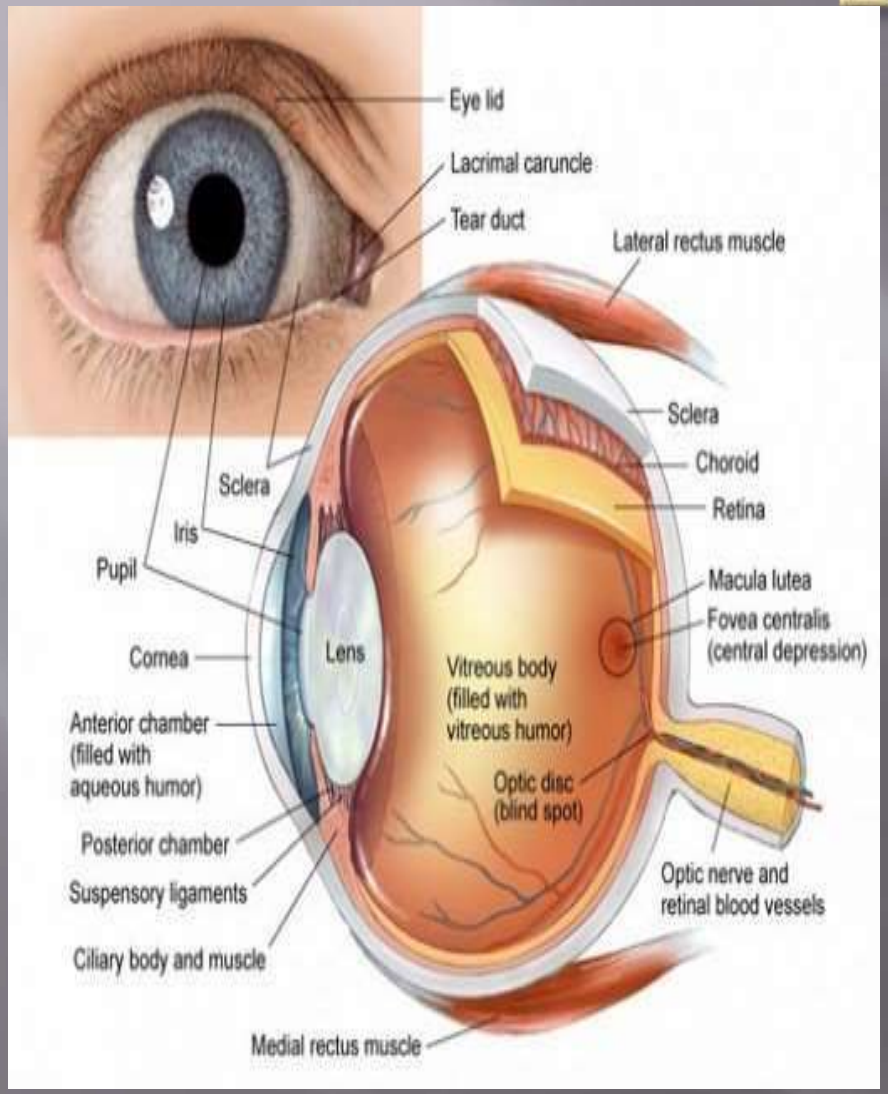
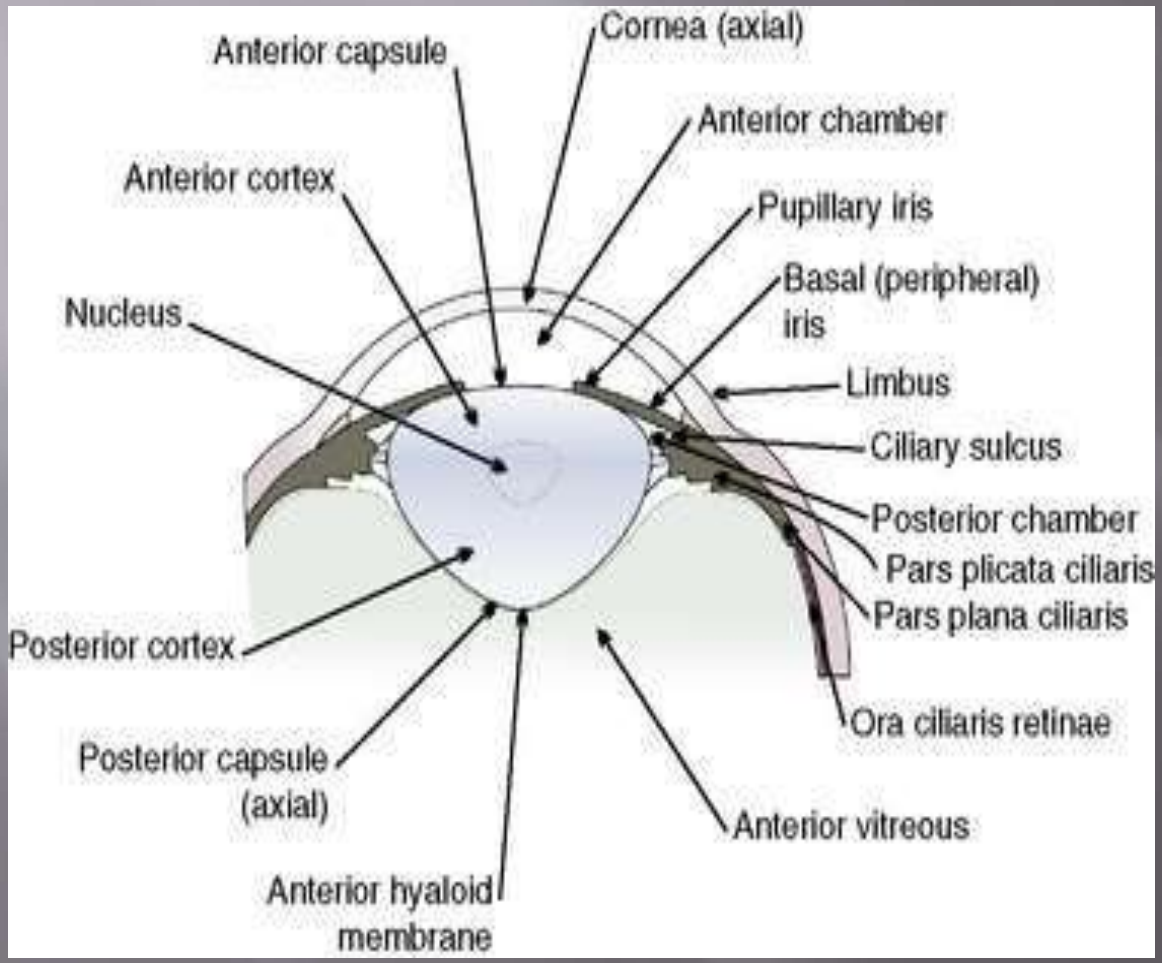
CATARACT

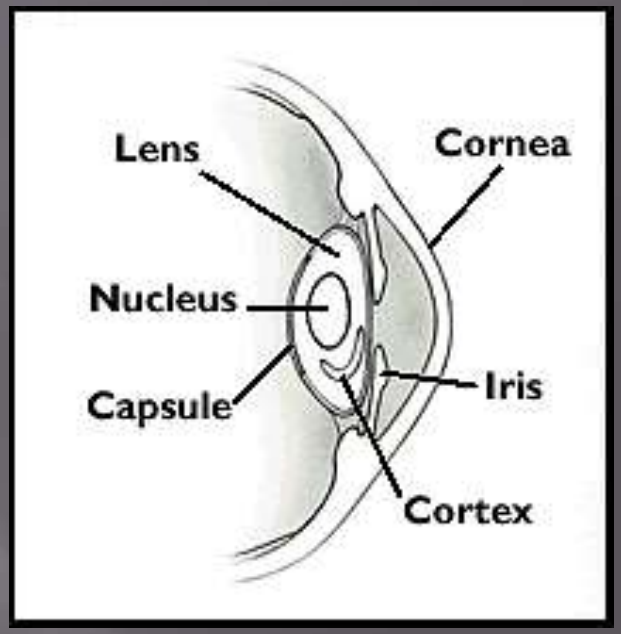
ANATOMY OF THE LENS



- A **biconvex** structure attached to the ciliary process by the zonular fibre, between iris & vitreous humour
- **Non-vascular**, **colourless** and **transparent**
- Index of refraction 1.336
- Consists of stiff elongated, prismatic cells known as lens fibre, very tightly packed together
- Divided into **nucleus**, **cortex** and **capsule**
- The whole lens enclosed within an **elastic capsule**
- **Helps to refract incoming light and focus it onto the retina**

ANATOMY OF THE LENS

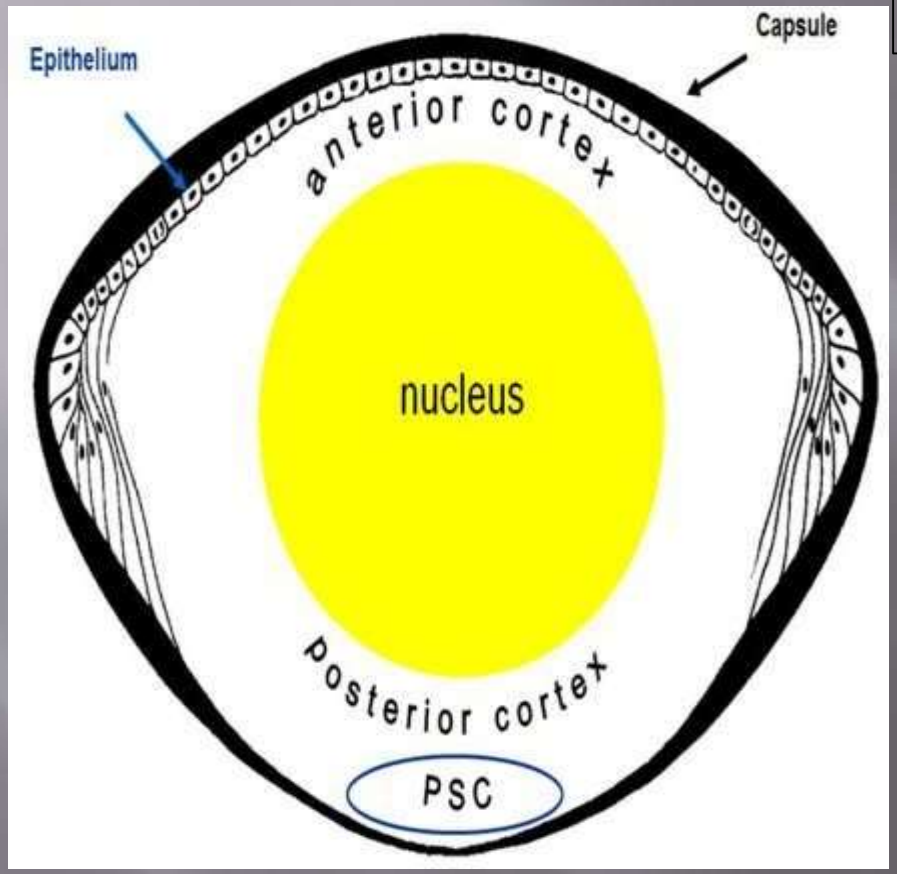




STRUCTURE OF THE LENS:

- **LENS CAPSULE**
- **ANTERIOR LENS EPITHELIUM**
- **LENS FIBER**

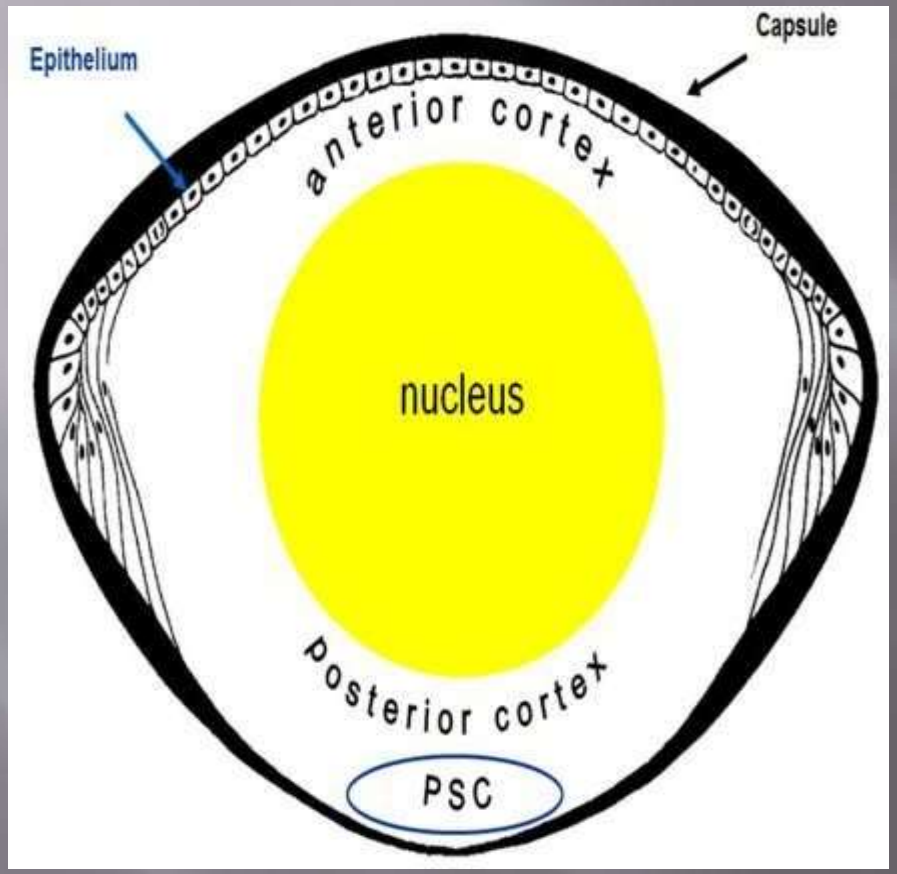
ANATOMY OF THE LENS



LENS CAPSULE

- Thin transparent, collagen membrane
- Surrounds lens completely
- Elastic in nature but contain no any elastic tissue
- Anteriorly secreted by lens epithelium and
- posteriorly by basal cells of elongating fibers

ANATOMY OF THE LENS



ANTERIOR LENS EPITHELIUM

- Single layer below the lens capsule
- Formed of cuboidal cells
- Become columnar at equatorial region

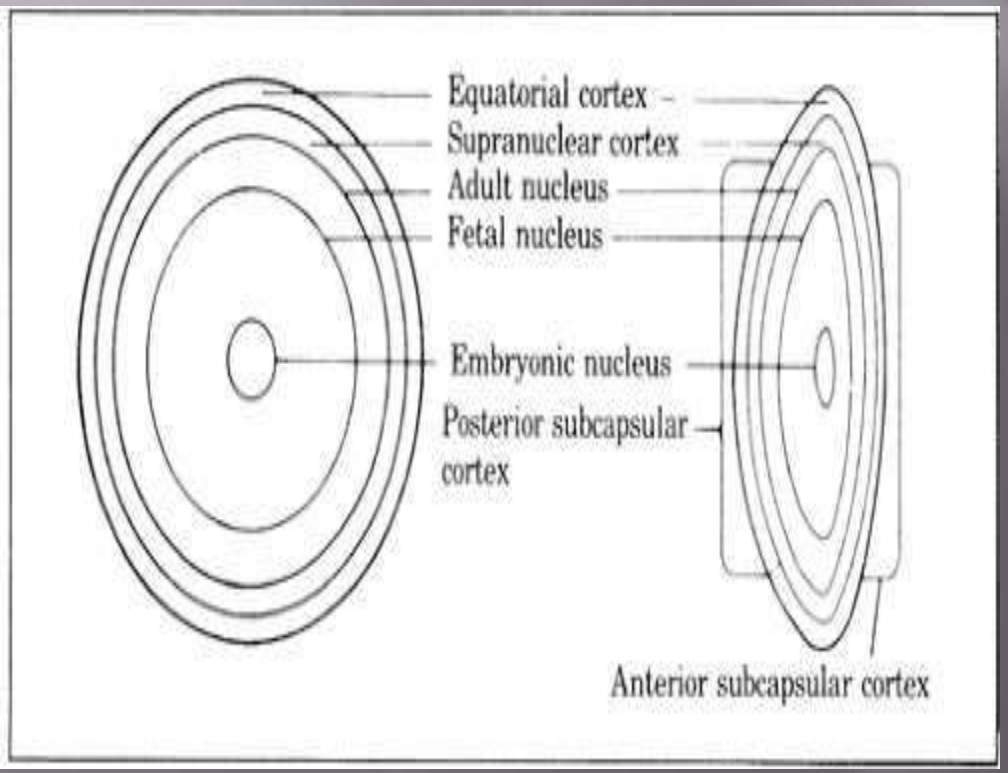
LENS FIBER

- The epithelial cells elongated to form lens fibers which have a complicated structural forms.
- Mature lens fibers are cells which have lost their nuclei.
- As the lens fibers are formed throughout the life, these are arranged compactly as nucleus & cortex of the lens.

ANATOMY OF THE LENS

CORTEX

- Its is the peripheral part which compromises the youngest lens fibres.



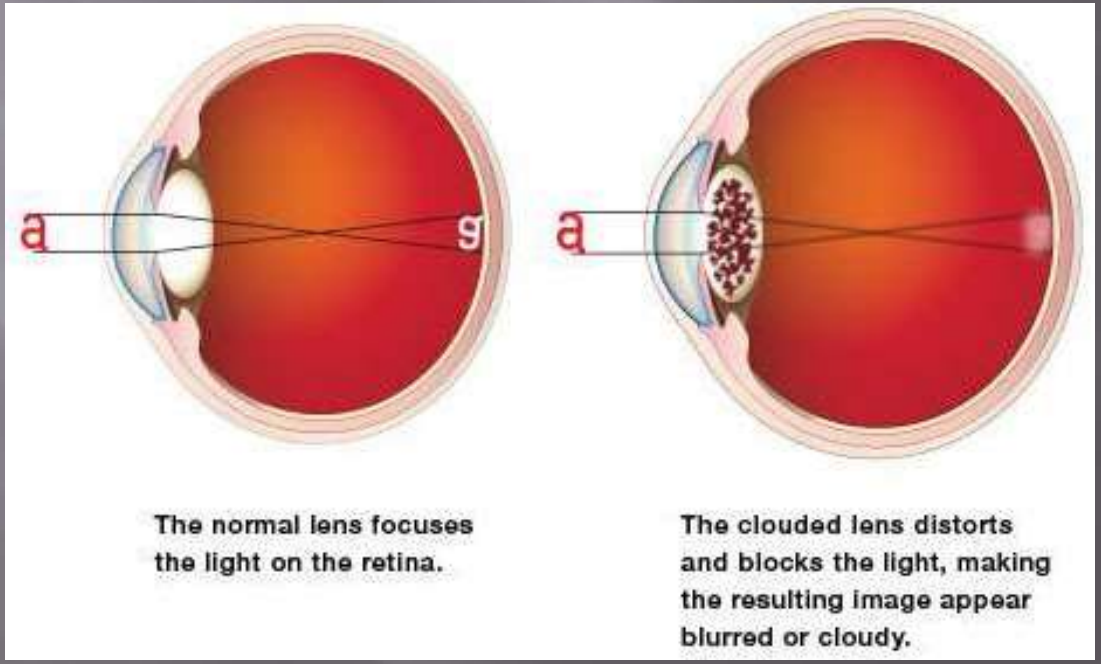
NUCLEUS

- Its is the central part containing the oldest fibres. It consists of different zones, which are laid down successively as the development proceeds.
- Different zones:
  I. Embryonic nucleus
  II. Fetal nucleus
  III. Infantile nucleus
  IV. Adult nucleus

CATARACT

WHAT IS CATARACT?

Cataract is a clouding of the lens or any opacity within the lens which leads to a decrease in vision



The normal lens focuses the light on the retina.

The clouded lens distorts and blocks the light, making the resulting image appear blurred or cloudy.

CAUSES

CONGENITAL

- Familial
- Intrauterine infections
- Maternal drug ingestions

AGE

- Elderly

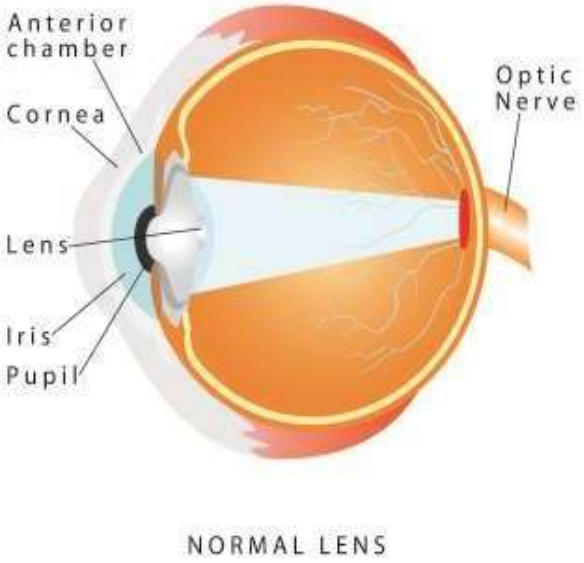
METABOLIC

- Diabetes
- Hypocalcaemia
- Wilson's Disease
- Galactosemia

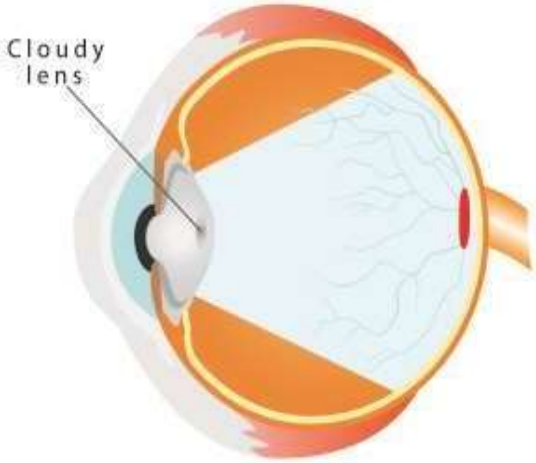
CAUSES

DRUG - INDUCED	▪ Corticosteroids ▪ Miotics ▪ Amiodarone ▪ Phenothiazines
TRAUMATIC AND INFLAMMATORY	▪ Post intra-ocular surgery ▪ Uveitis
DISEASE ASSOCIATED	▪ Down's Syndrome ▪ Dystrophia Myotonica ▪ Lowe's Syndrome ▪ Atopic dermatitis

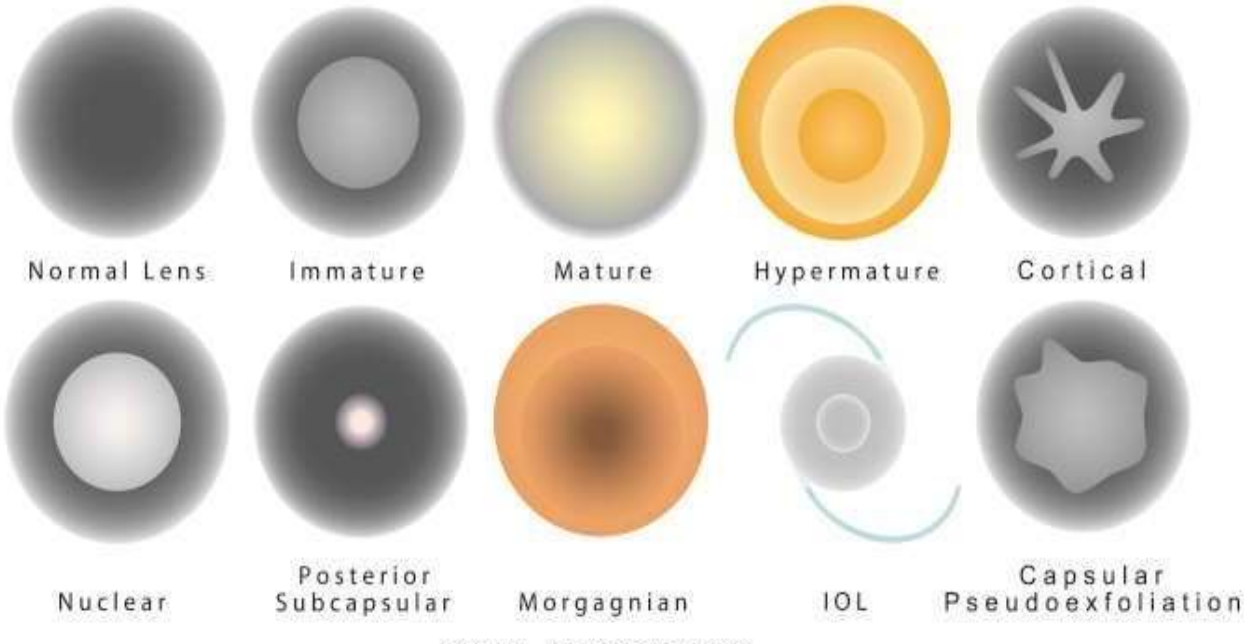
CLASSIFICATION



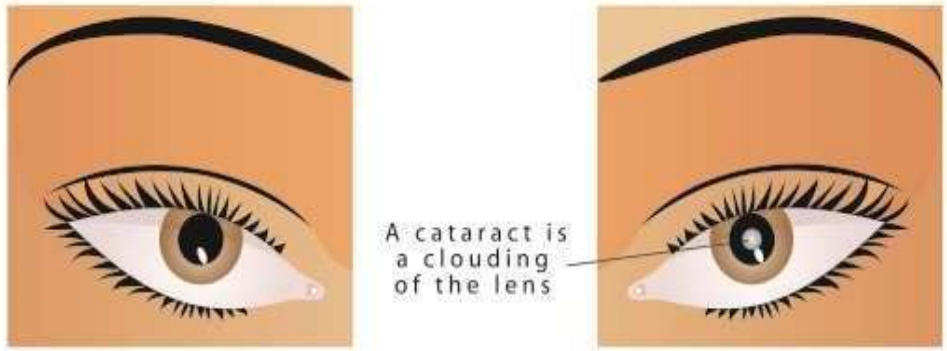
NORMAL LENS



LENS AFFECTED BY CATARACTS



TYPES OF CATARACTS



Healthy eye

Eye with cataract

HUMAN EYES

CLASSIFICATION

BASED ON DEGREE OF MATURITY

MATURE

Cataract is one in which the **lens is completely opaque**.

IMMATURE

Cataract is one in which the **lens is partially opaque.**

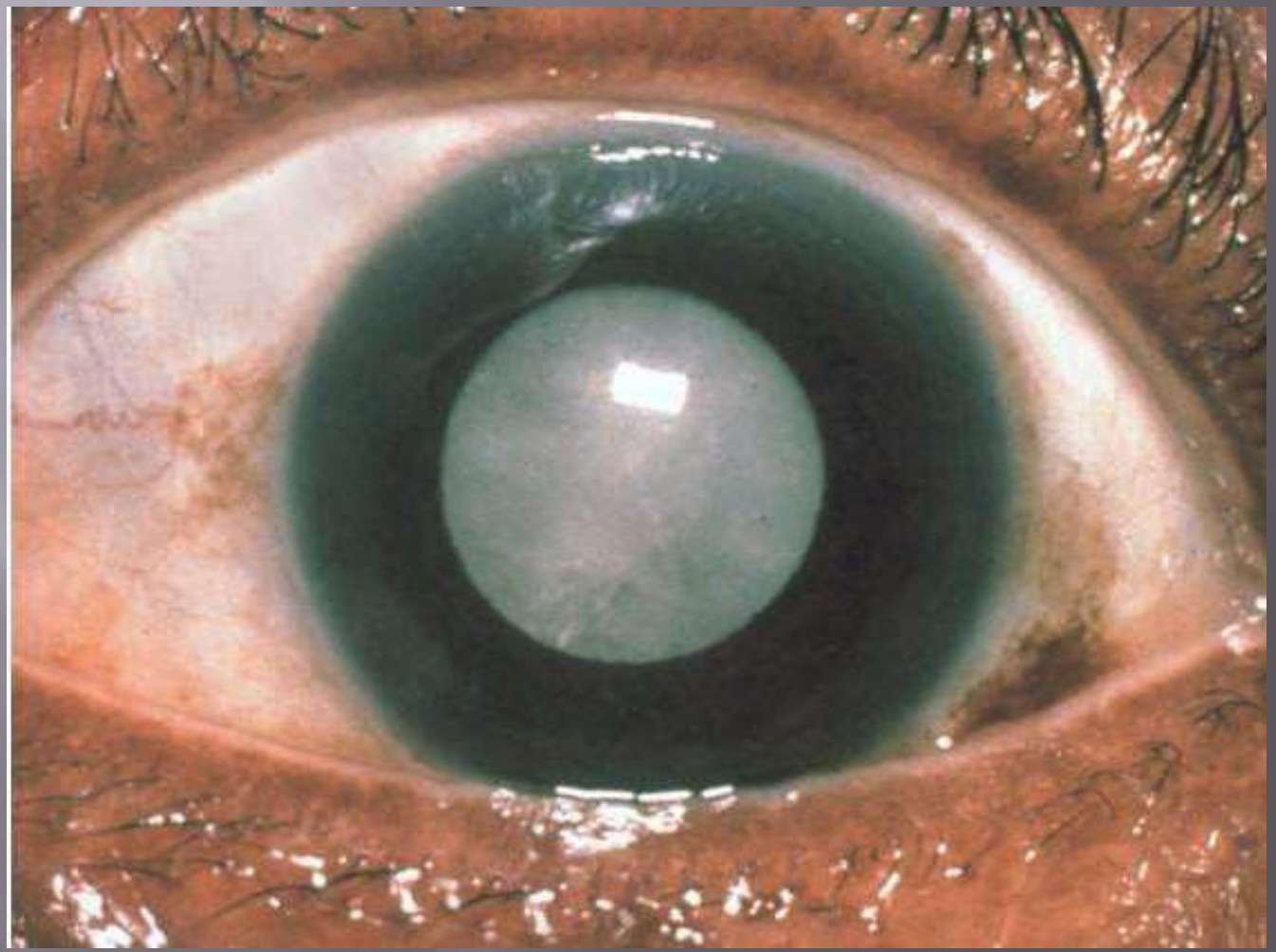
HYPERMATURE

Cataract is **shrunken** and **wrinkled anterior capsule** due to leakage of water out of the lens

MORGAGNIAN

Cataract is a **hypermature cataract** in which liquefaction of the cortex has allowed the **nucleus to sink inferiorly**

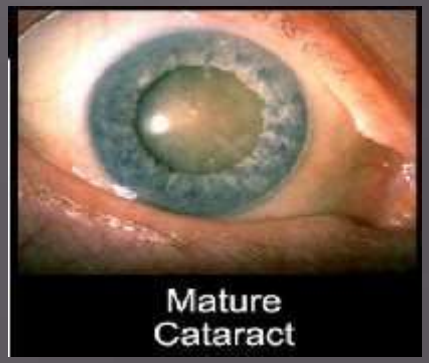
MATURE CATARACT



MATURE VS IMMATURE

HOW TO DIFFERENTIATE MATURE AND IMMATURE CATARACT?

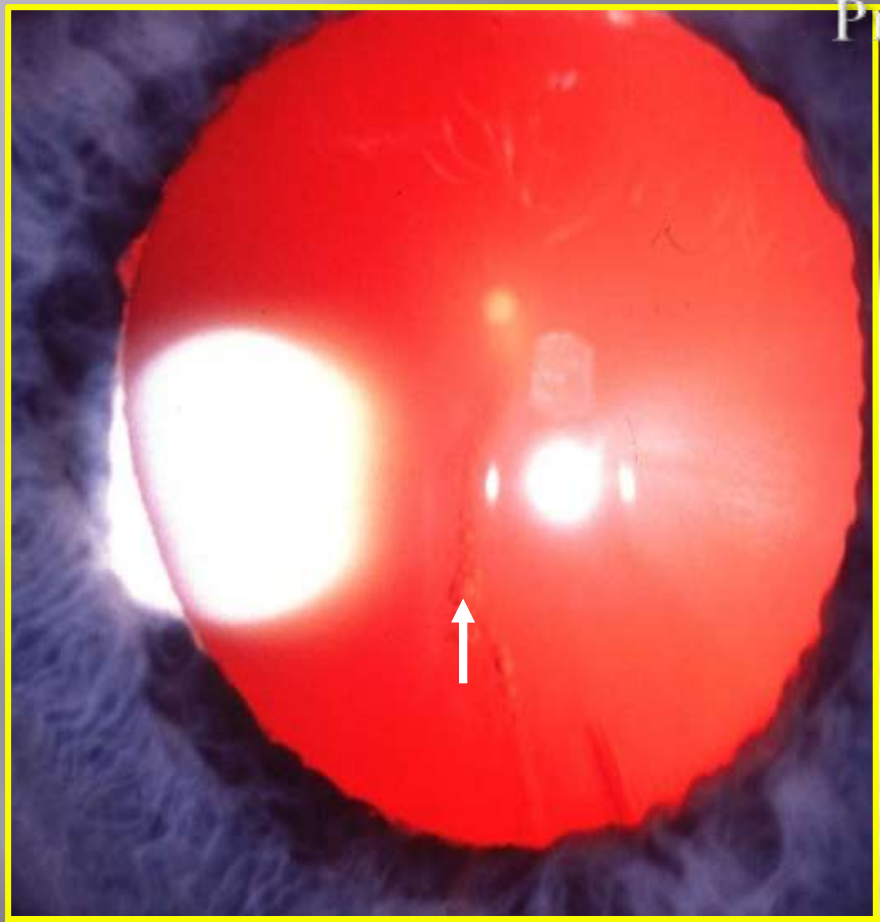
IMMATURE CATARACT	MATURE CATARACT
▪ Visual acuity is reduced to counting fingers	▪ Visual acuity is reduced to hand movement or perception of light
▪ Lens is partially opaque	▪ Lens in totally opaque
▪ Iris shadow is present	▪ No iris shadow is present
▪ Fundus may be visible	▪ No fundus details

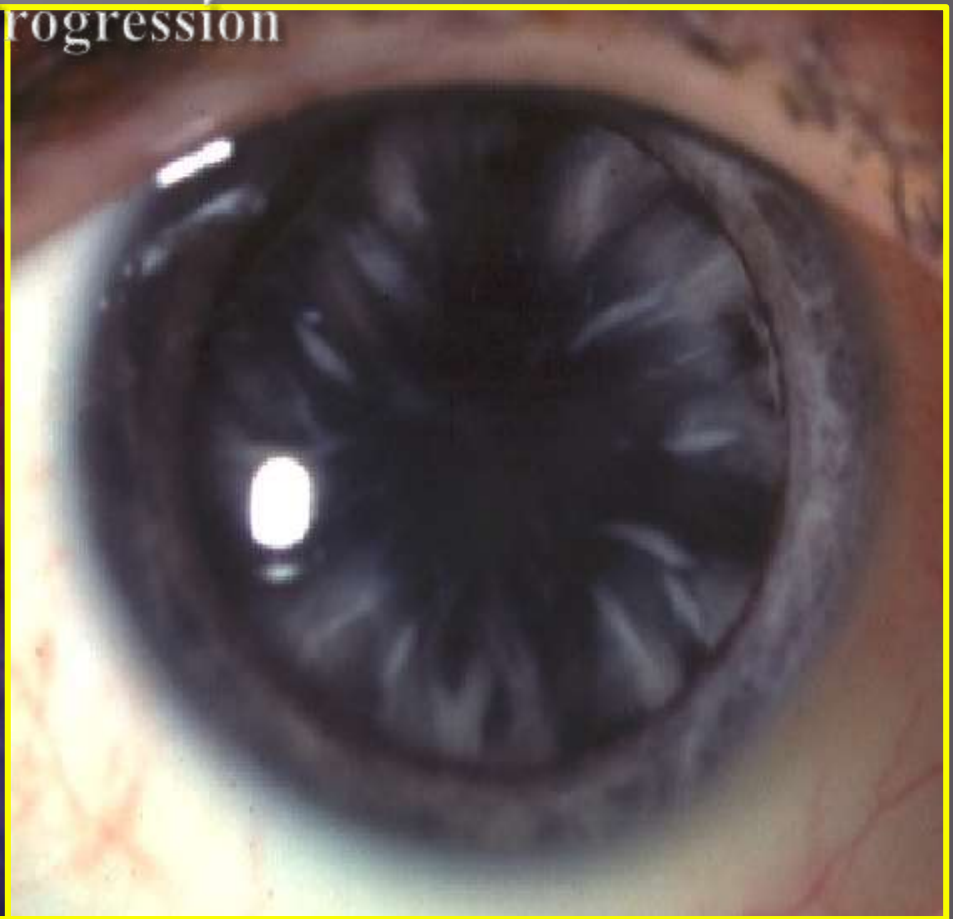


HYPERMATURE CATARACT

Cortical cataract

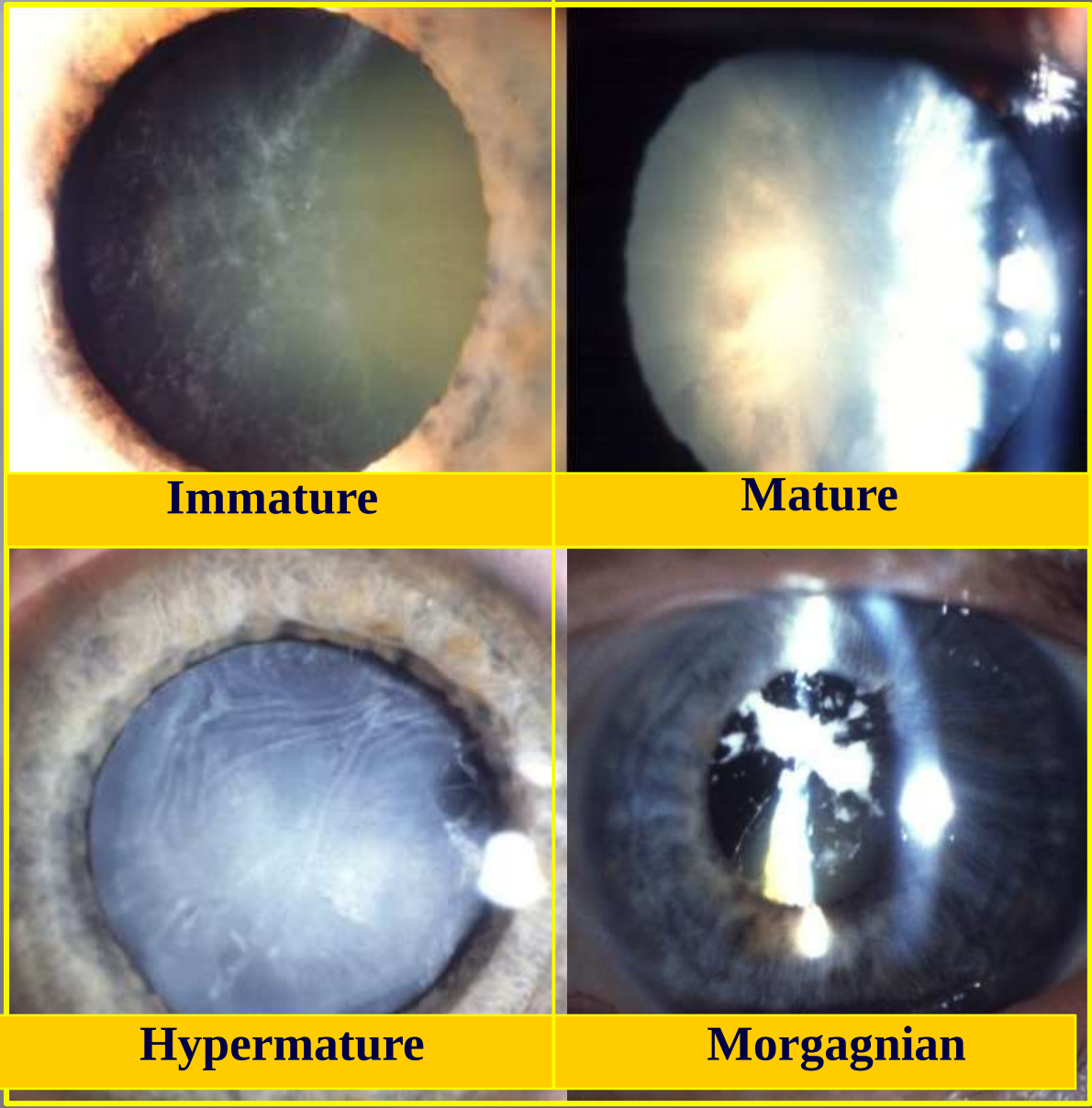
Progression



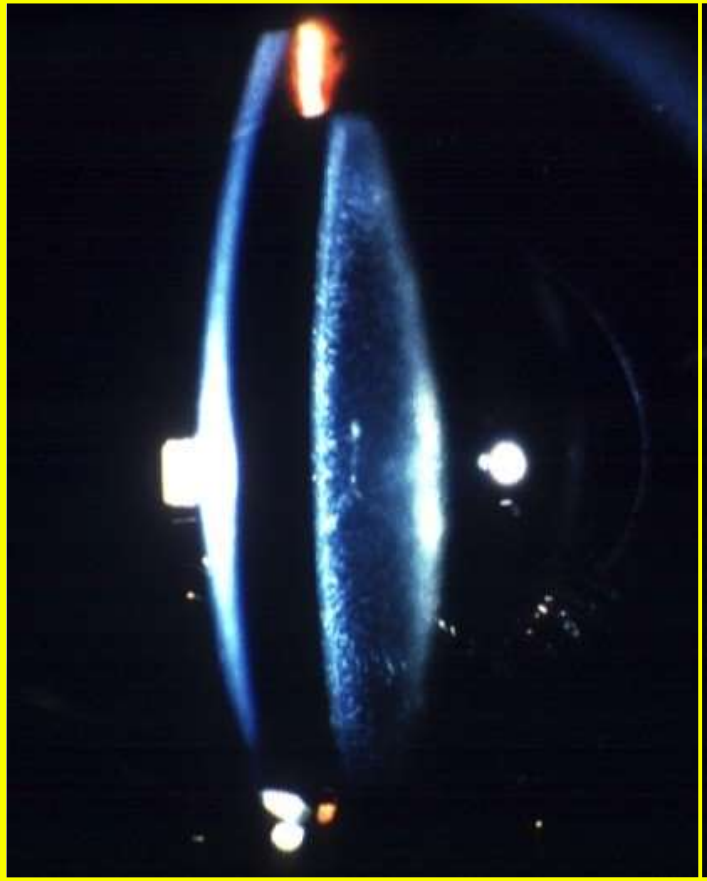


Initially vacuoles and clefts	Progressive radial spoke-like opacities

Classification according to maturity

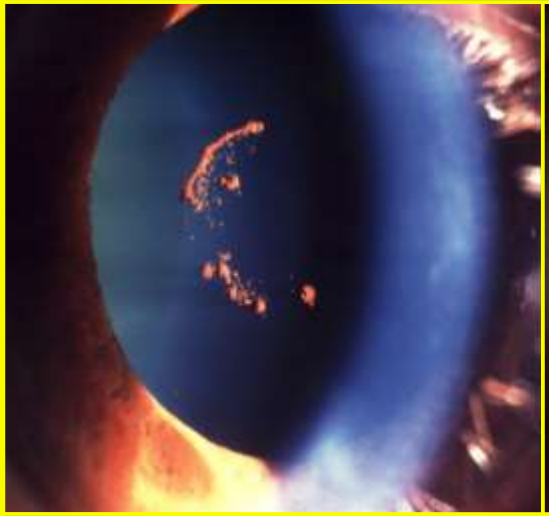


Other causes of cataract - diabetes

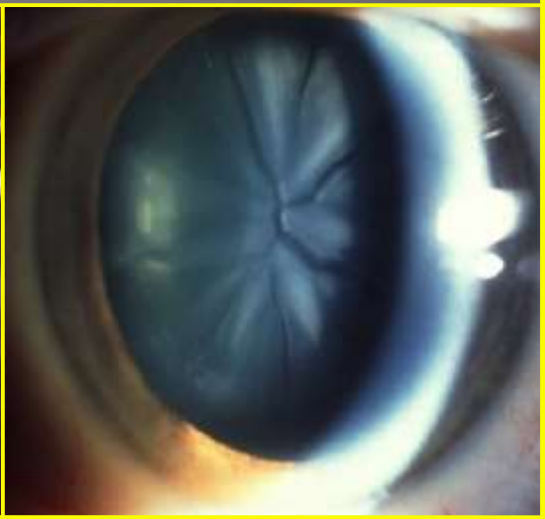
Juvenile	Adult
	
· White punctate or snowflake posterior or anterior opacities · May mature within few days	· Cortical and subcapsular opacities · May progress more quickly than in non-diabetics

Causes of traumatic cataract

Concussion



‘Vossius’ ring from imprinting of iris pigment



Flower-shaped

Penetration

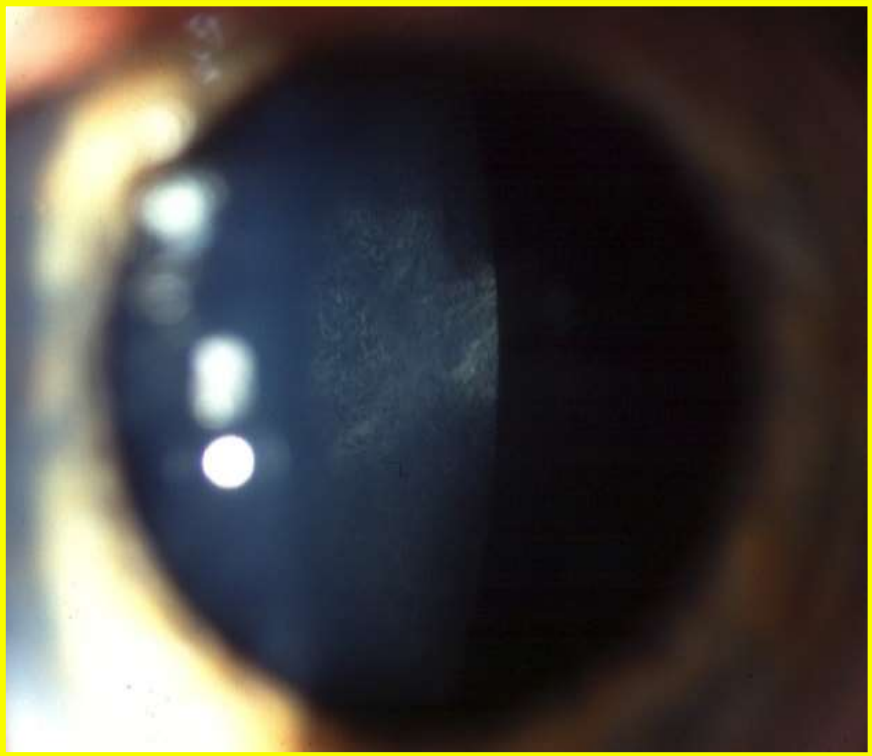
Other causes

- Ionizing radiation
- Electric shock
- Lightning

Drugs

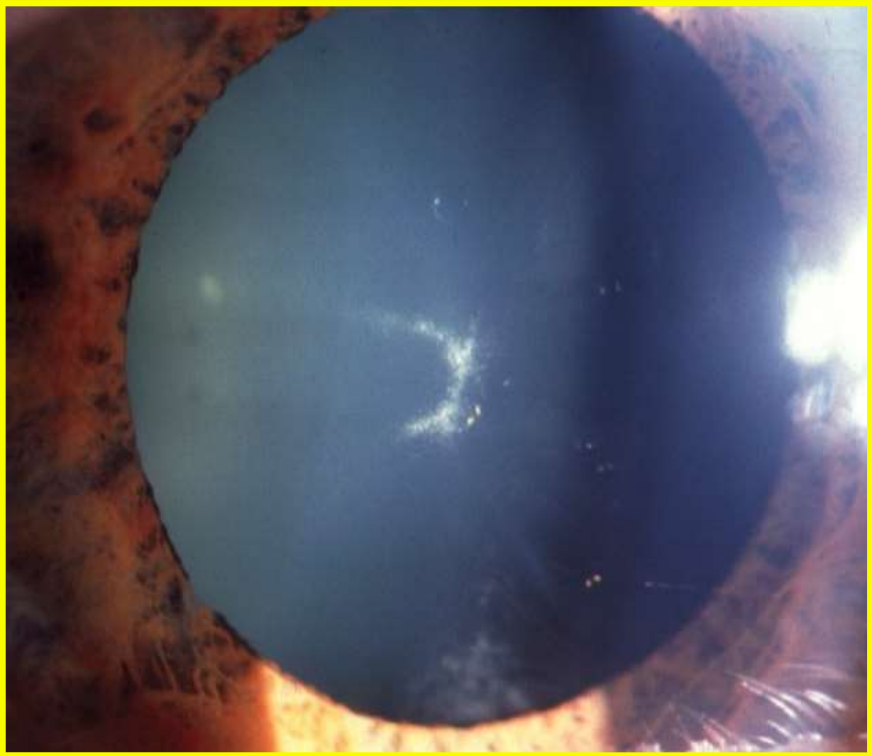
Systemic or topical steroids

- initially posterior subcapsular



Chlorpromazine

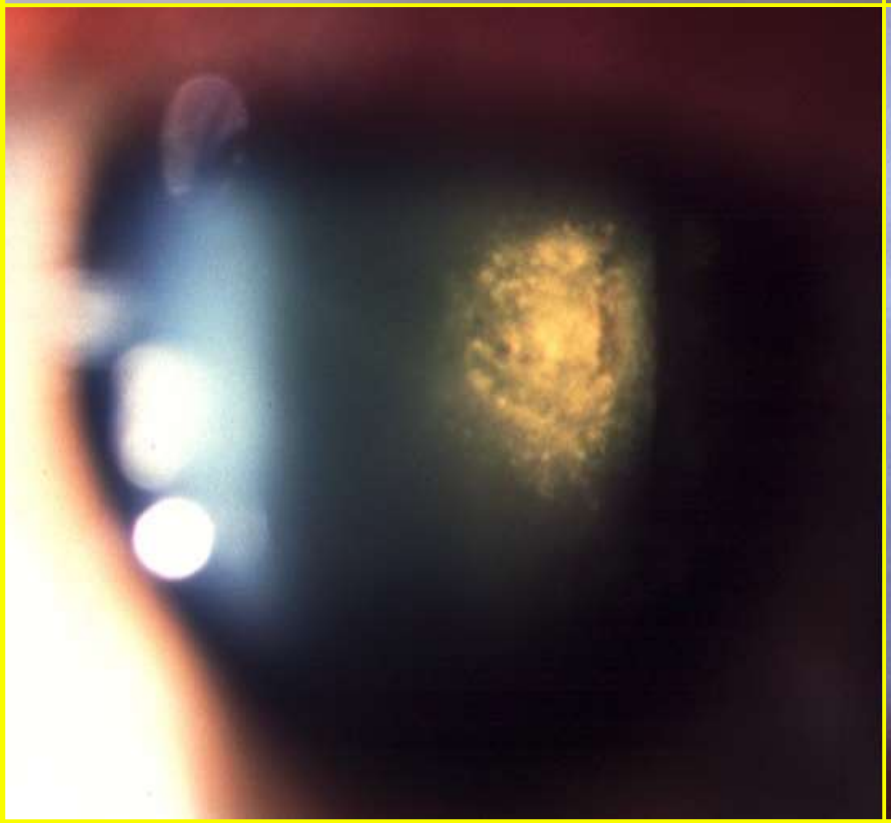
- central, anterior capsular granules



Other drugs

- Long-acting miotics
- Amiodarone
- Busulphan

Secondary (complicated) cataract

Posterior subcapsular	Glaukomflecken
	
· Chronic anterior uveitis · High myopia · Hereditary fundus dystrophies	· Follows acute angle-closure glaucoma · Central, anterior subcapsular opacities

Symptoms

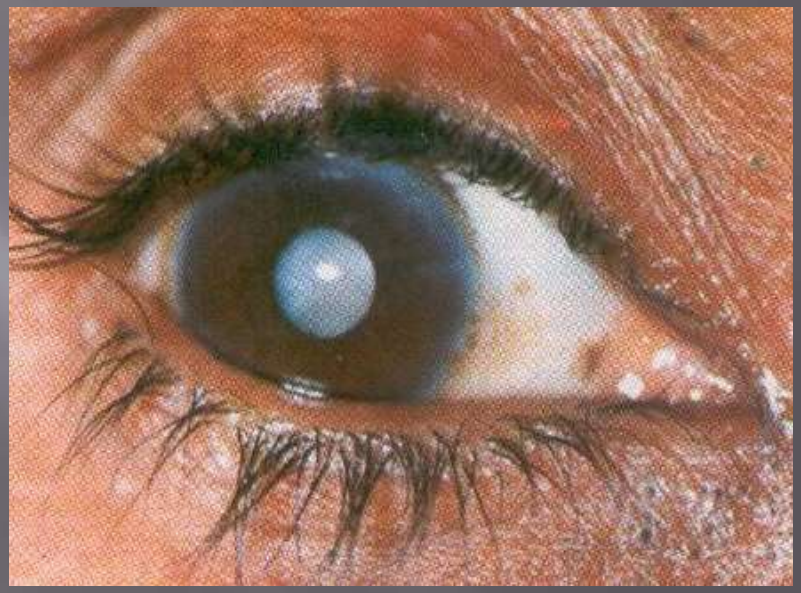
- Progressive decrease in visual acuity for near and distant.
- Glare in bright light and sun light.◊ difficulty in driving.
- Uniocular diplopia or polyopia.
- Fixed dark spots in field of vision.
- Nuclear sclerosis◊ making the patient short sighted (good near vision).aka myopic shift

Signs

- Reduction in visual acuity.
- Diminished red reflex on ophthalmoscopy.
- Opacity covering the pupillary area.
- Slit lamp examination◊ details and location of cataract.

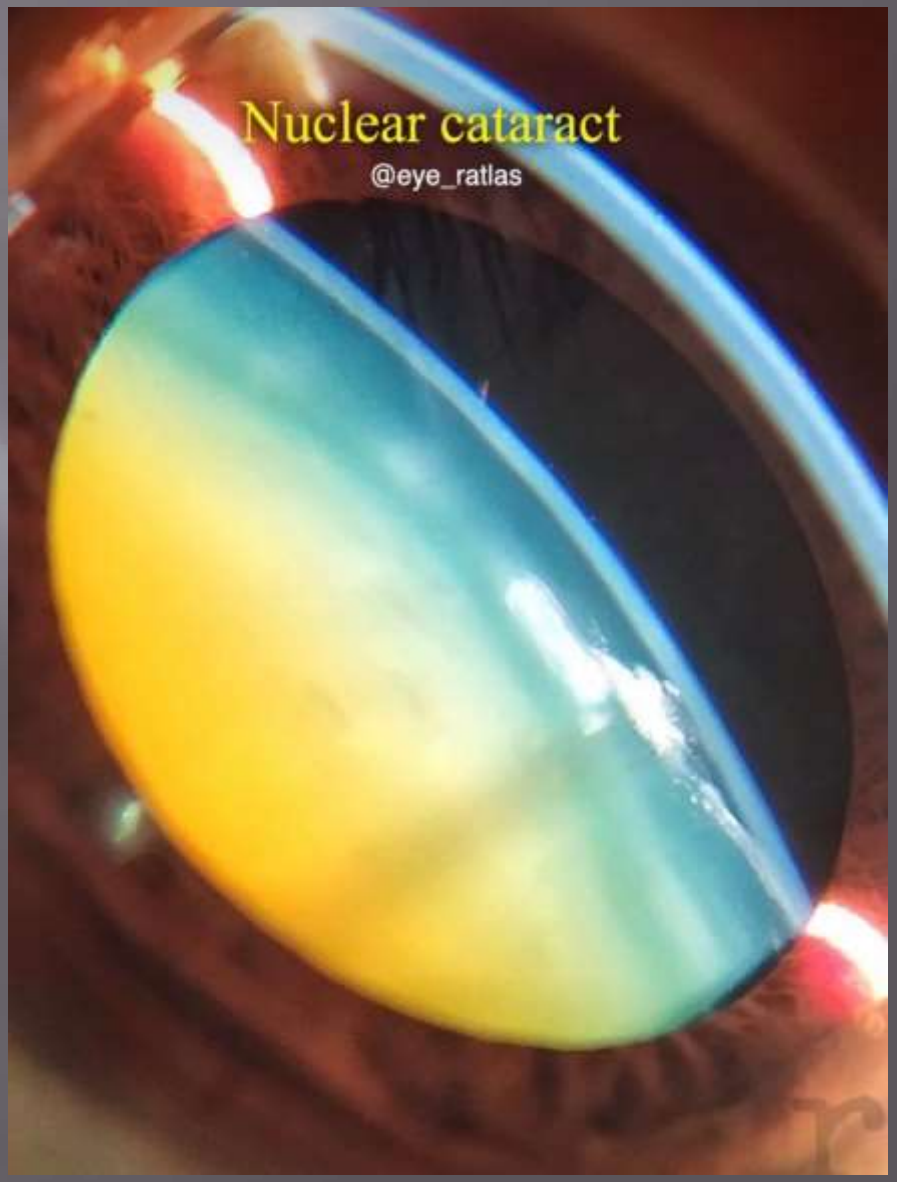
LENS OPACITY

Normal eye – Good red reflex

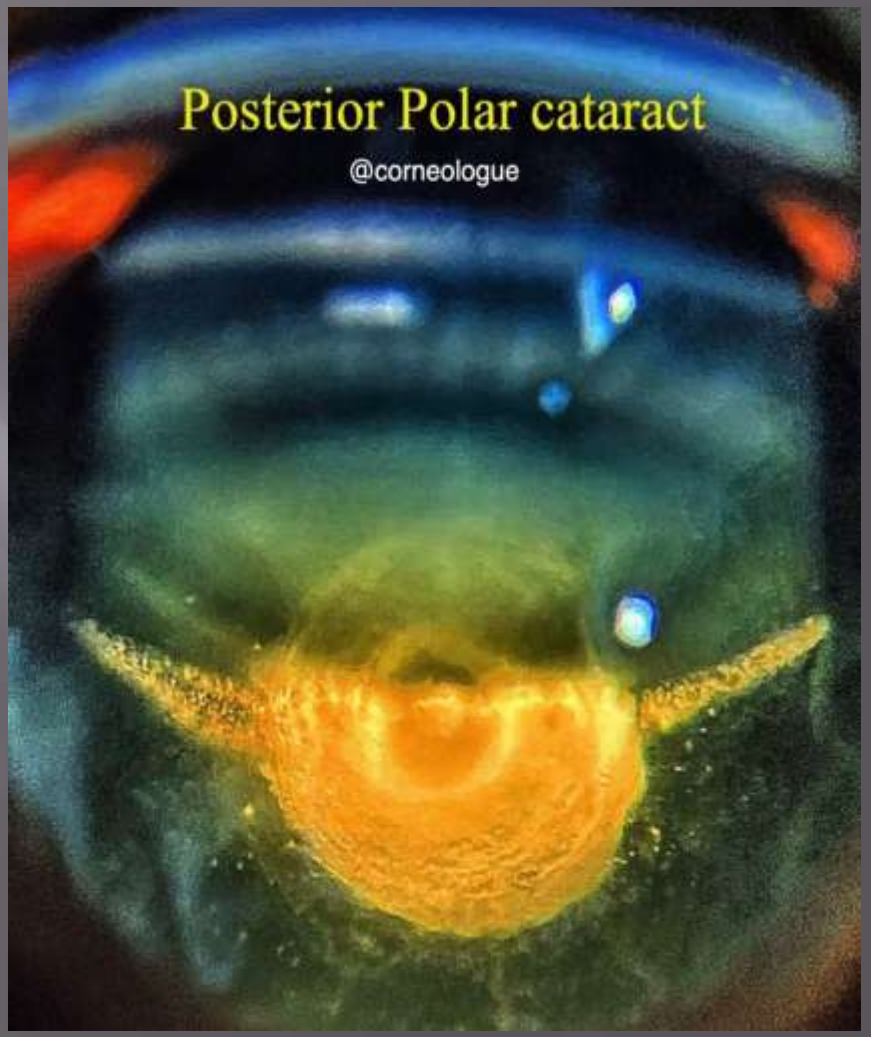


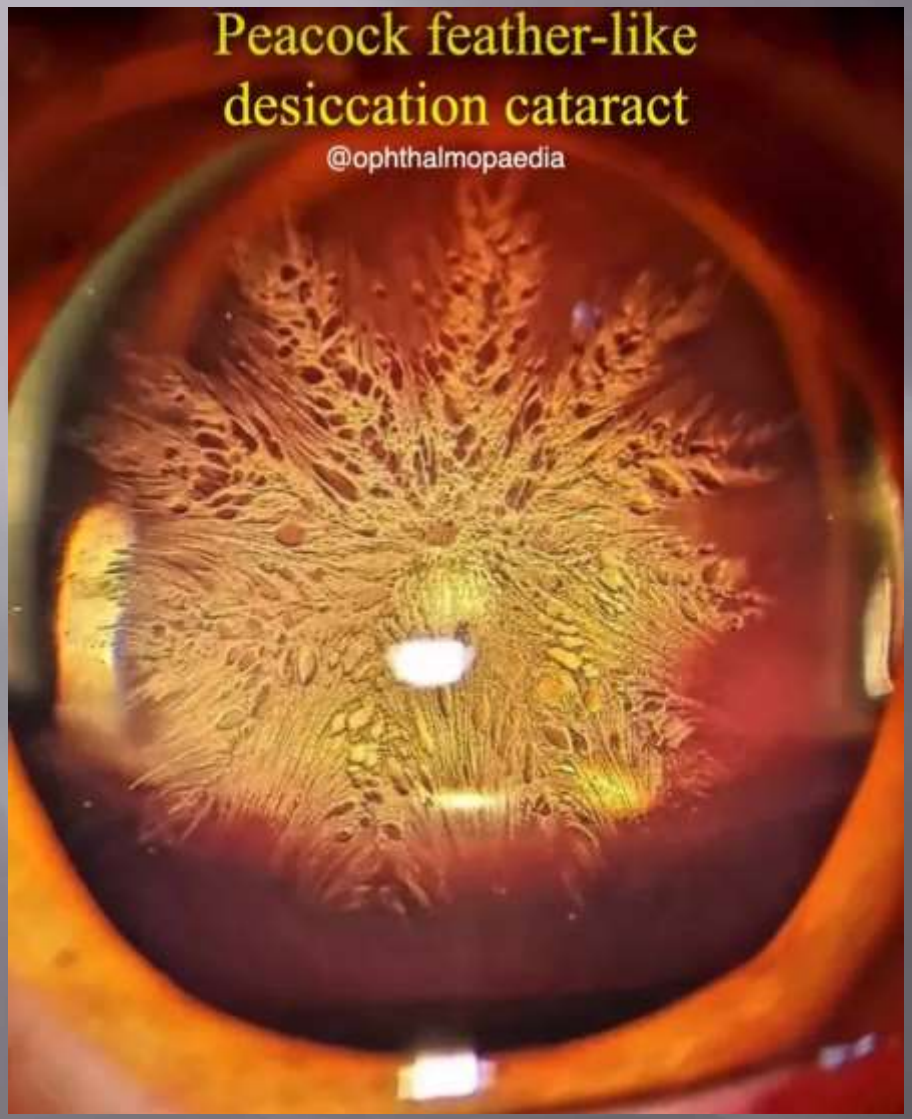
Cataractous eye – Poor red reflex


Cortical cataract
@ocularsurgeon


Nuclear cataract
@eye_ratlas


Anterior Polar cataract
@ocu.fy


Posterior Polar cataract
@corneologue


Peacock feather-like
desiccation cataract
@ophthalmopaedia


Brunescent cataract
@mco.pharg

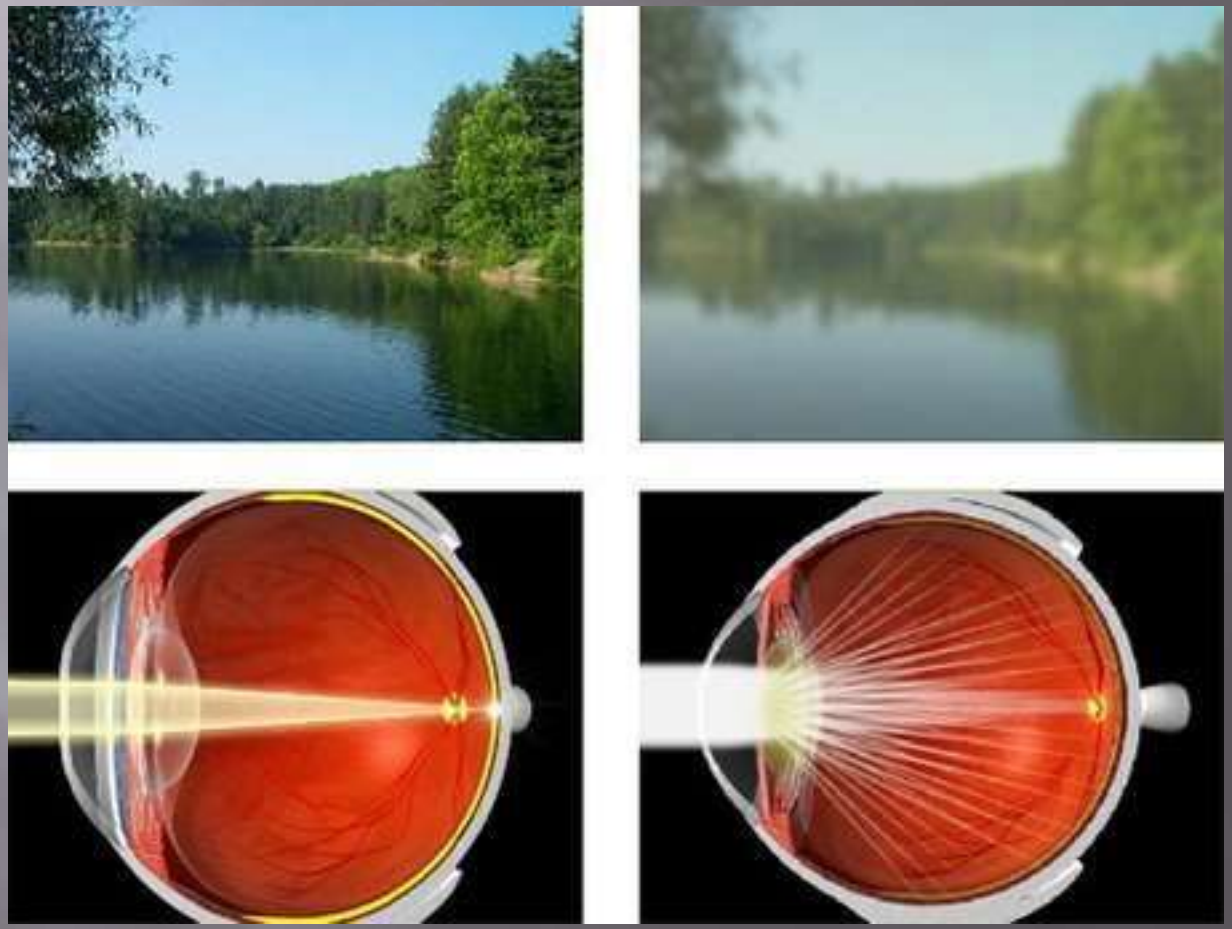

White cataract
@ofta.mex


Subcapsular Posterior cataract
@your_eye_spy
@your_eye_spy


Sutural cataract
@oftalmo_chile


Pulverulent cataract
@hiphoptometryschool

VISUAL ACUITY



Blurred vision due to scattering of light on the retina

VISUAL ACUITY

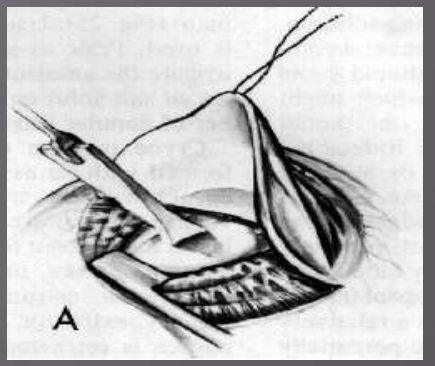
Treatment: Surgical

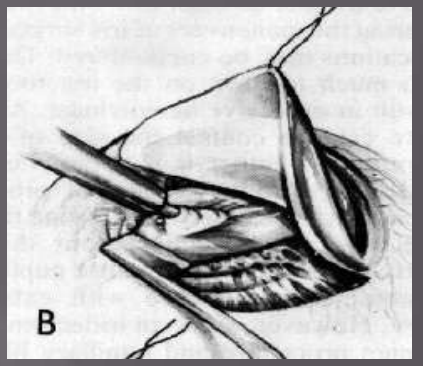
Indications:

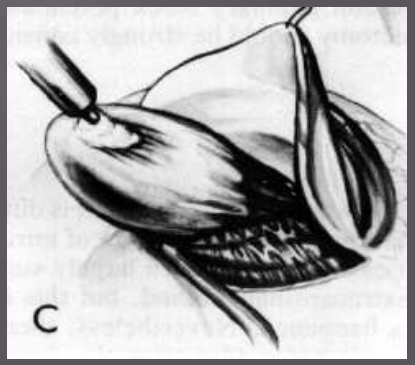
- Decreased visual acuity which causes disturbance in his or her daily work.
- Lens induced glaucoma
  ◊Phacomorphic/ Phacolytic
- To permit photocoagulation.
- If cataract blocks the posterior segment for posterior segment surgery.
- Cosmetic◊ to obtain black pupil.

Surgical techniques (1/3)

- Intracapsular cataract extraction with IOL (ICCE).
- The entire lens is removed using cryo probe.
- Anterior chamber IOL.
- This method is for subluxated cataractous lens.





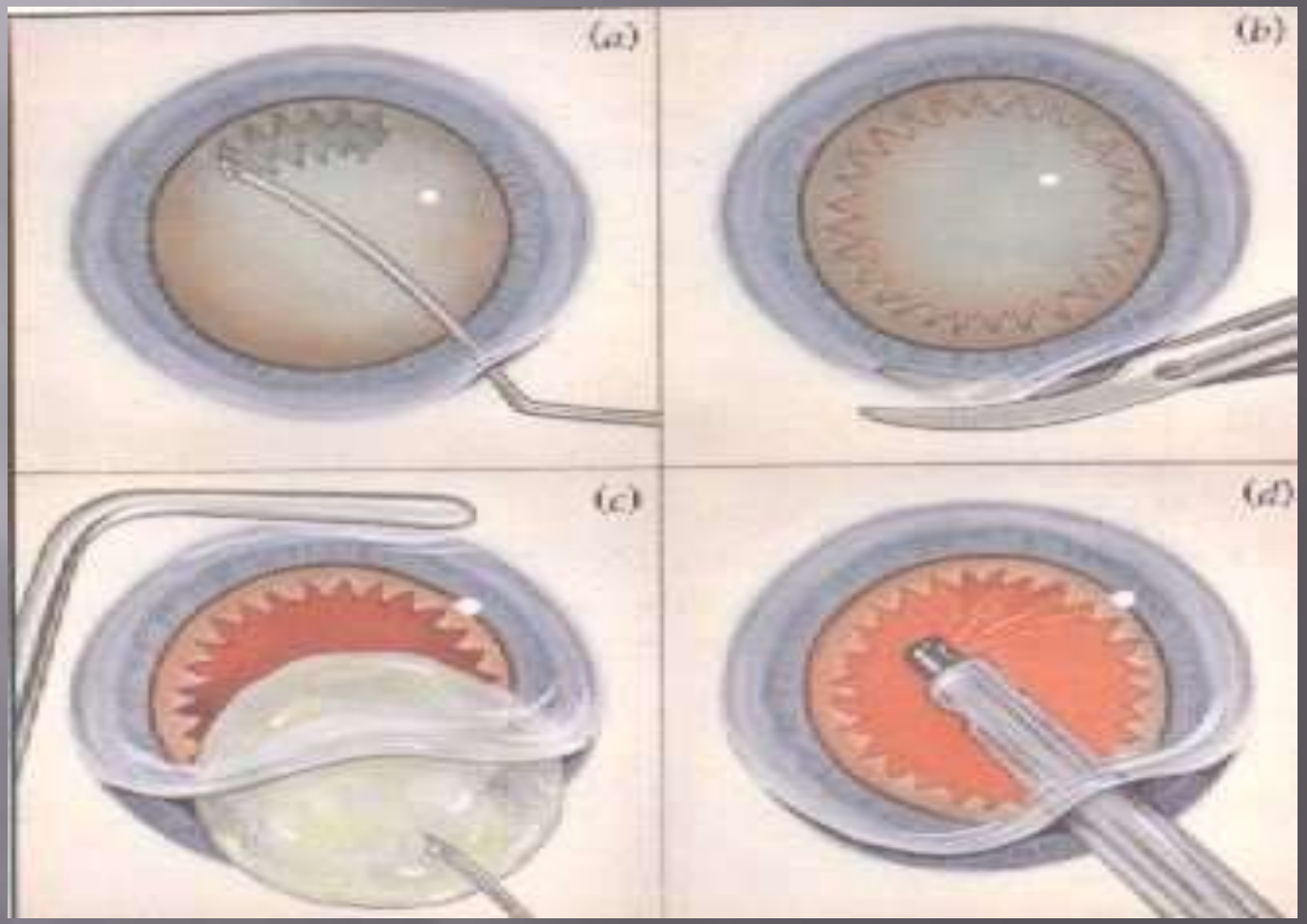


Surgical techniques (2/3)

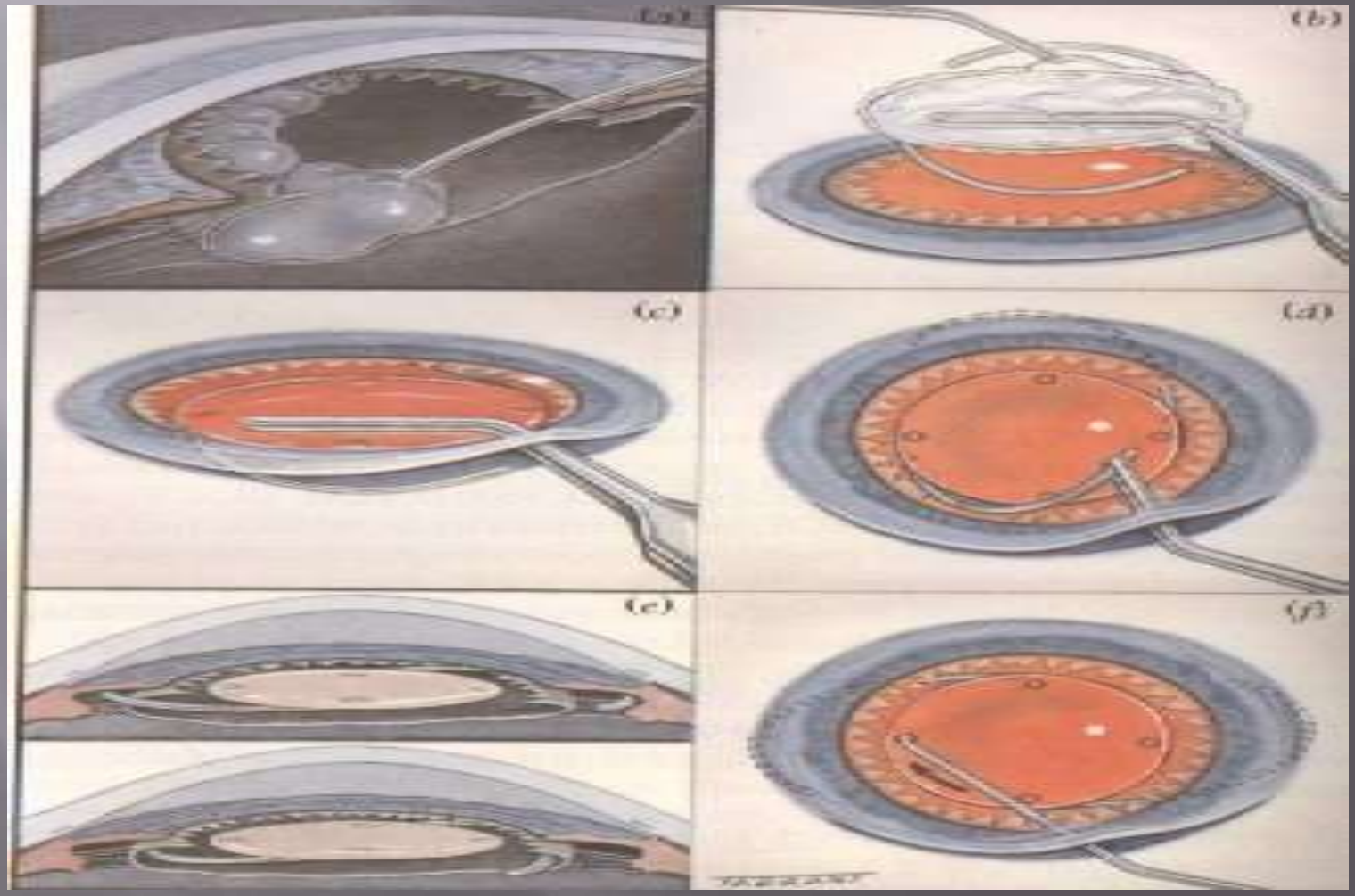
- Extracapsular cataract extraction with IOL. (ECCE)

1. Open the anterior capsule.
2. Nucleus expression.
3. Aspiration of lens cortex.
4. Posterior chamber IOL implant.
5. Incision size is about 10 mm.

ECCE



ECCE with IOL



ECCE

- Step 1- Incision
- Step 2- Anterior capsulotomy
- Step 3- Deepening the wound
- Step 4- Nucleus expression
- Step 5- Cortex aspiration
- Step 6- IOL insertion
- Step 7- Suture
- Complete suture

Surgical techniques (3/3)

- Phacoemulsification (sophisticated form of ECCE) with IOL:

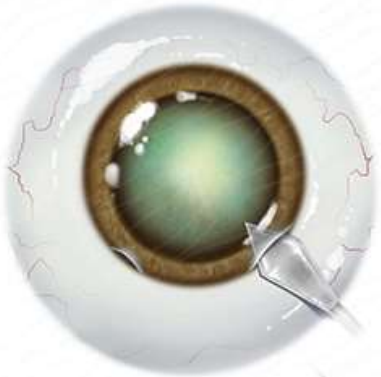
1. Open the anterior capsule
2. Using the ultrasonic power nucleus is fragmented and removed.
3. Aspiration of lens cortex.
4. Posterior chamber IOL implant.
5. Incision size◊ 3mm only.

Phacoemulsification with Intraocular Lens Implantation

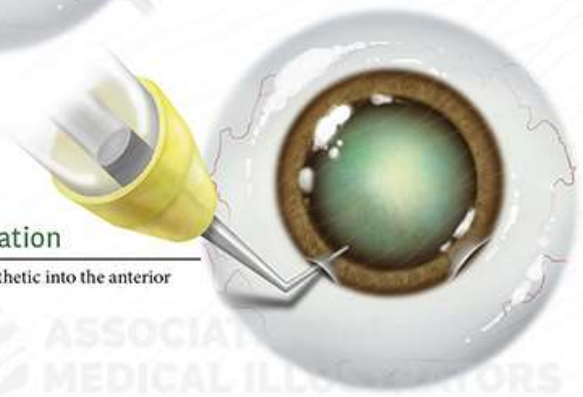
Orientation View

A. Port Incisions

1 Create two 3mm incisions of the cornea. The first incision is made with a paracentesis blade.

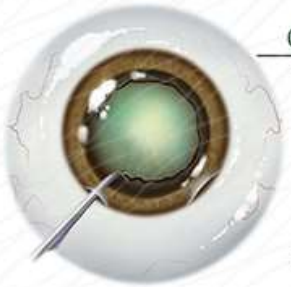


2 The second incision is being made with a keratome blade.



B. Viscoat Application

Inject viscoat and anesthetic into the anterior chamber.



C. Continuous Curvilinear Capsulorhexis

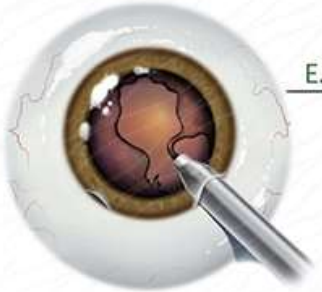
1 Use a cystotome blade to create a complete circular incision around the lens capsule about 5 mm in diameter.

2 Create a flap and then peel away.

D. Phacoemulsification

1 Break down the nucleus by creating a cross with a phacoemulsifier.

2 Then use suction to remove cataract fragments.



E. Irrigation/Aspiration

Use an aspiration / irrigation hand piece with a straight tip to clean up leftover cortical material.

F. Intraocular Lens Insertion

Insert an artificial intraocular lens using a lens injector. Forceps can be used to pull the lens into place.