This is a compilation effort from my preparation notes and other sources, thus any contributions or comments are welcomed in the effort to improve this book. Therefore, feel free to e-mail me at
drdpatel87@gmail.com
Thank you GOD

This manual is collection of the mnemonics I made, found in books or internet when studying for the Final MD exam and Senior Residency Entrance Exam in ophthalmology. Till last few months of exam, I believed that I will understand and remember all important facts and will hardly need specially devised mnemonics for it. As exam fever comes nearer, all things started to evaporate.

I do not pretend that this manual will cause a lot improvement in your preparation, despite that, I am proud of what I have produced and hope you will find it a useful memory aid and help to increase your confidence in memorizing some confusing but important facts!

Many of these may be just simple fundamentals, but during your exams or MCQ test, there may not be time to recollect your basics and you may give wrong answer. I hope this manual of mnemonics may help to reduce your evaporation.

I hope it may help you to seal or laser your breaks of knowledge.

Good luck!

-Dhaval Patel MD

drdpatel87@gmail.com

January 2014
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Heterochromia

Difference in colour of the iris in the same eye is called heterochromia iridis.

Difference in colour between the iris of the two eyes is called heterochromia iridium.

Hypersensitivity

OCP is type 2-twO hypersensitivity reaction.

SJS-EM-TEN is type 3-thrEE hypersensitivity reaction.

Spindled cell Tumors

SLAM

- Spindle cell SCC - Keratin +
- Leiomyosarcoma - Smooth muscle actin (SMA)+
- Atypical fibroxanthoma (AFX) - CD68+, Vimentin+, CD99+, Procollagen-1 but really considered diagnosis of exclusion
- Melanoma - S100+

Achromatopsia:

But GoD RePly

Blue: Tritanopia
Green: Deuteranopia

Red: Protanopia

**Cells in Plexiform Layer**

The outer plexiform layer is composed of interconnections between photoreceptor synaptic bodies, horizontal cells, and bipolar cells. The inner plexiform layer is composed of connections between bipolar cells, amacrine cells, and ganglion cells.

- Outer PHoB
- Inner BAG

**Visual acuity**

**ViSoCo Separation**

_3 components of VA_

- Detection of presence or absence of stimulus, i.e. Minimum visible/ detection
- Ability to distinguish between more than one identifiable feature in a visible target, i.e. Minimum resolvable.
- Minimum recognisable
- Judgement of location of visual target relative to another element of the same target, i.e. Minimum separable $\Rightarrow$ Hyperacuity

**VA tests**

DeSoCo (Disco..!!)
Detection acuity tests: catford drum, stycar graded ball, boeck candy, dot visual acuity

Resolution acuity tests: OKN, VEP, PLT(teller card)

Recognition acuity tests:
- Direction identification: sjogren’s hand test, landolt’s C, snellen’s E, arrows
- Letter identification: snellen, sheridan’s, lipman’s HOTV, fook’s dymbol
- Picture identification

Lacrimal Gland

Orbital lobe of lacrimal gland is **anterior** and Palpebral lobe is **posterior**.

?? how can this basic anatomy has controversy...oops...but I think it is controversial.few books write palpebral is anterior and orbital is posterior.!!

Yes...!! Duane’s 2007 says that it’s actually Superior and Inferior. Orbital is superior and Palpebral is posterior...but by reading it thoroughly, the above controversial line seems true...still it’s difficult to believe for me. Many other textbooks quotes reverse...!! or we can just remember it like superior and inferior lobes of the lacrimal gland. I don’t know exactly which is anterior and which is posterior...!!

Treponemal Tests

Fluorescent treponemal antibody-absorption (FTA-ABS) and microhemagglutination of Treponema pallidum (MHA-TP) are the closest to a “gold standard” for syphilis testing.

The Venereal Disease Research Laboratory (VDRL) and rapid plasma reagin (RPR) tests reflect treponemal infection and revert to normal when treated.
FTA, MHA are Always positive

VDRL, RPR tests Reverts back to normal

DNA viruses

HHAPPPPPP

- Herpes - HSV, VZV, CMV (blueberry muffin baby), Roseola (HHV6 and 7 - half a dozen roses), Kaposi’s (HHV8), possibly PR
- Hepadna - Hepatitis B
- Adeno
  - Papilloma= HPV. 6,11,16,18 in Gardasil. 6,11 = warts. 16,18 = dysplasia; E6-p53; E7-Retinoblastoma
- Polyoma = JC John Cunningham Virus - PML - why Efalizumab taken off market;
  - Merkel Cell = CK20 - paranuclear dot
- Papova = old name that includes Papilloma and Polyoma
- Pox = Molluscum, Smallpox, Vaccinia; (Orf = parapox)
- Parvo B19 = slapped cheeks, lacy rash, anemia, joint pain in adults. Bad in pregnancy, sickle cell.

Synaptic Body

The synaptic body of a rod is called a spherule, whereas that of the cone is called a pedicle.

Visual Cycle Clues
light phase: 11 Trans retinal with opsin

dark phase: 11 cis retinal with opsin

**Dark:** Depolarization of photoreceptor → Displays NT (release of NT)

**Light:** Hyperpolarization of photoreceptor → Hides NT (no release of NT)

### Differentiation of Retinal Cells

**GCAHRBM** → God Can Always Help Revealing Best Messages.

The inner layer of the optic cup contains the pluripotent retinal progenitor cells, which differentiate in a specific chronologic sequence and defined histogenic order into the final seven retinal cell types. In general, the ganglion cells differentiate first, followed by the cone photoreceptors, amacrine cells, horizontal cells, and finally, the rod photoreceptors, bipolar cells, and Müller cells.

### Corneal Quadrants

**TINS** (thickness in descending order)

temporal (28%), inferior (19%), nasal (11%), and superior (4%).

*(so remember this.. its not like ISNT of glaucoma)*

### Ishihara Clues

Reads first 7 plates (except “12”) incorrectly and unable to read the rest: red-green deficiency

Reads “26” as 6 and “42 as 2: protan defect

Reads “26 as 2 and “42 as 4: deutan defect
Remember Dhaval Patel 😊: from 26 & 42, if one reads first letter correctly, its Deutan, if second letter correctly, its Protan. (D for first and P for second. Think about it once)

**Color vision deficiency**

- Retinal disease: Blue yellow defect Ru-BY
- Optic Nerve disease: Red Green defect O-RGan

**Dimensional characteristics of the optic nerve**

125-1017
- intraocular (1)
- intraorbital (25)
- intracanalicular (10)
- intracranial (17)

**IOP-elevating potential**

DPLFHT

in decreasing order

\[ dexamethasone > prednisolone > loteprednol etabonate > fluorometholone > hydrocortisone > tetrahydrotriamcinolone. \]

**LASERs**
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<td>10,600 (far infrared)</td>
<td>Photothermal</td>
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<td>Nd:YAG</td>
<td>1064 (near infrared)</td>
<td>Photodisruption</td>
</tr>
<tr>
<td>Femtosecond</td>
<td>1053 (near infrared)</td>
<td>Photodisruption</td>
</tr>
<tr>
<td>Krypton</td>
<td>647–531 visible light</td>
<td>Photochemical (coagulation)</td>
</tr>
<tr>
<td>Argon</td>
<td>514–488 visible light</td>
<td>Photochemical (coagulation)</td>
</tr>
<tr>
<td>Excimer</td>
<td>193 far ultraviolet</td>
<td>Photoablation</td>
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As you go down, T \(\rightarrow\) D \(\rightarrow\) C \(\rightarrow\) A (TaDKa)

Thermal \(\rightarrow\) Disruption \(\rightarrow\) Coagulative \(\rightarrow\) Ablative

**LASER Properties**

**MICCU**

- Monochromatic
- Interference
- Coherence
- Collimation
- Unidirectional

**Sterilization in ophthalmology**

**ABCDEF**

**AUTOCLAVE**

**BOILING**

Chemicals like Alcohol (Rectified spirit), Isopropyl alcohol/ClOEX: 2% Glutaraldehyde

**DRY HEAT** temperature of 150°C is used for 90 minutes

**ETHYLENE OXIDE** for sterilization of IOL etc.
FUMIGATION of operation theatre/ FORMALIN vapour
GAMMA-IRRADIATION: Gamma rays from Cobalt-60

**Neuroectoderm**

MORE

- Muscles of pupil
- Optic Nerve
- Retina (with RPE)
- Epithelium of Iris
- Epithelium of Ciliary Body

**Surface ectoderm**

S1 L2 E3 (you can remember SLE- which is surface ectoderm disease)

- Skin of Eyelids and its derivatives viz. cilia, tarsal glands, conjunctival gland
- Lens,
- Lacrimal Gland,
- Epithelium of Conjunctiva,
- Epithelium of Cornea,
- Epithelium of lacrimal passage

**Mesoderm**

MeSS

- Extraocular muscles
- Sclera (small area temporally)
Schlemm's canal

**Neural crest**

*STOC’S*

Stroma of Iris and ciliary body

Trabecular meshwork

Orbital cartilage and bone

Ciliary muscles

Corneal *stroma* and endothelium

Connective tissue of extraocular muscles

Sclera

**Refractive indices**

8303 (from anterior to posterior)

cornea 1.38

aqueous humour 1.33

lens 1.40

vit humour 1.33

**Cavernous Sinus**

Rule of 3
3 Afferent veins: Sphenoparietal sinus (Vault veins), Superficial Middle cerebral Vein (Brain), Ophthalmic vein (Orbit)

3 Efferent Veins: Superior petrosal sinus, Inferior Petrosal Sinus, Communicating vein to pterygoid plexus

3 Contents: Cranial Nerves (III, IV, V1, V2 & VI)

3 Areas Drain into it: Vault Bones, Brain (Cerebral Hemisphere), Orbit

3 Nerves: Motor (III, IV, VI), Sensory (V1, V2), Sympathetic

Optic Nerve

Optic Nerve head as Nasal side, so blind spot is temporal side.

Stroma of Choroid

haLLer layer: Larger, outer
Sattler later: Smaller, inner

Medial orbital wall

Nose it at medial side of orbit, which SMEL

Sphenoid (lesser wing)
Maxilla
Ethmoid
Lacrimal

Floor of Orbit
PZM (PayZaMa)

Palatine

Zygoma

Maxilla

Nerves outside Annulus at SOF

LFT

Lacrimal

Frontal

Trochlear

Whitnall tubercle attachment

4 “L”

Levator aponeurosis

Ligament of LR (check ligament)

Lockwood’s ligament

Lateral canthal ligament

Retinal Layers

10 -outer to inner

RPE o-NP i-NP GNI
RPE
Photoreceptor layer
ELM
Outer Nuclear
Outer Plexiform
Inner Nuclear
Inner Plexiform
Ganglion cell layer
Nerve Fiber layer
ILM

Ciliary Epithelial Layers

OPIN
Outer → Pigmented
Inner → Non-pigmented

Generally if you know embryology, you don’t need this but still.. 😊

Ophthalmic Artery branches

PALS MS MD
Posterior ethmoidal
Anterior ethmoidal
Lacrimal
Supratrochlear
Muscular
Supraorbital
Medial palpebral
Dorsal nasal

**Superior Ophthalmic Vein**

**PALS MAC**

Posterior ethmoidal
Anterior ethmoidal
Lacrimal
Superior vortex
Muscular
Anterior ciliary veins
Central retinal vein

**Facial Blocks**

**LOAN**

van Lint’s block: Blocking the peripheral branches of facial nerve

O’Brien’s block: Facial nerve trunk block at the neck of mandible
**Atkinson’s block**: In it superior branches of the facial nerve are blocked by injecting anaesthetic solution at the inferior margin of the zygomatic bone.

**Nadbadh block**: facial nerve is blocked as it leaves the skull through the stylomastoid foramen.

**Hyaloid Remnants**

**B is Behind**

Bergmeister’s papilla: at optic nerve

Mittendorf dot: behind lens

**Stimulus for Goldman Perimetry**

**Roman numeral**: Size of the target in square millimeters (Each successive number is an increase by a factor of four)

**Arabic numeral**: Intensity of the light presented (Each successive number is 3.15 times brighter than the previous one)

**Lower case letter**: Minor filter (The ‘‘a’’ is the darkest, and each progressive letter is an increase by 0.1 log unit)

**Lacrimal Duct**

**IPL**

It passes inferiorly, posteriorly and laterally.

**TGFB1 and Dystrophies**
GREAT

- Granular
- Reis Buckler
- EBMD
- IAttice
- Thiel Behnke

**TGFB1**: aka BIGH3, 5q31.2, Protein produced by corneal epithelium, Phenotypic heterogeneity

**Wilbrand’s Knee**

Just think this “KNEE” as “NI” and you have the answer → Nasal and Inferior

The inferior nasal retinal fibers cross in the anterior chiasm and are thought to loop anteriorly in the contralateral optic nerve before traveling posteriorly, leading to the term Wilbrand’s knee (NI=Nasal + Inferior). It is now thought that Wilbrand’s knee may be an artifact.

**Combination H1 antagonists/mast cell inhibitors**

**POKAN**

Ketotifen (Zaditor)
Olopatadine (Patanol)
Nedocromil sodium (Alocril)
Azelastine hydrochloride (Optivar)
Pemirolast (Alamast)
Optics

Galilean telescope

- **Positive lens**: Objective lens
- **Negative lens**: Eye piece

In keplerian telescope, both are positive lens.

Hard lens

**SAM FAP**: Steeper Add Minus, Flatter Add Plus

Bending of Light Ray

**HLA**: Higher to Lower RI → Away from normal

When a light ray passes from a medium with a higher refractive index to a medium with a lower refractive index, is it bent away from the normal?

Soft lens

**LARS**: Left Add Right Subtract

**IMAGE**

- **DEV → DO**: Erect Virtual
- **IIR → IO**: Inverted Real
Basic Lens Formula:

_Under Water_

\[ U + D = V \]

(this is very basic of optics and all know and understand it, but still in case if one get confused, use the mnemonic)

PROPERTIES OF LIGHT

R2D2TIPS

1. Reflection
2. Refraction
3. Dispersion
4. Diffraction
5. Total internal reflection
6. Interference
7. Polarization
8. Scattering

Axis of Eye

FOVe

- **Fixation Axis**: This is a straight line that joins center of rotation of eyeball with fixation point
o **Optical Axis**: A line passing through center of cornea, center of lens and posterior pole of retina is the optical axis of eyeball

o **Visual Axis**: A line joining point of fixation with fovea and passing through nodal point of eyeball is called visual axis. Nodal point of eyeball is just anterior to posterior capsule of lens. Fixation point is the point which is being seen with fovea at any particular moment.

o **Pupillary Line**: This is a straight line that passes through center of pupil

**Angles of the Eye**

- Angle Alpha is the angle formed between optical axis and visual axis. \( \text{AOV} \)
- Angle Kappa is the angle formed between visual axis and pupillary axis. \( \text{KaVPa} \)
- Angle Gamma is the angle formed between optical axis and fixation axis. \( \text{GOF} = \text{FOG} \)

*Positive angle Kappa results in pseudoxotropia. \( \text{K-POX} \)*

**Reflex convergence**

**FAT-P**

1. **Proximal convergence**: Psychological awareness of a near object initiates this type of convergence.

2. **Tonic**: It means that when the patient is awake there is an inherent tone in the extraocular muscles.
3. **Fusional**: It is initiated by a **bi-temporal retinal image disparity** and is not associated with change in refractive status of eyeball. It ensures that image of an object falls on corresponding retinal points in the two eyes.

4. **Accommodative**: It is initiated by act of **accommodation**. It means that when we accommodate; we converge. It is a part of near reflex. One dioptre of accommodation is accompanied by 4-5 prism diopters of accommodative convergence and it remains fairly constant. Abnormalities of accommodative convergence are associated with squint.

**Hyperopia**

**Total hyperopia** = **manifest hyperopia** *(absolute hyperopia + facultative hyperopia) + latent hyperopia*.  

**Manifest**: Both part of hyperopia that **can and cannot** be corrected by the power of accommodation

**Absolute**: That part of hyperopia that **cannot** be corrected by the power of accommodation

**Facultative**: That part of hyperopia that **can** be corrected by the power of accommodation

**Latent**: That part of hyperopia that **can** be corrected by the **tone** of ciliary muscle

**Direct ophthalmoscope**

In DO, the optic disc may not be focused as you see it, as hypermetropic patients require more “plus” (green numbers) lenses for clear focus of the fundus while myopia patients require more “minus” (red numbers). **MiRe**
Prism

Light is **Bent** towards **Base** of Prism.

Image is shifted towards Apex of Prism. (this is for virtual image)

Deviation

**Minus lens Measures More**

Focal Points

**Primary focal point (F1)**, The point along the optical axis at which an object must be placed for parallel rays to emerge from the lens. Thus, the image is at infinity.

**Secondary focal point (F2)**, The point along the optical axis at which parallel incoming rays are brought into focus. It is equal to 1/lens power in diopters (D). The object is now at infinity.

Aberrations of Thick lenses

**C-CODS**

1. Spherical aberration:

2. Coma:

3. Astigmatism of oblique incidence:

4. Chromatic aberration:

5. Distortion:
Near triad

CAM
Convergence
Accommodation
Miosis

Hypermetropia types

CAPAI
Curvatural
Axial
Positional
Aphakia
Index

Myopia types

CAPAI
Curvatural
Axial
Positional
Accomodation
Index
Berliner’s seven methods of Slit lamp illumination

**DD RIO SS**
- Diffuse illumination
- Direct focal illumination
- Retroillumination
- Indirect illumination
- Oscillating illumination of koeppe
- Specular reflection
- Sclerotic scatter

**Pentacam**

5 things: **3D-PSC**
- 3D anterior chamber analyser
- Densitometry of lens
- Pachymetry
- Scheimpflug image of anterior segment
- Corneal topography

**Specular Zones**

*Bright towards bowman’s and Dark towards descemet’s*

*Bright boundary* is between zone 1 and 2.
Dark boundary is between zone 3 and 4.

**RAF Ruler**

**ABCD**

Accommodation: Blurring

Convergence: Diplopia

*It means while checking for accommodation, you need to see for diplopia and while checking for convergence you need to see for Diplopia.*

**Topography color Maps**

- **Red is Raised**
- **Blue is Below**
- **Green is Ground plane/ Reference plane**

**Cornea**

**Schirmer’s test**

*Test 1 measures 2 thing,*

*Test 2 measures 1 thing,*

*Test 3 measures NOSE thing.*

A Schirmer’s I (without anesthesia): basal and reflex tear secretion
Schirmer's II (with anesthesia): basal tear secretion

Schirmer’s III is with nose irritation

(though some book says different 😊)

Adenovirus

**Pharyngoconjunctival fever** is caused by serotypes 3, 4, 7, 11 of adenovirus. It is associated with keratitis in 30% cases. \((3+4 = 7, 7+4 = 11)\)

**Epidemic keratoconjunctivitis** is caused by serotypes 8, 9, 17, 37 of adenovirus. It is associated with keratitis in 80% cases. \((E = \text{Eight}, 8+9 = 17)\)

Bacterial adhesion

*S. Aureus* uses **Adhesins** to bind bowman’s membrane and stroma

*Pseudomonas* uses **Proteases** and **Elastases** to invade stroma

Bacteria which can invade corneal epithelium primarily:

**Cornea Has Lost Normal Strength.**

Corynebacter

Hemophilus

Listeria

Niesseria

Shigella
Non-infectious from suppurative infiltrates

**PEDAL**

Pain

Epithelial defects (> 1mm)

Discharge

Anterior chamber reaction (uveitis, hypopyon)

Location central

Suppurated are associated with PEDAL

Epithelial cells of the limbus and central cornea

**Limbus**: CK 5/14+ve, CK 19+ve, P63+ve, Vimentin+ve

5+14 = 19

**Central Cornea**: CK 3/12+ve, CX 43+ve

3 x 4 = 12, 4.3

Follicles and Papillae

*Follicles* are usually seen in *viral and chlamydial* Conjunctivitis.

**F-VC (FeViCHol)**

Trachoma

Acute follicular conjunctivitis

Chronic follicular conjunctivitis

Benign (School) folliculosis
**Papillae** are usually seen in *allergic and bacterial* conjunctivitis.

**P-AB**
- Trachoma
- Spring catarrh
- Allergic conjunctivitis
- Giant papillary conjunctivitis

**Gland of Conjunctiva**

*See Little Kittens Walking, Going My Home*

Serous: Lacrimal
- Krause
- Wolfring

Mucous: Goblet (maximum at inferonasal)
- Manz (encircles limbus)
- Henle’s Crypts

**Sweaty Molly**

Sweat Gland is Moll’s Gland, ECCrine

Meibomian: Sebaceous, HOLOCRINE

Zeis: Modified Sebaceous, APOCRINE

**Fungal Corneal Ulcer**

*We Saw Vegetative DPS Film*

Wessley’s yellow ring

32
Symptoms less than sign
Vegetative material trauma
Dry looking ulcer
Pseudohypopyon ??
Satellite lesion
Feathery Finger like extension into surrounding stroma

Deep corneal Neovascularization

DISCU Graft
Disciform keratitis
Interstitial keratitis
Sclerosing keratitis
Chemical burns
Ulcer-deep
Graft rejection

Waring’s Classification of Congenital corneal opacities

STUMPED
Sclerocornea
Trauma
Ulcers
Metabolic disorder

Peter’s anomaly

Endothelial dystrophy

Dermoid

5 Layers of Amniotic Membrane

EBC For Sure

1. a single layer of highly metabolically active, columnar to cuboidal epithelium
2. a thin basement membrane
3. a compact layer made of reticular fibres virtually devoid of cells;
4. a loose network of reticulum containing fibroblasts, called the fibroblast layer; and
5. a spongy layer of wavy bundles of reticulum bathed in mucin, which forms the interface with the chorion

Amniotic Membrane Components

E-CG

B-CL fine

S-TAP

Epithelium: Cytokines, Growth factors,

Basal lamina: Collagen IV/VII, Laminin 1/5, Fibronectin

Stromal matrix: TGF-beta, Anti-inflammatory and anti-angiogenic proteins, Protease inhibition factors
Autologus serum making

These critical steps in the production of serum eyedrops should therefore be standardised.

These include: CCDS

1. **Clotting phase**: duration and temperature

2. **Centrifugation**: centrifugal force and duration

3. **Dilution**: dilution factor and diluent

4. **Storage**: container, temperature, duration

**Blue Sclera**

**A POEM**

Anemia

PXE

OI

EDS

MFS (?)

**Prominent Corneal Nerves**

**KING of MALASIA**

Keratoconus

KCS

Ichthyosis
NF
Graft Failure
FECD
MEN I-II
Amyloidosis
LGV
Leprosy
Advanced age
Sipple-Garlin (MEN)
Idiopathic
Acanthameba

More visible corneal nerves

I can C Korneal Filaments
Ichthyosis
Congenital glaucoma
Corneal edema
Keratoconus
Fuchs corneal dystrophy

Enlarged corneal nerves

Sum Day A Men II b Have NF
Sum = Refsum
Day = Riley-Day syndrome
A = Acanthamoeba perineuritis
Men 2b = Multiple endocrine neoplasia type 2b
Have = Hansen Disease (leprosy)
NF = Neurofibromatosis

Causes of chronic catarrhal conjunctivitis

LEGS
- Local irritation with rubbing lashes
- Error of refraction
- General irritation with dust, smoke, wind or heat
- Sequelae of acute conjunctivitis

Treatment of dry eye

SPOT
- Systemic steroids (in autoimmune cases)
- Protective glasses and contact lenses
- Occulsion of puncti to reduce tear drainage
- Tear substitutes (eye drops, eye gel)
- Treatment of any associated diseases

Layers of Cornea
To help you remember the corneal layers, you might use this trick:

- Decemet’s membrane is Deep while
- Bowman’s layer is high up in the Bell tower
EBSDEin → Read as "Ebstein "

Epithelium
Bowman’s membrane
Stroma
Descemet’s membrane
Endothelium

Cornea Verticiliata: (Vortex Keratopathy)

ABCDEF
Arthritis - Diclofenac
Breast Cancer - Tamoxifen
Cardiac - Amiodarone
Dementia/Depression - CPZ
Enzyme Deficiency
Fabry’s Disease

Red Eye

UG SOCK
Uveitis
Glaucoma
Scleritis
Orbital Disease
Conjunctivitis
Keratitis

Alkali Injury: Rate of Penetration

ASPC: As Soon Post Chemical Mechanisms

Ammonium hydroxide
Sodium hydroxide
Potassium hydroxide
Calcium hydroxide
Magnesium hydroxide

Keratoconus Signs

CONES

Central scarring & Fleischer ring
Oil drop reflex / Oedema (hydrops)
Nerves prominent
Excessive bulging of lower lid on downgaze (Munson’s sign)
Striae (Vogt’s)

Keratoconus Features

I Had FAMOVS Plans
Irregular circles on placido disc, Irregular retinoscopic reflex, Irregular astigmatism

Hydrops

Fleisher ring

Astigmatism

Myopia, Munson sign

Oil droplet reflex on distant direct ophthalmoscopy

Vogt’s lines

Stromal thinning

Protrusion of cone

Trachoma

HALF PSC

Herbert’s pit

Arlt’s line

Leber’s cells

Follicles

Papillary hyperplasia and Pannus

SAFE management

Corneal ulcers
Acute hemorrhagic conjunctivitis

**PACE**

Picornavirus

Adenovirus 11

Coxsackie virus A-24

Enterovirus 70

Spring Catarrh

Cobble stone : cobble stone papillae (not follicles)

Can : cupid’s bow outline

Provide : pseudogerantoxon, pavement stone

Maximum : Maxwell Lyon sign (ropy discharge)

Shield : shield ulcer of cornea

In Hot : Horner- Tranta’s dots

Summer : Summer problem (NOT SPRING...!!)

Reis-Buckler dystrophy

4 R + 2 F

Recurrent corneal erosions

Reticular pattern

Reduced corneal sensations
Recurrence after graft

Fibrous tissue replaces epithelial basement membrane and bowman’s membrane

Ferritin lines in epithelium.

**Tears: Composition**

*Water PLUSS*

- Water
- Protein
- Lysozyme
- Urea
- Salts and
- Sugar

**Interstitial keratitis: Causes**

*TIC TACS*

- Tuberculosis
- Inherited syphilis (*Congenital syphilis*)
- Trypanosomiasis
- Acquired syphilis
- Cogan’s syndrome
- Sarcoidosis
**Stromal dystrophies**

*Marilyn Monroe Always Gets Her Men in LA California.*

Macular dystrophy - Mucopolysaccharide - Alcian blue

Granular dystrophy - Hyaline - Masson trichrome

Lattice dystrophy - Amyloid - Congo Red

**Membranous or pseudomembranous conjunctivitis**

*ABCDE PV Her GC Ligneous*

(I’ll try to make this better friends)

A = Adenovirus

B = beta-hemolytic streptococcus

C = Candida & Chlamydia & Chemical

D = Diphtheria

E = EBV & Erythema multiforme

P = Pemphigoid

V = Vernal

Her = HSV

GC = GC

Ligneous

**Filamentous keratitis**

*ABCDEF NPO*
A = Aerosol & Atopic
B = beta radiation
C = cataract surgery
D = DM
E = ectodermal dysplasia
F = FB
HS keratitis
N = neurotrophic keratitis
P = prolonged occlusion & ptosis
O = Osler-Weber-Rendu disease

**Megalocornea**

**MAD FX**

Marfan
Alport’s syndrome
Down syndrome, Dwarfism
Facial hemiatrophy
X-linked

**Tests for Dry Eye Work-up**

**SSSS CC O**
Tear film Stability: TBUT, NIBUT, Ocular ferning, impression cytology

Diagnostic dye Staining: Fluorescein, rose bengal, Lissamine green

Corneal Sensation: cotton swab, cochet-bonnet

Secretion: schirmers, Phenol red

Tear film Composition: Osmolarity, lysozyme, lectoferin

Clearance: Fluorescein clearance Test

Others: meniscometry, interferometry

Randleman’s post-LASIK Ectasia risk factors

Randleman CAT

RSBT: reduced residual stromal bed thickness

Myopia high

CCT reduced pre-operatively

Age young

Topography abnormal

Rabinowitz Criteria

four quantitative videokeratographic indices as an aid for screening patients for keratoconus.

KISS

K value greater than 47.2 D

inferior-superior dioptic asymmetry (I-S value) over 1.2

Sim-K astigmatism greater than 1.5 D
skewed radial axes (SRAX) greater than 21 degrees

Hughes Classification and prognosis in acid injuries of the eye

**ESCLator**
- Epithelial opacity, defect
- Stromal edema, opacity
- Conjunctival involvement
- Limbal ischemia

Chemical Injury Management Guidelines

*In Acute Chemical Assault, Care Always Stood Beneficial To Patients.*

- Immediate irrigation
- Antibiotics
- Cycloplegics
- Antiglaucoma drugs/ AMG?
- Collagenase inhibitors (acetylcystine, doxycycline)
- Ascorbic acid
- Steroids
- Bandage contact lens
- Tear Substitute
- PK- Therapeutic/ Tectonic etc
Filamentous Fungi

Filamentous **Absent pigment:** *Fusarium, Aspergillus*

Filamentous **CACHing pigment:** *Curvelaria, Alternaria, Cladosporium, Helminthosporum*

- Non-pigmented
  - *Fusarium solani*
  - *Aspergillus fumigatus, flaun, niger*
  - *Acremonium*
  - *Paecilomyces*

- Pigmented
  - *Curvelaria*
  - *Alternaria*
  - *Cladosporium*
  - *Helminthosporum (diechslera)*

Antifungal Side Effects

**Polene:** *renal toxicity (poly-uria)*

**Imidazole:** *hepatic toxicity (i-cterus)*

Non Infective PUK

**SPAM DATE**

Superior limbic keratoconjunctivitis

Pellucid marginal degeneration, phlyctenulosis

Acne Rosacea
Marginal keratitis

Dellen

Arthritis (RA)

Terriens marginal degeneration

Exposure keratopathy

**LASIK Flap Complications**

*Free* flap: *Flat* corneas (due to suction does not build up)

*Button-holes*: *Steep* corneas

**Iris Atrophy**

*HSV*: Sectoral Atrophy

*HZV*: Diffuse Atrophy

**Lens**

**OVD Characteristics**

*Visco Elastics Should Possess CCD*

The Rheologic characteristics:

- **Viscosity** (reflects a *solution's resistance to flow*, which is in part a function of the molecular weight of the substance)
• Elasticity (Elasticity refers to the *ability of a solution to return to its original shape* after being stressed)

• Surface tension

• Pseudoplasticity = rheofluidity (refers to a solution's *ability to transform* when under pressure, from a gel-like substance to a more liquid substance)

• Coatability: It measures the *adhesion* capacity of OVDs. It is inversely proportional to surface tension and the contact angle between the OVD and a solid material.

• Cohesiveness: Cohesiveness is the degree to which material *adheres to itself*.

• Dispersiveness: It is the tendency of a material to disperse when injected into the anterior chamber.

Grading of nucleus hardness

slit-lamp biomicroscopy:

GYABB

Gray, Yellow, Amber, Brown & Black

Local causes of complicated cataract

RIGID

long standing Retinal detachment

Inflammatory conditions: chronic iridocyclitis, chorioretinitis

Glaucoma
Intraocular tumors

Degenerative conditions: retinitis pigmentosa, degenerative myopia.

local Drugs: corticosteroids, pilocarpine, adrenaline eye drops

Cataract DD

CATARAct

Congenital
Aging
Toxicity
Accident
Radiation
Abnormal Metabolism

Microspherophakia

PALM Will C

Peter’s anomaly
Alport
Lowe
Marfans
Weil Marchesani
Differential diagnosis of leukocoria in infants

**PREDICT**

- Presistent hyperplastic primary vitreous
- Retinoblastoma (the most important cause)
- Retinopathy of prematurity
- Endophthalmitis
- Dysplasia of retina
- Inflammatory cyclitic membrane
- Congenital Cataract (the most common cause)
- Coat’s disease - unilateral extensive leakage from retinal vessels resulting in large masses of subretinal lipids
- Toxocariasis

Drugs causing cataract

**ABCD**

- Amiodarone
- Busulphan
- Chlorpromazine
- Dexamethasone
Weil Marchesani Syndrome

6 “S”

Short
Stubby fingers
Stupid
Spherophakia
Subluxated Lens
Shallow AC

Posterior Subcapsular Cataract

"I Got A BSC"

Ionizing radiation
Glass blower’s cataract
Atopic dermatitis
Busulfan
Steroids
Chloroquine

Anterior Subcapsular Cataract

ASC
Amiodarone

Shock- electric

Cholinergics like pilocarpine, chlorpromazine

**Iris shadow**

Iris Shadow is visible in Immature Senile cataract.

**Ectopia Lentis: Causes**

**ECTOPIC BMW**

Ehler-danlos

Choroidal tumors

Trauma

Overstratched zonules (megalocornea)

Isolated AR

Cystathione Beta synthase deficieny (homocystinuria)

Buphthalmos

Marfan’s Syndrome

Weil-marchesani syndrome

**IOL generations**

**RAI-APMP**
1. **Ridley’s** Posterior chamber PMMA: 8.32 mm, +24D Rayner Ltd, UK

2. **AC IOL**: Barron, Strampeli, Choyce

3. **Iris-supported**, including iridiocapsular IOL implanted after ECCE

4. **AC IOL Modern**

5. **PCIOL Modern**

6. **Modern IOLs**

   a) **Monofocal IOLs** designed specifically for in-the-bag implantation - Small, single piece modified C-loop designs - Foldable IOLs, designed for small incision surgery

   b) **AC IOLs** - Kelman (flexibility) - Choyce (footplates) - Clemente (fine-tuning, no-hole, three point fixation)

7. **Premium IOLs**: Designed for special functions (refractive surgery, MICS, presbyopic correction, multifocal, accommodative IOL, telescopic IOL, light adjustable IOL, etc.)

8. **Phakic IOLs** are sometimes referred as 8th generation.

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**LenStar**

**LM-PEP**

The LenStar LS 900 device comparing to the IOL Master additionally enables

- Pachymetry
- macular retinal thickness
- lens thickness
- Eccentricity of visual axis
- pupil diameter measurement

*K, AL, ACD and W2W are measured by both.*
Steroid Induced Cataract

*Mechanism: NCCLO*

1. Inhibition of the Na-K-ATPase pump mechanism, which increases the permeability of the lens to cation

2. Conformational changes in specific amino groups of the lens crystallins, which lead to the development of disulfide bonds and protein aggregation.

3. Decreased expression of cadherin (a family of cell-cell adhesion molecules that control the calcium-dependent cell adhesion of lens proteins that are necessary to prevent cataract formation)

4. Binding of corticosteroids to lens proteins forming lysine-ketosteroid adducts that cause aggregation of lens crystallin proteins

5. Corticosteroid-induced oxidative stress caused by accelerated gluconeogenesis, with reduced levels of glutathione sulphate attributed to the possible inhibition of glucose-6-phosphate dehydrogenase.

IOL Power post refractive surgery

1. Man Cannot Bypass History.

2. Combination Can Mask All Loopholes.

3. No Great Man Has Try hard. (*This is weird but still....*)

1. Approaches that rely entirely on **historical data**
   - Clinical **history** method
   - Feiz-Mannis **Method**
   - Corneal **Bypass** Method

2. **Combination** of prior data and current corneal measurements
- Modified Computerized Videokeratography
- Arramberi Double K Method
- Masket Formula
- Latkany Formula

3. Approaches that require no prior data
- Gaussian Optics Formula
- Modified Maloney Method
- Haigis-L Formula
- Trial hard contact lens method

Apple’s six factors for PCO prevention

CHI-BES

Surgery-related

Capsulorrhexis slightly smaller than the diameter of the IOL optic

Hydrodissection enhanced cortical clean-up

In-the-bag IOL fixation

IOL-related

Biocompatible IOL to reduce stimulation of cellular proliferation

Enhancement of the contact between the IOL optic and the posterior capsule

Square truncated optic edge
Glaucoma

Genes in Glaucoma

MOWN

1. MYOC gene (chromosome 1q21-q31), coding for the glycoprotein myocilin that is found in the trabecular meshwork and other ocular tissues

2. OPTN gene on chromosome 10p, which codes for optineurin

3. WDR36 gene on chromosome 5q22

4. NTF4 gene on chromosome 19q13.3

Jonas ISNT rule

Inferior and Superior neural rim is normally the thickest with the Nasal and Temporal thinner

Steroid Induced Glaucoma: Pathogenesis

STEROID

Stabilization of lysosomal membranes $\rightarrow$ increased GAG

TIGR gene expression $\rightarrow$ decrease the MMP

Expression of collagen, elastin, laminin, fibronectin $\rightarrow$ increased TM resistance
Resistance to outflow increased due to biological edema caused by ECM - PG + GAG

Outflow-enhancing PGs such as PGF2α decreased

Inhibition of phagocytosis by endothelial cells → accumulation of debris in TM

Decreased proteinases including fibrinolytic enzymes, stromolysin, MMPs

**Spaeth Grading System**

1. **Iris Insertion:**
   
   A = Anterior to Schwalbe’s line (SL)
   
   B = Between SL and scleral spur
   
   C = Scleral spur visible (common in blacks and Asians)
   
   D = Deep: ciliary body visible (common in whites)
   
   E = Extremely deep: greater than 1 mm of ciliary body is visible

2. **Angle of Anterior Chamber**

   The angular width that is measured as the angle between a line parallel to the corneal endothelium at Schwalbe’s line and a line parallel to the anterior surface of the iris.

3. **Curvature of Iris**

   b = bowing anteriorly
   
   p = plateau configuration
   
   f = flat
   
   c = concave posterior bowing

4. **Pigmentation of Posterior Trabecular Meshwork (PTM)**
Viewing at 12 o'clock in the angle with mirror at 6 o'clock position, pigmentation graded on a scale of 0 (no PTM pigment seen) to 4+ (intense PTM pigment).

**Secondary Glaucoma**

LIPPINS

Lens

Iridoscisis

PXE

Pigmentary

ICE (Iritis)

Neovascular

Seclusio Pupillae (Trauma-Angle Recession)

**Iridocorneal Endothelial Syndrome**

ICE

Iris Naevus

Chandler Syndrome

Essential Iris Atrophy

**Trabecular pigmentation**

PIGMENT
Pseudoexfoliation & Pigment dispersion syndrome
Iritis
Glaucoma (Post angle closure Glaucoma)
Melanosis of angle (oculodermal melanosis)
Endocrine (Diabetes & Addison’s Syndrome)
Naevus (Cogan-reese syndrome)
Trauma

**Angle structures**

_I Can See Till Schwalbe’s Line_

Iris root
Ciliary Body
Scleral spur
Trabecular Meshwork
Schwalbe’s Line

**Buphthalmos**

5 “B”
Boys
Bilateral 2/3rd
Blephrospasm
Blue eyes
Bulls eye
Indiana Bleb Grading System

**HEVS**
- Height
- Extent
- Vascularity
- Seidel Test

Beta Blocker Side Effects

**ABCD’S**
- Allergic blephroconjunctivitis
- Blurred vision - burning
- Corneal hyposthesia
- Dryness of eye
- SPK- Stinging

Neuroprotection in Glaucoma

**CANN-VANG**
- Calcium channel Blockers
- Antiglaucoma medications (Betaxolol, Brimonidine)
- NMDA Antagonists (Memantine, Eliprodil)
NOS Inhibitors (Aminoguanidine)

Vaccinations (MBP immunization)

Antioxidants (Catalase, superoxide dismutase and vitamins C and E)

Neurotrophins

Ginkgo Biloba extracts

**Neurophthalmology**

**Supranuclear Eye movement control**

*Five pathways: ViP Supra Nuclear Pathway*

Vergence eye movements

Persuits

Saccade

Non-optic control

Position maintenance system

**Optic Chiasma**

Distribution of Nerve fibres
Lower Nasal fibres: Lower and Anterior in chiasma

Upper Nasal fibres: Upper and Posterior in chiasma

Macular fibres: Central in chiasma

Optic Atrophy

ICING

Ischemia

Compressed Nerve

ICP raised

Neuritis

Glaucoma

VEP in AION

AAION has decreased Amplitude. (Axonal abnormality)

NAION has decreased Latency. (Myelination abnormality)

Pseudotumor cerebri

Idiopathic IDEA

Idiopathic

Infections-Otitis media, mastoiditis, viral infections etc
Drugs - Steroid withdrawl, Vitamin A intoxication, Nalidixic acid, amidarone, cyclosporin, minocycline

Endocrine - obese, amennorrheic woman of child bearing age, Hypoparathyroidism

Anaemia

**Downbeat nystagmus**

Downbeat

Degeneration, Demyelination or Drugs (Lithium)

Wernicke's Encephalopathy

Neoplasm or paraneoplastic cerebeller degeneration

Brainstem disease (Syringomyelia)

Encephalitis

Arnold-Chiari malformation

Trauma or Toxin

**Physiologic Nystagmus**

Love

Latent nystagmus?

Optokinetic

Vestibular
Endpoint nystagmus

**Aetiological classification of Optic Neuritis**

**DePIN**

Demyelinating
Parainfectious
Infectious
Non-infectious

**Horner Syndrome diagnosis**

- Cocaine: Confirmation of diagnosis
  - Hydroxyamphetamine: Height/ Level of horner syndrome (pre-post ganglionic)

**Visual field defects**

**PITS**

parietal radiations: inferior quadrantanopia (‘pie on the floor’)

Temporal radiations: superior quadrantanopia (‘pie in the sky’)

**Nystagmus**

**COWS** (cold-opposite, warm-same) indicates fast phase of the nystagmus.
When cold water is poured into the right ear the patient will develop left jerk nystagmus (i.e. fast phase to the left).

When warm water is poured into the right ear the patient will develop right jerk nystagmus (i.e. fast phase to the right).

**Visual Cortex**

The *cuneus gyrus* receives projections from the *superior* retina and the *lingual gyrus* from the *inferior* retina.

**Papilloedema: Clinical features**

- **Blurring**: Blurring of margins of optic disc
- **Has**: Hyperemia of the disc
- **Reduced physiological**: Reduced physiological cup
- **Pulse**: Pulsation of vein absent
- **So**: Striations (Paton’s folds)
- **2-6**: 2-6D hyperopia
- **Elevated**: Elevated disc
- **Fan must**: Macular fan
- **Flame**: Flame and punctate hemorrhage
- **Cotton**: Cotton wool spots

**Argyll Robertson pupil (ARP)**

ARP

The acronym ARP can stand for ‘accomodation reflex present’.
Thus in Argyll Robertson pupil (ARP), accommodation reflex (near reflex) is present but light reflex is absent.

**Small pupils**

**A MOrPHine**

Argyll -Robertson pupil

Morphine

Organophosphate poisoning

Pontine hemorrhage

Horners syndrome

**Parinaud’s Syndrome**

**CLUES**

Convergence Retraction nystagmus

Light Near Dissociation

Upgaze Palsy

Eyelid Retraction

Skew Deviation

**Uniocular diplopia**

**ABCD**

Astigmatism
Behavioural

Cataract

Dislocated lens

**Pupillary Fibres**

- Pupillary Fibers are **DM - DorsoMedial** in oculomotor nerve which are spared in **DM**. (Diabetes Mellitus)

**Toxic Amblyopia**

**METAL CC**

Methyl alcohol

Ethyl alcohol

Tobacco

Arsenic

Lead

Carbon dioxide

Cannabis

**Strabismus**
Eye movements

- Versions are in the same direction.
  
  Vergences are in opposite directions.

Muscle Actions

SIN RAD

Superior are Intorters & Recti are Adductors

Nerve supply to EOM

SO4 LR6

Superior oblique: 4th CN

Lateral Rectus: 6th CN

All others: 3rd CN

Angle of muscles

- Superior and inferior rectus muscles make an angle of 23 and reflected tendons of the superior and inferior oblique muscles of 51.

Insertion of Recti

MILS (spiral of Tillaux) (or you can reverse it and make it SLIM)

Medial rectus: 5.5 mm
Inferior rectus: 6.5 mm
Lateral rectus: 6.9 mm
Superior rectus: 7.7 mm

*The superior and inferior oblique muscles insert posterior to the equator.*

**Exceptions to Law**

- Exception to Sherrington’s law: **DRS**
- Exception to Hering’s law: **DVD**

**Deviations of Eye**

*P for S, S for P*

Primary deviation: Sound eye fixates
Secondary deviation: Paretic eye fixates

**Sagitalization and Desagitalization**

*Desagitalization Decreases Depression action of SO*

And vice versa for sagitalization

**Amblyopia Types**

**SAF-ON**

Strabismic amblyopia
Anisometropic amblyopia

Form vision deprivation

Organic amblyopia

Nystagmus related amblyopia

**Amblyopia Management**

4O

- Optical correction of refractive error
- Occlusion therapy
- Orthoptic exercise
- Operative measures

**Squint management**

ROOOP

- Refraction
- Occlusion
- Orthoptics
- Operative correction
- Prism correction
Rule of 6

6 months:
- fixation reflex
- macular stereopsis
- accommodation reflex

6 years:
- visual acuity (6/6)
- binocular vision??

Anomalies of binocular vision

SACAD
- Suppression
- Amblyopia
- Confusion
- Abnormal retinal correspondence (ARC)
- Diplopia

Fourth nerve palsy

GOTS worse
- Hypertropia Worse in
- Gaze Opposite, Tilt Same
DRS Types

Number of Ds equals the syndrome number

Type 1: abDuction
Type 2: aDDuction
Type 3: aDD and abDuction

Uniocular diplopia

ABCD

Astigmatism
Behavioral: psychogenic
Cataract
Dislocated lens

Crossed-Uncrossed Diplopia

eXotropia: X= crossed diplopia

esotropia: uncrossed diplopia

Microtropia

3 A

Anisometropia
Angle small

Absent central field (Central suppression scotoma)

**Congenital nystagmus**

**CONGENITAL**

Convergence & eye closure dampens

Oscillopsia absent

Null zone that is present, *increases foveation time which results in increased acuity*

Gaze poision does not change the horizontal direction of nystagmus

Equal amplitude and frequency in each eye

Near acuity is good

Inversion of optokinetic response

Turning of head to acheive null point

Abolishes in sleep

Latent (occlusion) nystagmus occurs

**Nystagmus description**

**DWARF**

Direction= plane of movement-horizontal, vertical
Waveform = Pendular or Jerky

Amplitude= fine or coarse

Rest= At primary position or gaze evoked

Frequency= How often the eye moves

Actions of Superior oblique muscle

SOLID

Superior Oblique -

Lateral rotation (Abduction)

Intorsion

Depression

A and V patterns

VISA: V pattern IOOA, SOOA A pattern

MALE: for treatment, Medial rectus toward the Apex and Lateral rectus toward the Empty space

FADEN operation

M for M, L for L

Most effective for MR
Least effective for LR

**Vergence Amplitude**

Convergence amplitude: base Out prism

Divergence amplitude: base In prism

*(This is not difficult to understand once you apply logic, but here is a simple trick also)*

**Named Transposition Surgeries**

**Superior HeCK**

For SR:

- Helveston: with sclera
- Callahan: MR/2 + LR/2
- Knapp: MR + LR

**Lateral HOJ**

For LR:

- Hummelstein: SR + IR
- O’conors: SR + IR with LR cinch
- Jenson: SR/2 + IR/2

**Mar Pet** (mar-pit)
For MR:

Peter’s: SO

**Retina**

**Retina Blood Supply**

Outer four layers: chorioicapillaries

Inner six layers: retinal artery central

**Angioid Streaks**

**PEPSI-LITE**

Pseudoxanthoma elasticum (PXE)

Ehlers-Danlos

Penicillamine, Paget’s disease of bone

Sickle Cell Anemia

Idiopathic (50%)

Lead poisoning

Increased Phosphate

Thalassemia, Tuberous sclerosis

Epilepsy
Bardet-Biedl syndrome

*RPC MeH* (5 cardinal features)

Retinopathy 90-100%

Polydactyly 75%

Congenital obesity

Mental retardation 85%

Hypogenitalism 50%

Peripheral Retinal Degeneration

*MES*

Myopia

Marfans ??

EDS

Stickler’s

Drusen DD

*AGEING*

Alport Syndrome

Glomerulonephritis

Exudates
Inherited

North Carolina macular dystrophy

Stargardt and Fundus flavimaculatus

**Pseudoglioma**

**TT RR PP**

Toxocara

Tuberculoma

RD

Retrolental fibroplasia

Plastic iridocyclitis with vitreous abscess

PHPV

**Congenital Leucocoria DD**

**IN Familial COP**

Incontinentia pigmenti

Norries disease

FEVR

Cicatritial ROP

Coat’s

Ocular toxocariasis
Shields Staging of Coats Disease

TED-GP
1. Retinal telangiectasia (T) only
2. Telangiectasia and exudation (E): Extrafoveal, Foveal
3. Exudative retinal detachment (D): Subtotal, Total
4. Total retinal detachment and glaucoma (G)
5. Advanced end stage disease often with phthisis (P) bulbi

Hyperfluoroscence in FA

PLAST
1. Pooling
2. Leakage
3. Autofluorescence
4. Staining
5. Transmission, or window, defect

FFA
Pooling: due to breakdown of Outer BRB
Leakage: due to breakdown of Inner BRB
Functions of RPE

AV-PINC

Absorption of Light, avascular outer retina maintained by PEDF

Visual cycle

Phagocytosis of photoreceptor outer segment

Immune privilege

Nutrients

Cytokines secretion, GH secretion

CME

DEPRIVEN

- Diabetes
- Epinephrine
- Pars planitis
- Retinitis pigmentosa
- Irvine-Gass Syndrome
- Venous occlusion
- E2-prostaglandin
- Nicotinic acid and Niacin
Retinal Examination

**MVP-D**

M (macula) V (vessels) P (periphery) D (disk)

Choroidal neovascular membrane

**HAMMAR**

Histoplasmosis
ARMD
Multifocal Choroiditis
Myopia
Angiod
Rupture of the choroid

Goldmann’s 3 mirror lens

**C-PEG**

- 64D lens
  - The **central** part provides a 30° upright view of the posterior pole.
  - The **peripheral** mirror 67 (intermediate in size and square-shaped) enables visualization between the equator and the ora serrata.
  - The **equatorial** mirror 73 (largest and oblong-shaped) enables visualization from 30° to the equator.
  - The **gonioscopy** mirror 59 (smallest and dome-shaped) may be used for visualizing the extreme retinal periphery and pars plana.
Bull’s Eye Maculopathy

**Bull’s PICS**

Bardet-biedl, Batten’s

Phenothiazine and other drugs esp CHQ

Inverse RP

Cone dystrophy (MC)

Stargardt’s

Drug induced Maculopathy

**CPMT**

CHQ, Canthaxanthins

Phenothiazime

Methoxyfluorane

Tamoxifen

Rubeosis Iridis

**DEVS**

DR

Eales

crVo

Sickle cell retinopathy (SC not SS)
Salt and Peeper Retinopathy

MR SaLT

Myotonic dystrophy, Mayon-Batten
Rubella, RP sine pigmento
Syphilis
LCA
Thioridazine toxicity

Cherry Red Spot: DD

Quickly Pick My Tea BAGS

Quinine toxicity
niemann Pick's disease
Multiple sulfatase deficiency, Metachromatic leucodystrophy
Tay sach's disease
Berlin's edema
CRAO
Gaucher's disease, Gangliosidosis
Sandhoff's disease, Sialidosis
Treatment of Retinal Detachment

"6 S"

Sealing of retinal breaks

SRF drainage (SRF is Subretinal fluid)

Scleral buckling

SF6 pneumatic retinopexy

Sectioning vitreous (vitrectomy)

Laser prophylaxis

Background DR

HARM

HAemorrhage

Hard Exudates

Retinal Edema

Microaneurysms

Preproliferative DR

VADIC

Venous change (dilatation loops, bending)

Arteriolar change (narrowing, silver wiring)

Dark blot hemorrhage
IRMA

Cotton wool spots

**PVR Grade B**

WoRST

Wrinkling of retinal surface

Rolled edges of retinal break

Stiffness of retina

Tortuosity of retinal vessels

**Goldberg Staging of Sickle Retinopathy**

*Obviously All Sickle Has This*

1. Peripheral arterial occlusions

2. Peripheral arteriovenous anastomoses

3. Neovascular and fibrous proliferations: **Sea-fan fronds** are the hallmark of stage III PSR

4. Vitreous hemorrhage: more commonly in the Hb SC than the Hb SS genotype (23% versus 3%)

5. Retinal detachment: TRD

**Uvea**
Seclusio and Occlusio

- **Seclusio pupillae**: 360 posterior Synechia

  Occlusio papillae: pupillary membrane

Suspicious Choroidal Nevi

The mnemonic TFSOM UHHD for the phrase:

**To Find Small Ocular Melanomas Using Helpful Hints Daily**

- Thickness >2 mm
- Subretinal Fluid
- Visual Symptoms
- Orange pigment
- Tumor Margin within 3 mm of the optic disc
- Ultrasonographic
- Hollowness; absence of a surrounding Halo
- Absence of Drusen

Factors predictive of metastases include posterior tumor margin touching the optic disc, documented growth, and greater tumor thickness.

Nodules in uveitis:

- **BBB**: Bussaca nodules, Big, Base of iris
- **KPS**: Koeppe nodules, Pupillary margin, Smaller

Berlin nodules: angle
Granulomatous Uveitis Causes

**TVS@3 MILs** (TVS bike @ 3 miles per second)

- Tuberculosis
- Vogt-Koyanagi-Harada syndrome
- Sarcoidosis
- Sympathetic ophthalmia
- Syphilis
- Multiple sclerosis associated uveitis
- Intraocular foreign body
- Lens-induced uveitis

Vitreous Seeds DD

**MIL**

- Microbial Endophthalmitis
- Intermediate uveitis
- Leukemic infiltrates

4 signs of POHS

**PACJ**

- Punched-out chorioretinal lesions (Histo spots)
Absent vitritis

CNVM

Juxtapapillary atrophic pigmentary changes

**Behcet's Disease**

**ORAL UPSET**

Oclusive periphlebitis
Retinitis
Anterior uveitis
Leakage from retinal vessels
Ulceration (aphthous/genital)
Pustules after skin trauma (Pathergy test)
Scratching leaves lines (dermatographism)
Erythema nodosum
Thrombophlebitis

**Reiter Syndrome**

**PICK GUN**

Planter Fascitis
Inflamed Joints
Conjunctivitis
Circinate Balanitis
Keratoderma Blenorrhagia
Gum ulceration
Urethritis
Nail Dystrophy

**Ophthalmic Tuberculosis**

BCG GP
Busacca and Koepple nodules
Choroiditis
Granuloma in choroid
Granulomatous uveitis
Periphlebitis

**Posterior scleritis features**

POST SCLER

Proptosis
Ophthalmoplegia
Swelling of disc
Thickening of sclera (US/CT) & T sign (fluid in sub-Tenon’s space)
Subretinal exudates
Choroidal foLds
Exudative RD
Ring choroidal detachment
Vogt Koyanagi Harada Syndrome

MEVA PUDding

Meningo Encephalitis

Vitiligo - Sugira sign

Alopecia

Poliosis

Uveitis

Deafness

Immunosuppressants

4 main categories of therapy:

ACT-B

1. AntiMetabolites: Azathioprine, Methotrexate, and Mycophenolate mofetil

2. Cytotoxic agents (Alkylating): Cyclophosphamide and Chlorambucil

3. T-Cell suppressors: Tacrolimus, Cyclosporine

4. Biological (TNF-A inhibitors): AEIou → Adalimumab, Etanercept, Infliximab

Doses

Azathioprine (3-5 mg/kg/day), Methotrexate (20-40 mg/m2), and Mycophenolate mofetil (1 gm BD oral)

Cyclophosphamide (10-15 mg/kg weekly) and Chlorambucil (0.1-0.2 mg/kg/day)

Tacrolimus (0.05-0.1 mg/kg BD oral), Cyclosporine (10-15 mg/kg/day)
Adalimumab (40 mg every two week), Etanercept (50 mg weekly SC), Infliximab (3-5 mg/kg every month)

**Seronegative spondyloarthropathies**

**PAIR**

Psoriatic arthritis

Ankylosing spondylitis

Inflammatory bowel disease

Reiter syndrome/Postinfectious or reactive arthritis

**Kaplan’s 4 step management of Intermediate Uveitis**

**PCVI**

1. PST

2. Cryo / Laser

3. Vitrectomy

4. Immunosuppressive therapy

**Revised criteria for diagnosis of VKH**

**POBNI**

- Complete VKH: Criteria 1-5 must be present

- Incomplete VKH: Criteria 1-3 and either 4 or 5 must be present

- Probable VKH (isolated ocular disease): Criteria 1-3 must be present
1. **Penetrating trauma/Surgery:** ABSENT

2. **Other ocular disease:** RUL ED OUT

3. **Bilateral ocular involvement:** diffuse choroiditis, subretinal fluid bullous serous retinal detachments, Ocular depigmentation

4. **Neurological/auditory findings:** Meningismus, Tinnitus, Cerebrospinal fluid plenocytosis

5. **Intergumentory finding:** Alopecia, Poliosis, Vitiligo

**Oculoplasty**

**Retinoblastoma: International Classification**

**ABCDE**

**A:** smAll < 3 mm

**B:** Bigger > 3 mm, macula, SRF

**C:** Contained seeds

**D:** Diffuse Seeds

**E:** Extensive (>50% of globe, NVI, Opaque media)

**Group E Retinoblastoma**

**VAL-POND**

Vitreous face touch

Aseptic orbital cellulitis
Lens touch

Phthisis bulbi

Opaque media from hemorrhage

NVG

Diffuse infiltrating RB

Clark and WHO 2006 classification of Malignant Melanoma

LANS

- Lentigo maligna melanoma
- Acral lentiginous melanoma
- Nodular melanoma
- Superficial spreading melanoma

Lid coloboma

Upper lid colobomata are generally Isolated

Low lid colobomata are generally syndromic

Merkel Cell Carcinoma

AEIOU

Asymptomatic

Expanding lesions
Immunosuppressed (HIV etc)

Older than 50

UV exposed sites

**Ptosis classification**

(both congenital and acquired)

**T 2MAN (T2 is the real man)**

Traumatic

Mechanical- Myogenic

Aponeurotic

Neurogenic

**Werner’s Classification for Grave’s Ophthalmopathy**

**NO SPECS: 0-6**

0. No signs/ symptoms

1. Only signs

2. Soft tissue involvement

3. Proptosis

4. EOM involvement

5. Corneal Involvement
6. Loss of Sight

**Thyroid-Related Orbitopathy**

**VISA**

Vision

Inflammation

Strabismus

Appearance/exposure

**Thyroid Ophthalmopathy muscle involvement**

**I M Stuart Little**

Inferior, medial, superior, lateral rectus in order of their involvement

**Epicanthal Folds**

**PITS**

Palpebralis (simple), broader above

Inversus, broader below

Tarsalis, equally broad above and below

Supraciliaris, origin from eyebrow

**Periorbital Cellulitis**
SIGHT

Sinusitis

Insect bite

Globular Glandular spread

Hematogenous spread

Trauma

Chandler’s Staging of Orbital Cellulitis

POSIC

Preseptal cellulitis, which may develop in the early stages of ethmoid sinusitis

Orbital cellulitis

Subperiosteal abscess

Intraorbital abscess

Cavernous sinus thrombosis

Orbital Pathology

VEIIN

Vascular abnormalities

Endocrine

Inflammatory

Infectious
Neoplastic

Exophthalmos

VINDICATE

Vascular
Inflammatory
Neoplasm
Deficiency
Degenerative
Intoxication
Idiopathic
Congenital
Autoimmune
Trauma
Endocrine

Signs of Acute Dacryocystitis

RATE

Marked Redness of skin over the sac
Regurgitation test: negative due to congestion of canaliculi
Abscess formation with fluctuation
Tender swelling of lacrimal sac
Marked Edema of skin over the sac

Clinical Picture of Symblepharon

Blade
- Bad cosmetic appearance
- Limitation of ocular motility and diplopia
- Ankyloblepharon
- Diminution of vision in cases of corneal affection
- Exposure Keratopathy and chronic conjunctivitis

Post Enucleation Socket Syndrome

PESS
- Ptosis
- Enophthalmos
- Deep Upper Sulcus
- Slack lower lid

Hordeolum
- **EXTERNAL HORDEOLUM (STYE):** It is an acute suppurative inflammation of gland of the Zeis or Moll.

**INTERNAL HORDEOLUM: CHALAZION:** It is also called a tarsal or meibomian cyst. It is a chronic non-infective granulomatous inflammation of the meibomian gland.
Lid retraction

4 MP

4M = Myasthenia Gravis, Marcus Gunn jaw winking syndrome, Myotonic causes like dystrophica myotonica, Metabolic causes like uraemia, cirrhosis

4P = Perinauds syndrome, Parkinson’s Disease/Progressive supranuclear palsy, Ptosis of other eye, Palsy (aberrant III cranial nerve regeneration)

Craniosynostosis

SPOT:

Scaphocephaly: sagittal suture closure (aka ‘dolichocephaly’)

Plagiocephaly: unilateral Coronal suture (anterior) or Lamboid (posterior)

Oxycephaly: coronal suture plus any other suture, like the lambdoid

Trigonocephaly: metopic suture closure

Chalasis of Lids

Blephrochalasis: Young age

Dermatochalasis: Old age

Arrange B and D in alphabetical order.

TRO features
PROLS

Proptosis
Restrictive myopathy
Optic neuropathy
Lid retraction
Soft tissue involvement

Thyroid Eye Disease Surgery

Correction should be done in following order:

OSQE

Orbital Surgery
SQuint surgery
Eyelid surgery

The rationale for this sequence is that orbital decompression may affect both ocular motility and eyelid position, and extraocular muscle surgery may also influence eyelid position.

Eye signs of thyrotoxicosis

DR Joffroy May Validate Symptoms

Dalrymple sign- rim of sclera is seen all around the cornea, on looking straight forward.
Rosenbach's sign- fine tremor of the upper eyelids on slight closure of the eye.

Joffroy's sign- lack of wrinkling of the forehead when a patient looks upward.

Moebius sign- lack of convergence on looking to near object.

Von Graefe's sign (lid lag sign)- lagging of the upper eyelid on looking downward without moving the head.

Stellwag's sign- staring look with infrequent blinking

**Umbilicated Eyelid lesion**

- uMBiliKated
- Molluscum
- Basal cell carcinoma
- Keratoacanthoma

**Rhabdomyosarcoma types**

- BEAP
- Botryoid
- Embryonal
- Alveolar
- Pleomorphic

**HP types of Adenocystic carcinoma**
Total BCSC

Tubular
Basaloid
Cribriform
Sclerosing
Comedocarcinoma

Acquired Entropion

IMSC
Involutional, Mechanical, Spastic, Cicatritial

Acquired Ectropion

IMPC
Involutional, Mechanical, Paralytic, Cicatritial

Bleprophimosis Syndrome BPES

BPET
Blephrophimosis
Ptosis
Epicanthus Inversus (Ectropion medial)
Telecanthus
Community Ophthalmology

Blindness

NPCB categorization: LESMA

1. Low vision: < 6/18 - 6/60 in better eye
2. Economic blindness: < 6/60 - 3/60 in better eye
3. Social blindness: < 3/60 - 1/60 in better eye
4. Manifest blindness: < 1/60 in better eye
5. Absolute blindness: No perception of light in better eye

For WHO,

   Moderate visual impairment is 1

   Severe visual impairment is 2
Blindness is 3, 4, 5

**Vision 2020 Disease prevention and control**

**TORCC**

- Cataract
- Childhood blindness
- Trachoma
- Refractive errors and low vision
- Onchocerciasis

**Vision 2020 Strategic approaches**

**E-MUST**

- Effective disease prevention and control
- Mobilization of resources
- Use of appropriate and affordable technology
- Strengthening of existing eye care infrastructure
- Training of eye health personnel

**NPCB main objectives**

**Aware Blinds Can Voluntarily Deliver Human resources**

**Awareness** in community
**WHO Primary Eye Care Elements**

**ELEMENTS**

Education (awareness in community)

Immunization (measles)

Essential Drugs

Mother and Child (Ophthalmia neonatorum)

Endemic Disease Treatment (leprosy, corneal ulcer)

Nutrition (proper food supply)

Treatment of common diseases

Sanitation and Safe Water (Trachoma)

**Primary Eye Care Principles**

**FAIC**

Fair distribution

Appropriate technology
Inter-sectoral coordination

Community participation

**Childhood blindness Estimation Methods**

**BUCK**

Blind school survey

Under 5 Mortality Rate

Community Based Rehabilitation Project

KIM: Key Informant Methods

**WHO’s SAFE Trachoma Strategy**

**SAFE**

Surgery

Antibiotics

Facial cleanliness

Environmental improvement

**Miscellaneous**
Ocular Drug Delivery Systems

**CV-CAP**

**Conventional:** Suspension, Solution, Emulsion, Ointment, Insert, Gels

**Vesicular:** Liposomes, Niosomes, Discomes, Pharmacosomes

**Control Release:** Implants, Hydrogels, Dendrimers, Iontophoresis, Collagen Sheild, Polymeric, Solutions, Contact Lenses, Cyclodextrin, Micro Emulsion, Micro Needle, Nanosuspension

**Advanced:** Scleral Plugs, Gene Delivery, siRNA, Stem Cell

**Particulate:** Microparticles, Nano Particles

Zones of Operation Theater

**ORAD**

Outer zone

Restricted zone

Aseptic zone

Disposal zone

Systemic Steroids Side Effects

**STEROID**

**S**- Psychosis, headaches, pseudotumour cerebri

**T**- Thrombosis (venous)

**E**- Endocrinical- suppressed hypothalamic-pituitary adrenal axis, retarded growth, cushingoid state

**R**- Retention of fluid & sodium but loss of potassium & systemic alkalosis
O- Osteoporosis & myopathies
I- Immunosuppression with secondary infections esp. TB & fungal
D- Diabetes & hypertension, Duodenal & gastric (peptic) ulcers

**Basal View (Submentovertical View)**

**BaSE**

Sphenoid sinus
Ethmoid sinus

**Caldwell Luc View**

**Fishing Lovely Front For Me**

Superior orbital Fissure
Lamina papiracea
Frontal sinus (best)
Forament rotundum
Maxillary sinus
Ethmoid sinus

**OR**

**SSS**
Superior Orbital Fissure
Sinuses

Sella turcica

**Water’s View (OM)**

*Maximus Spherical Front In the Zyme*

Maxillary sinus

Sphenoid sinus

Frontal sinus

Infratemporal fossa

Zygomatic arch

**Gradenigo syndrome**

**EAR**

Ear discharge

Abducens nerve palsy (causes diplopia)

Retro-orbital pain (due to 5th nerve involvement)

**WOLFRAM syndrome**

**DIDMOAD**

Diabetes Incedidus

Diabetes Mellitus
Optic Atrophy
Deafness

**GEMSS Syndrome**

**GEMSS**
Glaucoma
Ectopia lentis
Microspherophakia
Stiffness of the Joints
Short stature

**Waardenburg Syndrome**

**MDS Has Broad Philosophy**
Microcornea
Dystopia canthorum (Telecanthus)
SNHL
Heterochromia
Broad nasal root
Piebaldism

**Waardenburg Syndrome GENES**
Pack your Mittens, Pack your SOX

Pack: PAX3 = type 1

Mittens: MITF = types 2

Pack: PAX3 = type 3

SOX10 = type 4

Lyme Disease

TICK’s CRAP
Tick borne
Iritis and Intermediate uveitis
Conjunctivitis
Keratitis
Swelling of disc, Star ant macula
Cardiac arrhythmias
Rash (EM)
Arthritis
Palsies

Necrobiotic Xanthogranuloma

CUBIK
Conjunctivitis
Uveitis
Blindness
Iritis
Keratitis

**Ocular features of acromegaly**

**ACROM**

Angiod streaks
Chiasmal syndrome
Retinopathy
Optic atrophy, papilloedema
Muscle enlargement

**Systemic features of Marfan syndrome**

**MARFANS**

Mitral prolapse
Aortic dissection
Regurgitant aortic valve
Fingers long (arachnodactyly)
Arm span>height

Nasal voice (high arched palate)

Sternal excavation

**Ocular features of Marfan’s syndrome**

**CLUMPS**

Cupping (glaucoma)

Lattice

Upward lens subluxation

Myopia

Cornea Plana

Sclera blue