

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
الْحَمْدُ لِلَّهِ الَّذِي
بَدَأَ خَلْقَ الْإِنسَانِ
مِنْ طِينٍ مِمَّا يَخْتَارُ
ثُمَّ عَلَّمَهُ الْقُرْآنَ
وَجَعَلَ الْإِسْلَامَ
دِينَهُ وَالْحَقَّ
مُتَّبِعًا

Lecture Title:

Basic anatomy and physiology

PROF. YASSER AL-FAKY MD, PhD, FRCS

Professor of Ophthalmology,

College of Medicine, KSU

Lecture Objectives..

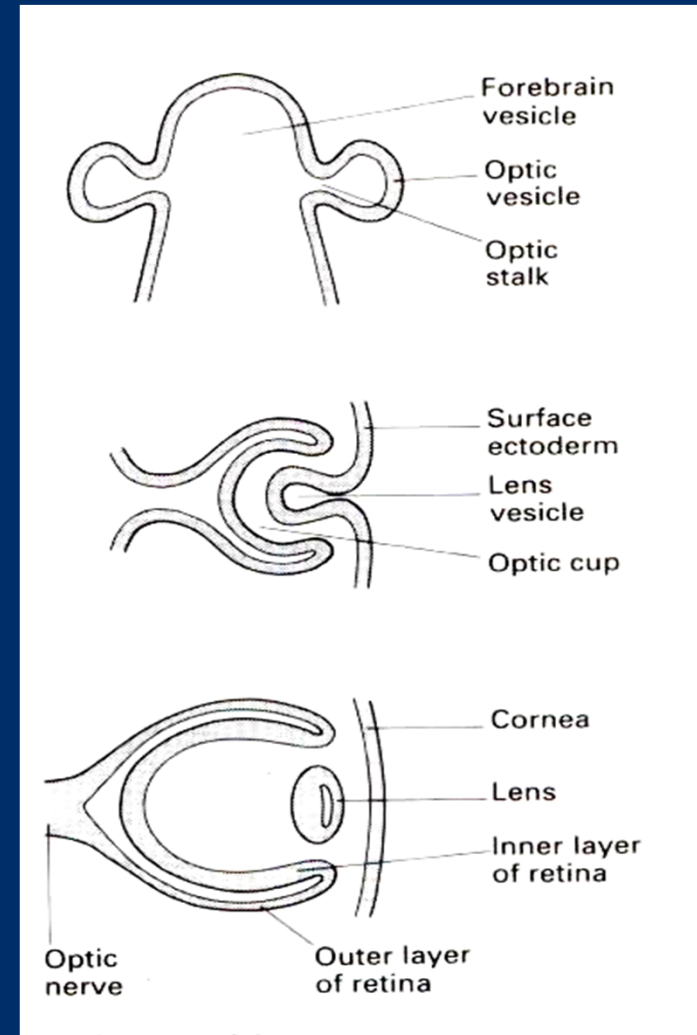
- Touch embryology of the eye.
- Explore anatomy of the orbit.
- Explore anatomy and physiology of EOM.
- Explore anatomy of the eyelid and conjunctiva.
- Explore anatomy of the globe .
- Explore anatomy of the visual pathway.
- Understand the physiology of vision, accommodation, pupillary reflex and tear drainage.

REFERENCE BOOKS..

- **Basic Ophthalmology**
(Cynthia Bradford)
- **Basic Ophthalmology**
(Frank Berson)
- **General Ophthalmology**
(Vaughan, Asbury and Tabbara)
- **Lecture notes in Ophthalmology**
(Bruce James, Chris Chew, Antony Bran)

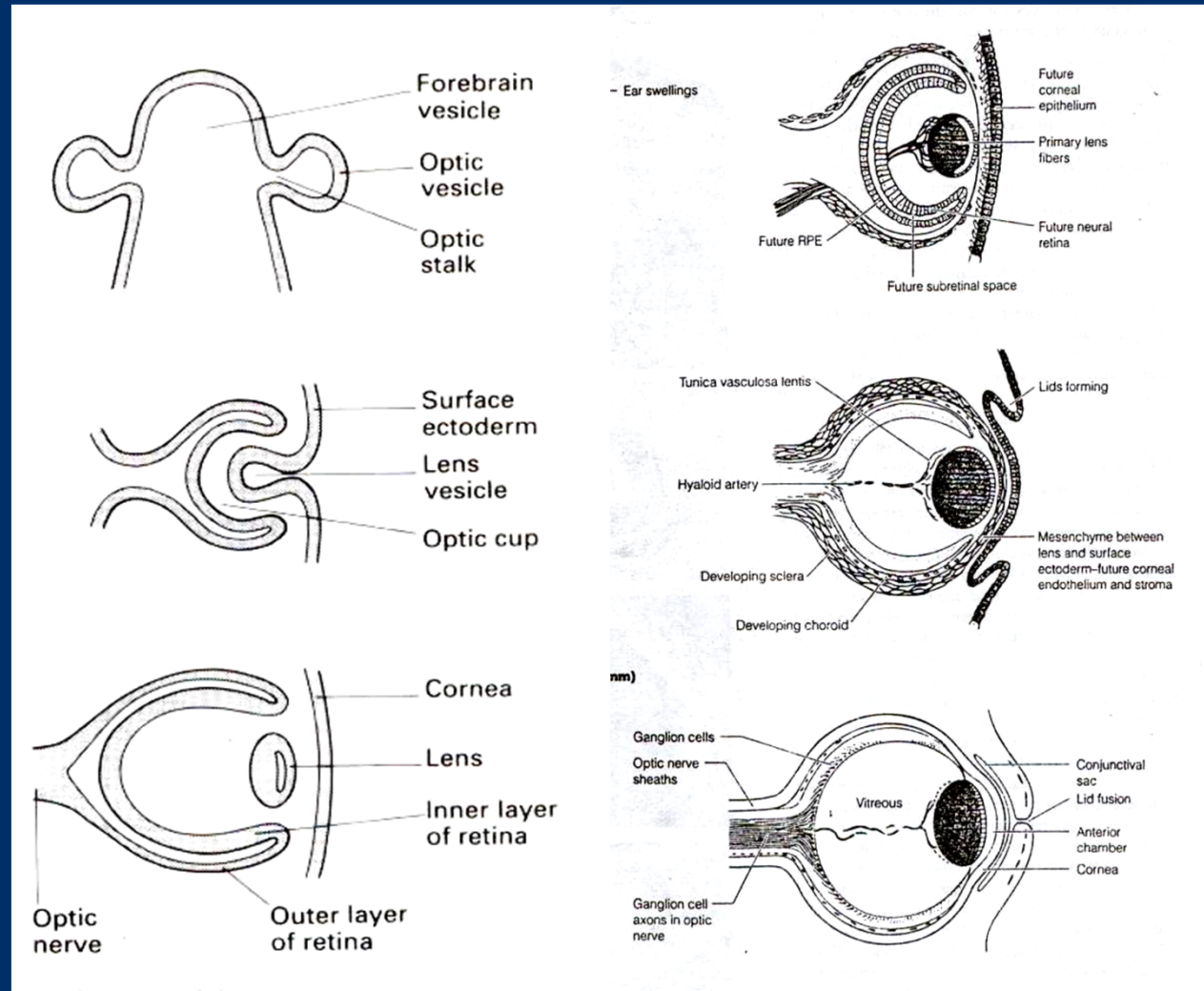
EMBRYOLOGY OF THE EYE

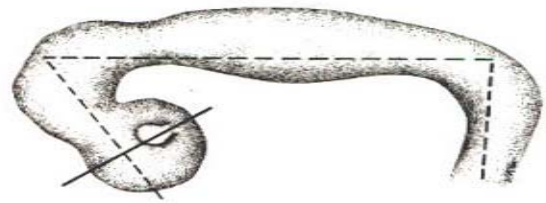
- This highly specialized sensory organ is derived from:
 - neural ectoderm,
 - surface ectoderm, and
 - mesoderm
- The eye is essentially an outgrowth from the brain (neural ectoderm).



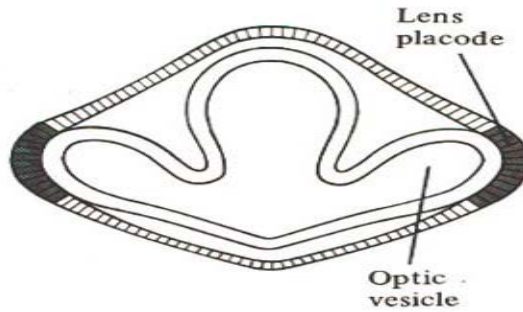
EMBRYOLOGY OF THE EYE

- Started as *Optic vesicle* connected to the forebrain by *Optic stalk*.

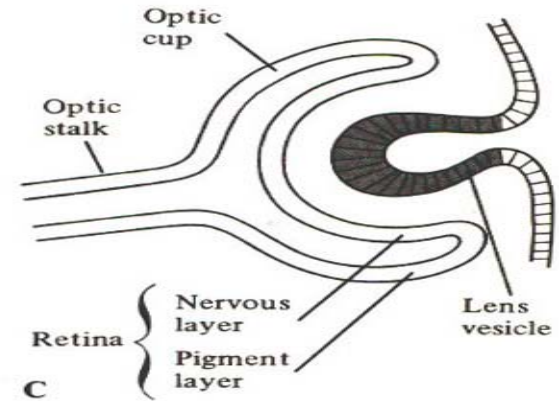




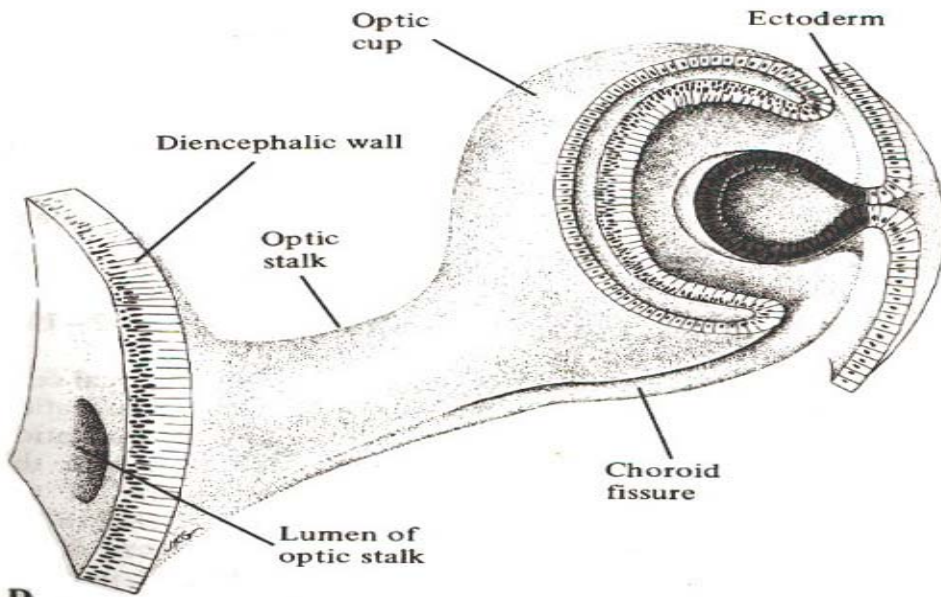
A



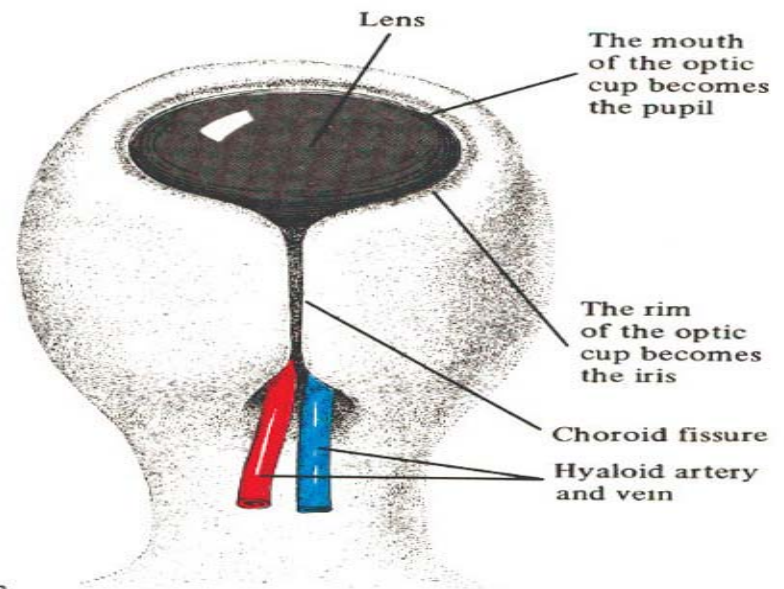
B



C



D



E

DEVELOPMENT OF THE EYE AFTER BIRTH

- At birth, the eye is relatively large in relation to the rest of the body.
- The iris has a bluish color due to little or no pigment on the anterior surface.
- During early infant life, the cornea & sclera can be stretched by raised IOP → enlargement of the eye.

DEVELOPMENT OF THE EYE AFTER BIRTH

- The eye reaches full size by the age of 8 years.
- The lens continues to enlarge throughout the life.

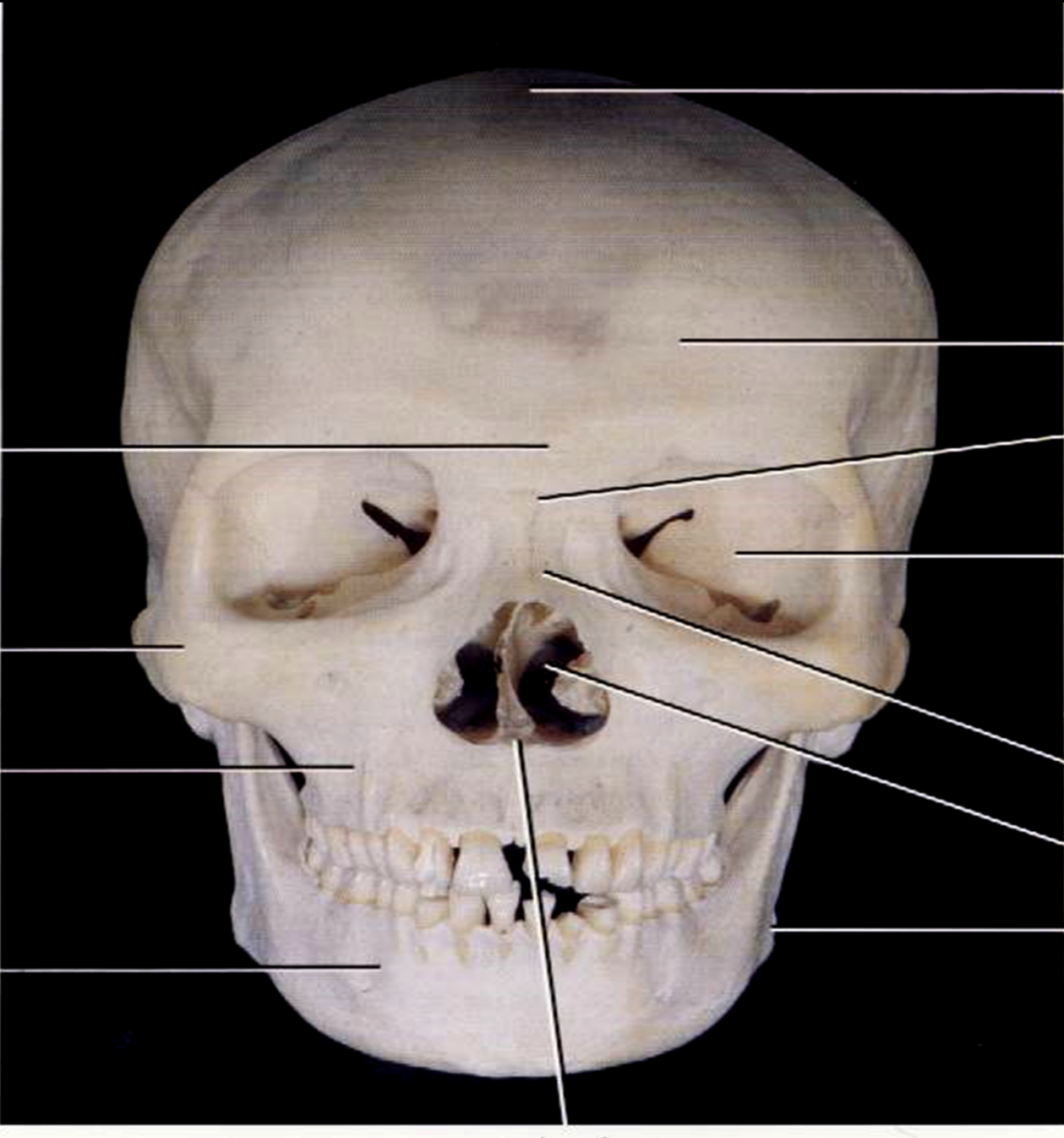


ORBIT

THE ORBIT

- As a socket, contains & protect the eye.
- Seven bones contribute the bony orbit.
- The weakest parts are the floor & the medial wall.
- Surrounded by nasal sinuses.

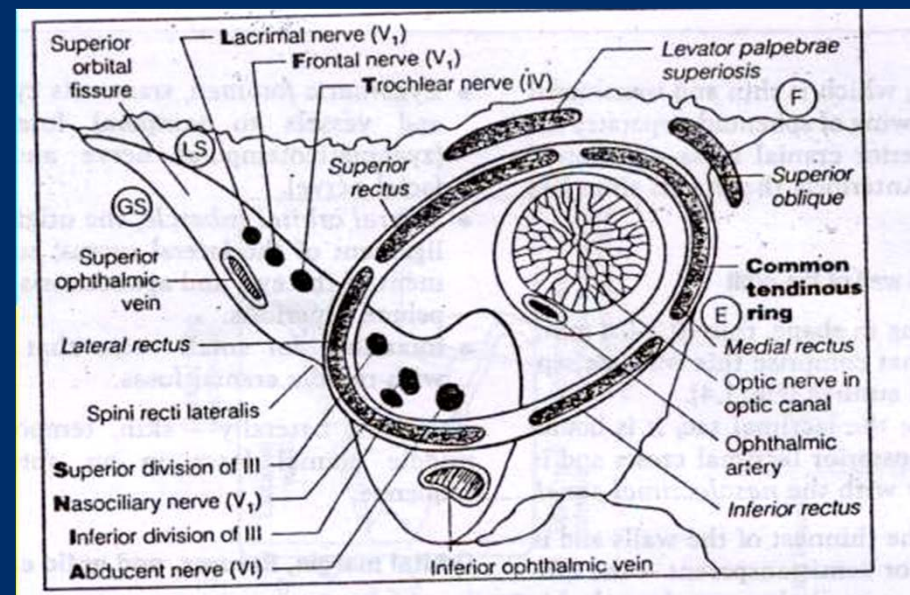
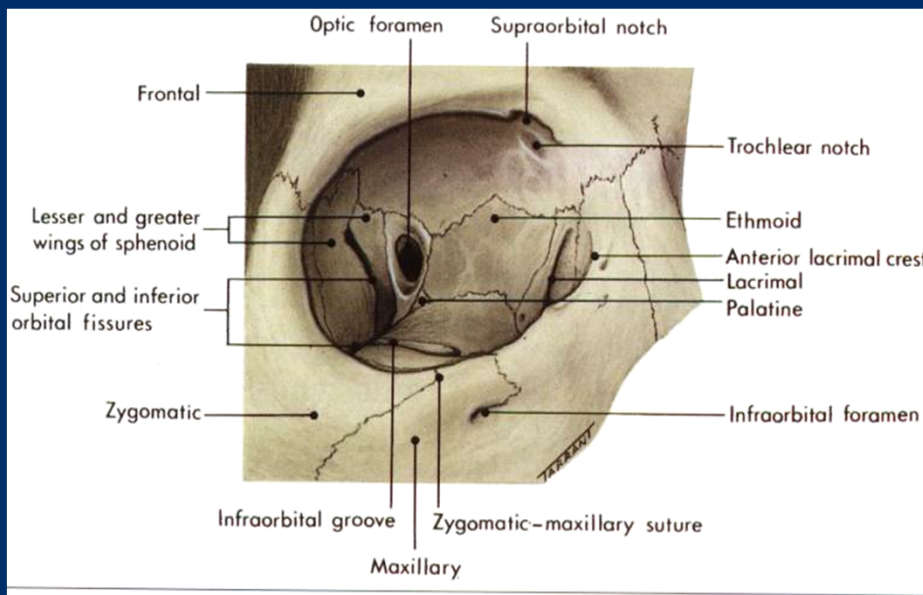
Glabella
Zygomatic bone
Maxilla
Mandible

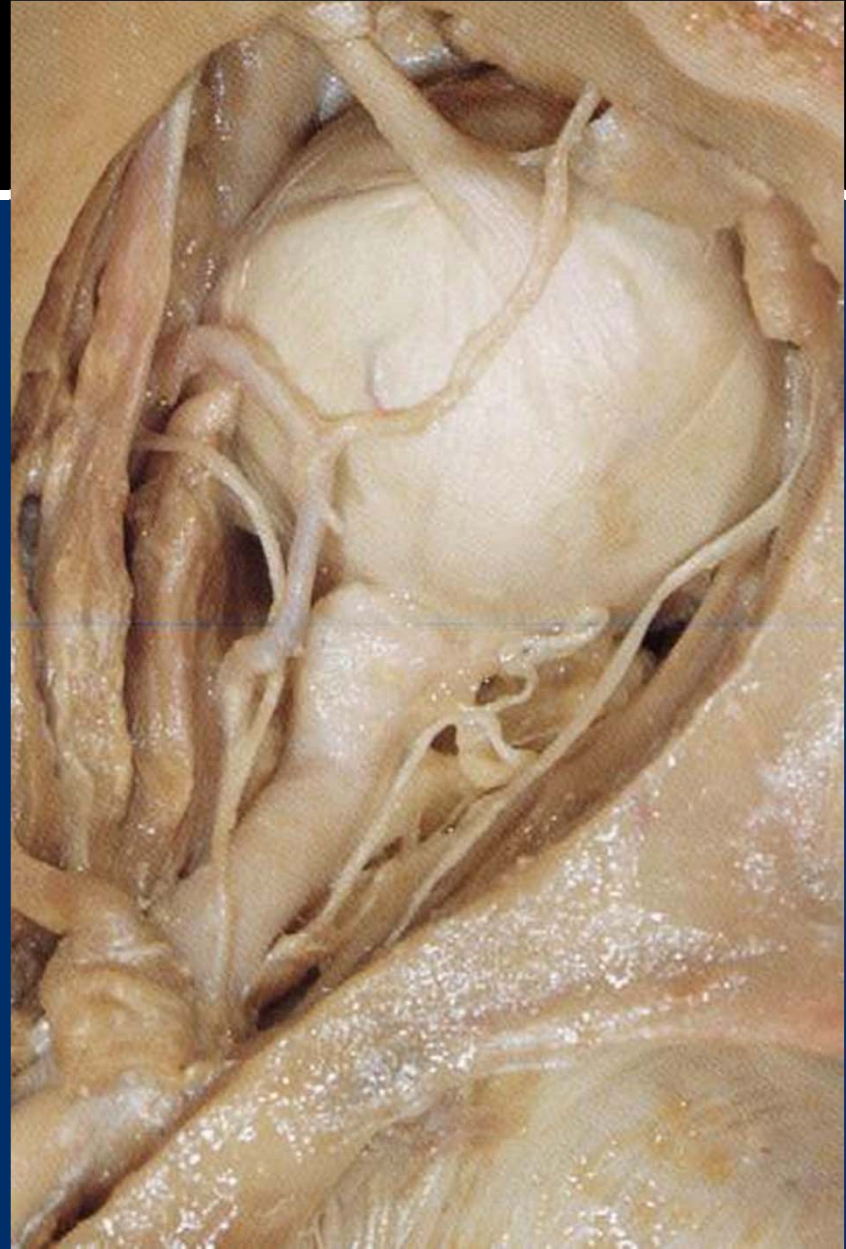


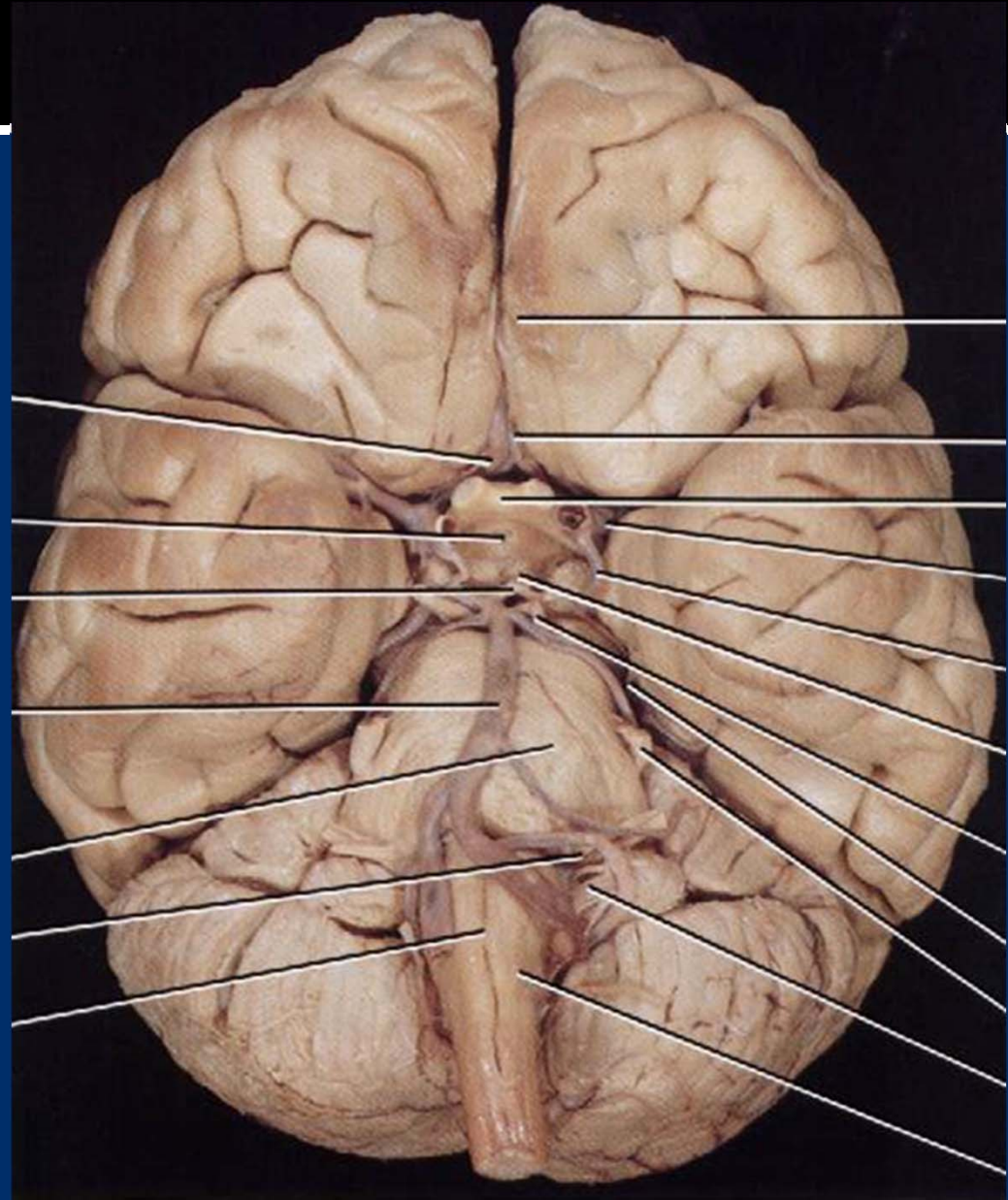
Vertex
Frontal bone
Nasion
Orbit
Nasal bone
Piriform aperture
Gonion

THE ORBIT

- Important openings are:
 - Optic foramen.
 - Superior orbital fissure.
 - Inferior orbital fissure.

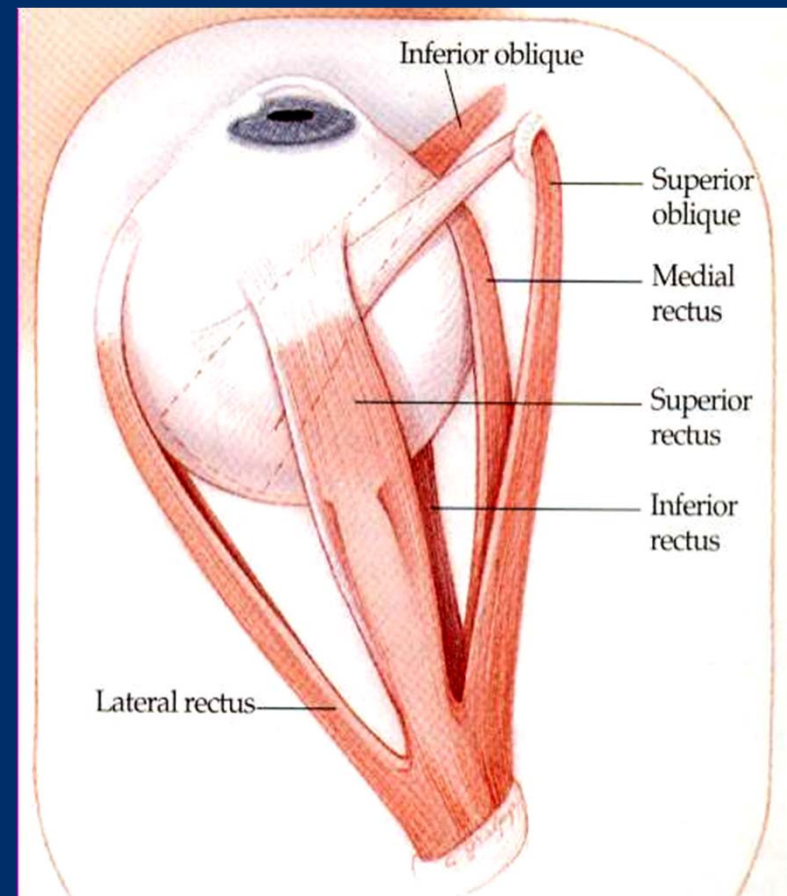




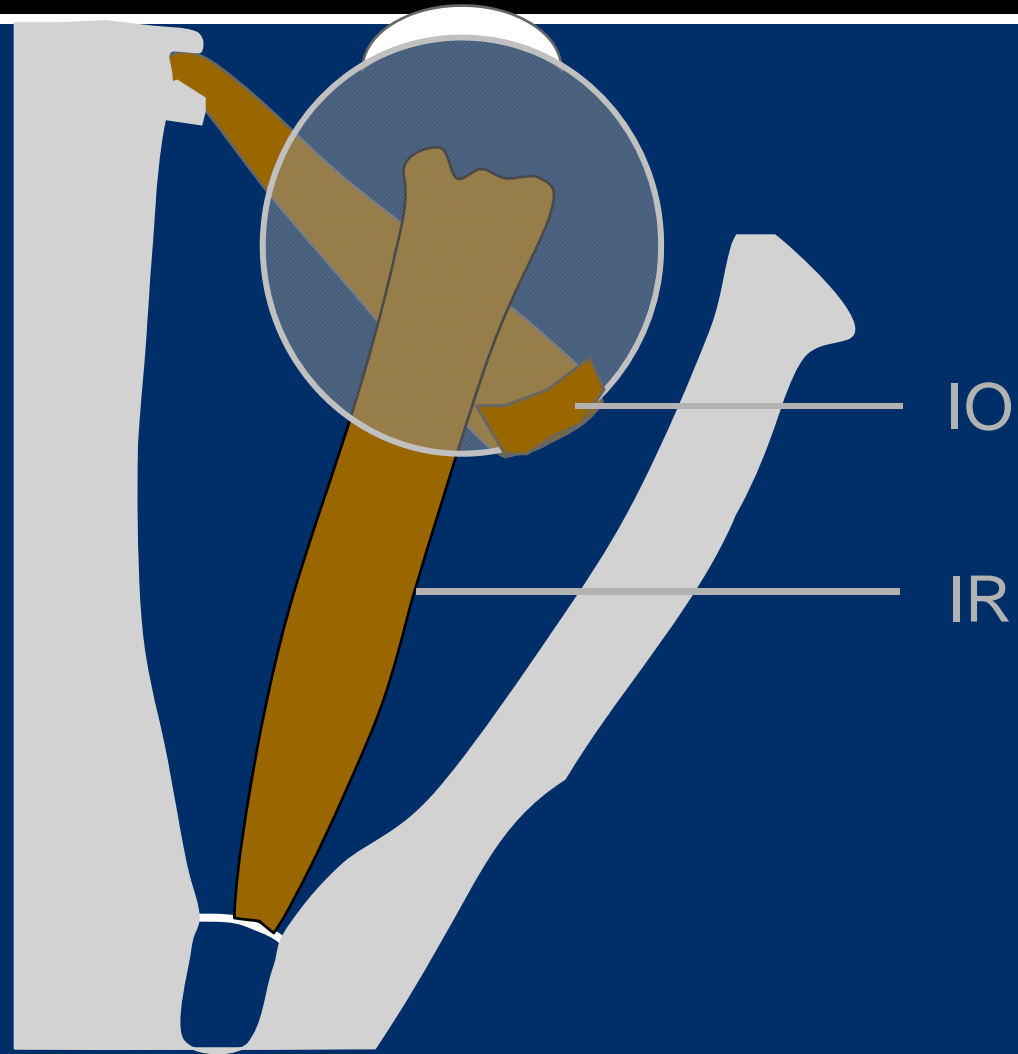


THE EXTRAOCULAR MUSCLES

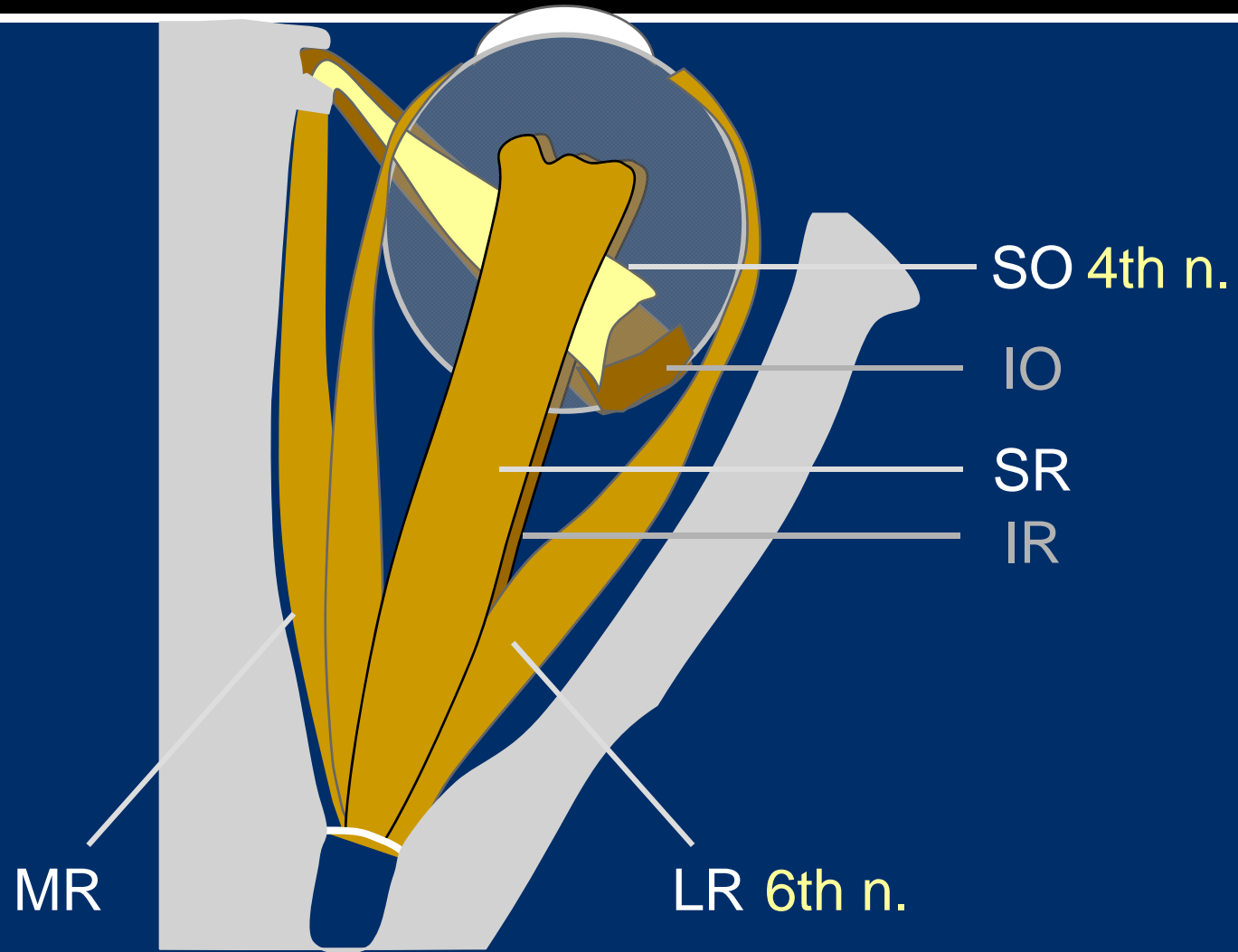
- Four recti & two oblique muscles.
- All are supplied by Oculomotor n. except superior oblique (Trochlear n.) & lateral rectus (Abducent n.).



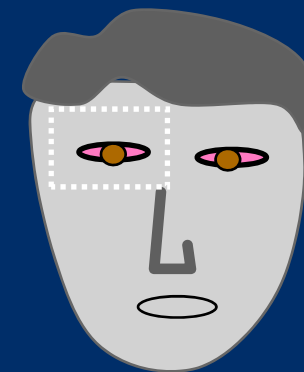
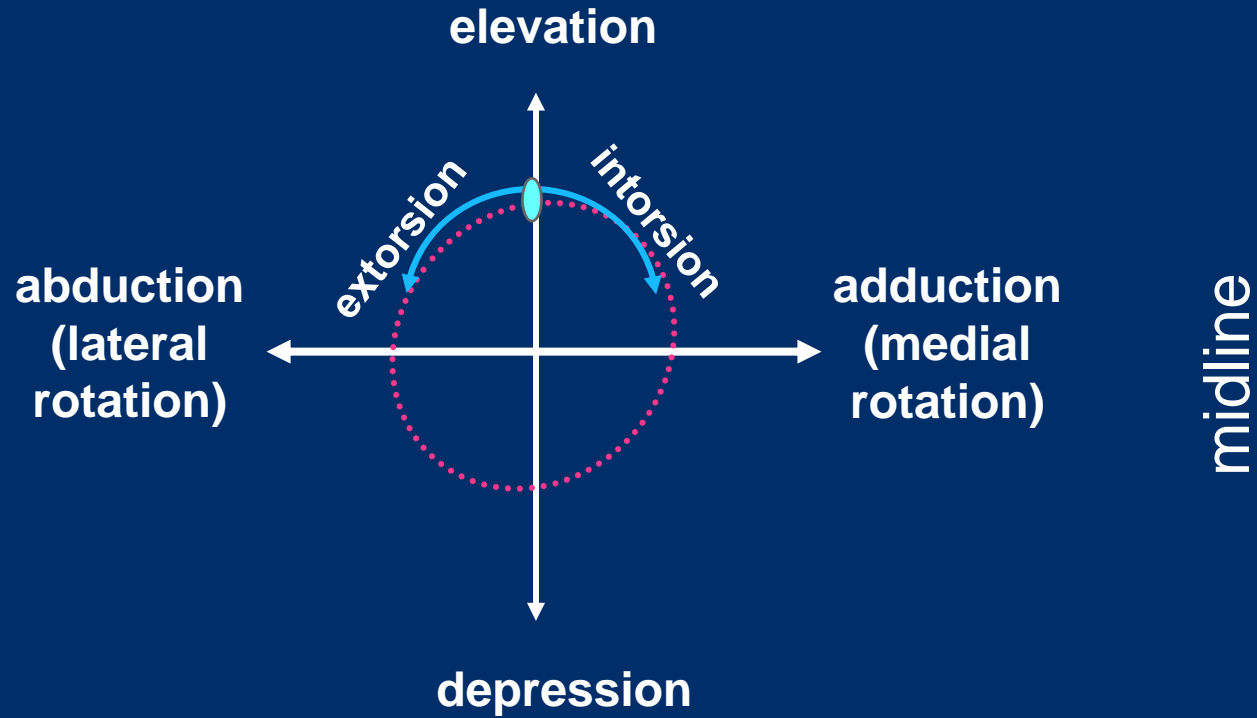
Attachment of eye muscles:



Attachment of eye muscles:



Innervation & action of eye muscles:



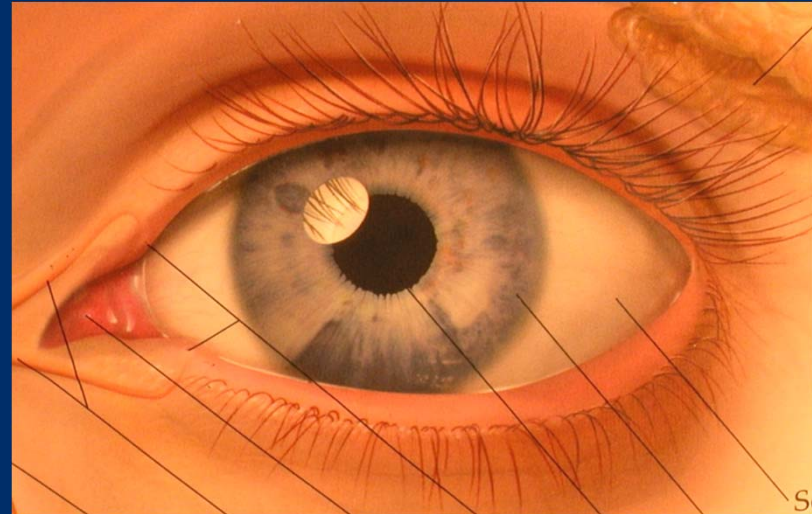
Hence for clinical test :

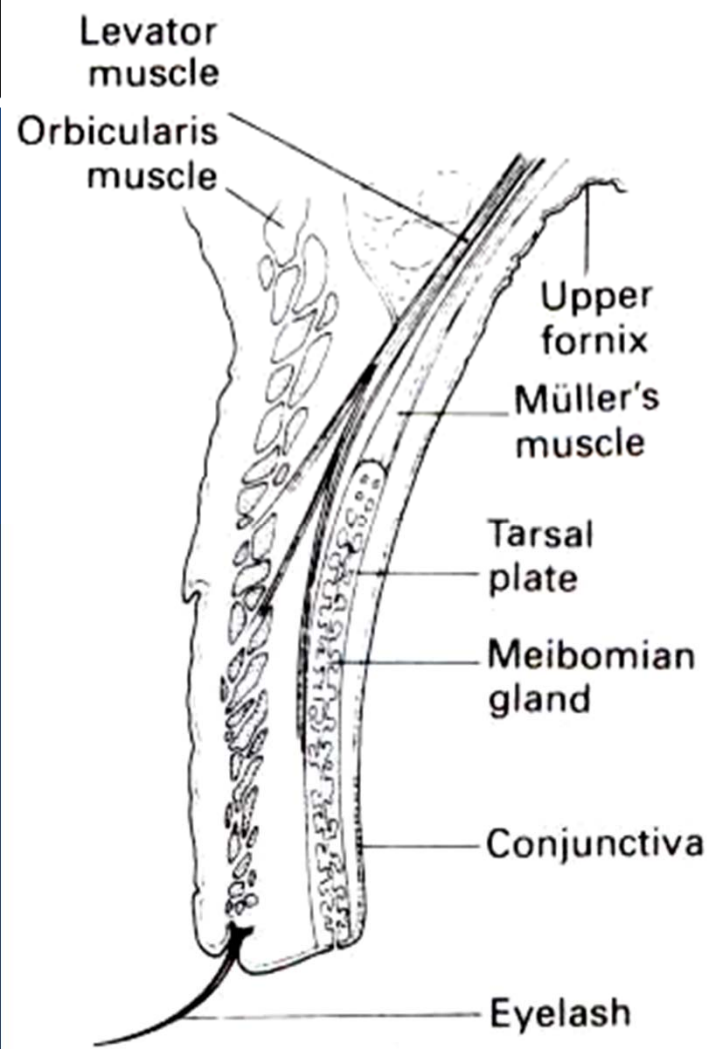
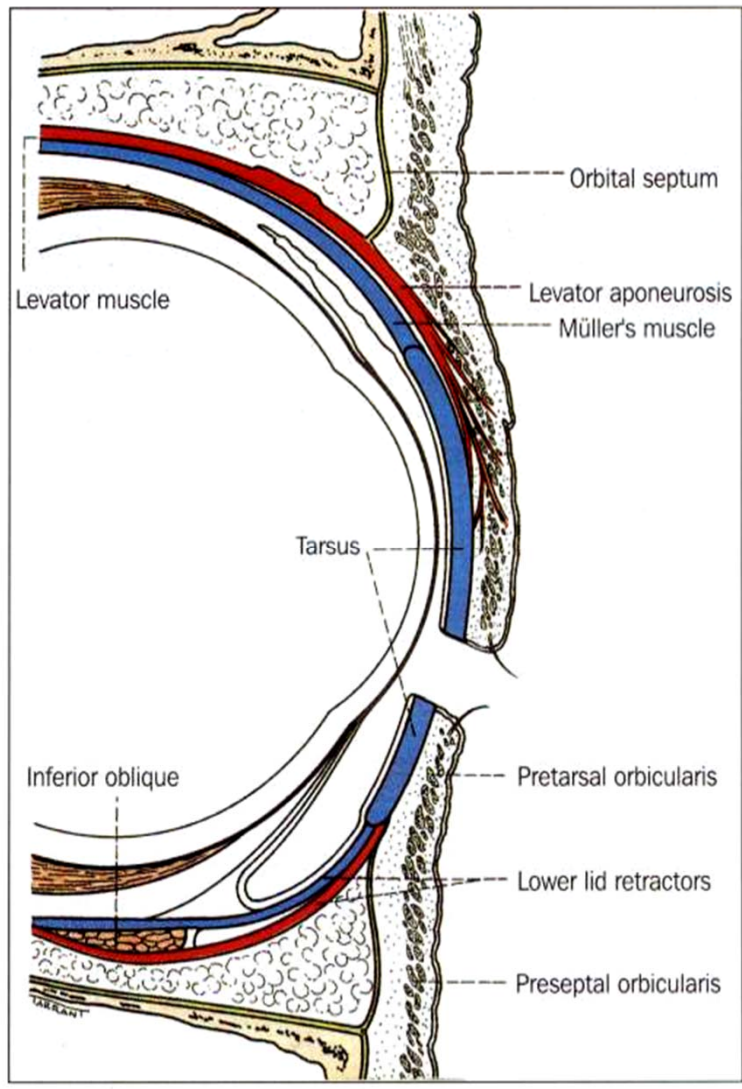
	<u>Direction to look</u>
• SO	Down and in
• IO	Up and in
• SR	Up and out
• IR	Down and out

[R=O, O=I]

THE EYELIDS

- They provide a protective covering for the eye.
- The lids are:
 - closed by Orbicularis oculi muscle (Facial n.)
 - opened with Levator palpebrae muscle (Oculomotor n.), Muller's muscle (Sympathetic supply) & Lower lid retractors.



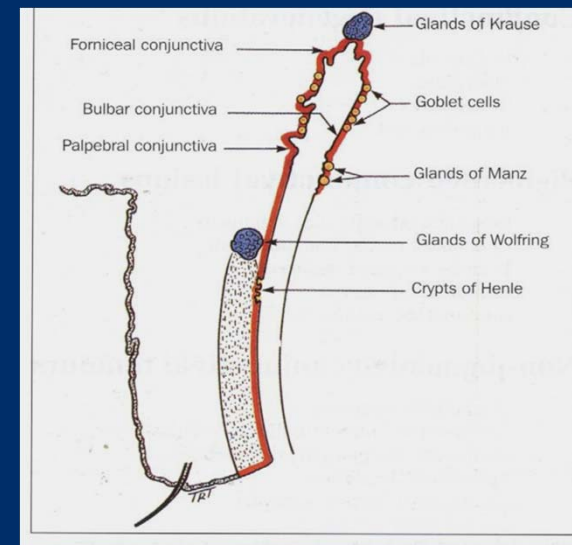
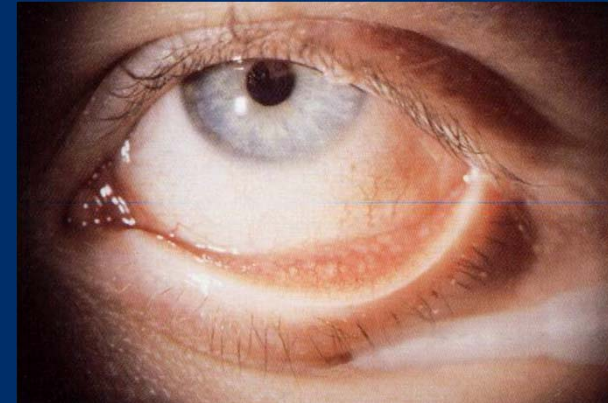


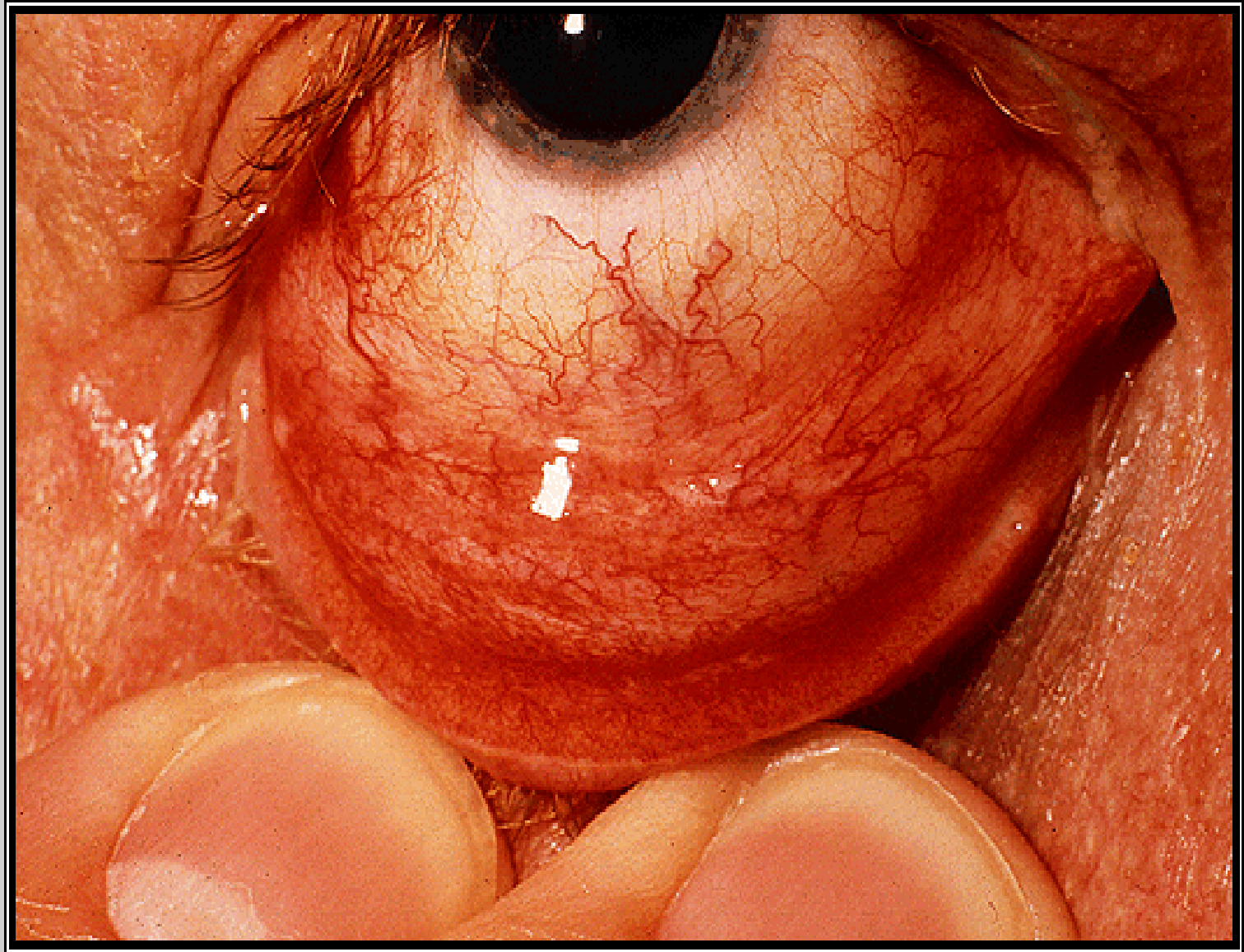
CONJUNCTIVA

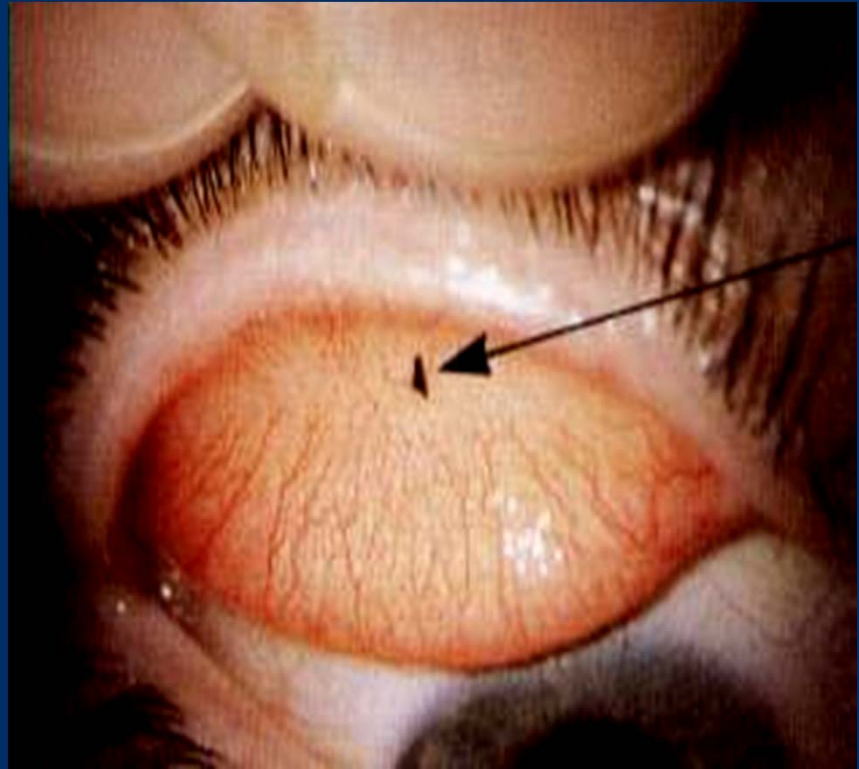
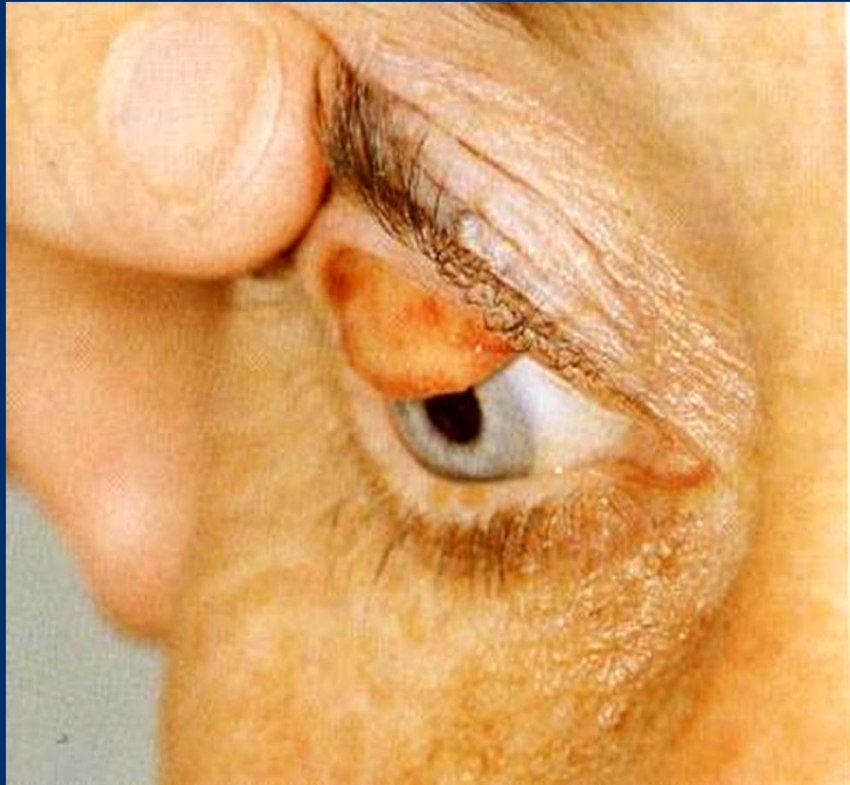
- **Three parts:**
 1. Bulbar conjunctiva.
 2. Palpebral conjunctiva.
 3. Forniceal conjunctiva.

- **Limbus.**

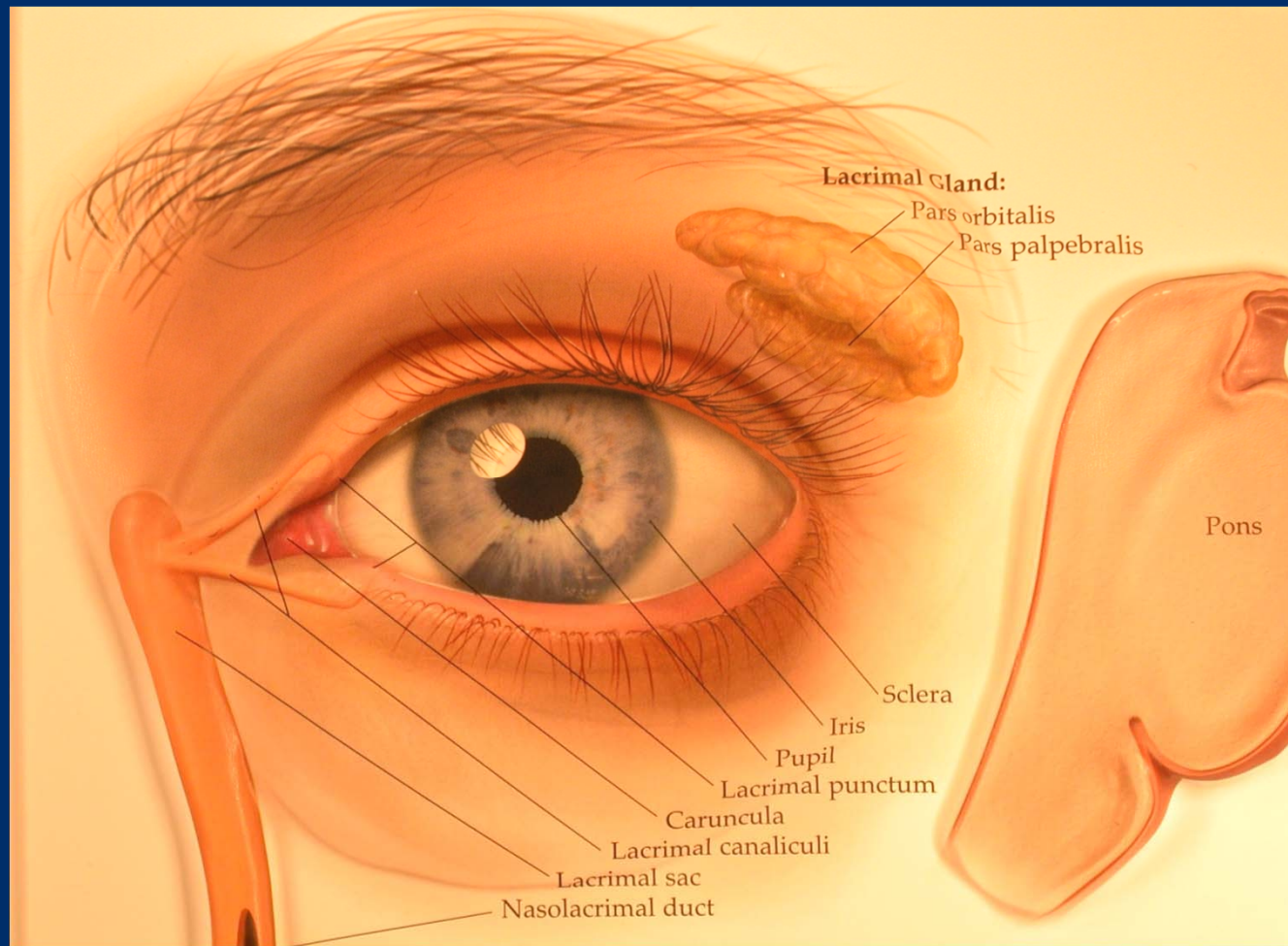
- **The stroma (no adenoid tissues until 3 months after birth).**
- **Follicles & Papillae.**
- **Injection and chemosis.**

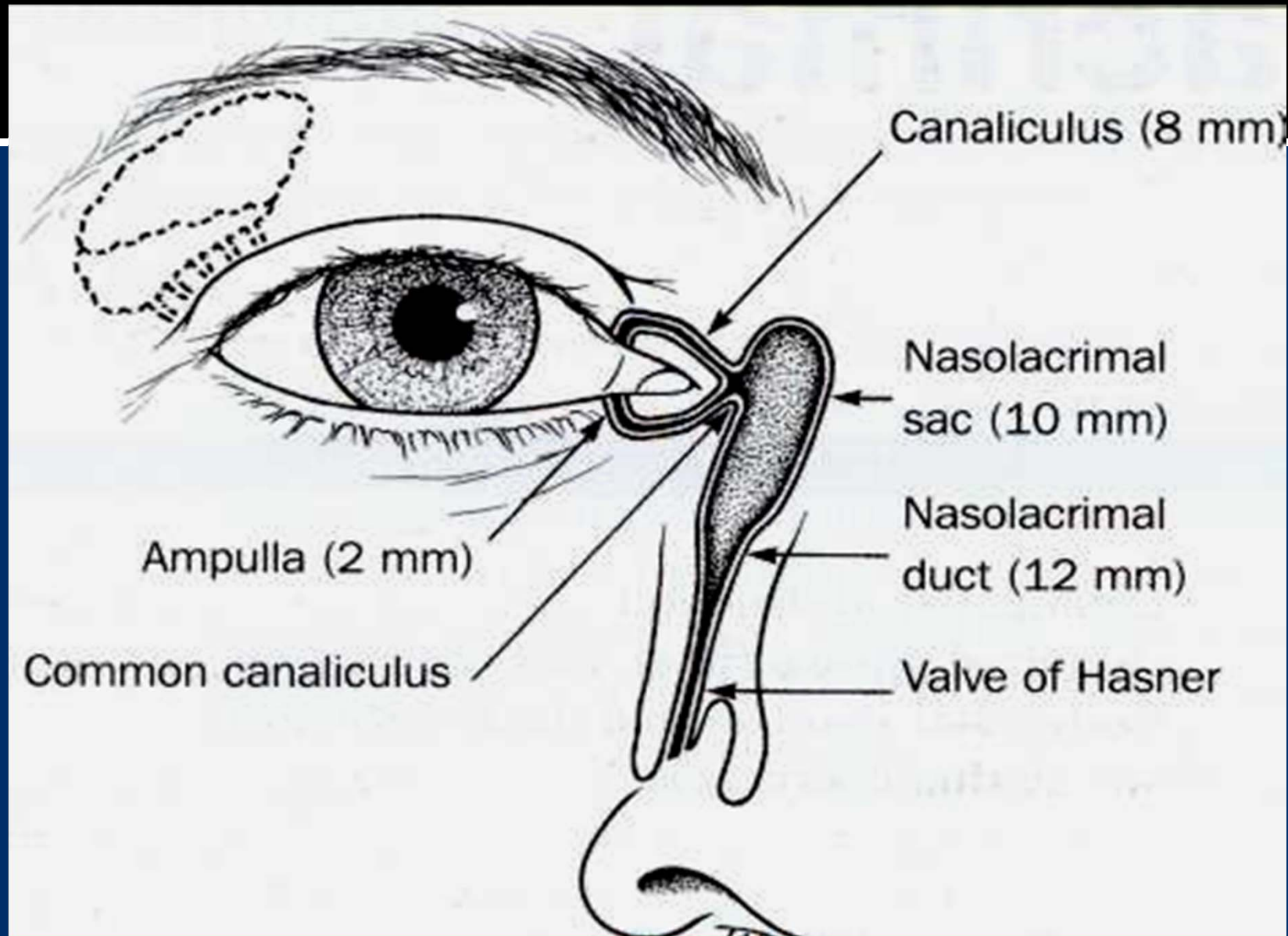






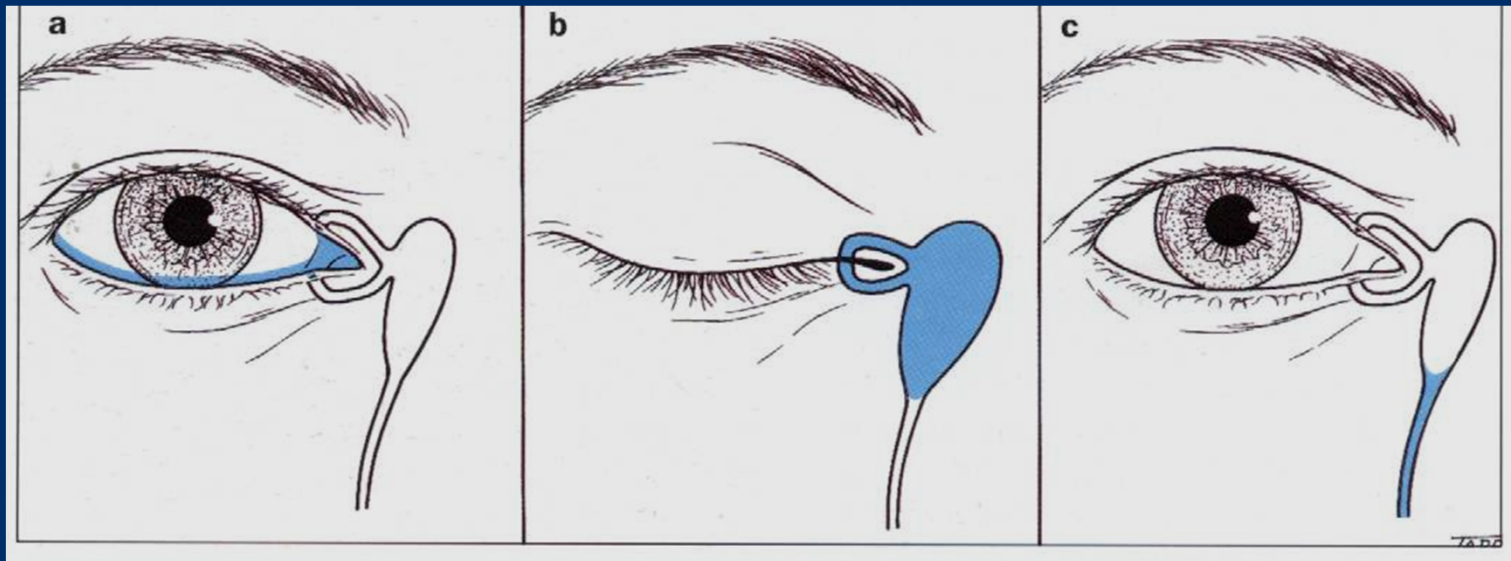
THE LACRIMAL APPARATUS





Lacrimal Apparatus Physiology

- Tear secretion.
- Layers of precorneal tear film.
- Drainage of tear.



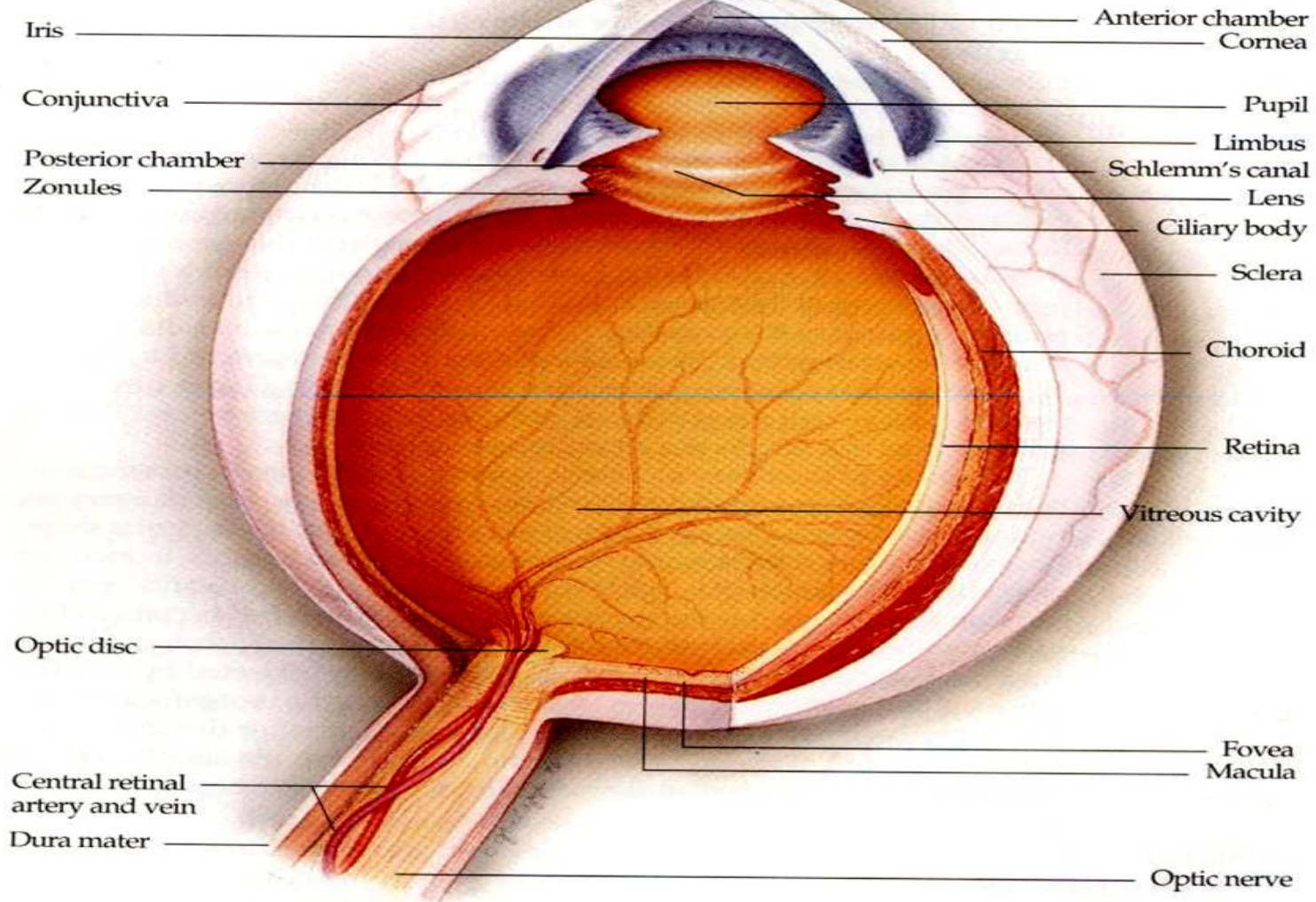
THE EYE (GLOBE)

- Two spheres with different radii:
 - Cornea, window of the eye.
 - Sclera, opaque shell.
- *** The eye measures approximately 24 mm in all its main diameters.

The coats of the eye

*** Three layers:

- The outer: inelastic coat, transparent cornea and opaque sclera.
- The middle, vascular coat, The Uvea: choroid, ciliary body and iris.
- The inner: The Retina, extends forwards to within 6 mm of the limbus.



The Chambers of The Eye

***Three optically clear spaces:

- The anterior chamber, in front of the iris
- The posterior chamber, immediately behind the iris. These two chambers which communicate through the pupil are filled with clear aqueous humour.
- The vitreous cavity: filled by gel-like structure, The Vitreous.

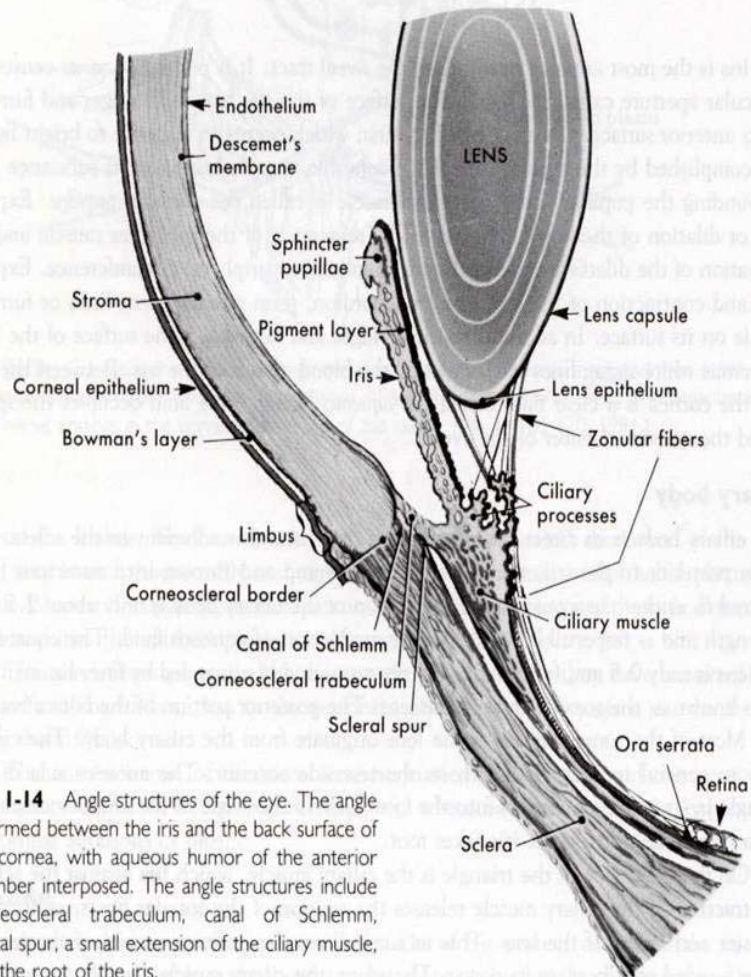
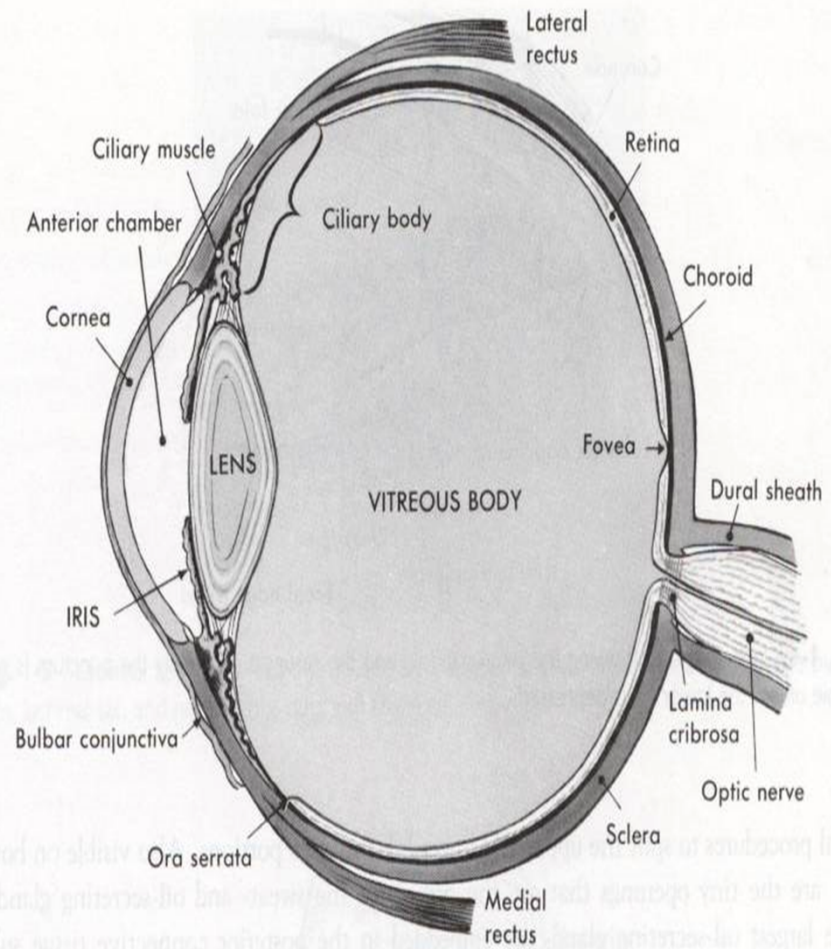


Fig. I-14 Angle structures of the eye. The angle is formed between the iris and the back surface of the cornea, with aqueous humor of the anterior chamber interposed. The angle structures include corneoscleral trabeculum, canal of Schlemm, scleral spur; a small extension of the ciliary muscle, and the root of the iris.



The Intraocular Pressure IOP

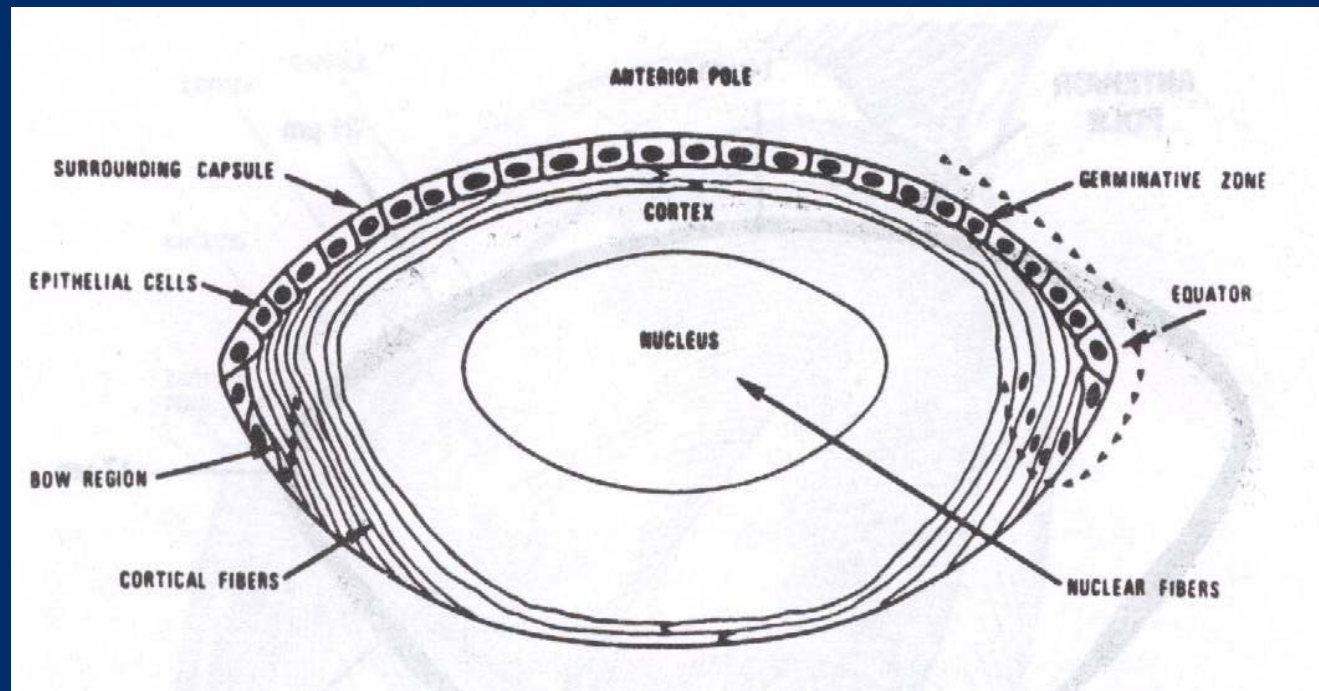
- The pressure within the eye is maintained at a steady level by continuous formation & drainage of aqueous.
- Aqueous is secreted by the ciliary epithelium → posterior chamber → anterior chamber (through the pupil) → drained through the anterior chamber angle.

The Intraocular Pressure IOP

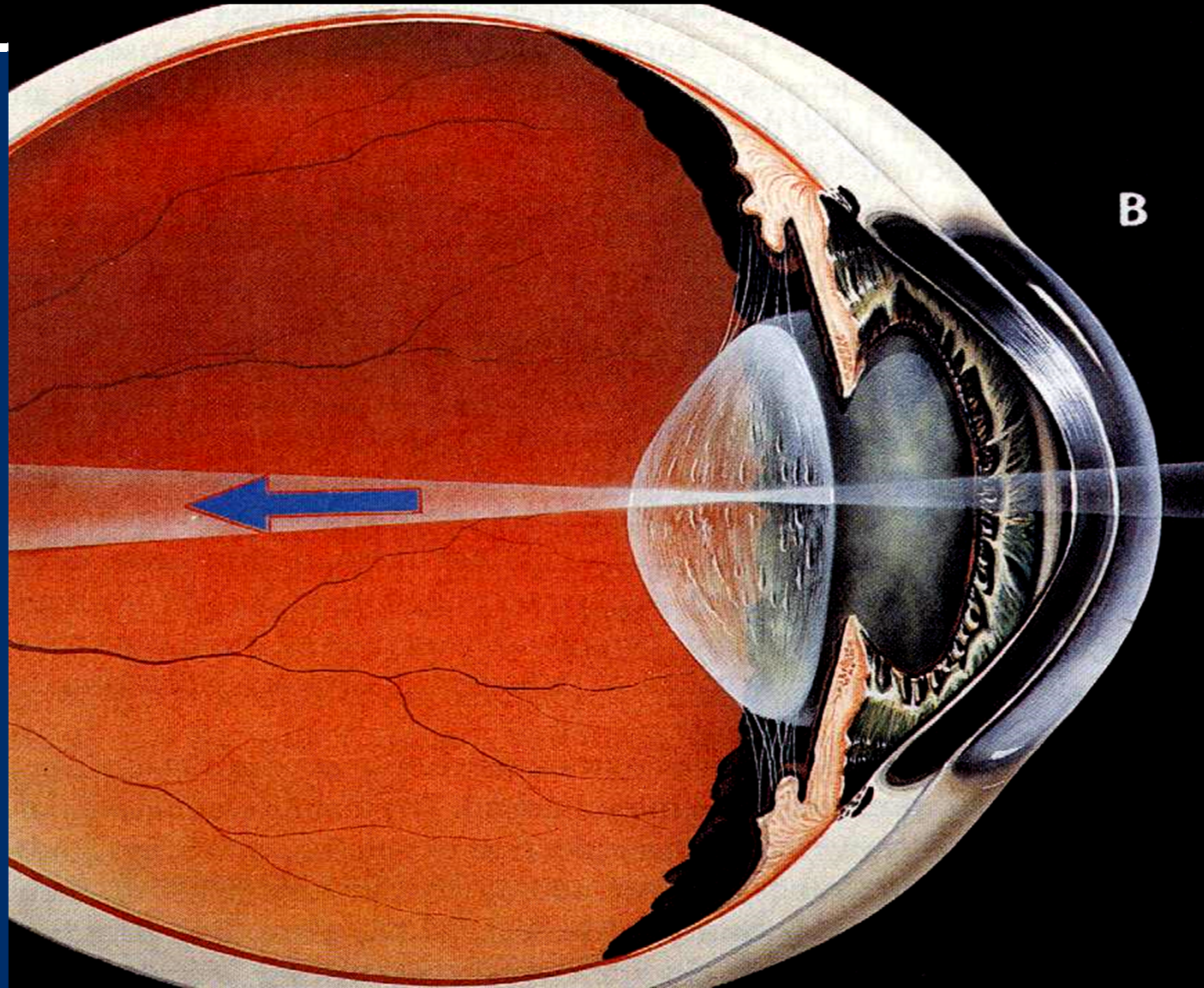
- The intraocular pressure, (IOP), is normally 10 – 21 mmHg; increased IOP called Glaucoma.
- High IOP almost always due to an obstruction of aqueous outflow.

The Lens

- The crystalline lens is the only structure continuously growing throughout the life.
- Capsule, epithelium and lens fibers.



Changeable refractive media



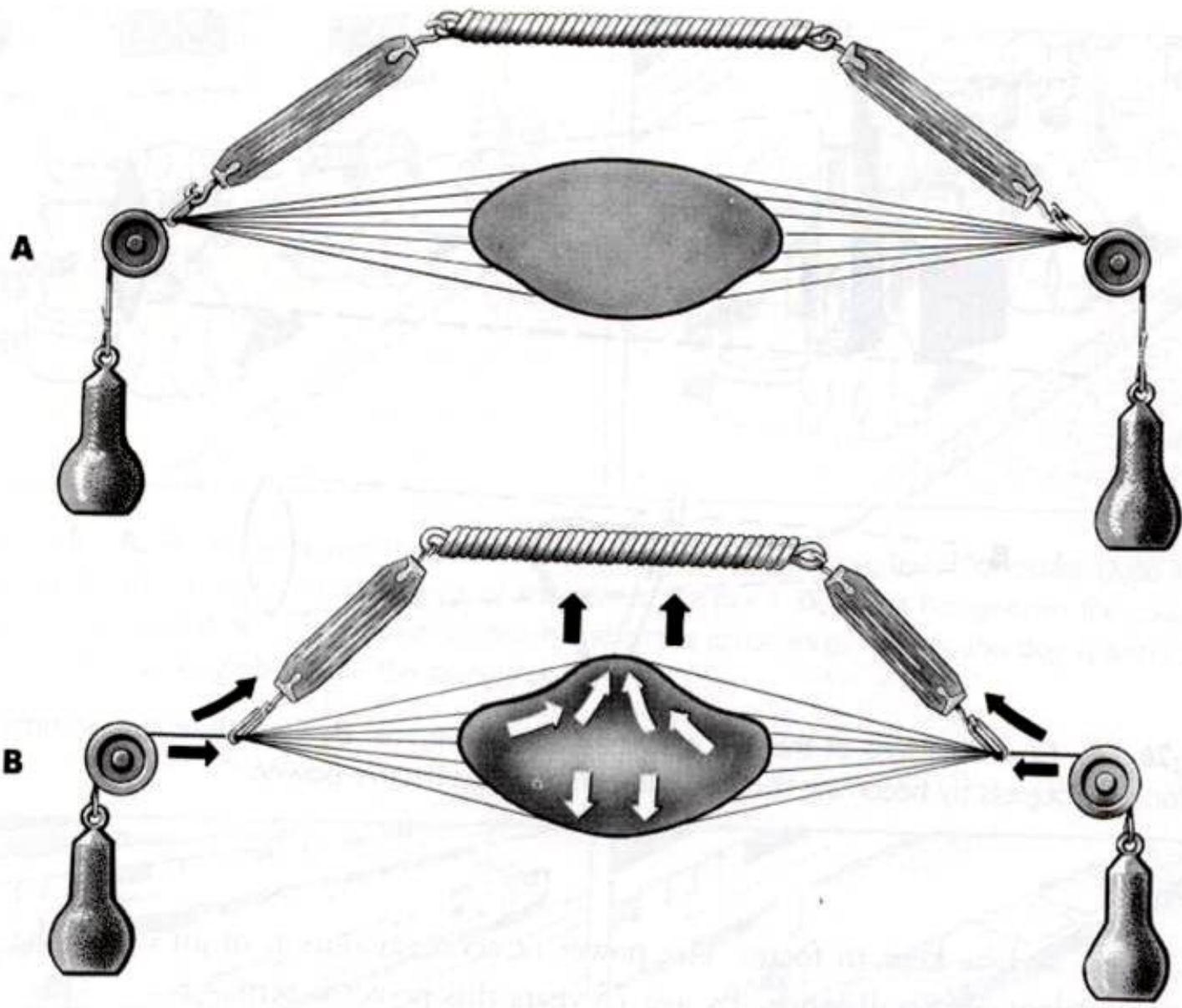
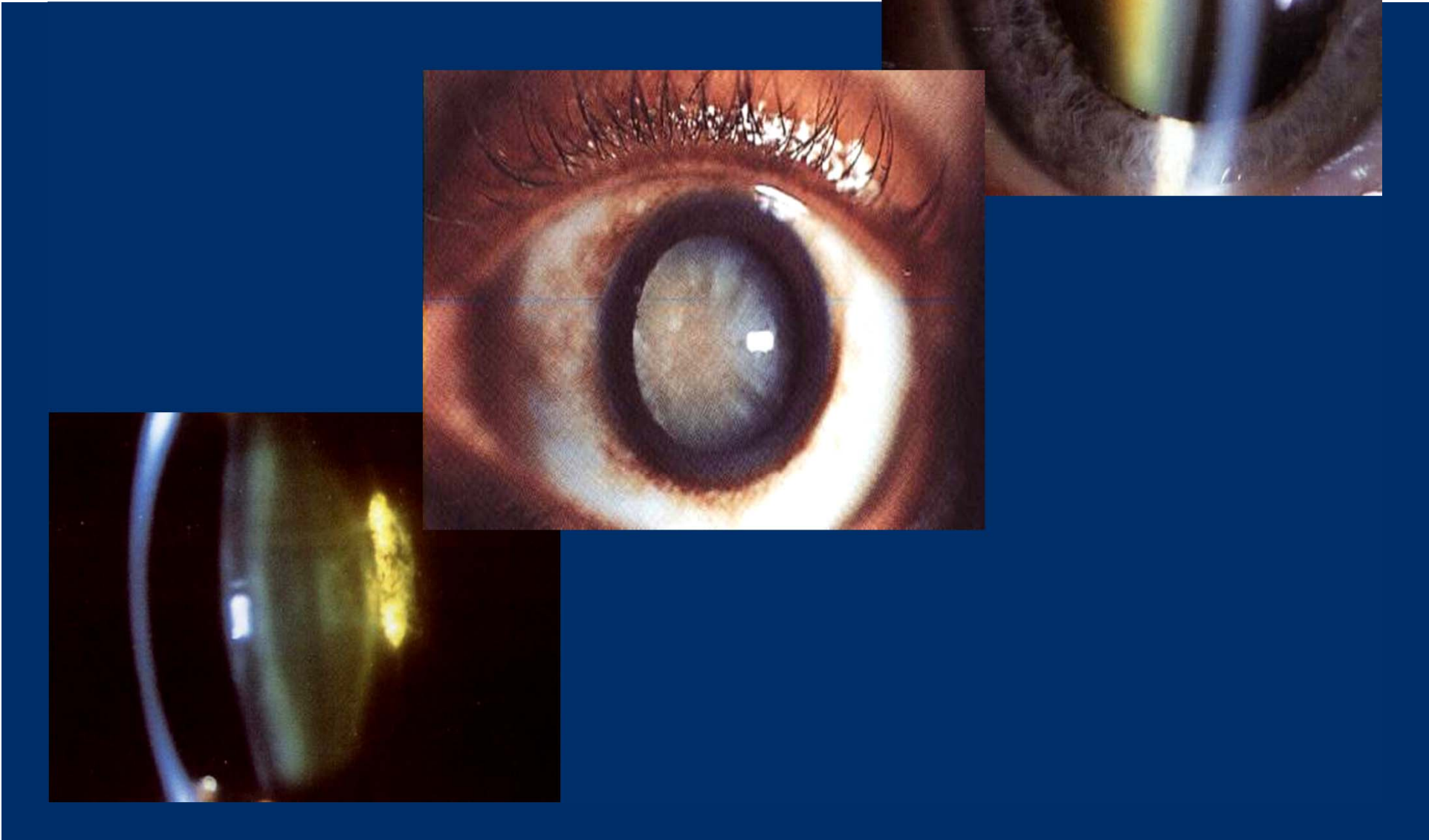
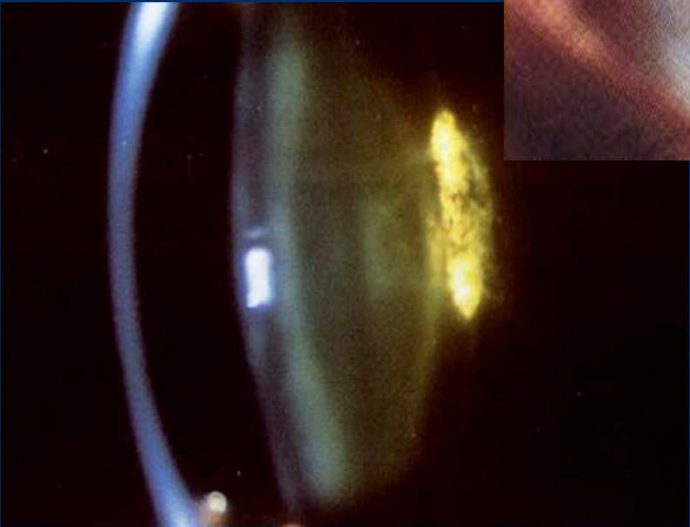
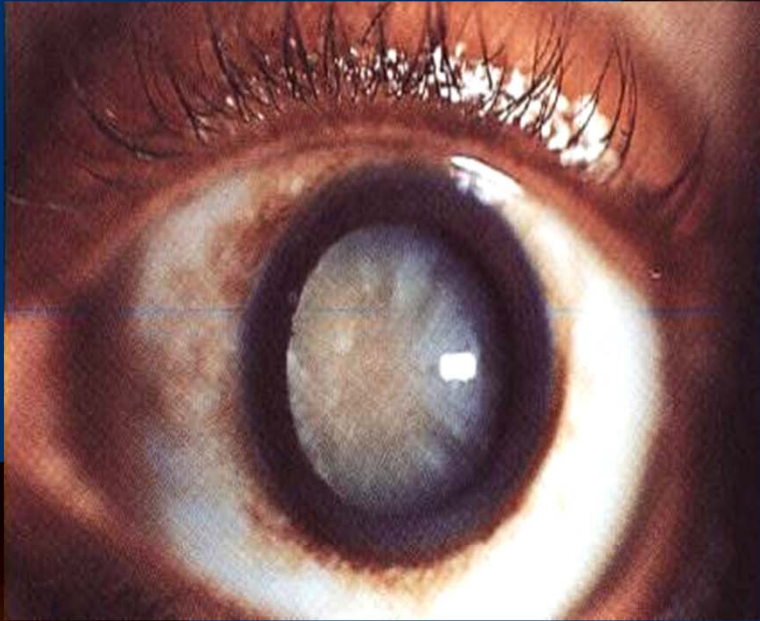
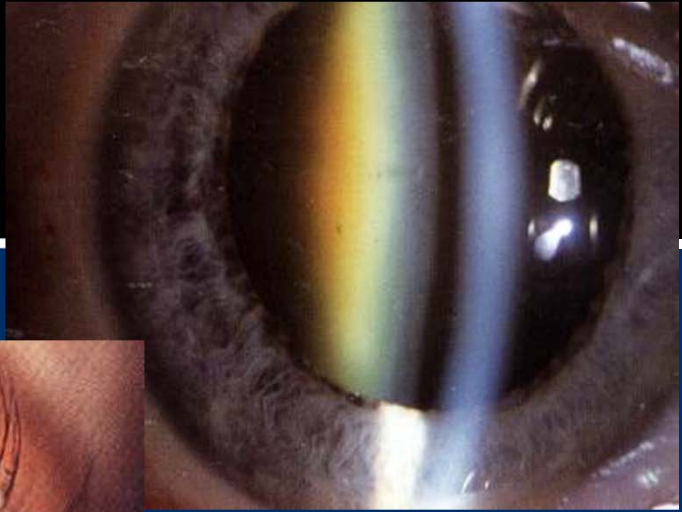


Fig. 1.29. A. A relaxed muscle fiber. B. A contracted muscle fiber.

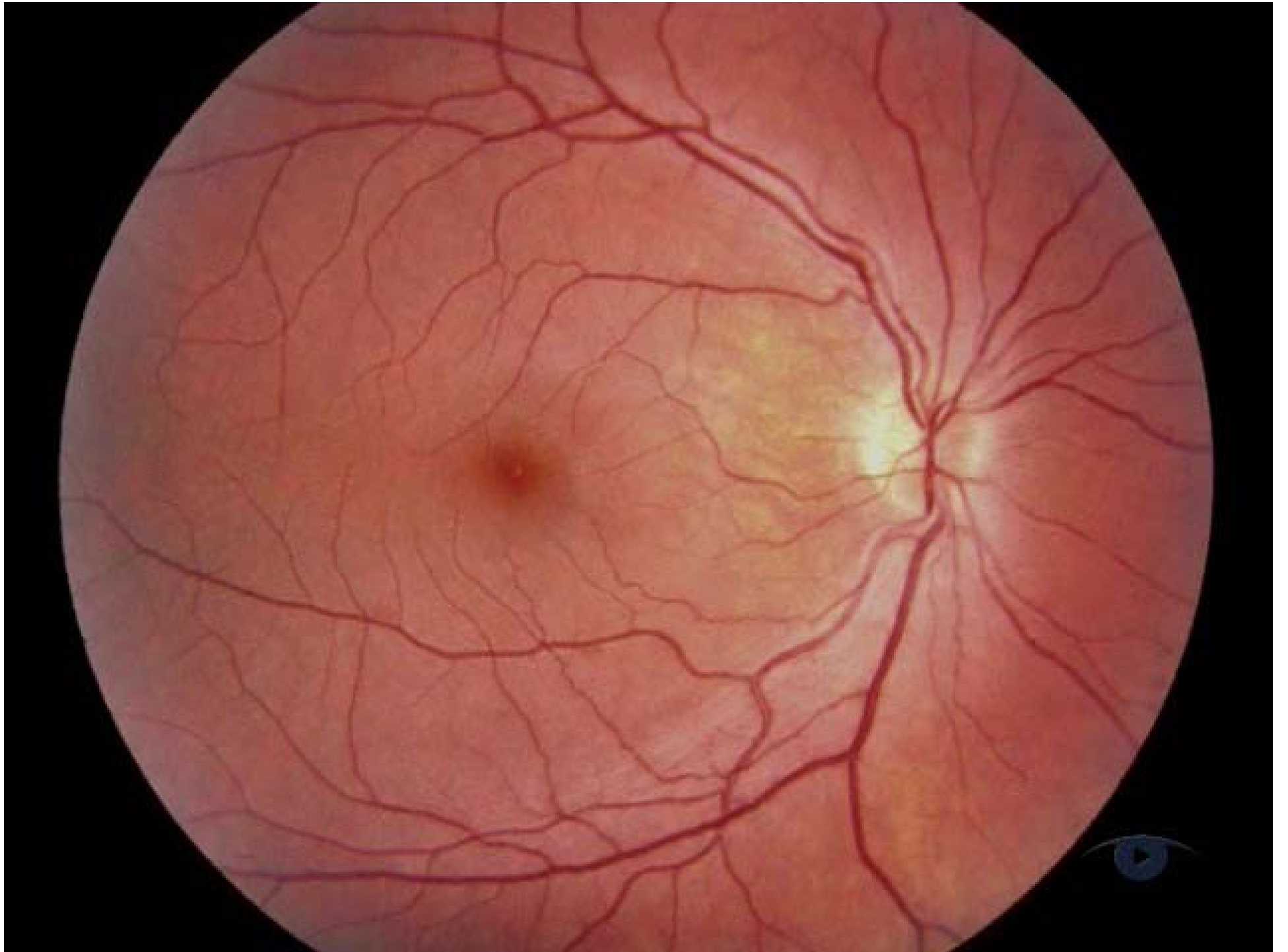
The Lens

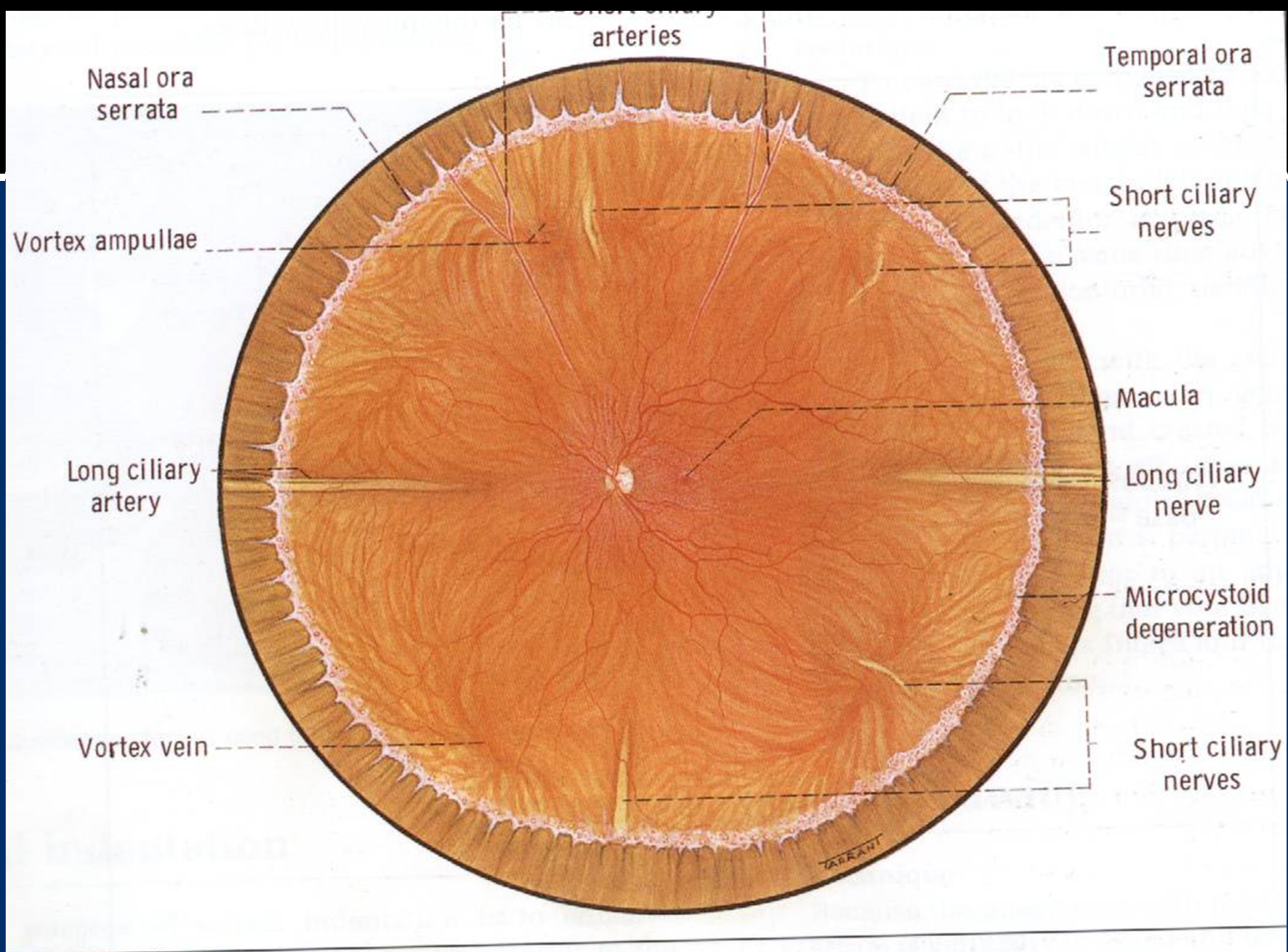
- Cataract.
- Congenital anomalies and effect of systemic diseases.

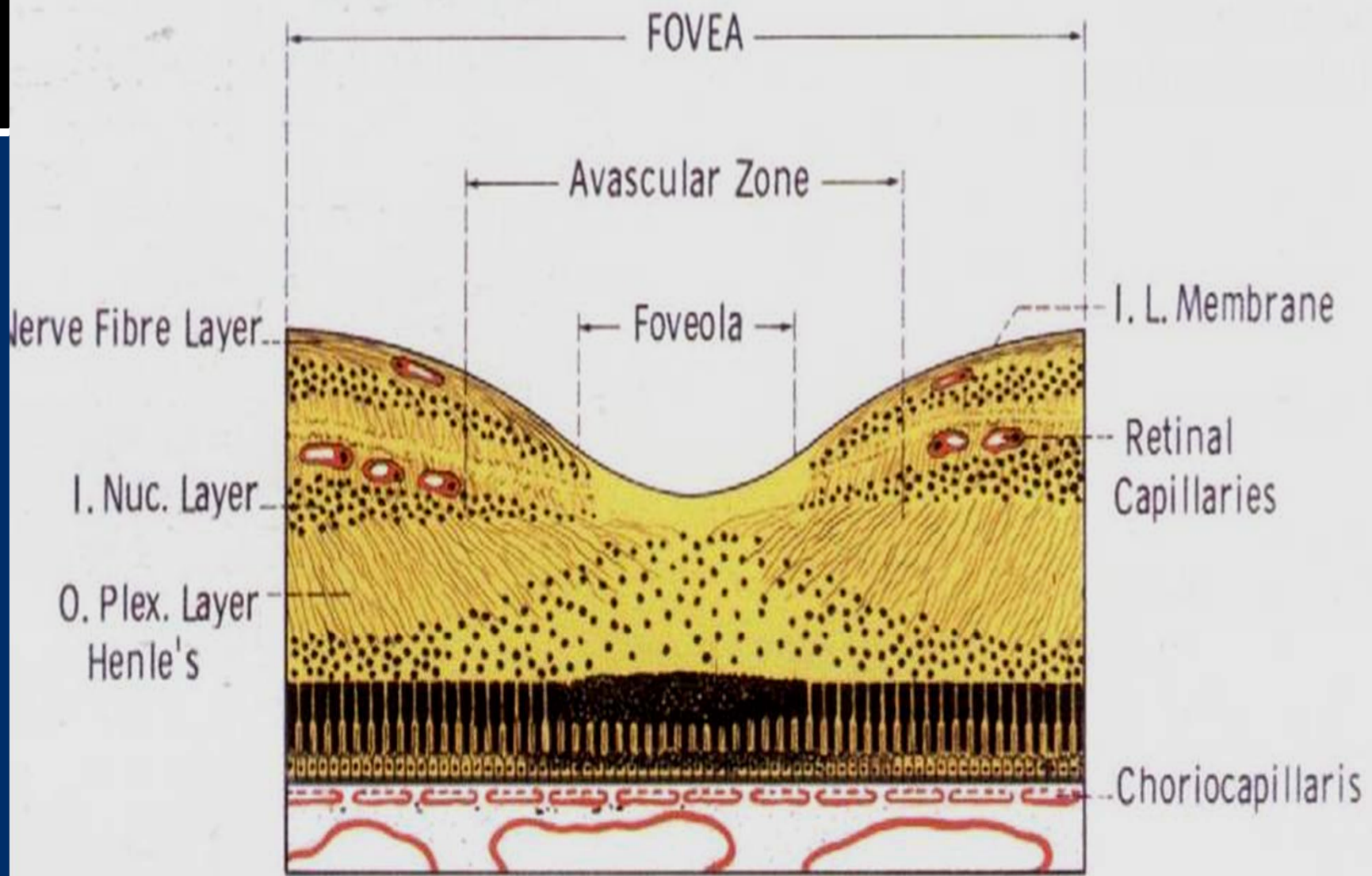


Retina and Vitreous

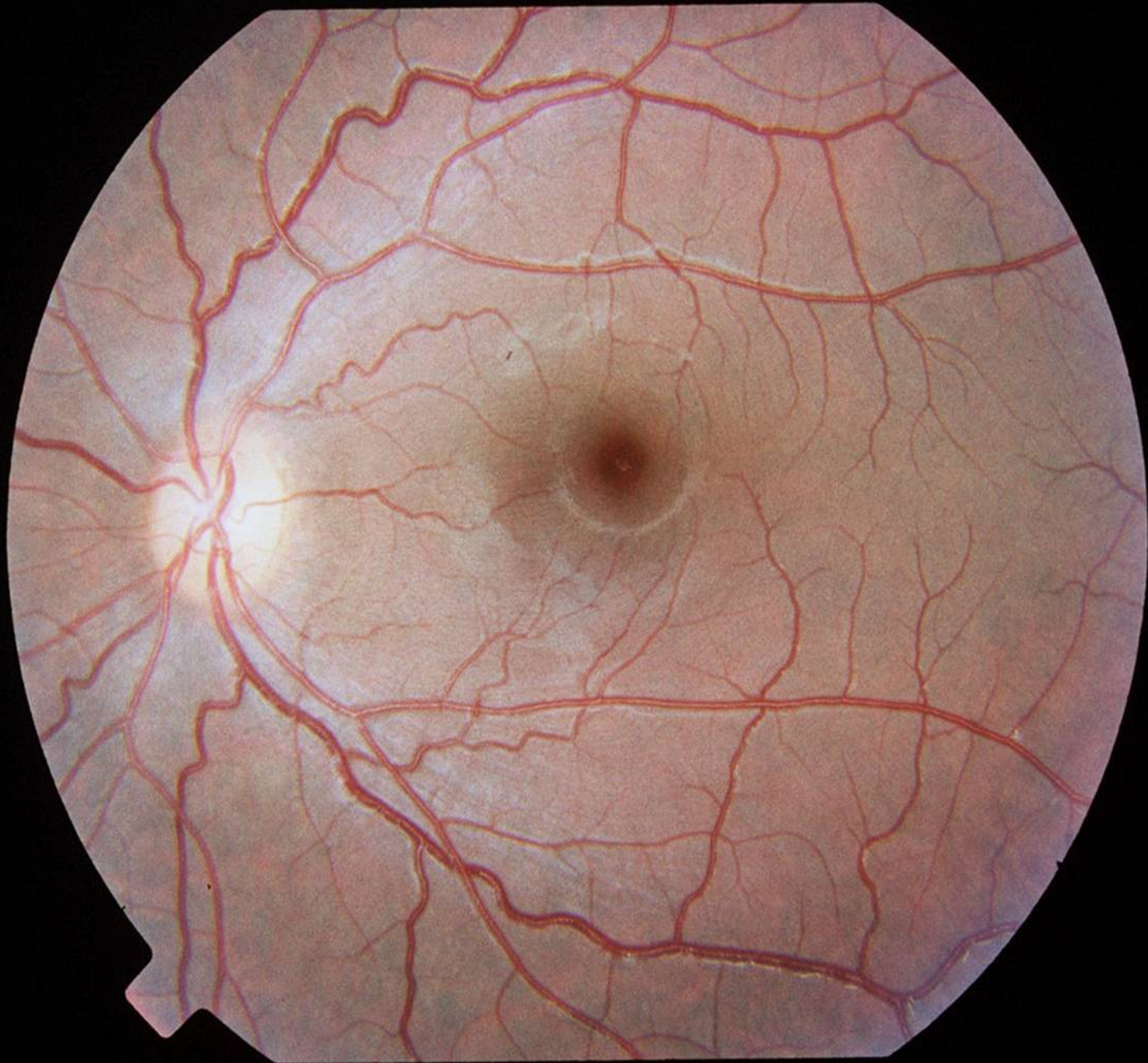
- Optic nerve head, macula, fovea, retinal background, Ora serrata, and retinal vasculature.
- Vitreous attachment.
- Retinal detachment.
- Effect of systemic diseases.

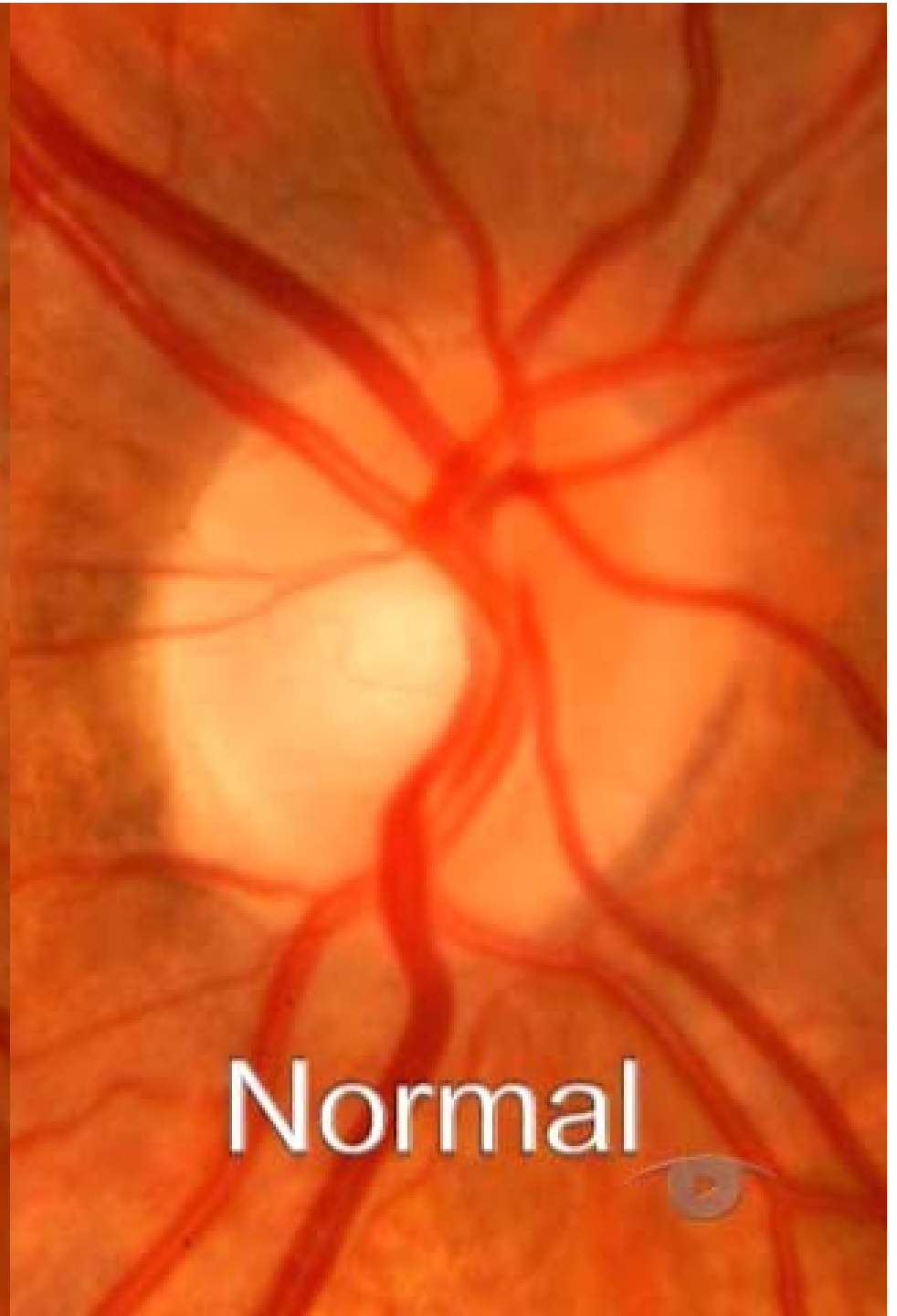
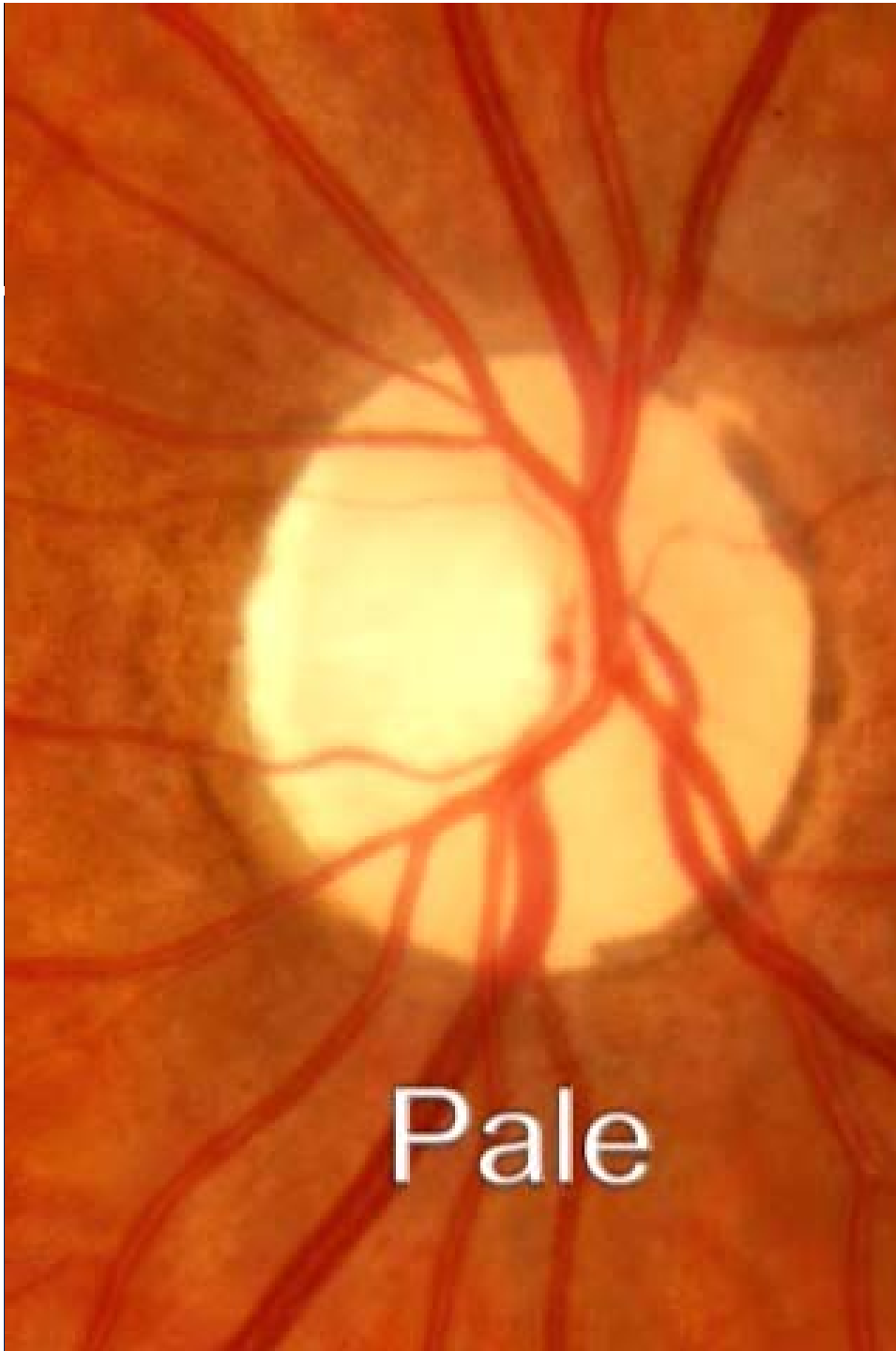


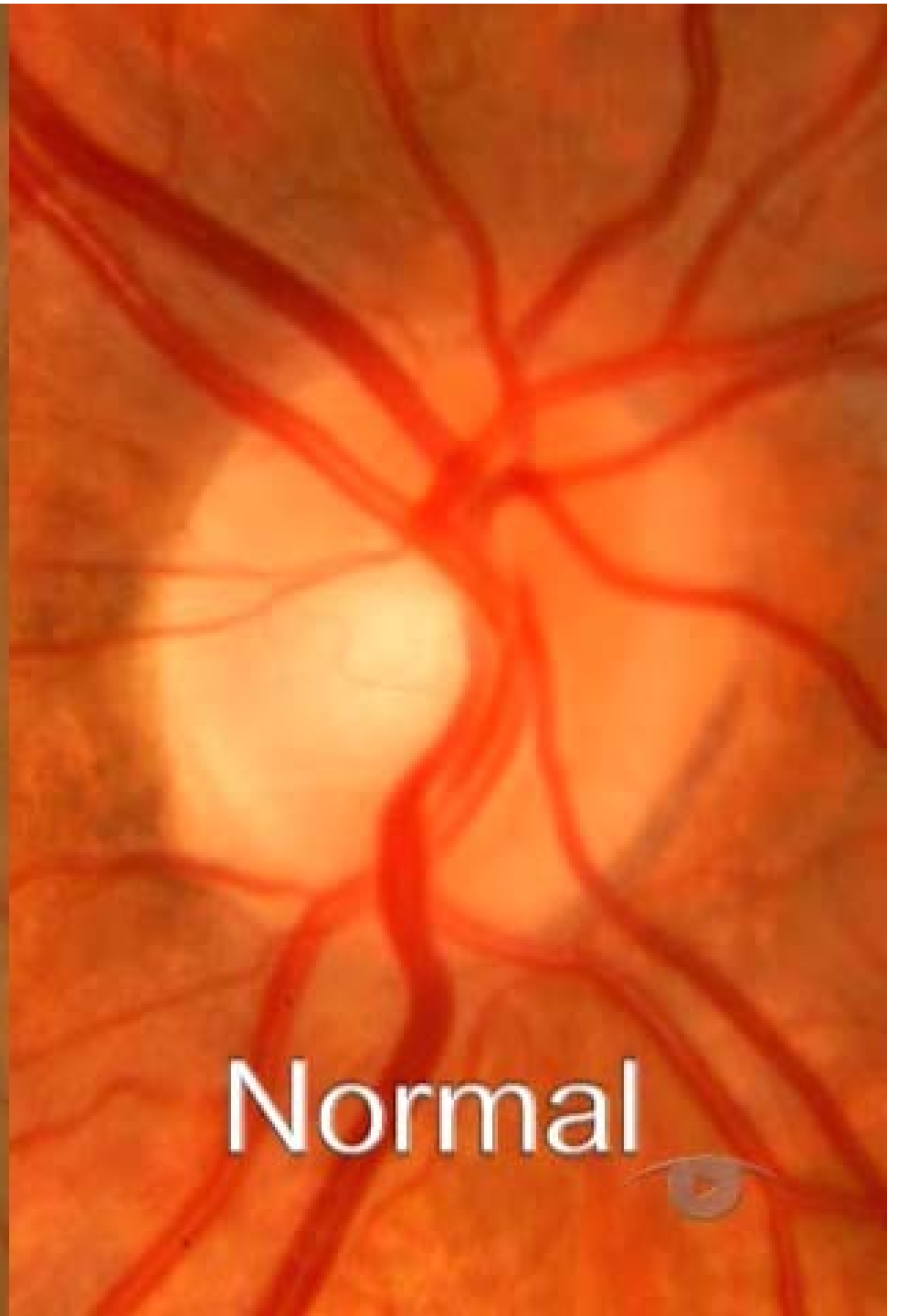
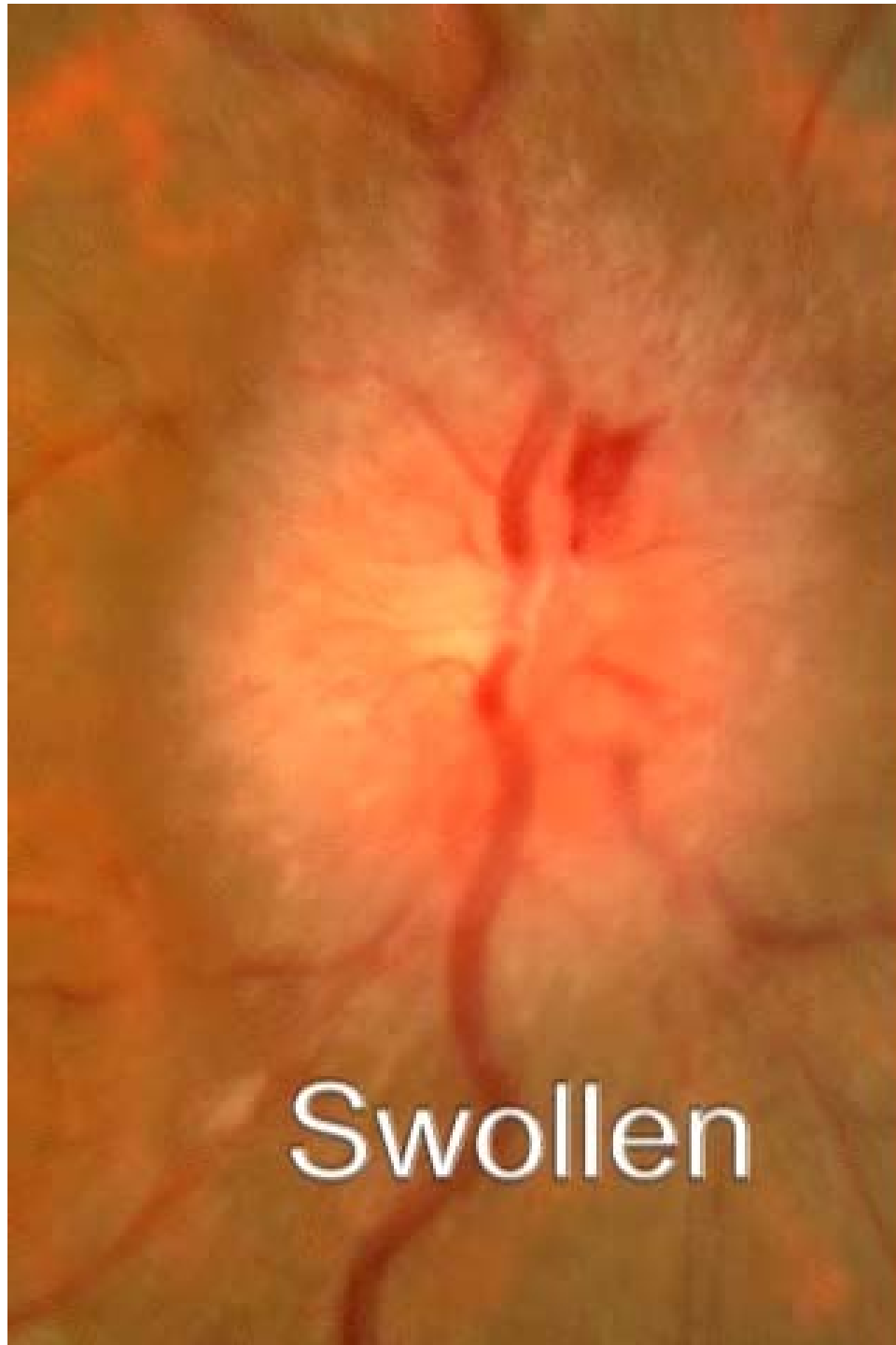


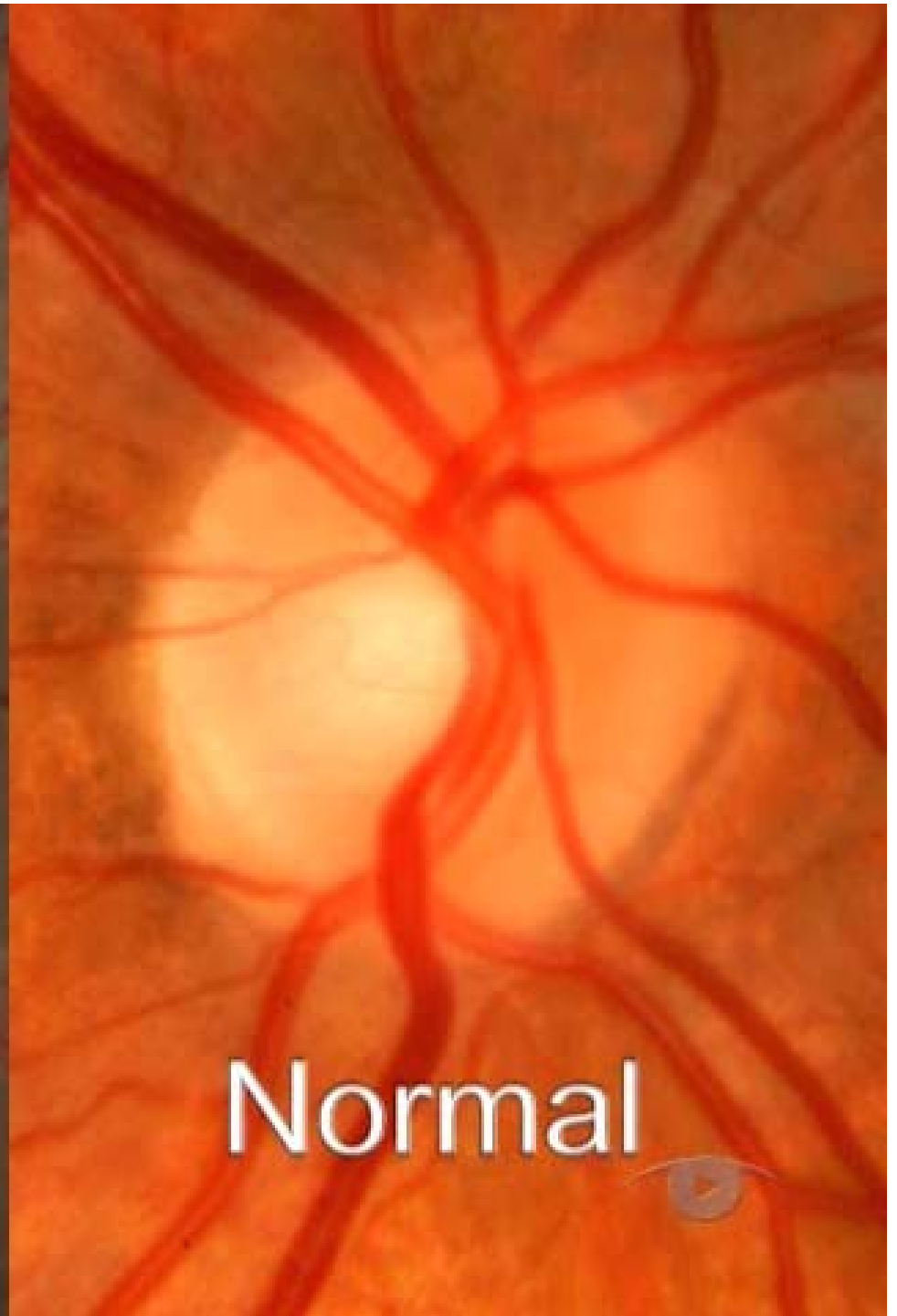
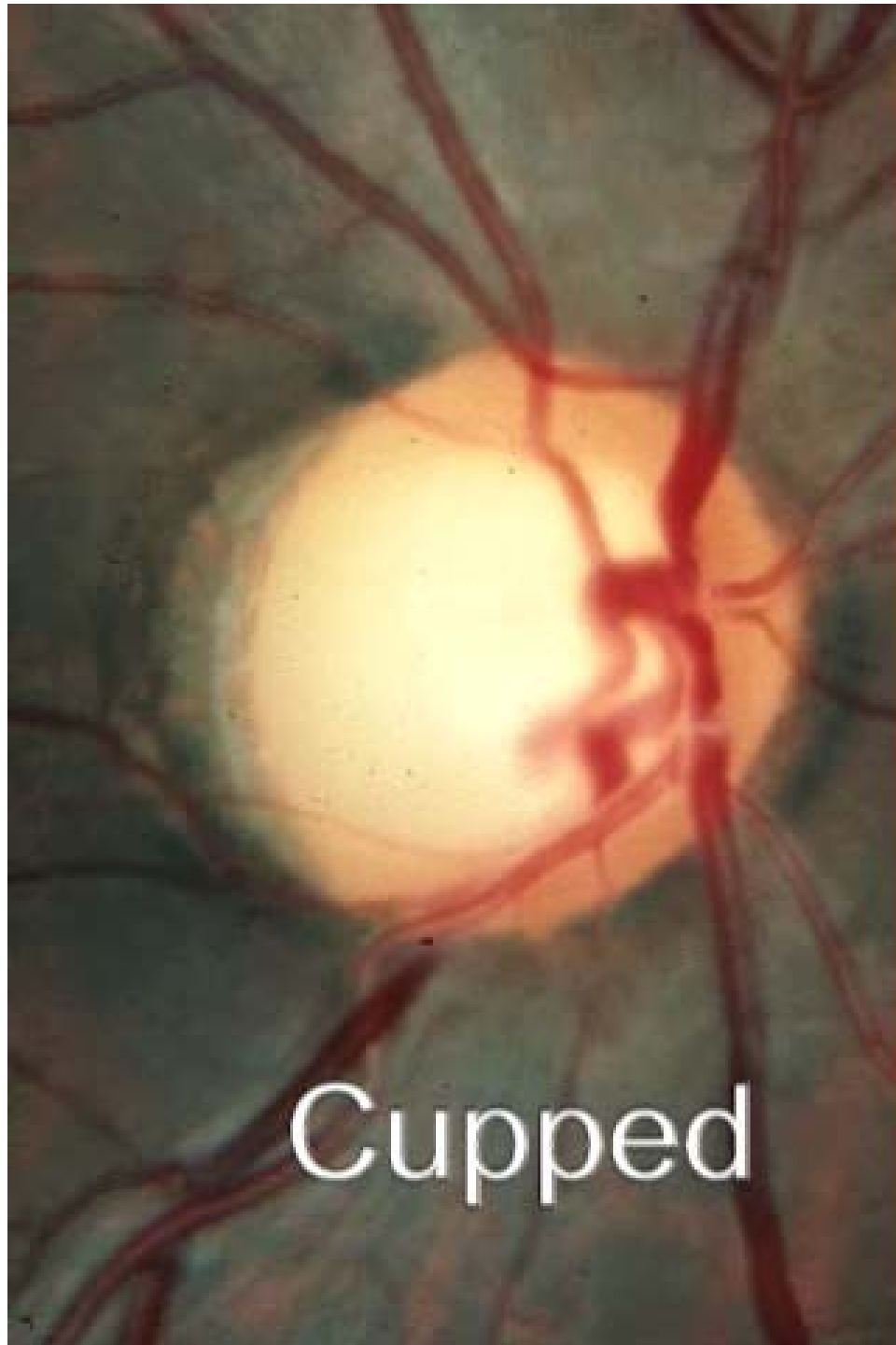


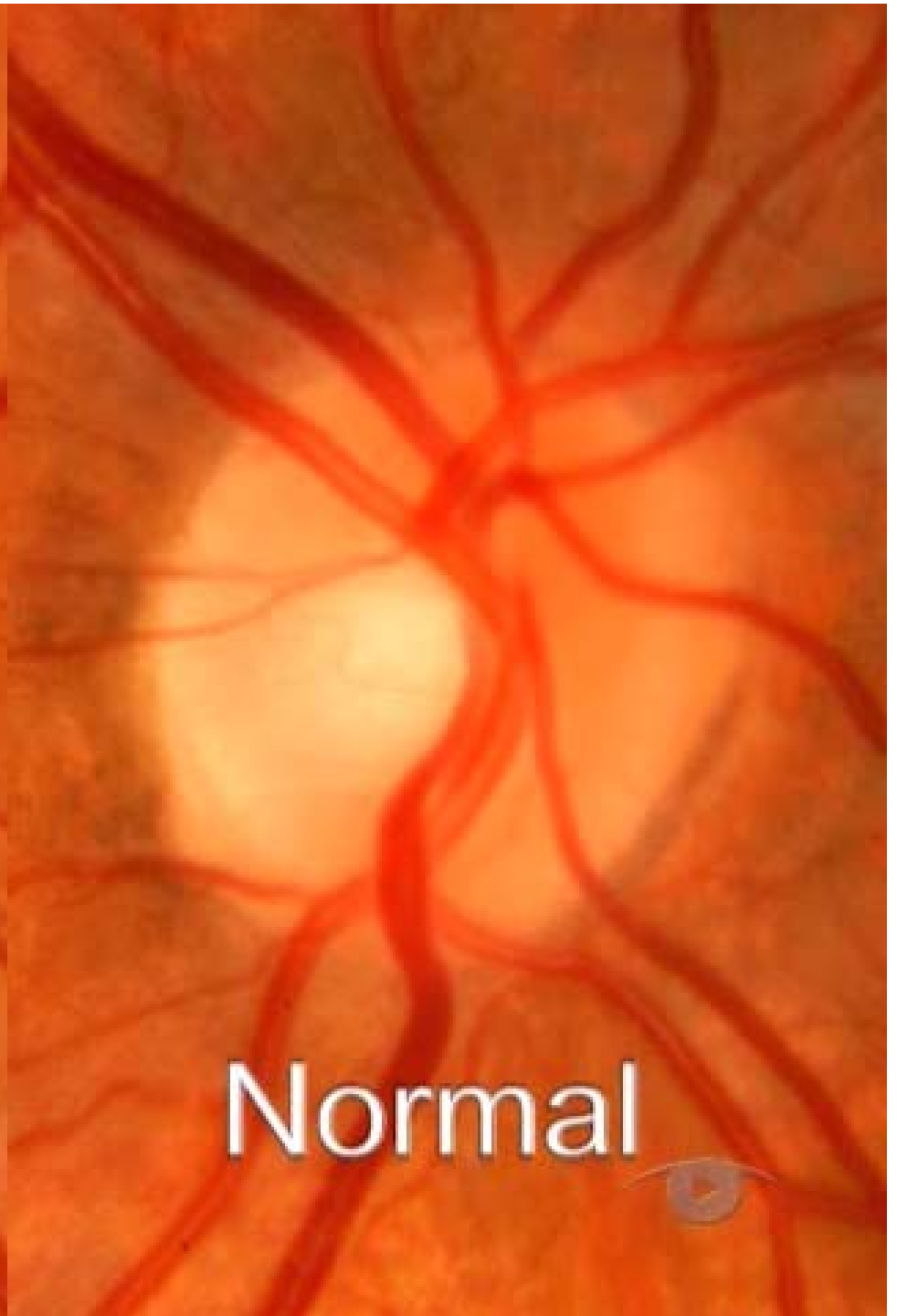
GERRANT













Pigment Clumps

This image shows a microscopic view of a tissue section, likely from the choroid or retina. A dense network of red blood vessels is visible, with several dark, irregular pigment clumps scattered throughout the tissue. The overall color is a warm, yellowish-orange, and the text 'Pigment Clumps' is overlaid in white at the bottom.

A fundus photograph of the retina, showing the optic disc on the left and the macula in the center. The macula exhibits a large, dark, irregular lesion, characteristic of macular degeneration. The surrounding retinal tissue is a healthy orange-red color, and the retinal vessels are visible as a network of thin lines.

Macular Degeneration

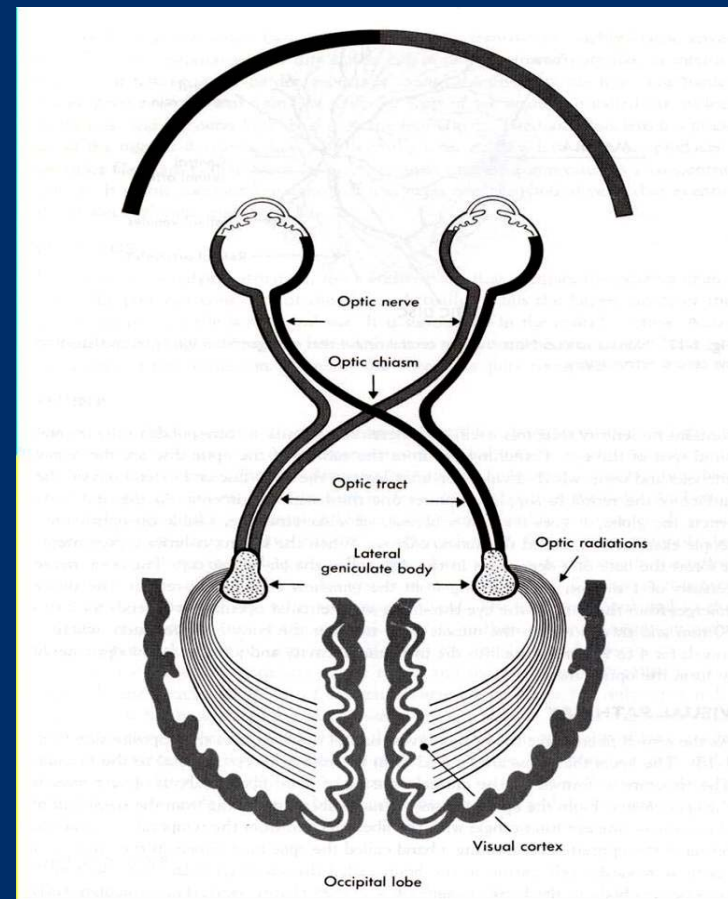


PROCESS OF VISION

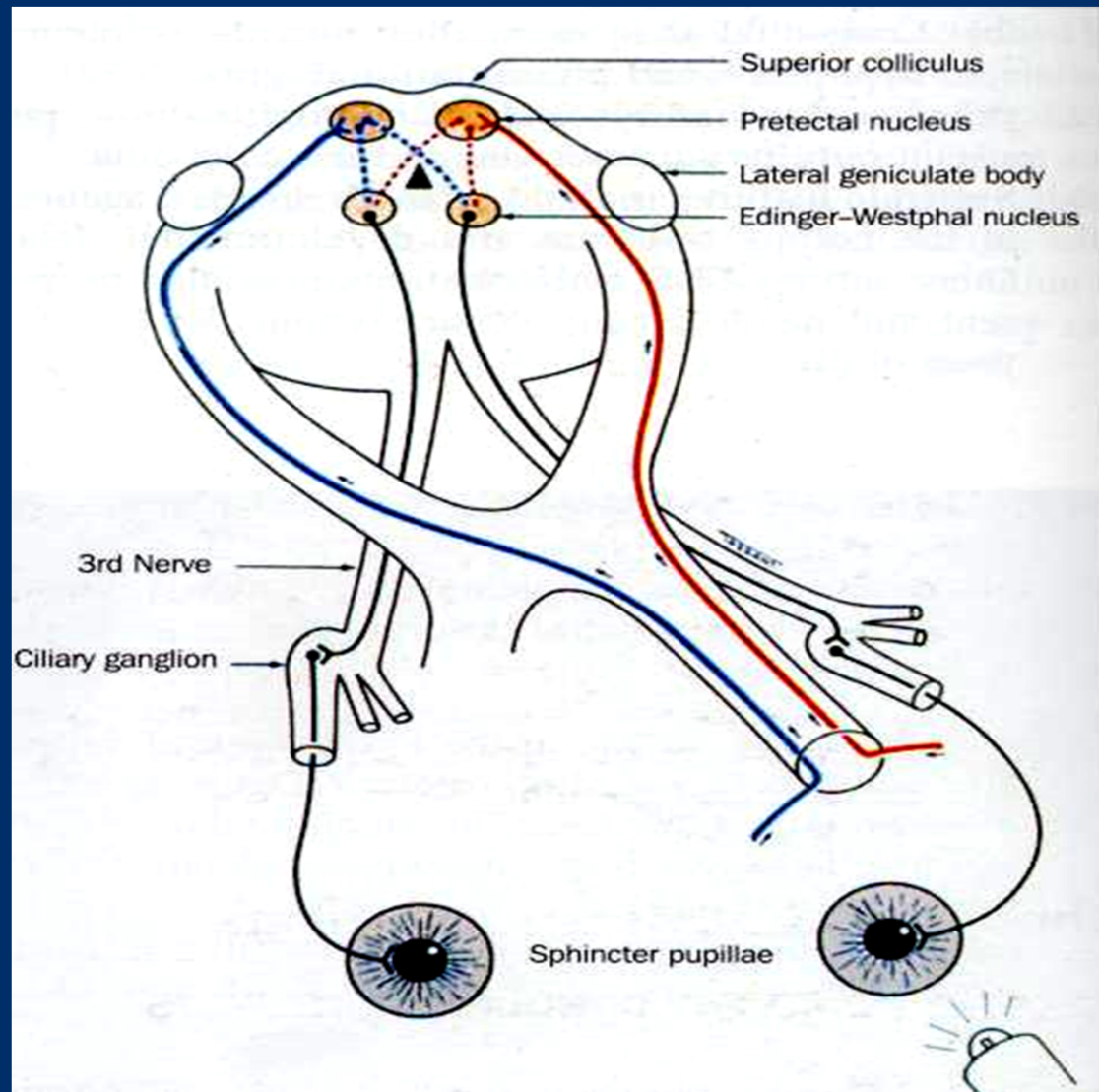
- *Function of the eye:*
 - Receive the image and change it into language that the brain can understand
- *The retina:*
 - It is divided into retinal pigment epithelium & neurosensory retina.
 - Photoreceptors contains visual pigment (11-cis-retinal) that changes into Rhodopsin upon light stimulation

The Visual Pathway

- Visual Pathway:
Three neurons
 1. Bipolar cell, lies within the retina.
 2. Ganglion cell, synapse in lateral geniculate body.
 3. Third neuron terminates in visual cortex.



The Pupillary Light Reflex



Thank You