear Substitutes

- Demulcents
- Emulsifiers
- Surfactants
- Preservatives
- Viscosity agents.

Demulcents

Compound intended to protect mucous membs & soothe epithelial suface

- Cellulose derivative
- Dextran 70
- gelatin.
- Liquid Polyols.
- PVA.
- Povidone

Any 3.

Cellulose — HPMC. 0.2 - 2.5%.

Oil in H_2O emulsion.

supplement Mucin & lipid components

Polyol — » Lubricants
» HPMC

Propylene g. 0.3%
Polyethylene (PEG-400) 0.4%.
+
Restasis

CMC 0.5% — Refresh tear. — SOC = Refresh +

CMC + glycerin 0.3% — Moisture Eyes BAK
+ Polysorbate 80 1% — Refresh Endura (More)

HPC — 5mg/insert — Lacrisert
HPMC — 0.3% — genteal — No Preservate.
" PF — X.
drops — No Preservate
0.2%. — g. mild.

HPMC + glycerine + Dextran 70 — Tear Natural forte.
L Polyquaternium 1

— Tear Natural free ×

Muricel — MC — 1%

Aquasite — Polycarbophil, PEG 400, Dextran 70. (EDTA)

PVA — 1.4%. — AKWA Tears
L + PEG 400 + Dextran 1% — Hypotears BAK | EDTA
" PF EDTA

Povidone 1.4%. — Mucine Tears

Propylene glycol, PEG 400 — 0.3 0.4%. Systane Polyquater
" PF

Ont

Genteal PM — 85% white petrolatum 15% mineral oil
Lacrilube — 56.8% " 42.5% "
+ chlorobutanol + Lanolin Alcohol

AKWA tear — NP, LL, MO

Hypotears — NP, MO.

Refresh PM — Lacrilube — Chlorobutanol

Ions

Bicarbonate → ↓ Recovery of damaged Corneal epithelial cells & maintanence of Ocular Surface health

K^+ → ↓ Retain Corneal thickness

0.1%.

CMC + HA — Optive fusion

HP-Guar — Systane ultra.

HA + " — " " Hydrat^n

Osmoprotectants

L Carnitine, Erythritol, Trehalose, Betaine

Visomitin — Antioxidant property

Electrolyte profile

Thealoz

Bion tears

↓

Omega 3 F.A.

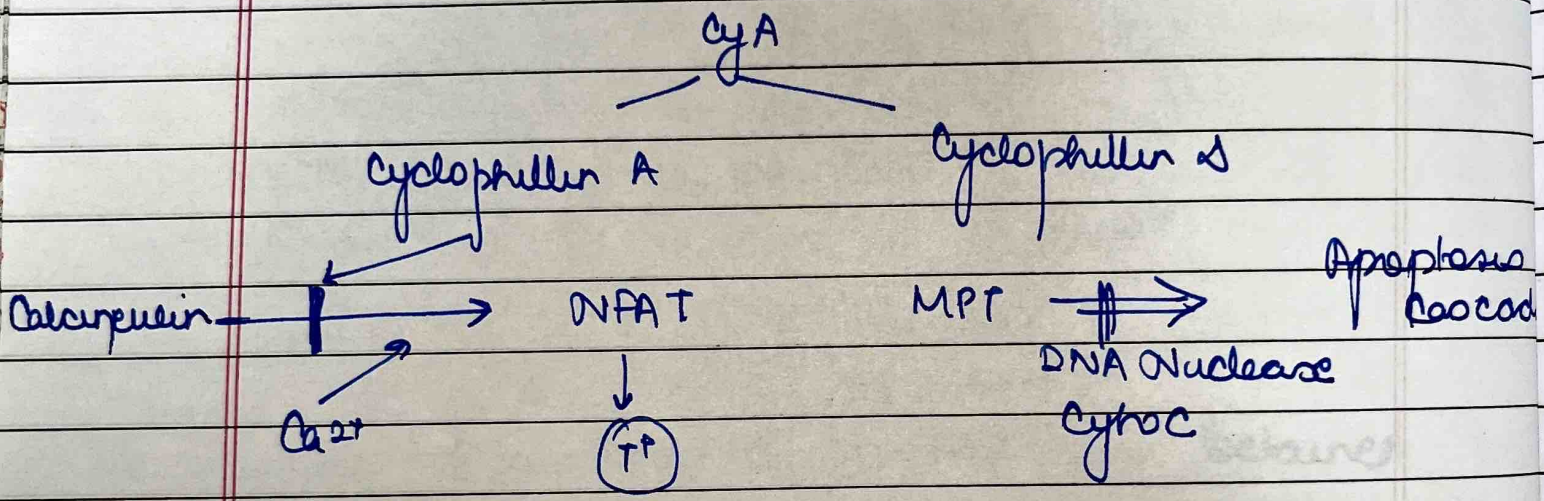
lipid layer permeating - freshcare
Refresh Endura — Improve TBUT

LLT (lipid layer thickness) — Restasyl.
Systane

Cyclosporine

Dry Eyes
Endothelial rejection → 1% cyclosporin.
↓ apoptosis of KED
conj goblet cell density ↑

lipid emulsion better — Castor oil + glycerin
Polysorbate 80 + NaOH



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Botulinum

- Treatment of Persistent epithelial defect in patients post PK. to Induce Ptosis
  - Benefit → drop instillation.
    Examination easy.

Antineoplastic Antibiotic

Streptomyces Caespitosus **Mitomycin**

- Scar prevention. In high risk eyes undergoing PRK to correct post op (PK) astigmatism.
- Bleb Treatment → fibrosis is prevented.
- Rx of OSSN.
- Earlier Rx of PVR changes — tried intracameral
- Rx of Idiopathic Canalicular Blockage. Cicatricial
- Rx of Post LASIK Epithelial ingrowth.

2mg/ml vial

+5ml → 0.4mg/ml → 0.04%

+10ml → 0.2mg/ml → 0.02%

Toll — Compleat ↓ C. Yelb Sirtis

Pterygium — Squint Sx ± late Adjustable Sutures
Glaucoma filtrat Sx — Destructive
Refractive Sx
OSSN — Allergic Conj → In place of Mitomycin
OCR

Phenylephrine

α_1 Agonist

Action → Contracts Iris dilator mal
Contracts smooth mal of C. arteriales
Pupillary dilation
Blanching of Conj.
Mueller's mal of Upper lid stimulated ∴ ↑PFH

Uses → Mydriasis — 2.5% 10%.
Dx of Horner Syndr — 1%.
(↑ effect in Corneal abrasion).
Dx of Tonic, ARP, Tectal pupil 0.1%.

Caution	CI
HTN	TCA
Cardiac	MAO
Arteriosclerosis	Reserpine
DM	CH_3 dopa

- Decongestant — 0.12%.
- Sup & Deep Vasc diff.

Also as part of Mydriatic provocative test for Angle closure (10%)

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Other Mydriatic

Hydroxyamphetamine 1%. + 0.25%. Topical.

↓ Paremyd.

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Botulinum

- For LR palsy — Inject in MR. 5U
- Essential Blepharophimosis
- ↓ of Persistent epithelial defect — 7.5U
  Injected into Orbital floor adjacent to LPs.

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SiRNAs

Double stranded RNA (a) + DICER (Protein Complex) = RNA (a) breaks

broken fragments

RISC
RNA induced.
silencing complex

eliminate one of strands

Remaining strand + RISC ⇒ Probe that recognises corresp mRNA

Probe finds complementary mRNA transcript

Transcript is cleaved & degraded
∴ silencing gene expression.

Bevasiranib / Cand5 — intravitreal inj

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Receptor Tyrosine kinase inhibitors

Non RNA | Inh of VEGF receptor Tyrosine kinase activity

Oral route. Dose - 1000mg

a) PTK 787 / Vatalanib
non selective inhibitor of all VEGF receptor

ADVANCE study OD x 3mth

b) AG 013958 - selective VEGFR & PDGFR inh
& Sutenon

fenretinide

Oral VitA binding protein antagonist for GA

halts accumulation of Vit A (retinol toxin)

Lipofuscin debris deposit — stop by fenretinide

↓ reabsorbed

~~in AMD~~.

↓

∴ drusen

300 mg dose.

Phase III trials.

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CNTF

Ciliary Neurotrophic factor

Neuroprotective agent

stops cell death & rescue photoreceptors

↓

change in total Macular vol & ↑ Retinal thickness

NT 501 Implant

Glitasamer acetate.

Copaxone

weekly vaccination ↑

- MD — Drusen in Retina
- Alzheimer's
- MS
- Plaque in Brain

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Off LABEL drugs in Ophthal

Avastin
Infliximab
RL
i.v inj of Endoph
5FU
mito C
PDT for AMD
Topical Cyclosporin A
Riboflavin drops
5% Povidone Iodine
Peribulbar steroids

Lasel

- Thermal effect
  - Photo Coag
    - Argon
    - krypton
    - freq doubled Nd YAG
    - CW Nd YAG
    - Long pulsed Nd:YAG
    - Dye
    - Diode (810nm)
  - Photo Vaporizat^{n}
    - CO_2
- Photochemical effect
  - Photo ablation
    - Excimer Ag/Kr
    - freq quad Nd:YAG
    - Holmium: YAG
    - freq doubled dye.
  - Photoradiation
    - Dye
    - Gold Vapor
    - Diode (689 nm)
- Ionising effect
  - Photodisruption
    - Q switch Nd.
    - Mode locked Nd
    - Nd-YLF
    - Er: YAG
    - Holmium YAG
    - Er: YLF

LASER in Ophthalmology

exc | Xenon Arc

Monochromatic → Single freq. → × chromatic Ab

Coherent Beam → All photons produced are in phase with each other with limited divergence.

PhotoCoagulation

temp ↑ 4m 37°C → 50°C

↓

Denaturation of protein.

Coagulation at tissue site

↓

Light → Heat energy

Burn ∝ λ

Abs by

↓

Melanin pig.

↓

400-700 nm

» TM.

Co-abs in RPE (M. somes)

Choroid (M. cytes)

↓

Xanthophyll at Macula

IPL, OPL

Blue – Max

green – Poor

↓

∴ Abs green

No Abs (green) ✓

x → Blue green.

↓

Hb.

Big, Y ✓

x → R

Arg	double freq (green) Nd YAG		krypton red.	diode.	Nd YAG
514	532		647nm.	810 nm.	1064 nm
				Pulse ↓ disrupt^{n}.	Cout ↓ Coag

RPE & choriocapillaries

Deeper lesions in choroid.

threshold choroidal damage pain.

* Blue ↓ LASER → At Macula — Unwanted retinal damage.
In Older pt — Abs blue light » By ageing lens

Laser used in Photocoagulation

CW green Argon

514.5 nm.

RPE, Hb
CC
Layer of Rod/Cones
ONL, INL.
Melanin.

Coagulates 4m.
CC — NL.

✓ — RPE
Choroids
B.V

Freq doubled Nd YAG

532nm
green Nd YAG/KTP

Hb » RPE
Melanin TM

CC — ONL

Why popular

- small & portable.
- Solid state.
- Aiming beam = diode laser size.
- ↓ Energy transmiss" safer in Macula.

Krypton Red LASER

647nm

✓ Melanin
✗ Hb
✗ Xantho
∴ Macular
Subretinal NVM

RPE & choroids
Vascular System
↓ abs & ↑ transmitted thru RPE. ∴ CC & C.

Diode laser

810 nm
Semiconductor LASER.

✗ → for μAn.
✓ → DME & Arg, Nd

✓ → pt convenient as ✗ bright flash light
↓ cost, portable
✗ painful

Grading of laser burns

Grade I	II	III	IV
Light	Mild	Moderate	Heavy
Barely visible blanching of RPE.	Hazy faint white Retinal Coagulat^n	Opaque dirty white Retinal Coag	Dense white Chalky RC.
↓		↓	
DME		PRP	
		Retinal tears.	
		Abn. B.V.	

Opacities influence. Laser Parameters →
C. Edema, haziness, flare & cells.
Lental Opacity, Viteous Opacities

↓ Barely Visible constriction of vessel.

↓ Total constrict^n & spasm of vessel.

↓ + Coag of Duct tissue

↓ + + Charring of vessels.

~~Ndyag~~

Invisible.

∴ aiming beam [He-Ne. —— Visible red
~~He~~ diode Red –

Laser Parameters

- Power
- Exposure time
- Spot size ∝ —— Laser spot Magnification factor (LSMF)
  - spot size
  - Refractn of eye
    - Myope – longer.
- Energy – P × ET.

Continous Mode

Pulse

Q switching
↓
(Min exposure)
light cannot travel back & forth until complete population inversion
↓
released in pulse of few to tens of Nanosec

Mode locking
after Max pop inversion
∴ diff modes of light synchronized
Peak of Energy

Post PhotoCoagulation Advice

- Aim to reduce/control venous pressure.
  rise in the eyes

Avoid sneezing
* heavy exs & yoga.

Photovaporization
Temp > P. Coag
tissue disruption
Cutting + PhotoCoag

Photoablation
temp ↑
tissue disappears
Excimer — 193 nm.
— better than.
Kaf (248 nm)

Photoradiation
Hematoporphyrin
Red light → 630 nm
Cytotoxic singlet O_2

Verteporfin (CNVM)
689 nm

Photodisruption
localized area
temp 1 4m 37°C to 15000°C
development of plasma field & bubble
hydrodynamic & acoustic shock wave

Laser delivery systems

- Slit lamp
- LIO
  - Argreen
    - ✓ → PC of break, deg PRP in periphery
    - Photocoag in children
    - ↓ age
      - Eyes ⊆ small pupil, IO gas
      - Incidental Opacities
      - spot size ∝ Rep status
      - handheld lens
  - Conventional single spot LASER – Argon ↑ freq, doubled YAG Krypton.
- endoscopic
  - Aeg green diode
    - ✓ During PPV
    - Inner SRF removal deg ✓

glaucoma

- Q Switched
  - ↓
  - Iridotomies
- ND YAG
  - Pulsed thermal
  - Cont wave
    - ↓
    - DLCP

PASCAL

Pattern Scan Laser PC

Semi automated, multiple pattern, short pulse multiple shot, painless procedure LASER burns ≤ freq doubled. YAG LASER.

	PASCAL	Conv
• Pulse duration	10-20 msec	100-200 msec
	↓ collateral damage.	
• Size of burn post laser	Constant	↑ ≤ time.
	↓ destructive than	
• Titration		⇒ easy
• Diff pattern	*	
•	allow > periphery	
•	> accurately in	macular area
•	↑ in ME	
•	perfectly spaced ∴	× overlapping ∴ ⇒ field of vision.
• Single spot mode also available.		
• 36 spots in 0.6s.		
• ↓ pain		
• ↓ Rx duration.		

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(*) Semi Circular — IC of R. periphery
Std Square — Mid periphery
Circular — Retinal holes / breaks.

Precise, pre determined settings →
Square array — PDR
Triple arcs — Retinal tear, Kattre deg, PDR
Modified Macular grid — Diffuse DME

Disadvantages → Restricted spot size. 100, 200, 400
150, 300 & >400 — Not available
) Noise on activation
) Green λ emitted ∴ difficult penetration
) Xpose difficult in periphery ∴ use ↓ intensity

PRP lenses

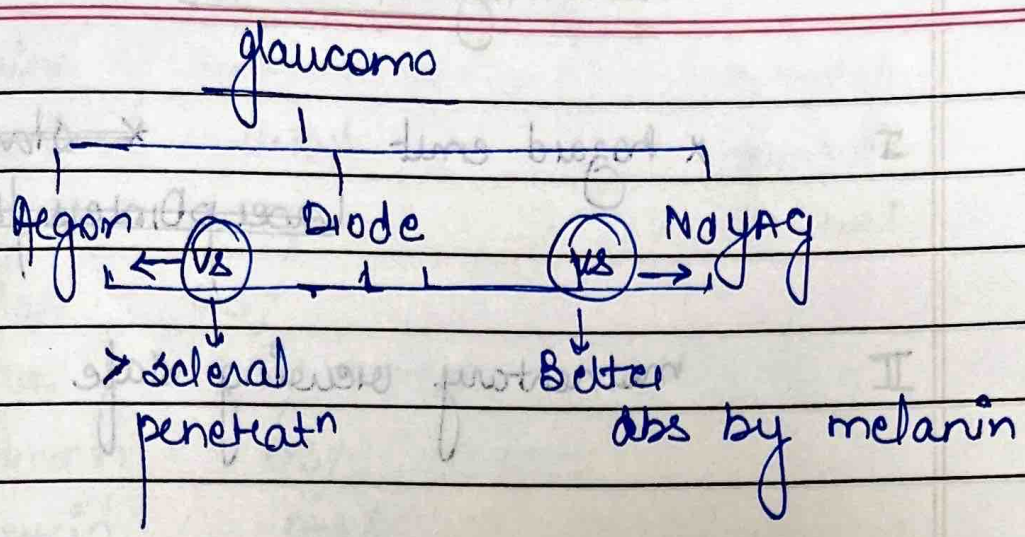
Lens	Image Magni (PP)	LSMF	Field
Mainster Widefield	0.68 *	1.5 *	118 - 127°
Volk Quadrispheric	0.51 *	1.97 *	120 - 144°
goldmann 3 Mirror	0.93 *	1.08 *	140°
Volk Super Quad 160	0.50 *	2.00 *	160 - 165°
Mainster PRP 165	0.51 *	1.96 *	165 - 180°

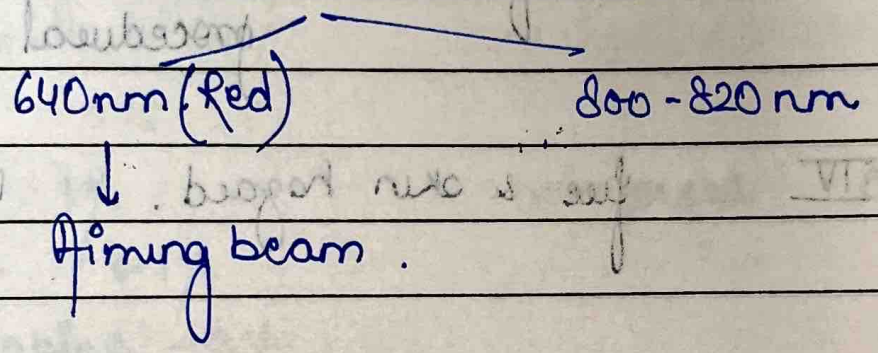
Bigid laser lenses

Volk area centralis	1.06 *	0.94 *	70 - 84°
Mainster high. Magnificat"	1.25 *	0.8 *	75 - 88°
Std.	0.96 *	1.05 *	90 - 121°
Ocular PDT 1.6 *	0.63 *	1.6 *	120 - 133°
goldman 3 Mirror	0.93 *	1.08 *	140°

ALT | SLT Lenses

Lens	Laser Magni	LSMF	Field of view	Ix
Latera.	1 *	1 *	130°	SLT, ALT
Ocular Magna.	1.3 *	0.77 *	160°	"
Litch.	1.4 *	0.70 *	80°	ALT
goldmann 3 mirror	0.93 *	1.08 *	140°	ALT
Pollack. Indotomy	1.5 *	0.65 *	160°	SLT, ALT





Why Antireflection Coating — Bystander at side of slit lamp exposed to unattenuated back reflection ≤ in 1m of Contact lens

Laser Hazard levels

I — x hazard emit ~~x stored~~.
~~Laser pointers / beam~~.

II — momentary viewing safe

III — Unsafe. Requiring procedural control

IV — fire & skin hazard. ↓ Most laser beam

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Lignocaine 2%.
Bupivacaine 0.75%.
Moxiflox 0.5%.
Gatiflox 0.3%.
Levoflox 0.5% & 1.5%.
Gentamicin 0.3%.
Tobramycin 0.3%.
Azithromycin 1%
Pilocarpine - 2-4%
Timolol 0.25 - 0.5%.
TFT - 1%. - Twiomersal 0.001%.
IDU - 0.1%.
Vidarabine - 3%.
Ketorolac - ~~0.04%~~ 0.4%.
Lacular - 0.5%.
Flur - 0.03%.
Diclo - 0.1%.
Nepafenac - 0.1%.
Bromfenac - 0.09%.

Combination

Cyclomydril	–	Cyclopentolate 1%	Phenylephrine 1%
Phenmyd	–	Tropicamide 0.25%	Hydroxy Am-1
Mydrocell	–	Scopolamine 0.3%	Phenyl ep 10%

How to make

- Fortified
- Enhanced

Ceftazidime – Vanco

Ceft Vanco

Voriconazole