NORMAL MACULAR ANATOMY ON OCT

DR AMRIT SAHIL PANJWANI (MBBS, MS OPHTHALMOLOGY)

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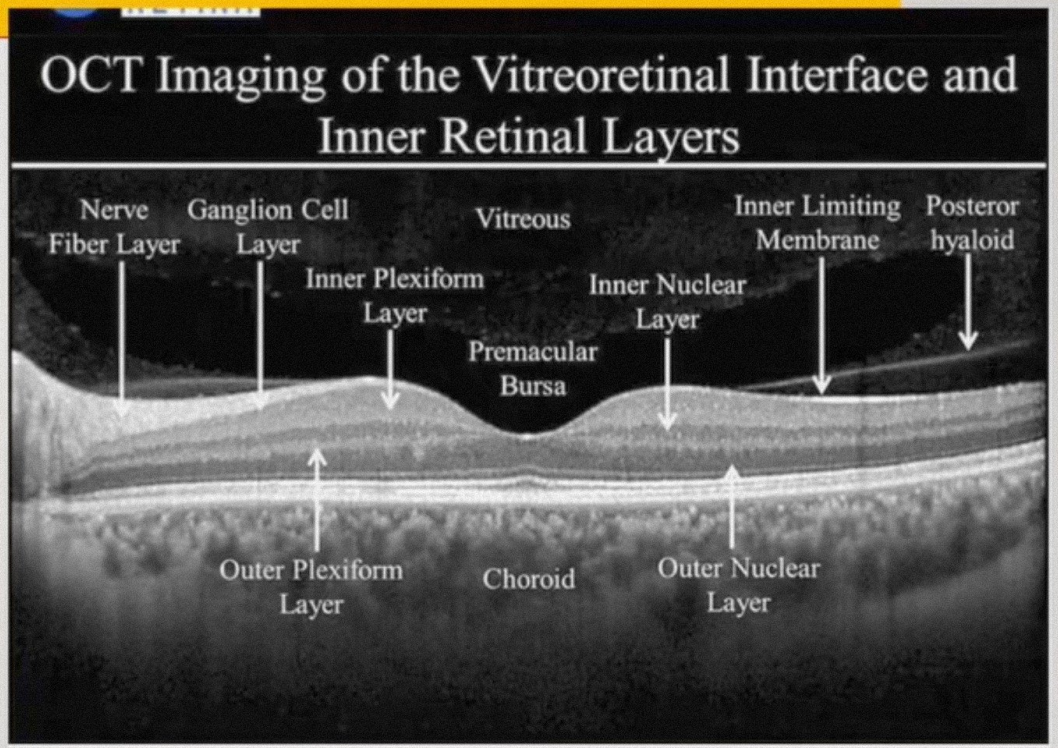
NORMAL MACULAR OCT

- VR interface
- Inner Retina
- Outer retina
- RPE/ bruchs membrane
- Choroid



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VITREOUS AND VR INTERFACE

- **Vitreous and vitreoretinal interface:**
- Vitreous (hyporeflective space)
- Premacular bursa (hyporeflective space in front of the macula)
- Posterior hyaloid (hyperreflective continuous line.

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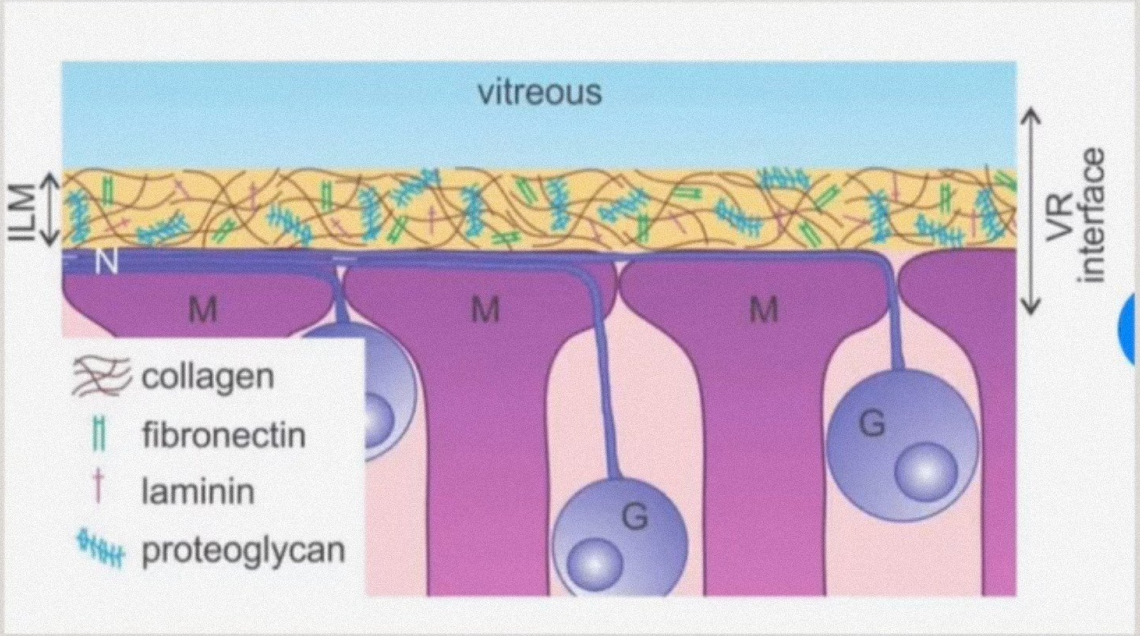
vitreous
ILM
N
M
M
M
G
G
VR
interface
collagen
fibronectin
laminin
proteoglycan

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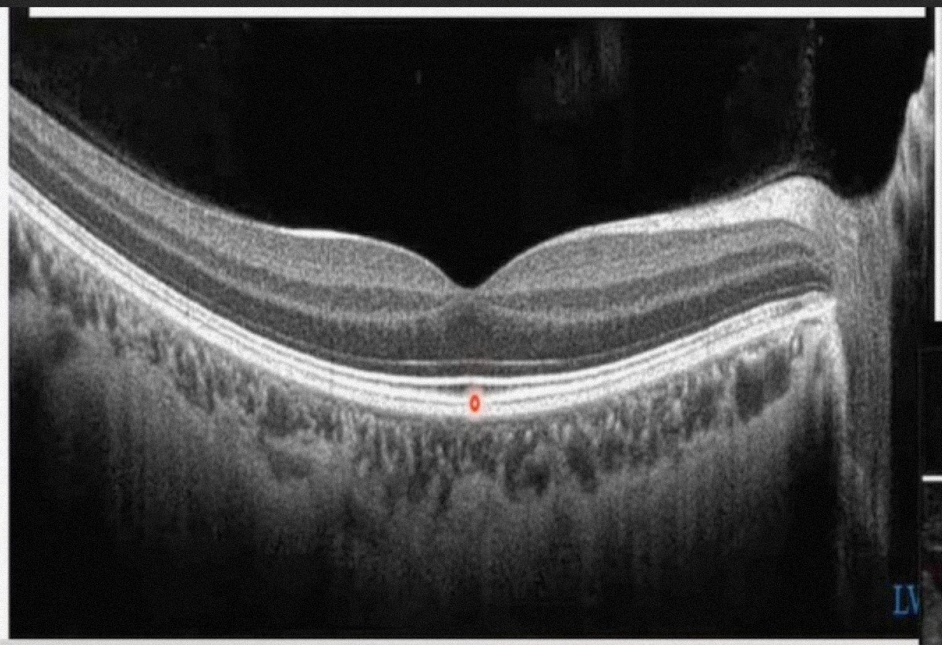

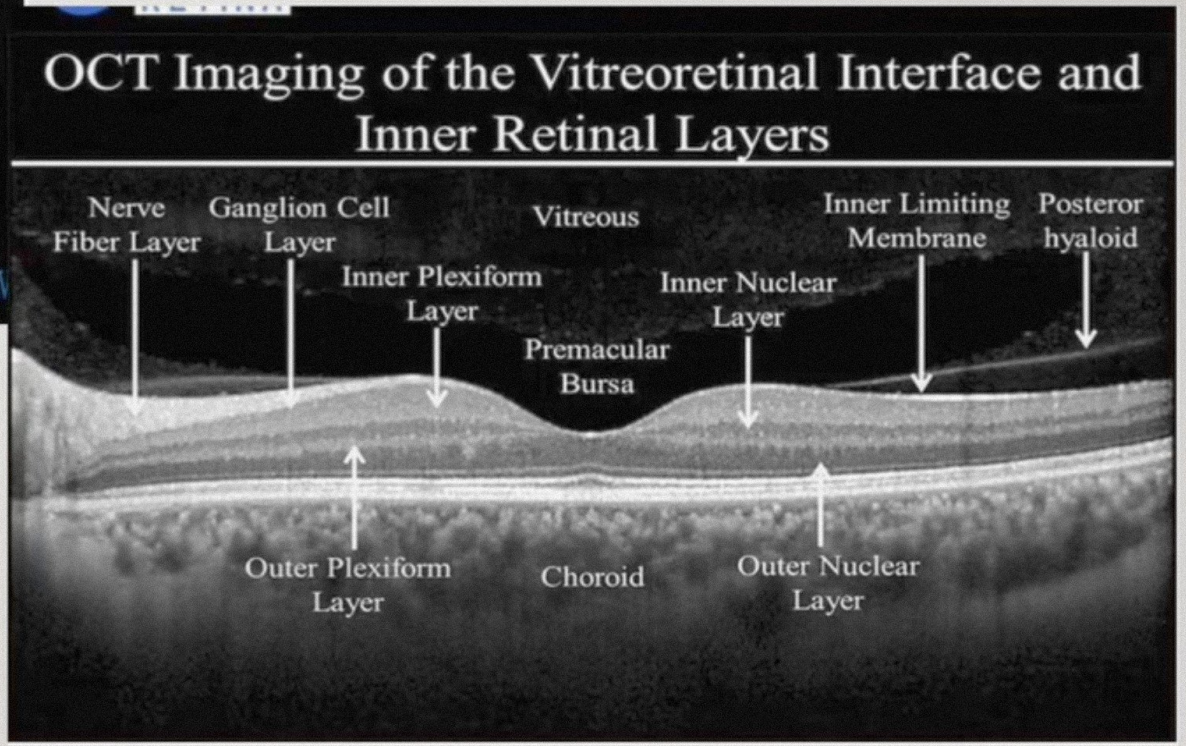
OCT Imaging of the Vitreoretinal Interface and Inner Retinal Layers
Nerve Fiber Layer
Ganglion Cell Layer
Vitreous
Inner Limiting Membrane
Posteror hyaloid
Inner Plexiform Layer
Inner Nuclear Layer
Premacular Bursa
Outer Plexiform Layer
Choroid
Outer Nuclear Layer

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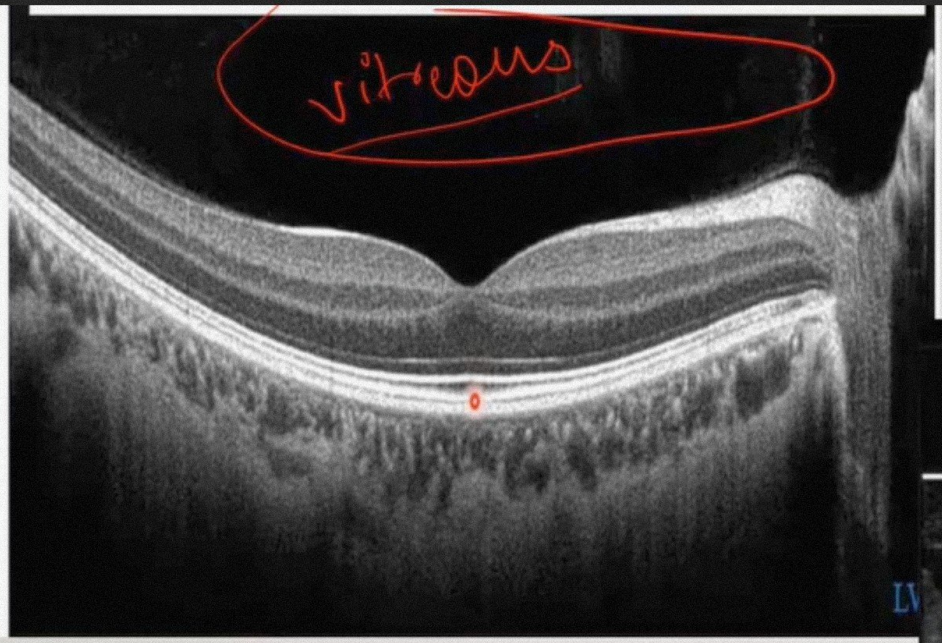
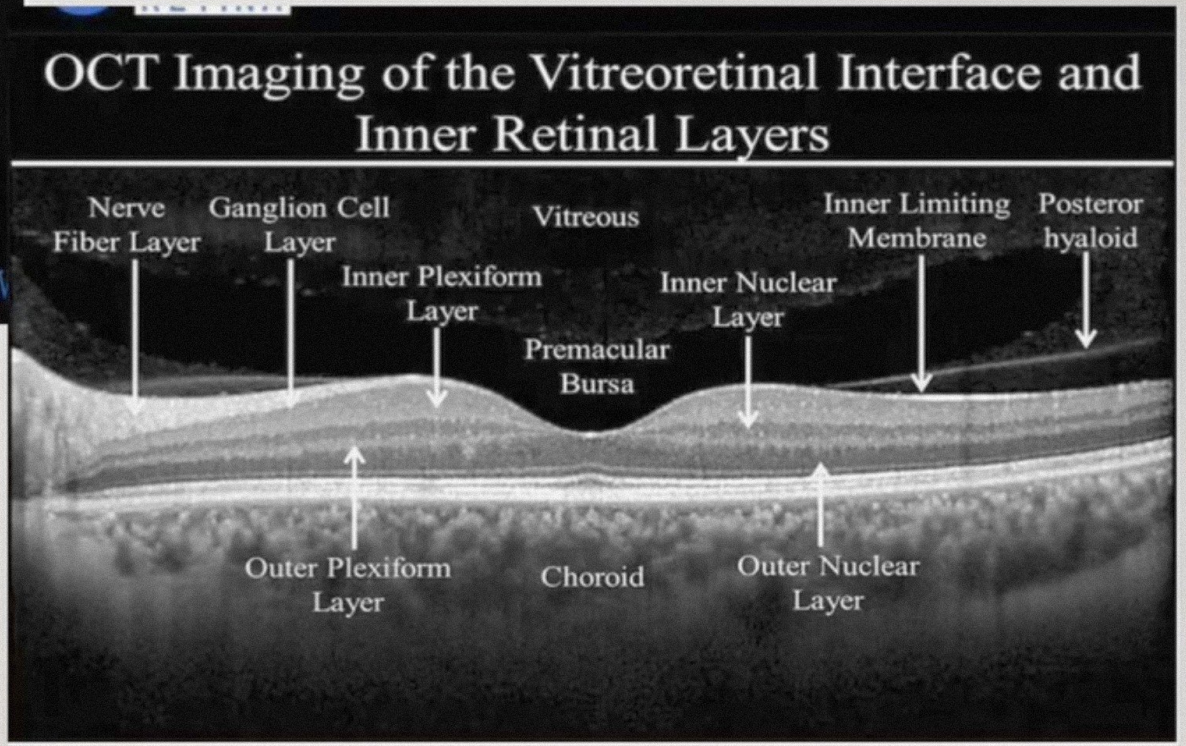

vitreous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Nerve Fiber Layer
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Inner Limiting Membrane
Posteror hyaloid
Outer Plexiform Layer
Choroid
Outer Nuclear Layer

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INNER RETINAL LAYERS

Inner retinal layers appear as hypo- and hyperreflective bands:

- Inner limiting membrane
- Nerve fiber layer
- Ganglion cell layer
- Inner plexiform layer
- Inner nuclear layer
- Outer plexiform layer
- Outer nuclear layer

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INNER RETINAL LAYERS

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- Inner limiting membrane
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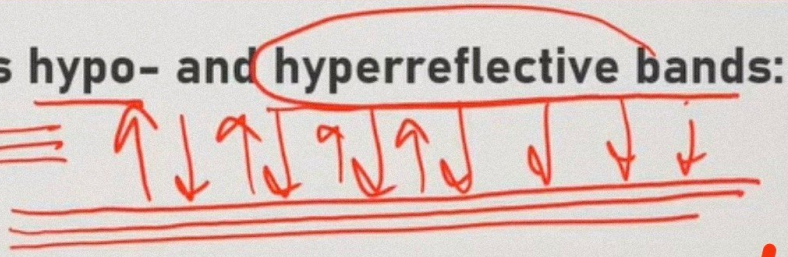
- Outer nuclear layer



hyper

These show hyper reflectivity

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INNER RETINAL LAYERS

Inner retinal layers appear as hypo- and hyperreflective bands:

- Inner limiting membrane
- Nerve fiber layer
- Ganglion cell layer
- Inner plexiform layer
- Inner nuclear layer
- Outer plexiform layer
- Outer nuclear layer

Hyporeflective on OCT

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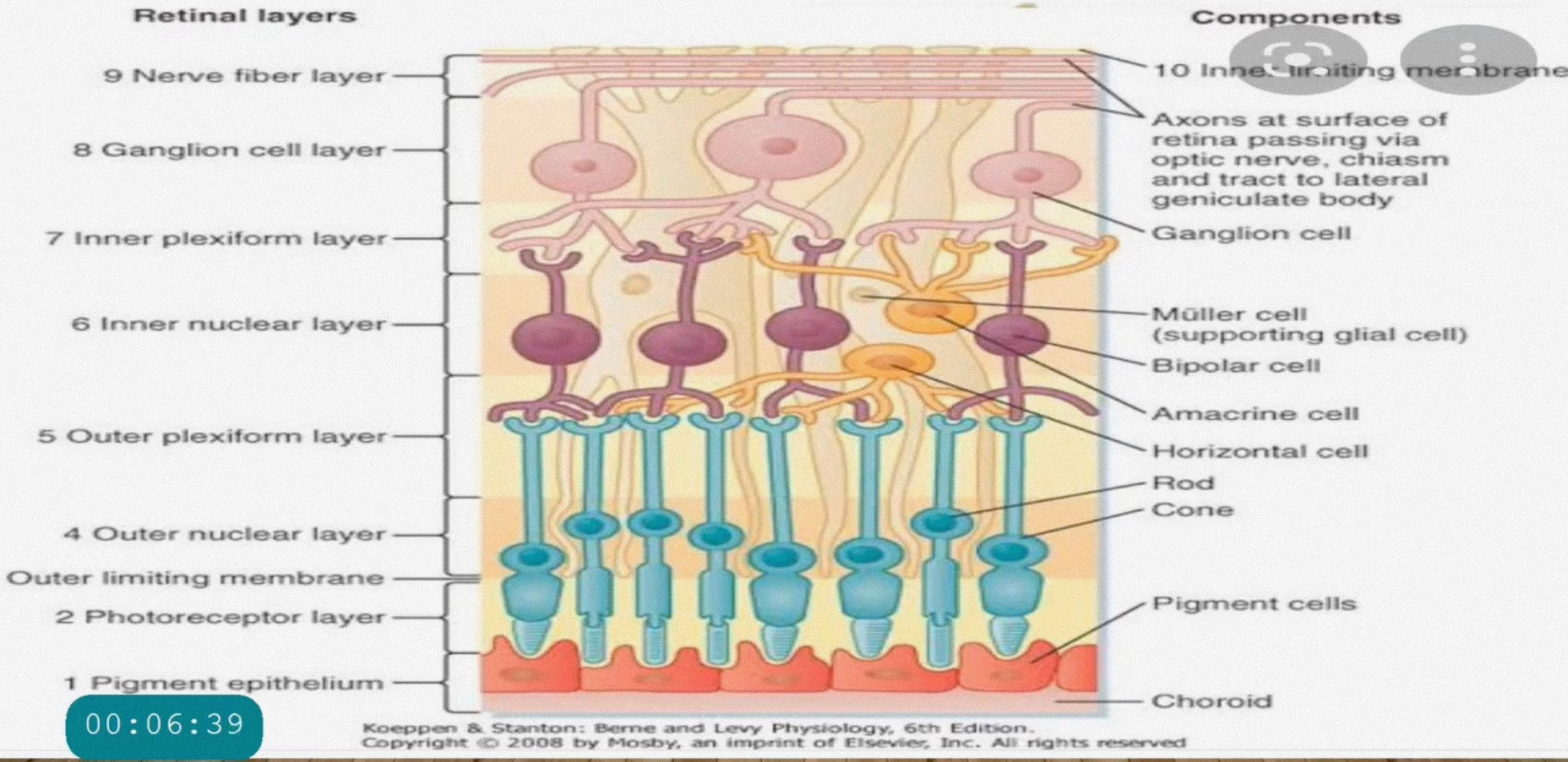

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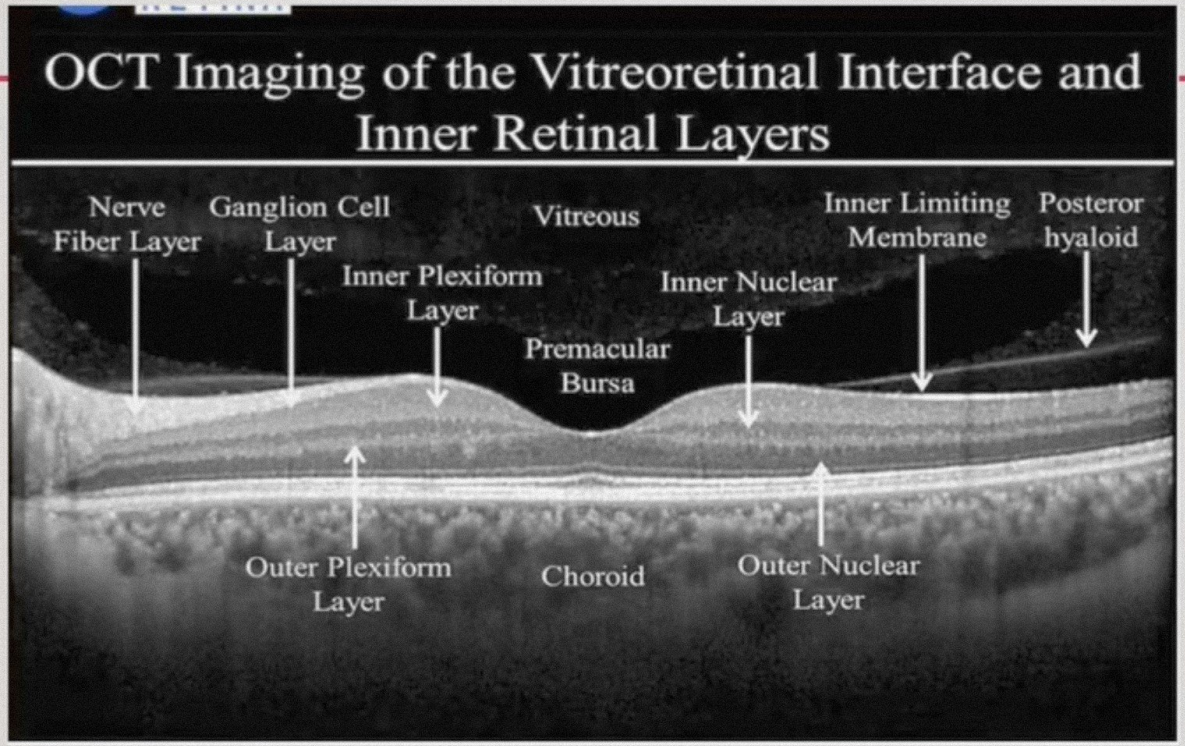
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Nerve Fiber Layer
Ganglion Cell Layer
Vitreous
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Inner Nuclear Layer
Premacular Bursa
Outer Plexiform Layer
Choroid
Outer Nuclear Layer

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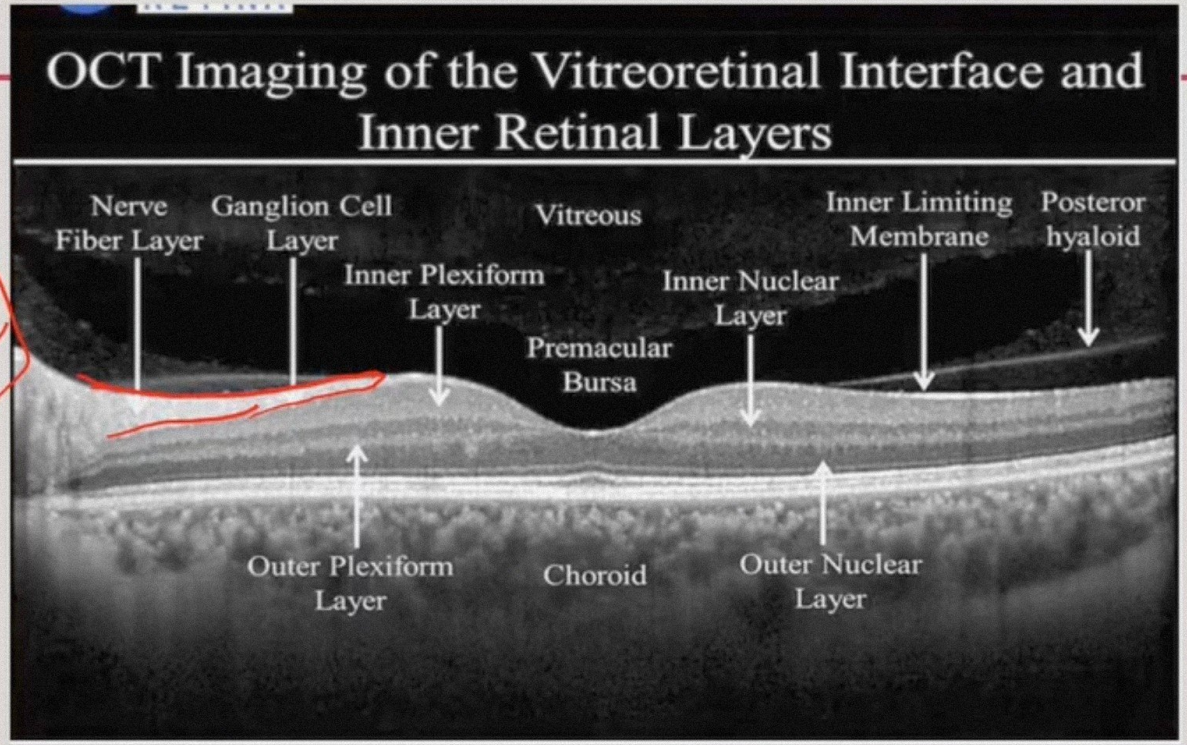
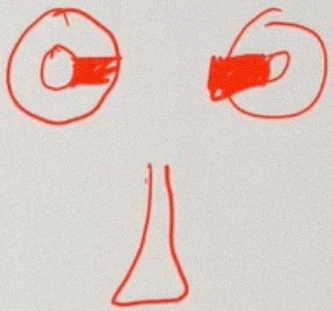
Nerve fiber layer is more thickened on nasal part of retina



Nasal



FLASE COLOR CODING

- Large reflections:- warm colors :- **red**, orange
- Moderate reflections :- **green**
- No reflection :- **black**

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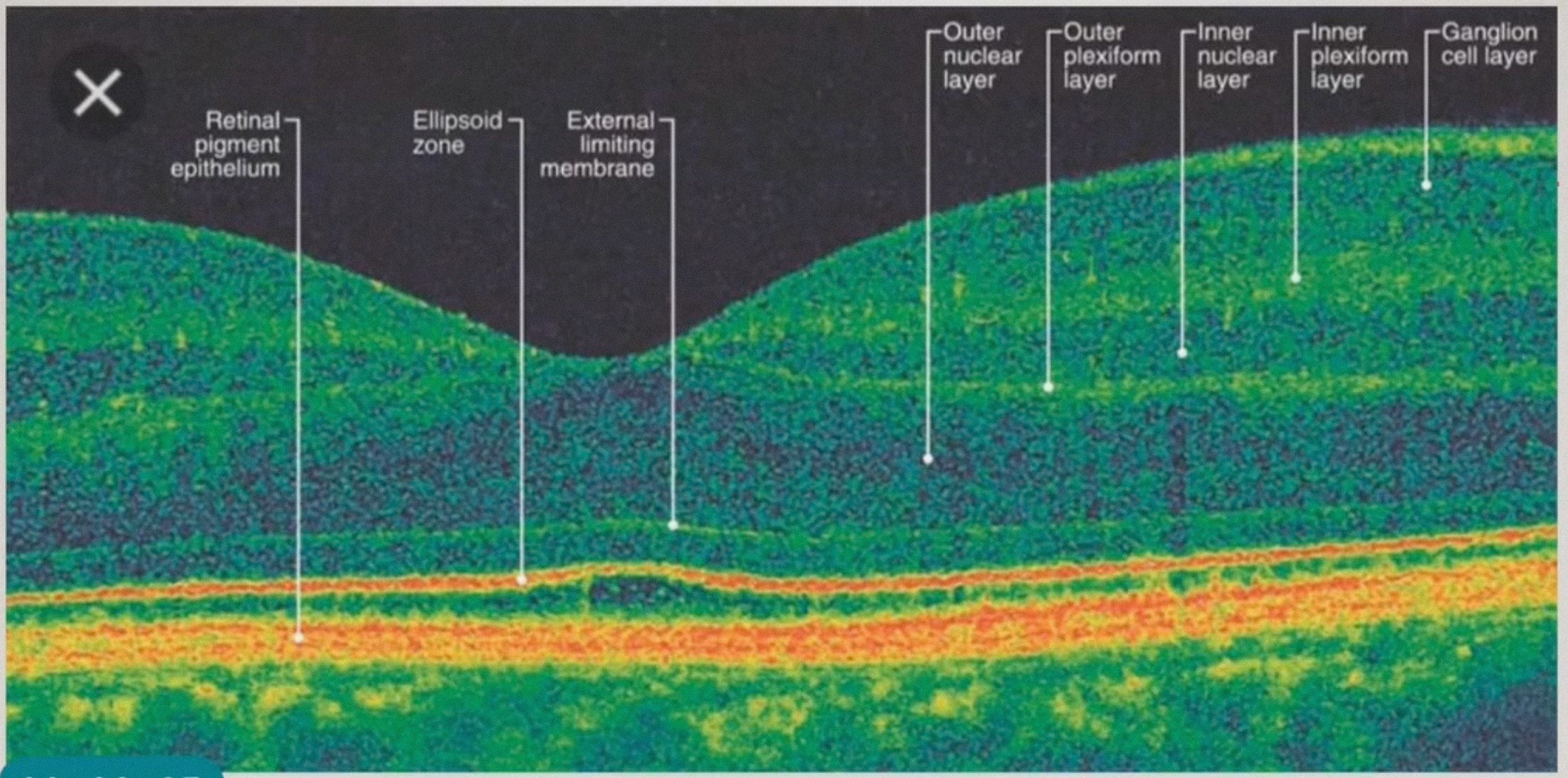
Retinal pigment epithelium
Ellipsoid zone
External limiting membrane
Outer nuclear layer
Outer plexiform layer
Inner nuclear layer
Inner plexiform layer
Ganglion cell layer

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INTERNATIONAL NOMENCLATURE OF OCT

- 2014, an international panel of OCT experts came to a consensus on the most proper terminology for the retinal layers as visualized on OCT, and this terminology is currently commonly used among experts in the field.
- The term "zone" was used to define anatomic regions without recognized histopathological correlation to a specific retinal layer.

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OUTER RETINAL LAYER

Outer retinal layers appear as **four distinct hyper-reflective lines:**

- External limiting membrane
- Ellipsoid zone
- Interdigitation zone
- Retinal pigment epithelium / Bruch's membrane complex

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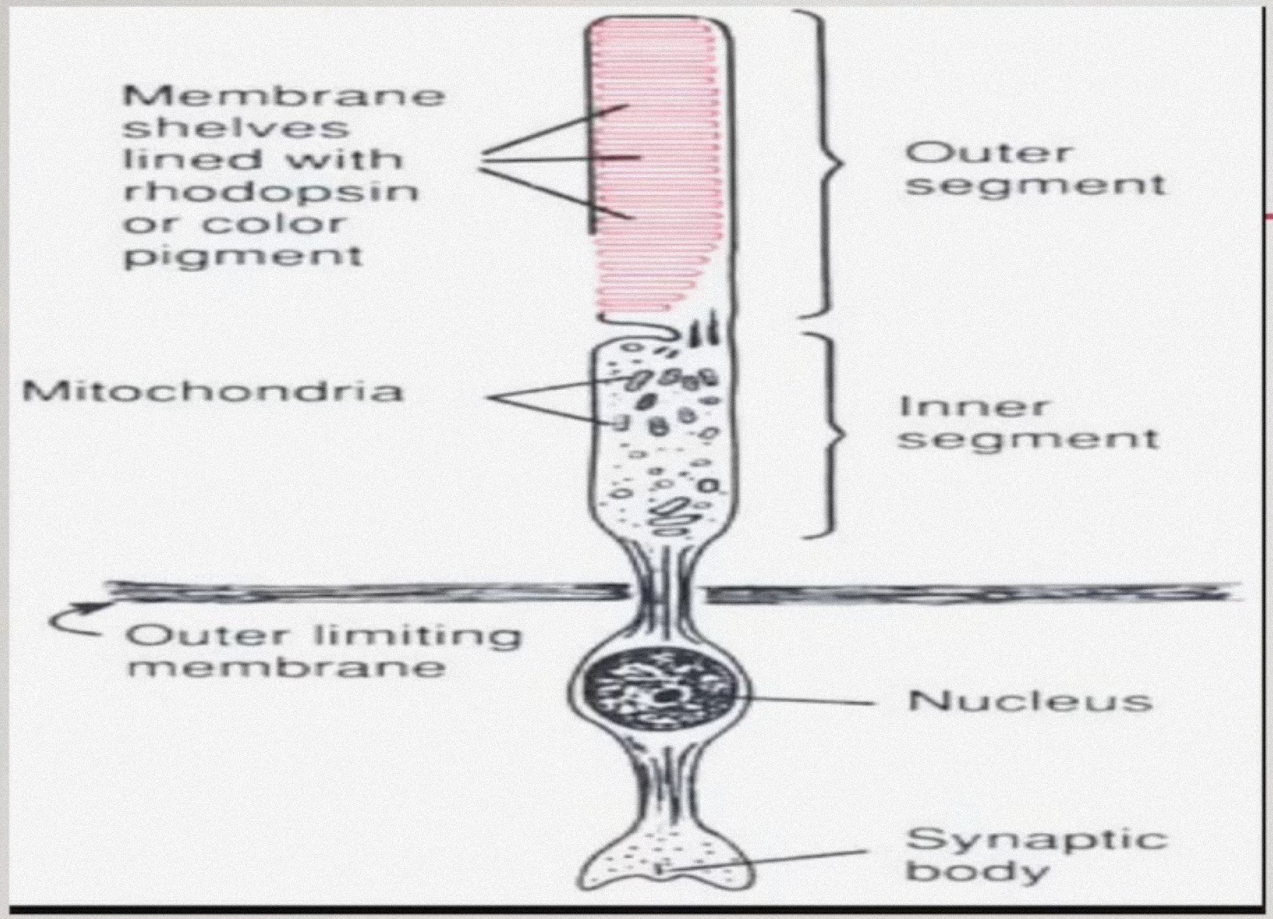
Membrane shelves lined with rhodopsin or color pigment
Outer segment
Mitochondria
Inner segment
Outer limiting membrane
Nucleus
Synaptic body

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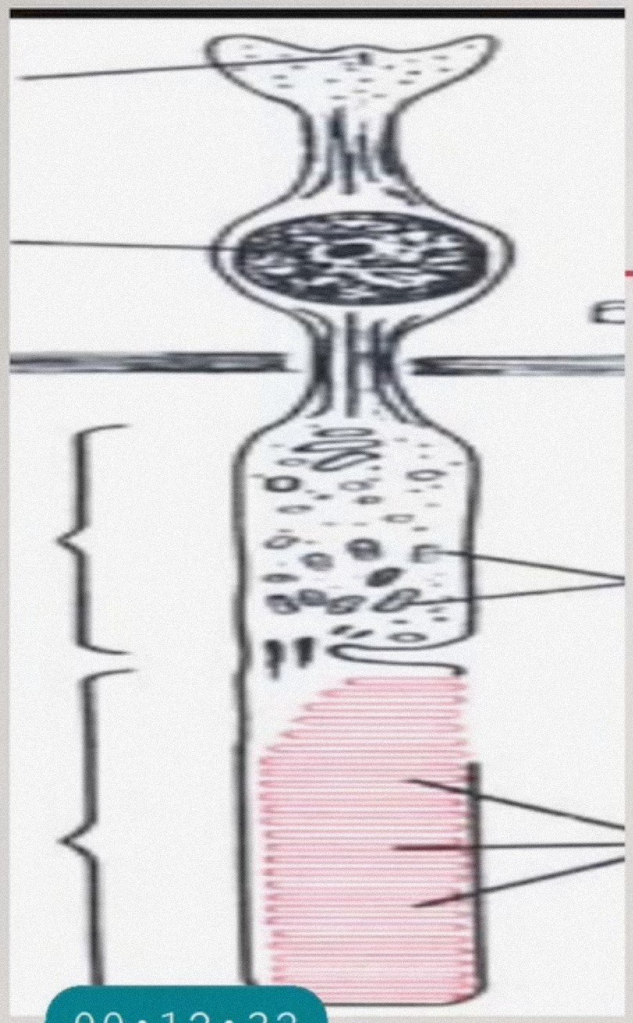

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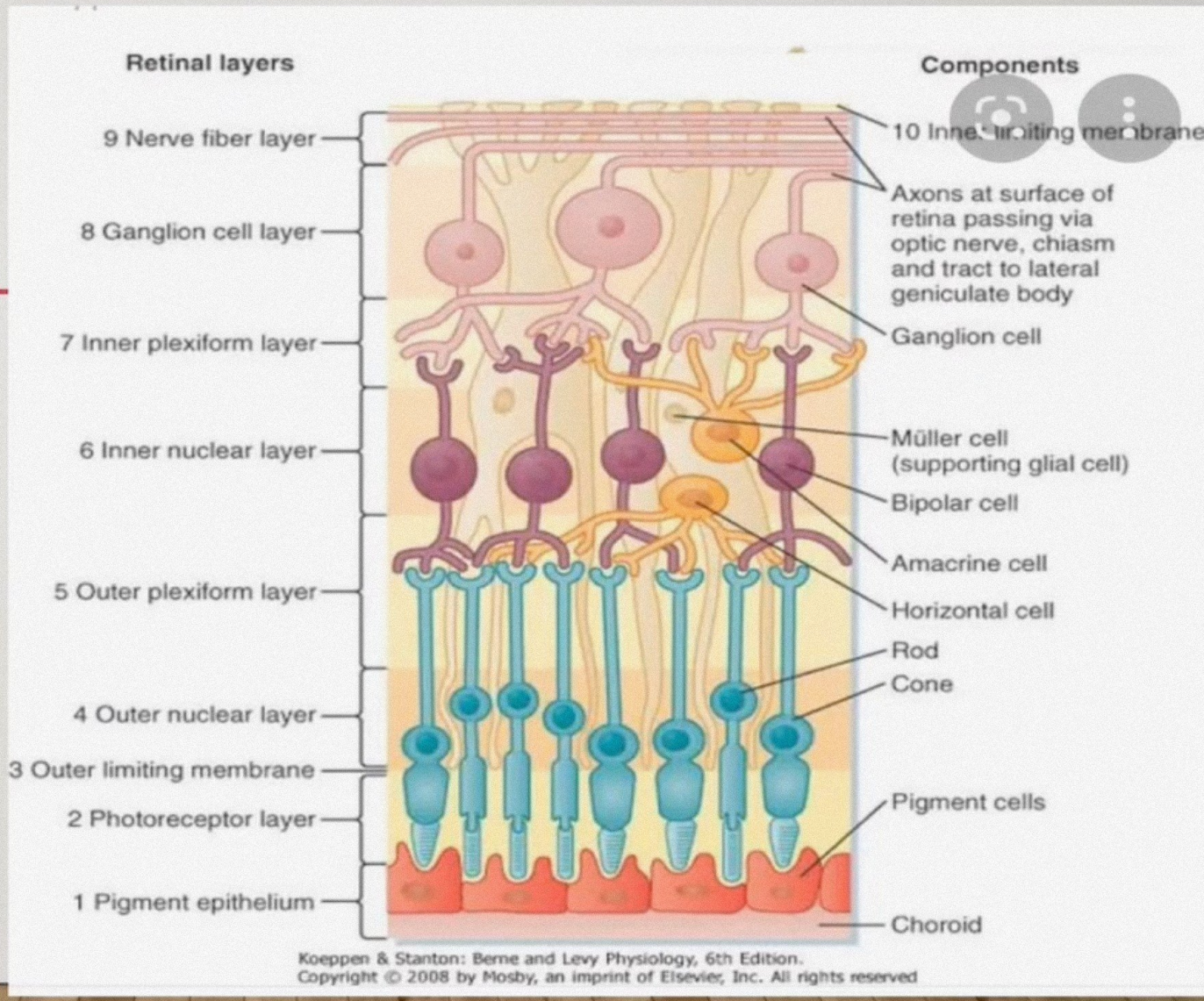
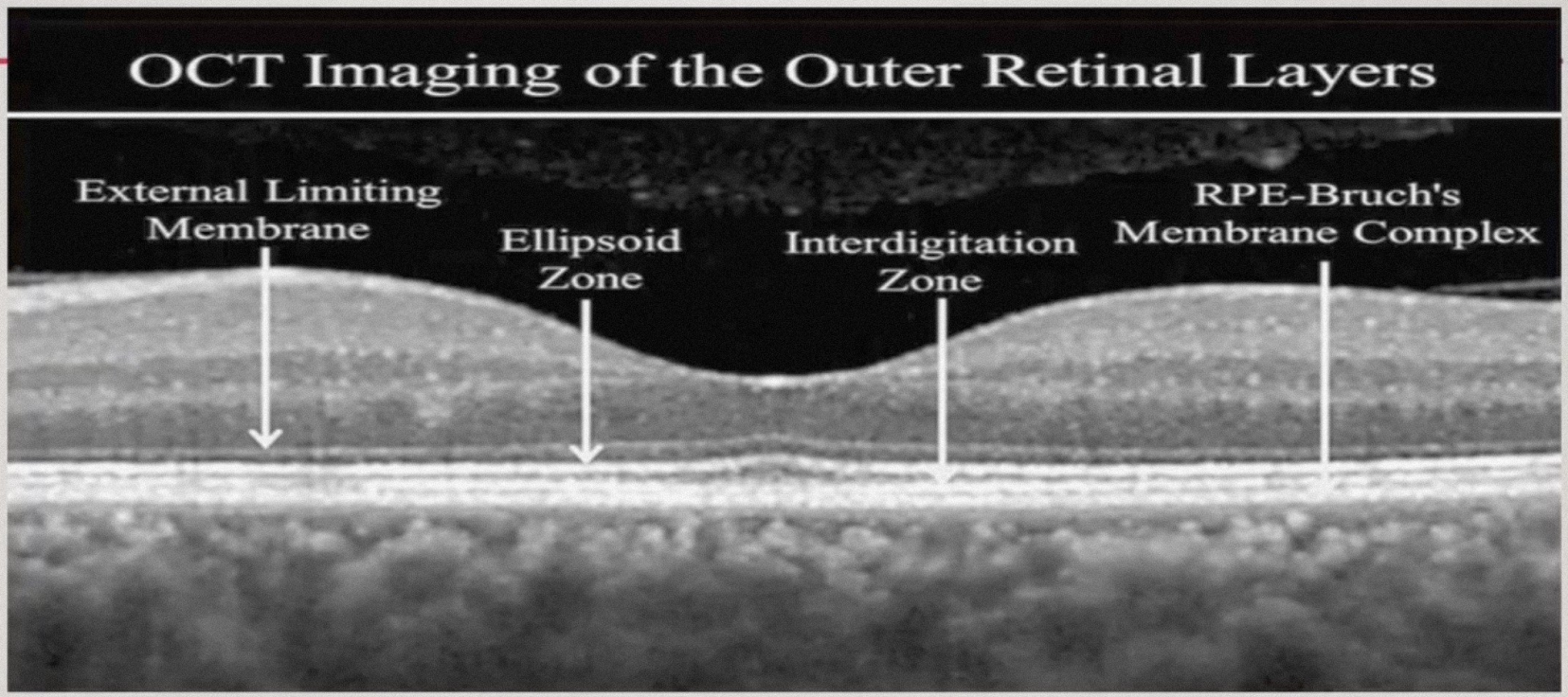


OCT Imaging of the Outer Retinal Layers



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EXTERNAL LIMITING MEMBERANE

- The external limiting membrane band (ELM) is located at the boundary between the cell bodies (nuclei) and the inner segments of the photoreceptors, and comprises clusters of junctional complexes between the Müller cells and the photoreceptors.

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ELLIPSOID ZONE

- The ellipsoid zone (EZ), which was previously referred as the photoreceptor inner segment/outer segment (IS/OS) junction, is now thought to be formed mainly by mitochondria within the ellipsoid layer of the outer portion of the inner segments of the photoreceptors.

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INTERDIGITATION ZONE

- Contact cylinder represented by the apices of the RPE cells that encase part of the cone outer segments.
- This layer was previously referred to as cone outer segment tips (COST) or rod outer segment tips (ROST), and it is not always distinguishable from the underlying RPE layer, even in normal subjects.

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Bruch's membrane → innermost layer of choroid

RPE- BRUCHS MEMBERANE COMPLEX

- The retinal pigment epithelial band is formed by the RPE and Bruch's membrane (indistinguishable from each other in a normal state using current SD-OCT systems).
- In the fovea, this band is thicker, which indicates that choroidal structures may also contribute to the hyper-reflectivity of the RPE band at this location

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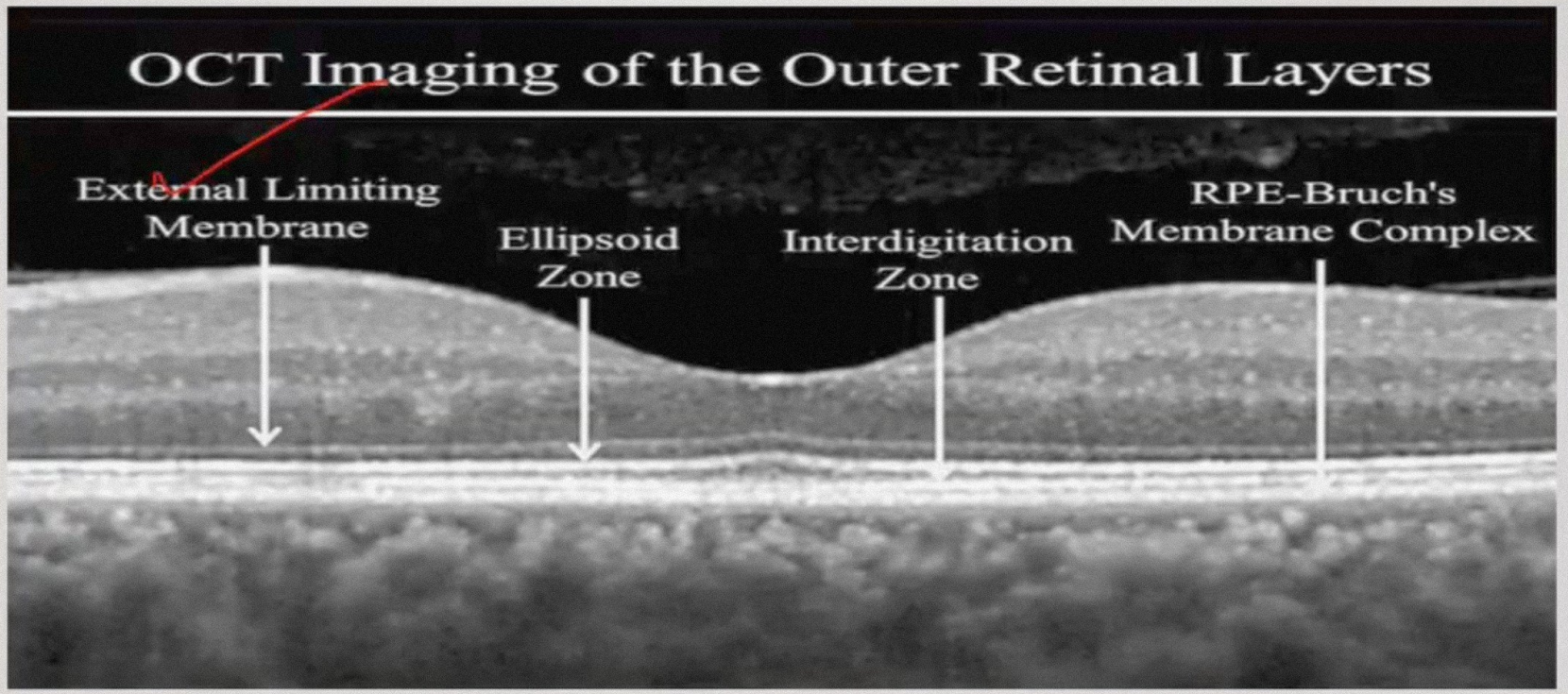
OCT Imaging of the Outer Retinal Layers
External Limiting Membrane
Ellipsoid Zone
Interdigitation Zone
RPE-Bruch's Membrane Complex

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CHOROID

- Choriocapillaris (capillaries adjacent to Bruch's membrane)
- Sattler's layer (medium- and small-sized vessels of the choroid)
- Haller's layer (outer choroidal layer containing large choroidal vessels

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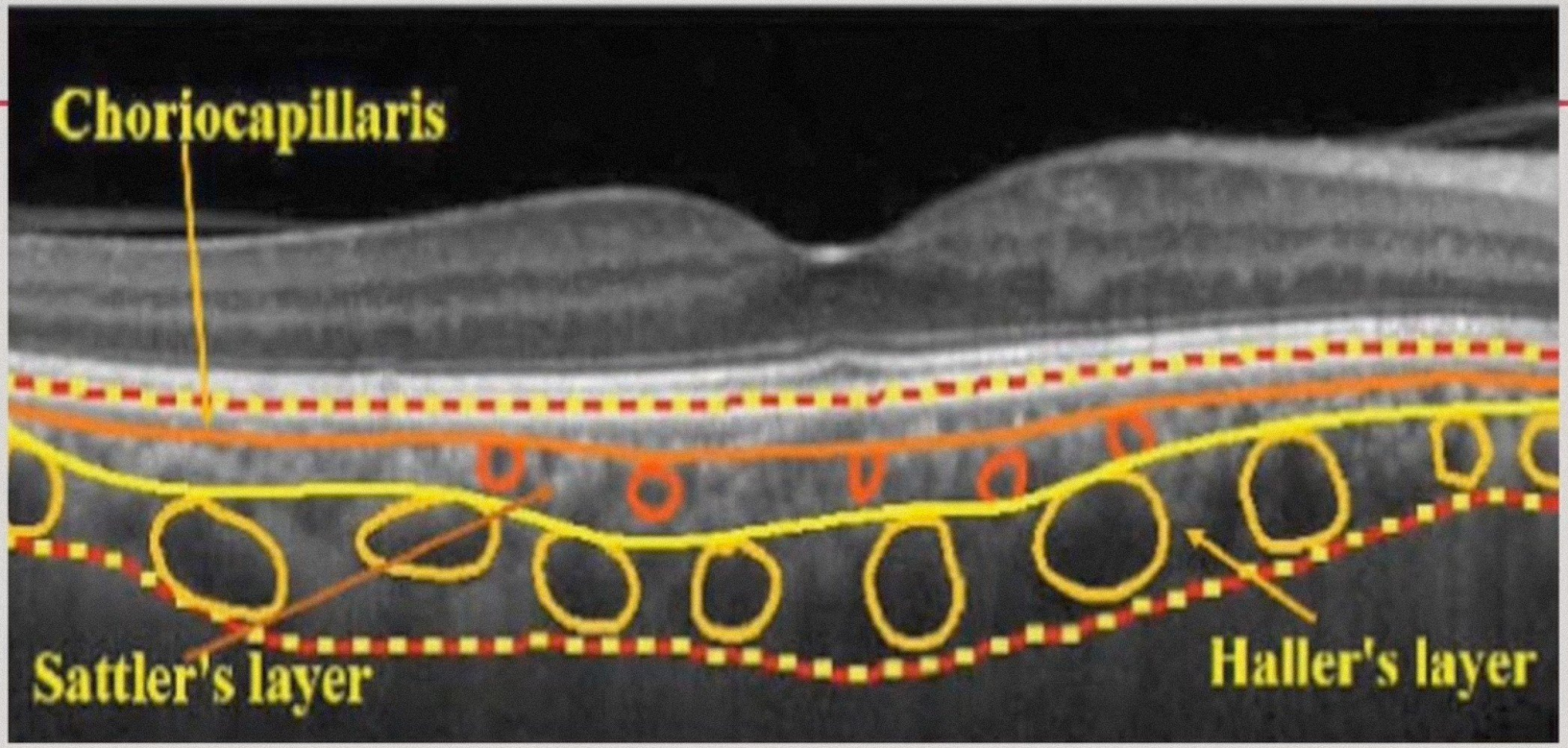

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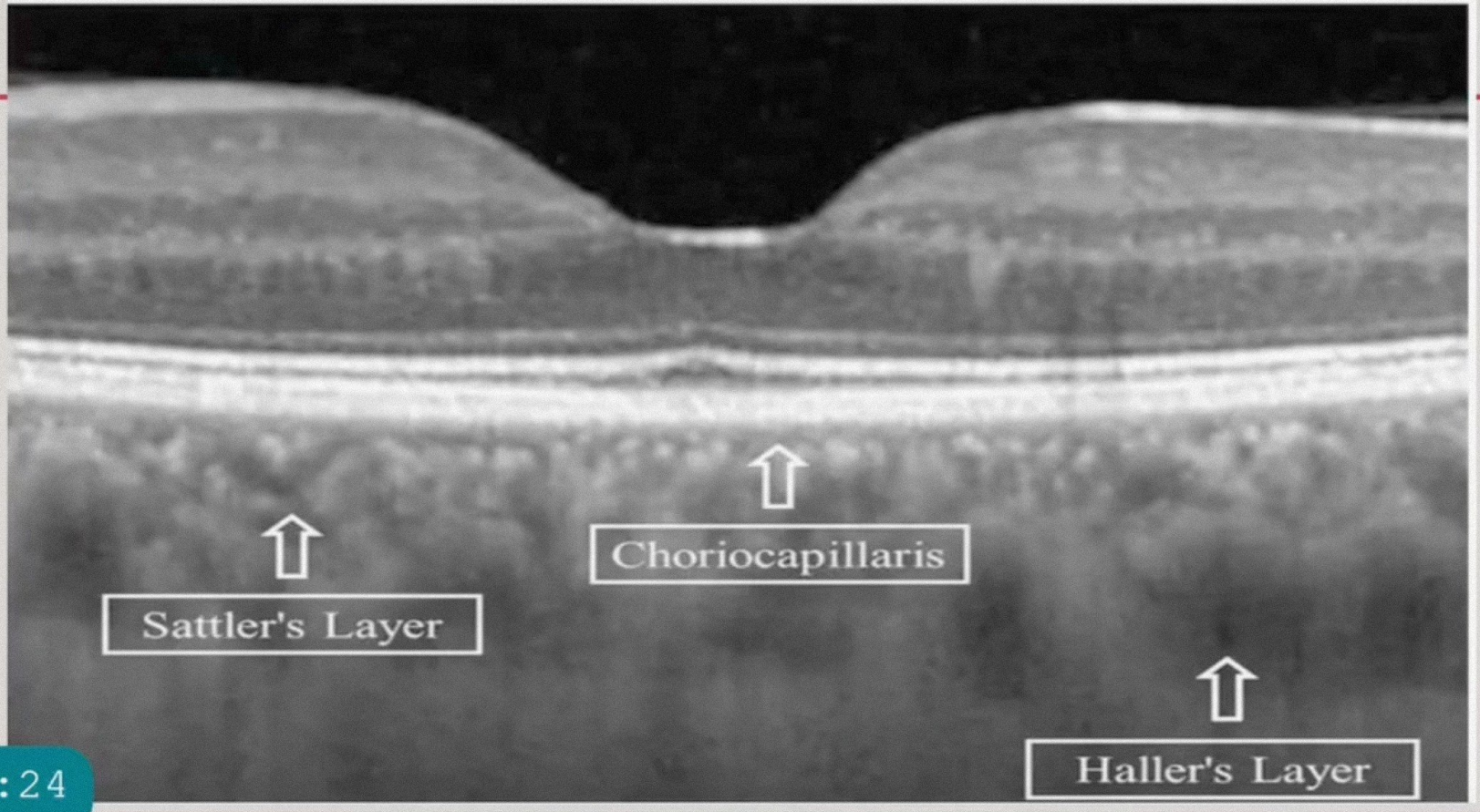
OCT Imaging of the Choroidal Layers



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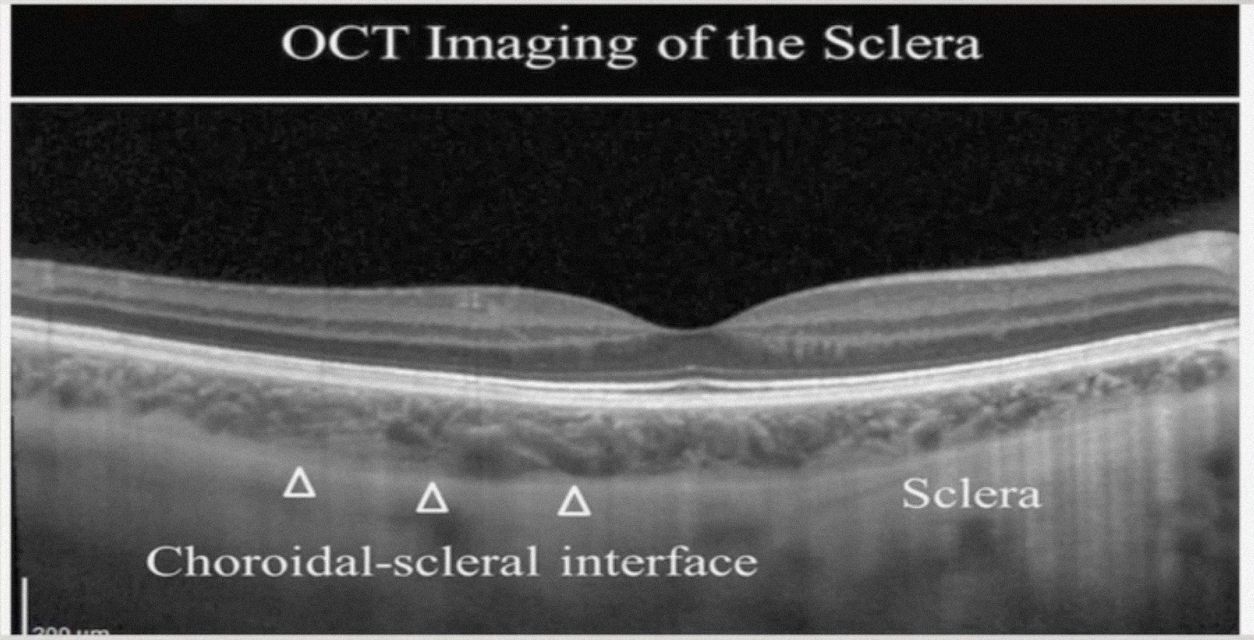
SCLERA

- **Sclera is observed as a relatively uniform, hyperreflective structure exterior to the choroid on EDI-OCT images**



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