Basic Eye Examination and History Taking

Resources

- Eye, Brain and Vision;
  David H.Hubel

- Clinical Anatomy of the Eye;
  Richard Snell, Michael Lemp

- North Queensland Eye Clinic
  https://nqeyeclinic.com.au/

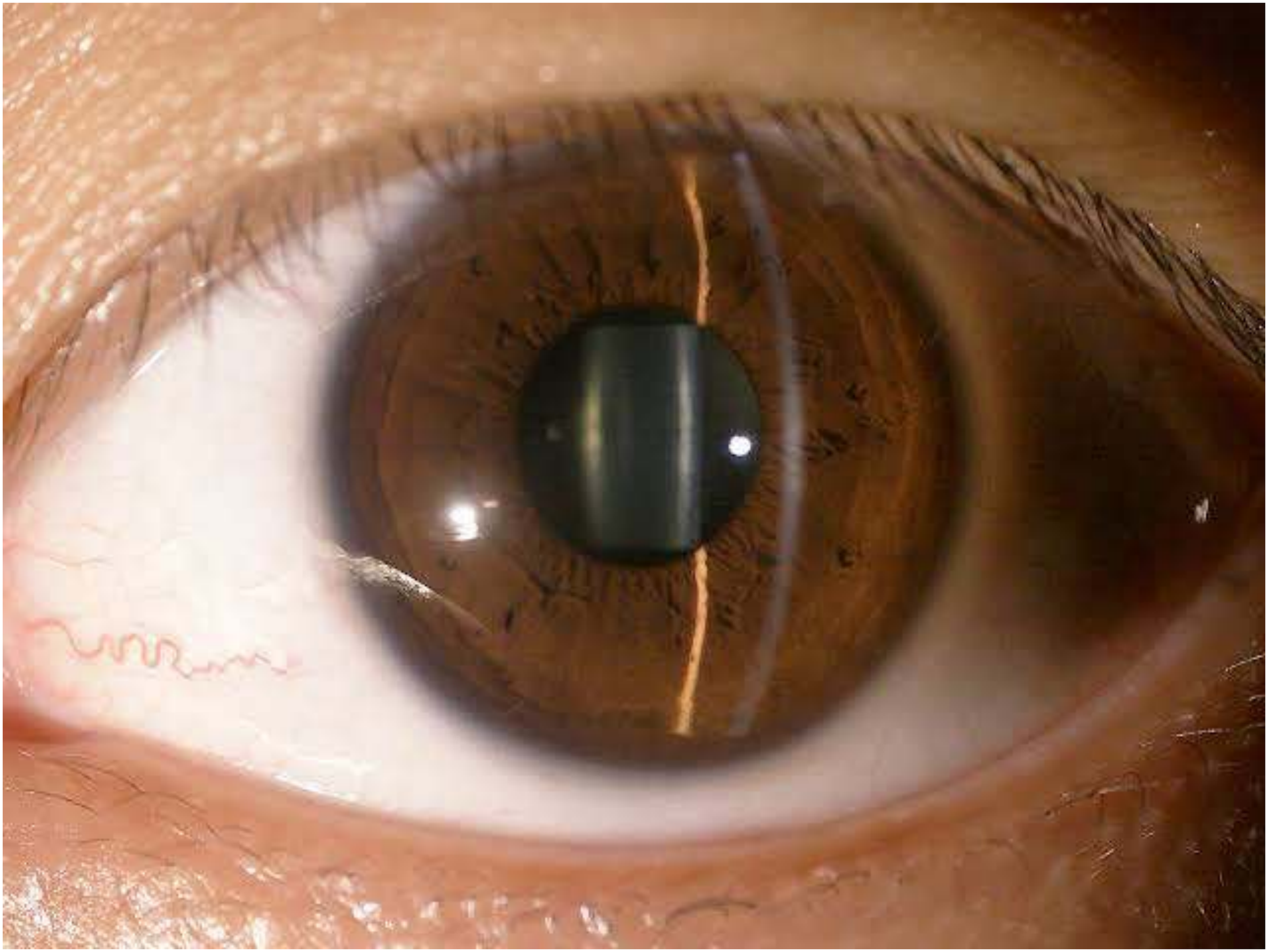
- Doctors for the Environmeny Australia
  http://www.dea.org.au

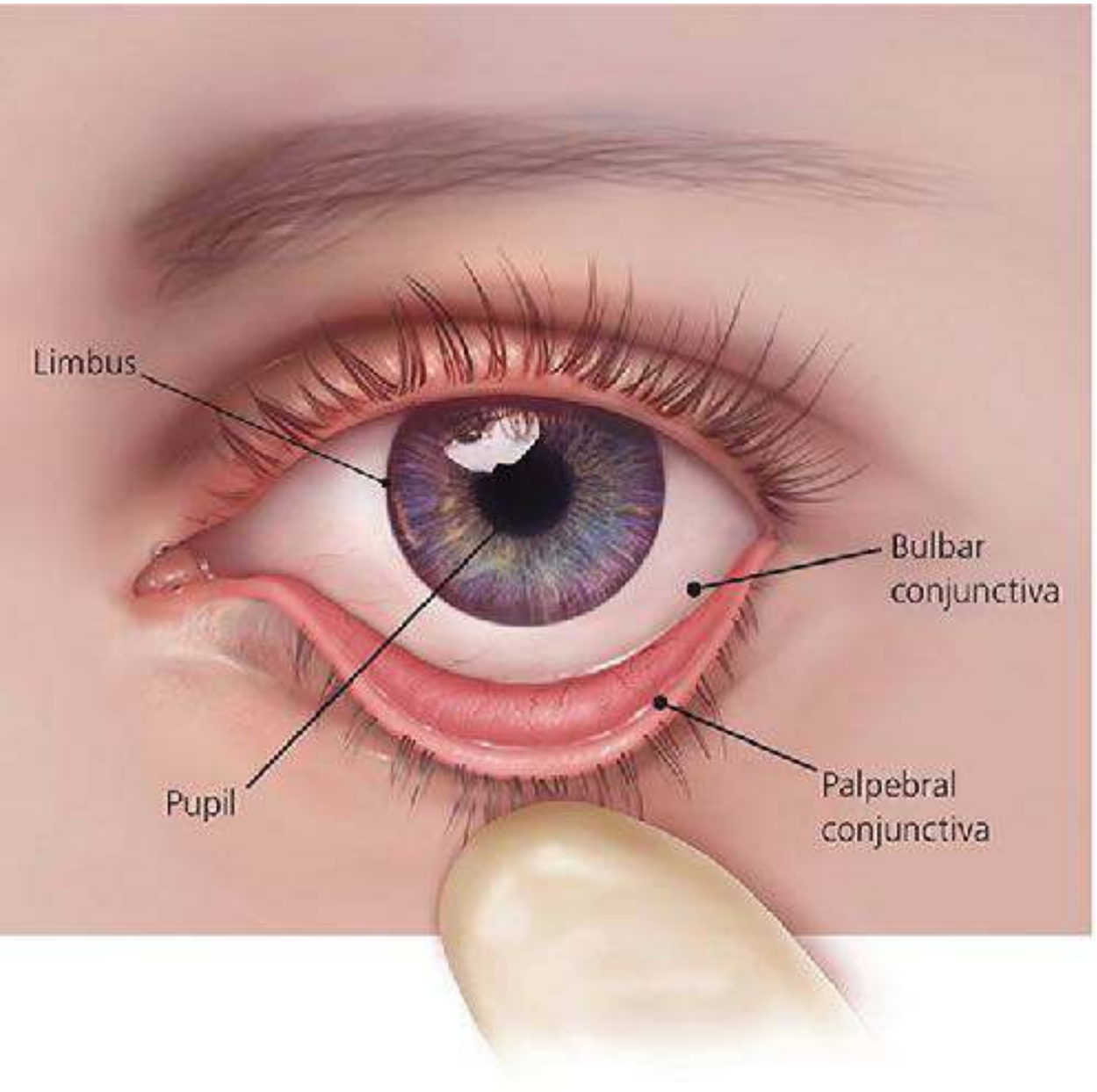
AIMS OF THE LECTURES

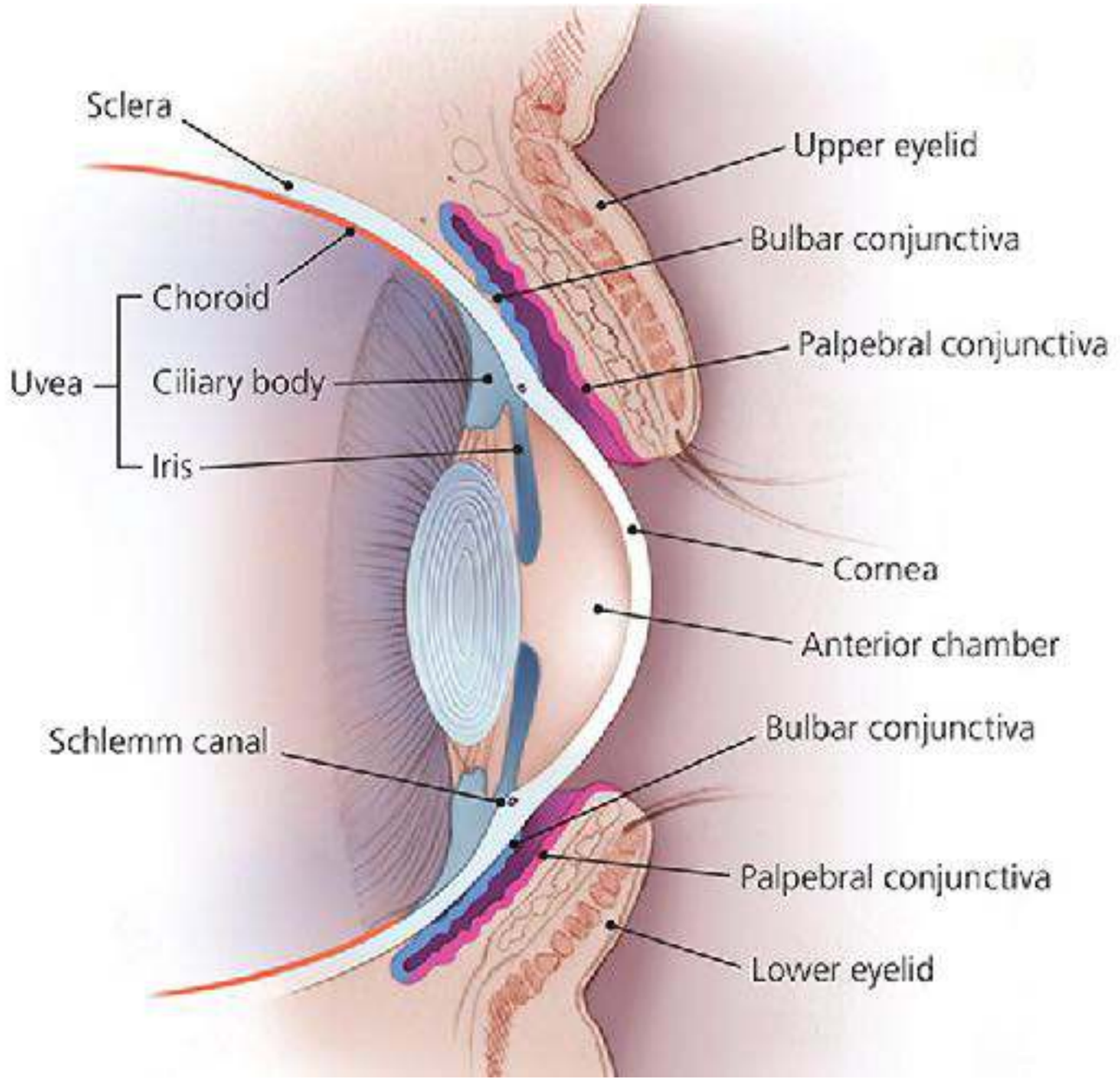
- Basic understanding of eye anatomy and physiology
- To develop a frame work for history taking and examination of the eye and visual system based on that understanding
- Pathophysiology of some common eye diseases such as Blepharitis, Conjunctivitis, Cataract, Glaucoma and Age Related Macular Degeneration (ARMD)
- Some discussion about the values required to be an effective doctor

MY BACKGROUND

- A Baha'i refugee from Iran 1985
- BMBS from Flinders University in SA 1993
- Worked as a country GP, paediatric and emegency medical officer for about seven years
- Ophthalmologist since 2004
- Have been a patient on several occasions in past few years

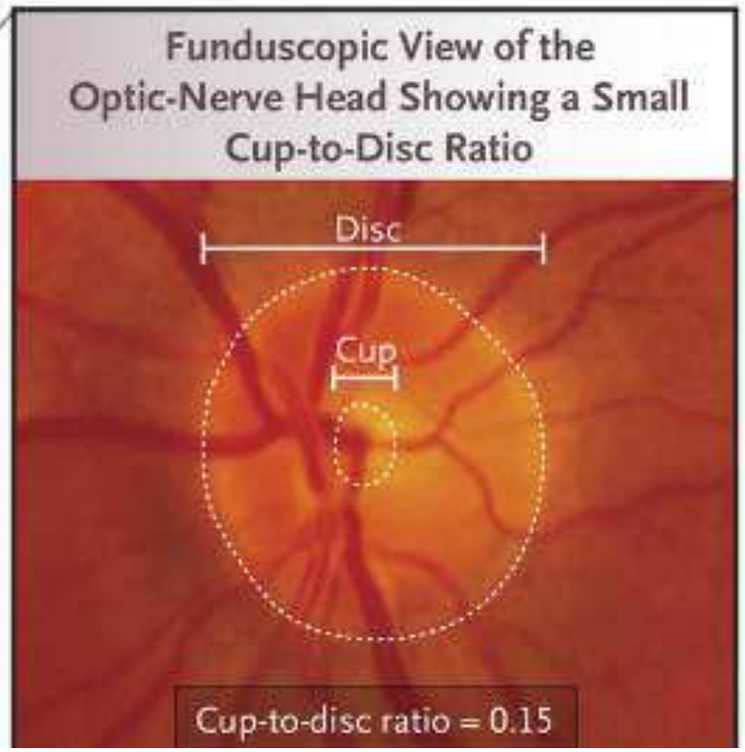


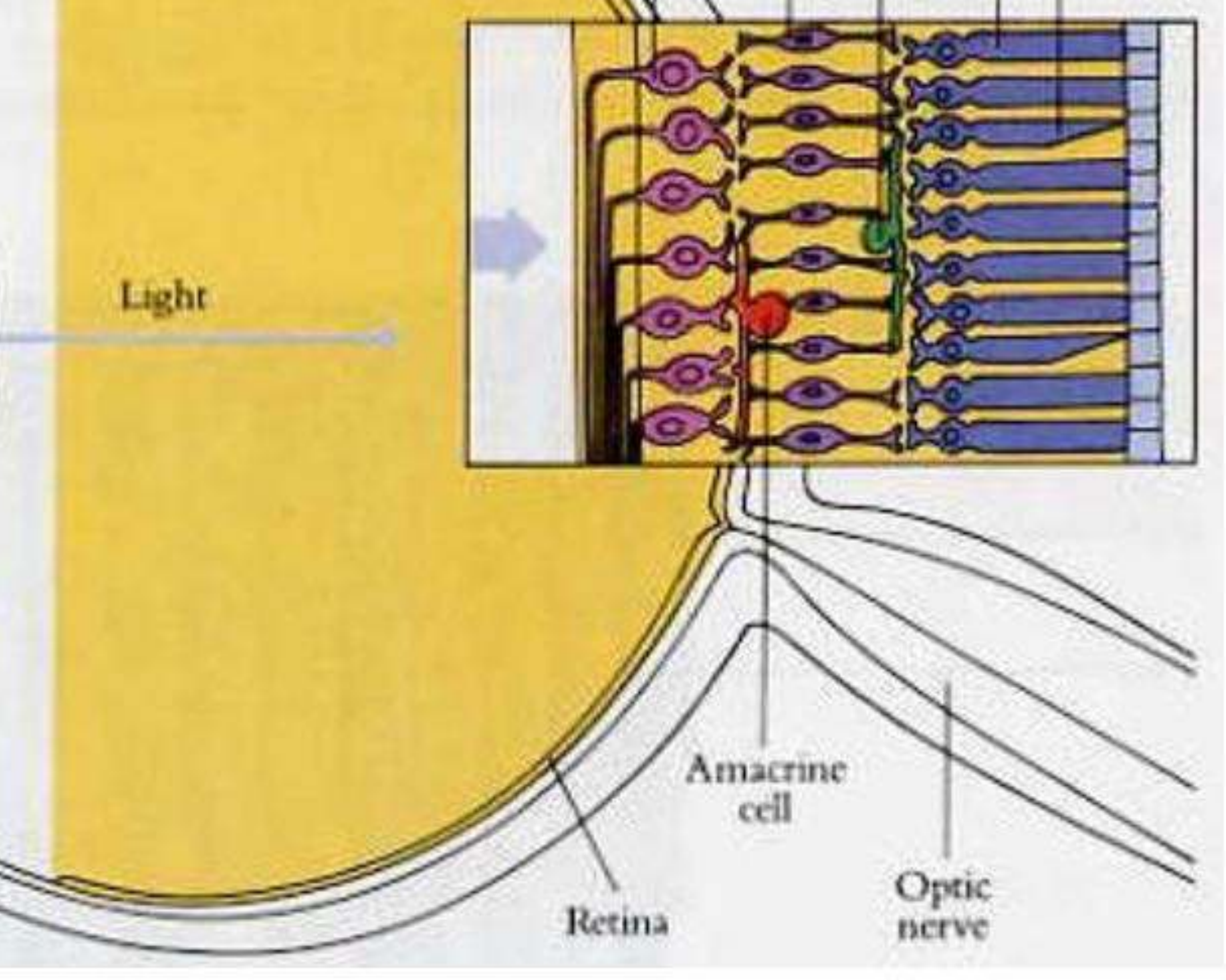

Limbus
Bulbar conjunctiva
Pupil
Palpebral conjunctiva


Sclera
Upper eyelid
Bulbar conjunctiva
Choroid
Uvea
Ciliary body
Palpebral conjunctiva
Iris
Cornea
Anterior chamber
Schlemm canal
Bulbar conjunctiva
Palpebral conjunctiva
Lower eyelid

Optic nerve
Central retinal artery
Anterior optic nerve
Retina
Choroid
Sclera
Internal carotid artery
Ophthalmic artery
Pial plexus
Optic-nerve sheath
Long posterior ciliary arteries
Short posterior ciliary arteries
Sclera
OPTIC NERVE
Lamina cribrosa
Central retinal artery
Posterior
Circle of Zinn–Haller

Funduscopic View of the Optic-Nerve Head Showing a Small Cup-to-Disc Ratio




Light
Amacrine cell
Retina
Optic nerve

Fovea Centralis

Gelber Fleck
Macula lutea

NETZHAUT

Stäbchen

Amakrinzellen

Horizontalzellen

Fovea

Bipolarzellen

Ganglienzellen

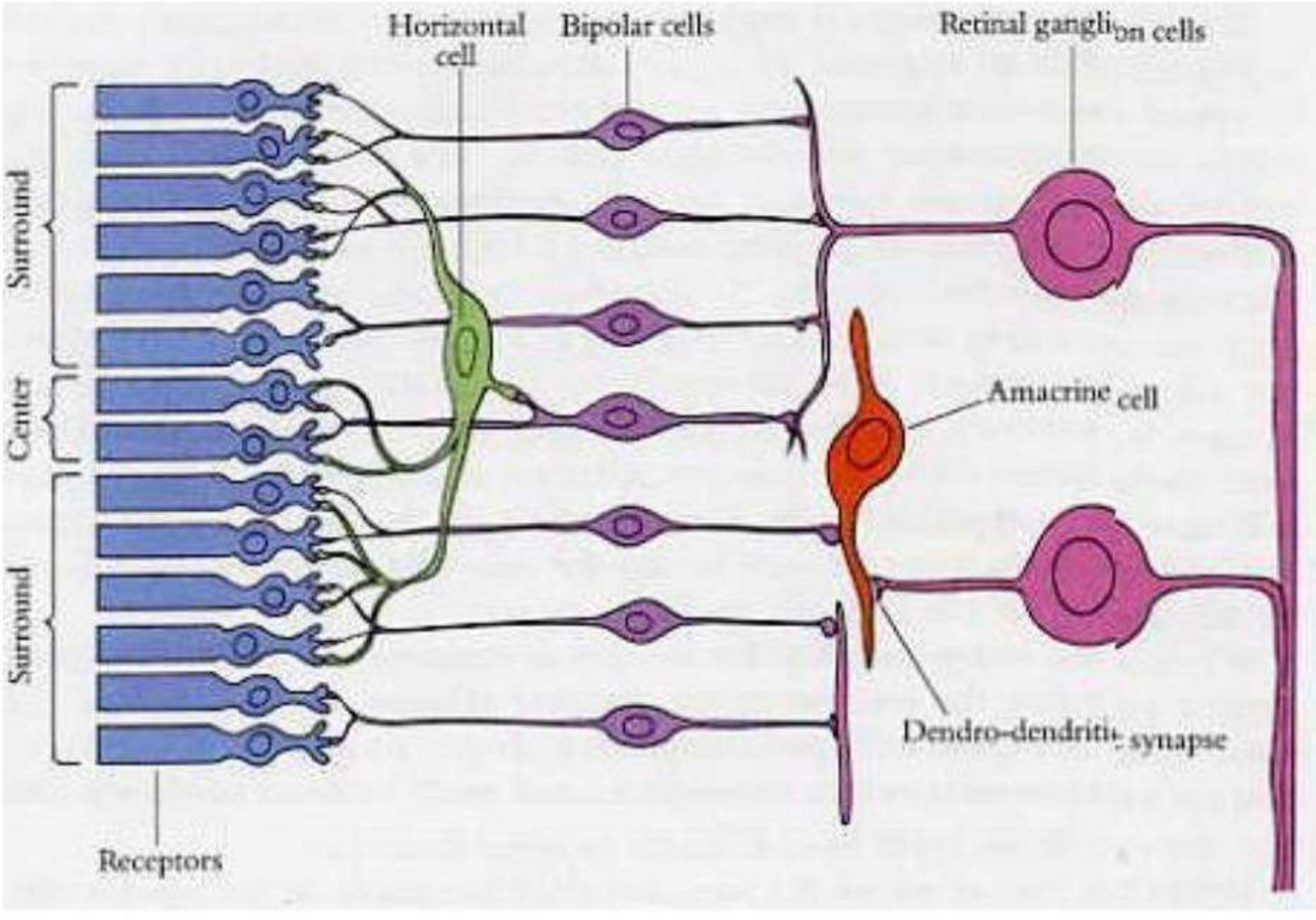
Sehnerv

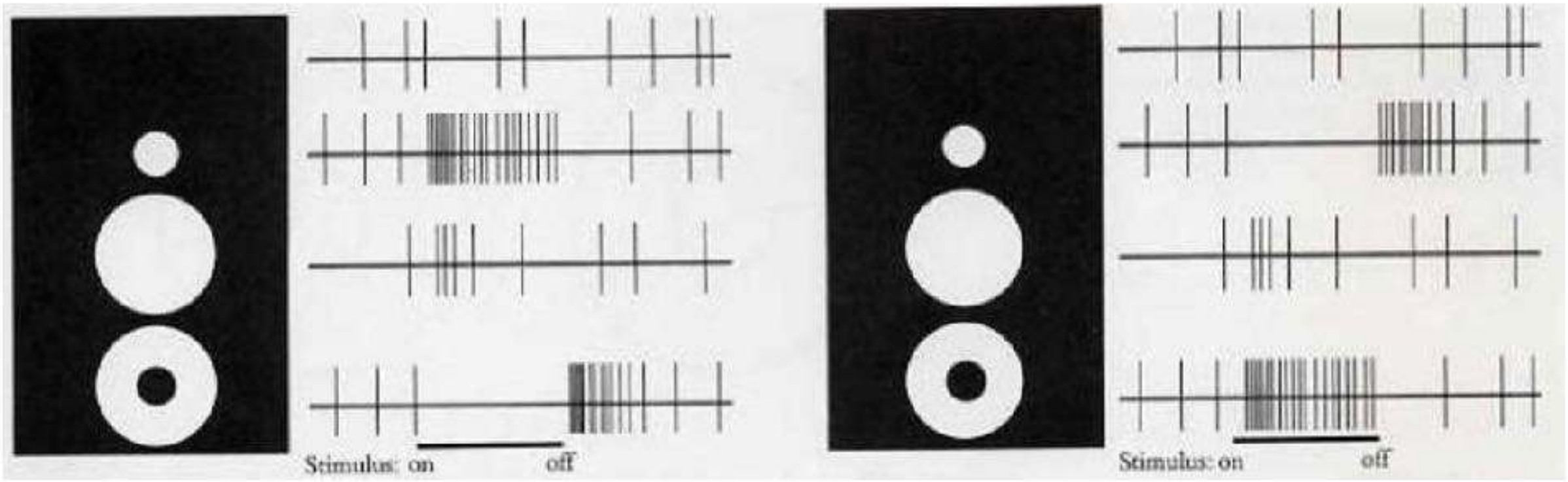
Zapfen

RETINALES PIGMENTEPITHEL

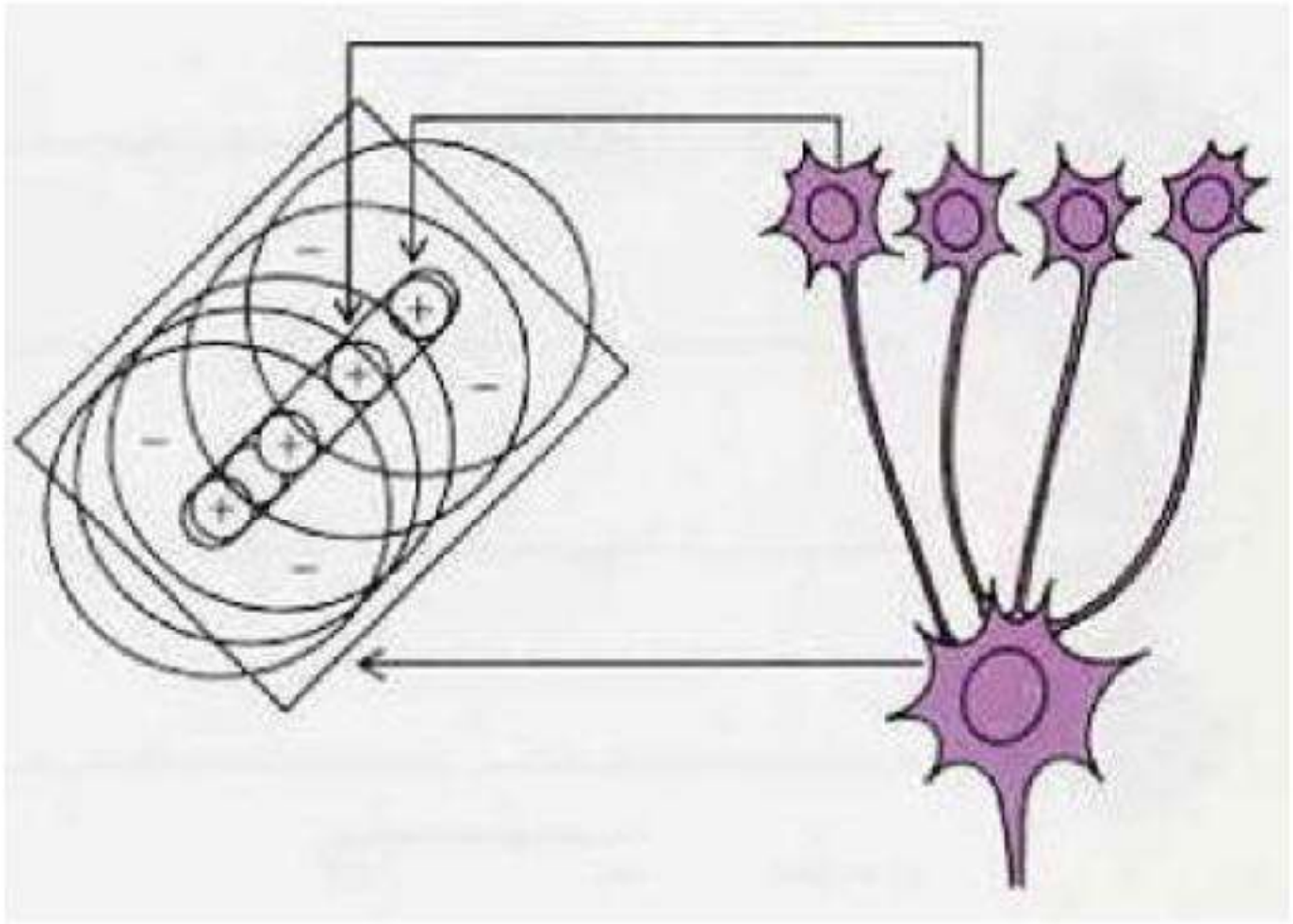
ADERHAUT

BLICKCHECK

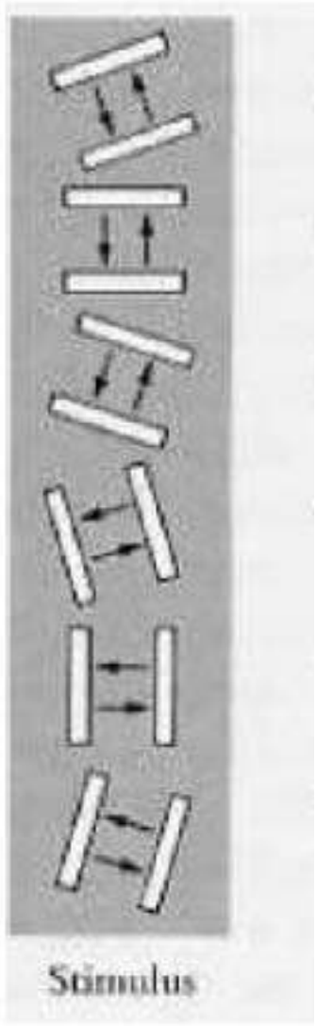

Horizontal cell
Bipolar cells
Retinal ganglion cells
Surround
Center
Surround
Amacrine cell
Dendro-dendritic synapse
Receptors



Left: Four recordings from a typical on-center retinal ganglion cell. Each record is a single sweep of the oscilloscope, whose duration is 2.5 seconds. For a sweep this slow, the rising and falling phases of the circular spot, and maximal off responses to a ring of just the right dimensions impulse coalesce so that each spike appears as a vertical line. To the left the stimuli are shown. In the resting state at the top, there is no stimulus: firing is slow and more less random. The lower three records show responses to a small (optimum size) spot, large spot covering the receptive-field center and surround, and a ring covering surround only. *Right*: Responses of an off-center retinal ganglion cell to the same set of stimuli shown at the left.



This type of wiring could produce a simple-cell receptive field. On the right, four cells are shown making excitatory synaptic connections with a cell of higher order. Each of the lower-order cells has a radially symmetric receptive field with on- center and off-surround, illustrated by the left side of the diagram. The centers of these fields lie along a line. If we suppose that many more than four center-surround cells are connected with the simple cell, all with their field centers overlapped along this line, the receptive field of the simple cell will consist of a long, narrow excitatory region with inhibitory flanks. Avoiding receptive-field terminology, we can say that stimulating with a small spot anywhere in this long, narrow rectangle will strongly activate one or a few of the center-surround cells and in turn excite the simple cell, although only weakly. Stimulating with a long, narrow slit will activate all the center-surround cells, producing a strong response in the simple cell.



Responses of
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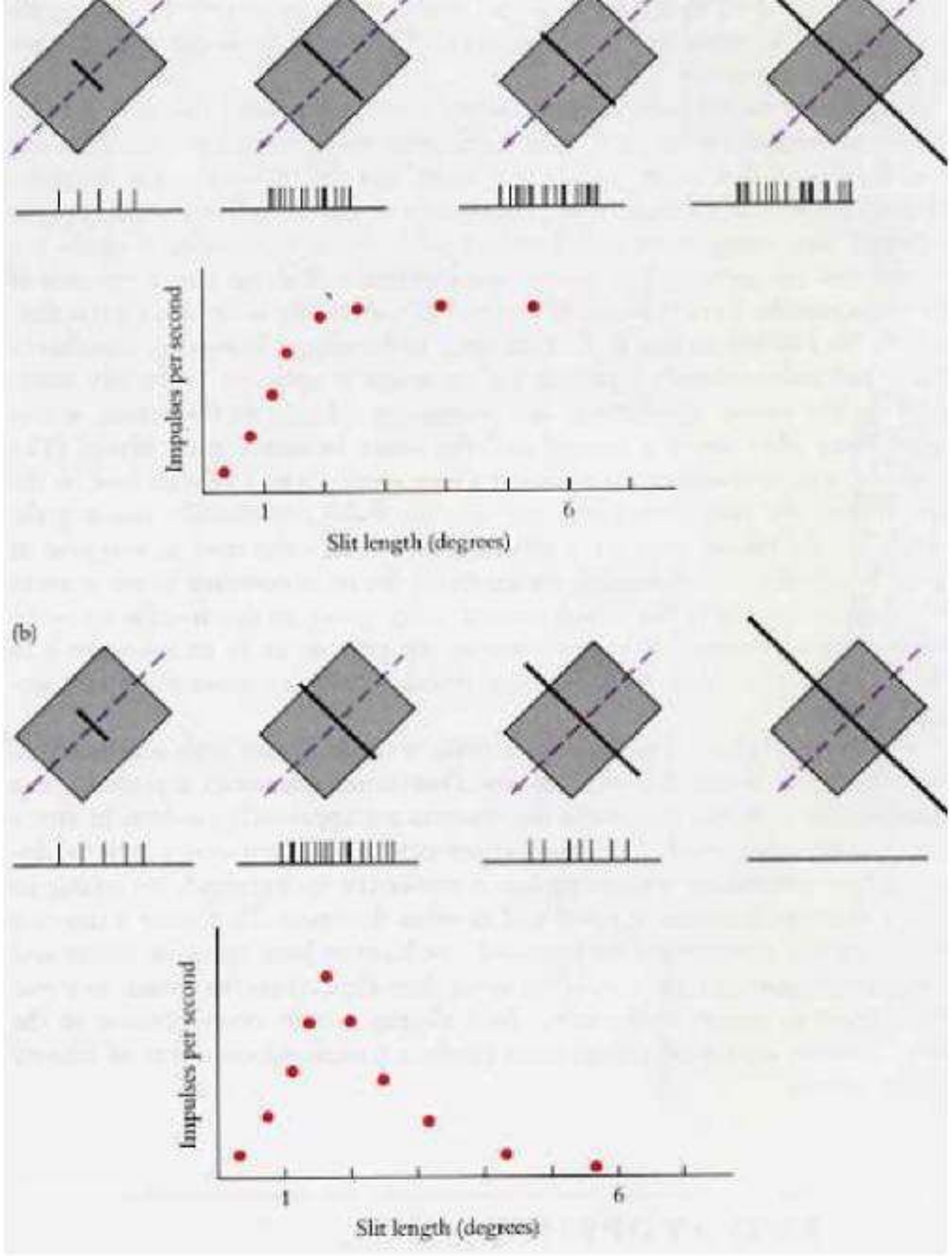
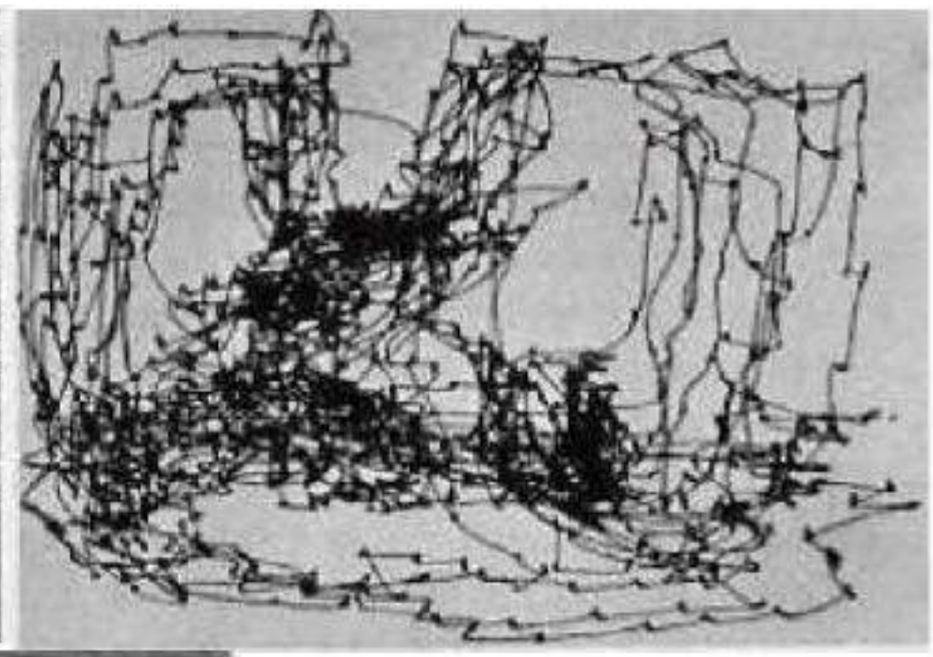
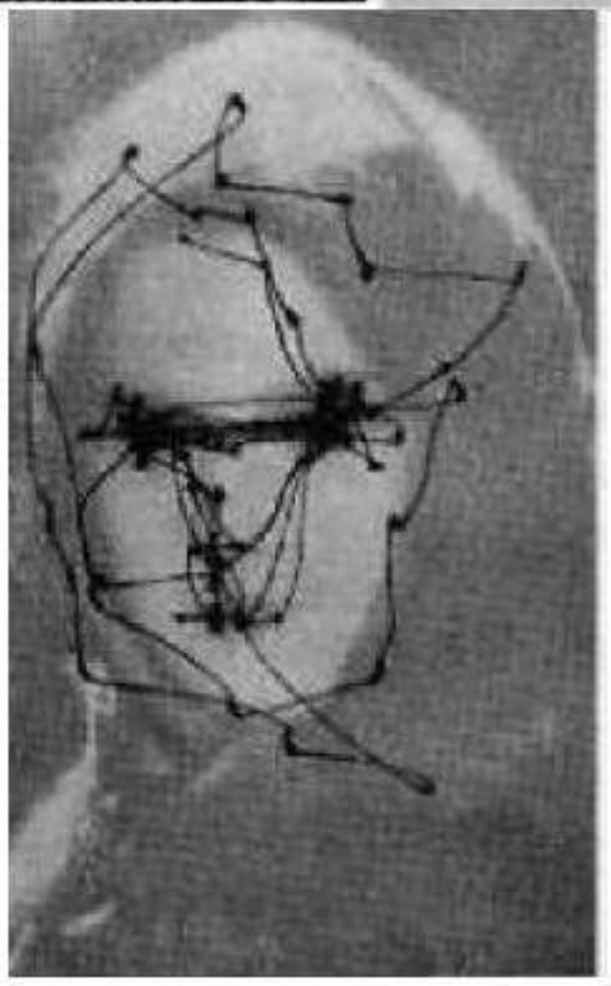
movement rig



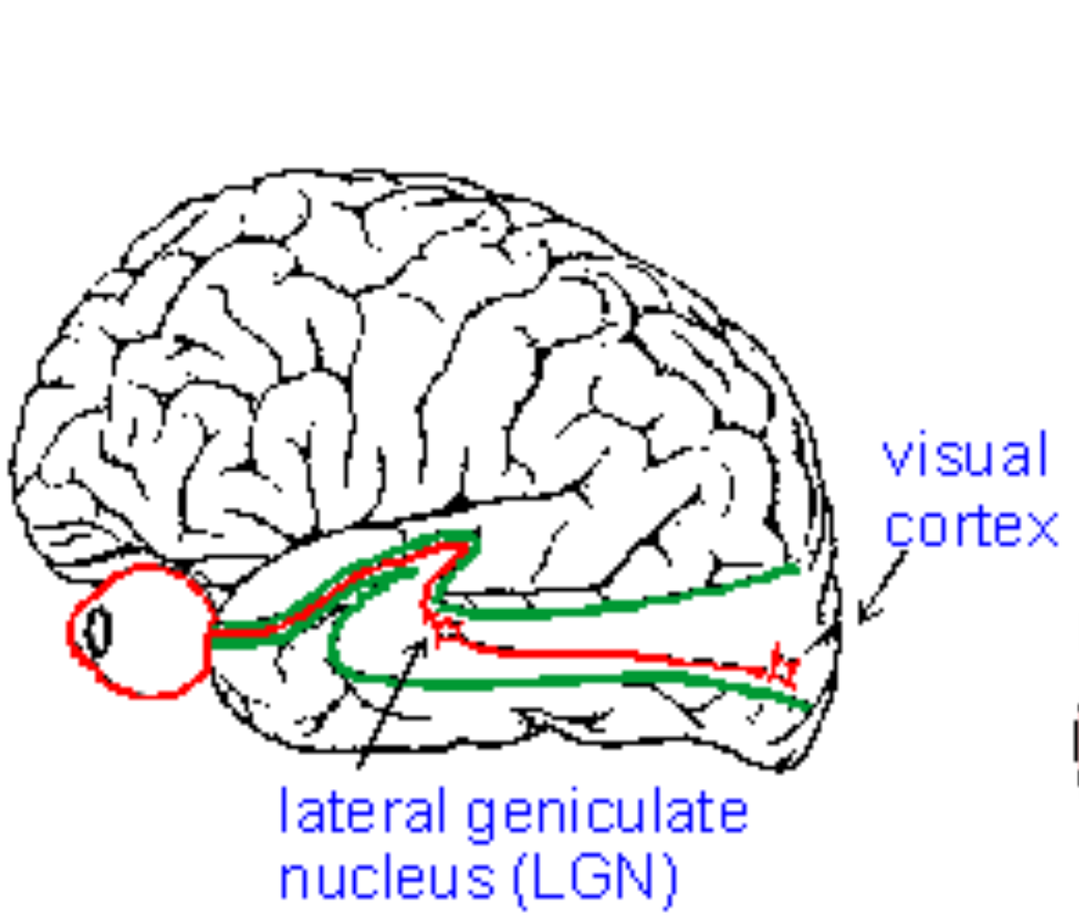
triate cortex in
lso responds to

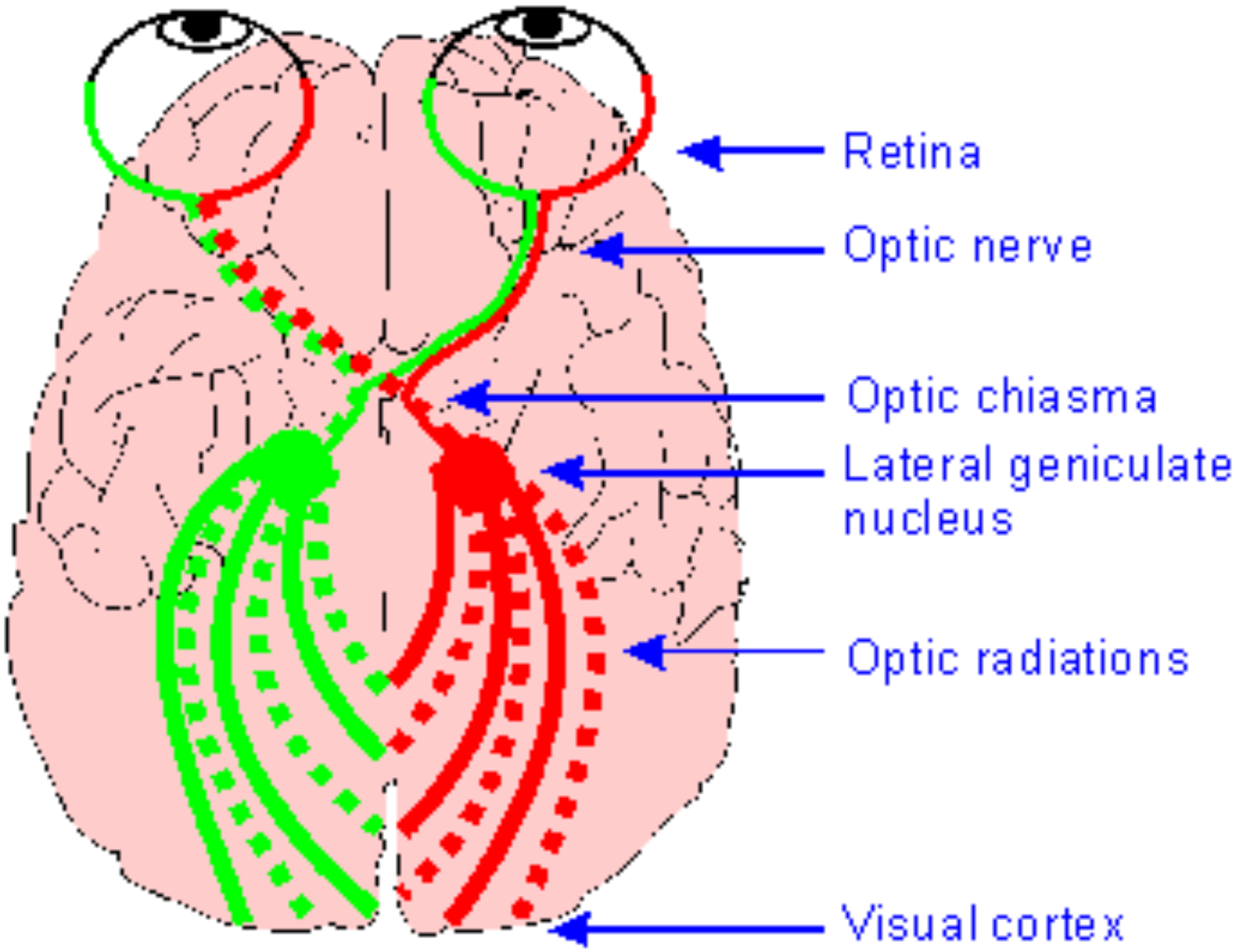
Top: An ordinary complex cell responds to various lengths of a slit of light. The duration of each record is 2 seconds. As indicated by the graph of response versus slit length, for this cell the response increases with length up to about 2 degrees, after which there is no change. *Bottom*: For this end-stopped cell, responses improve up to 2 degrees but then decline, so that a line 6 degrees or longer gives no response.





A picture is viewed by an observer while we monitor eye position and hance directinon of gaze. the eyes jump, come to rest momentarily (producing a small dot on the record), then jump to a new locus of interest. It seems difficult to jump to a void—a place lacking abrupt luminance changes.





Master Diagram

More detailed look at LGN & cortex

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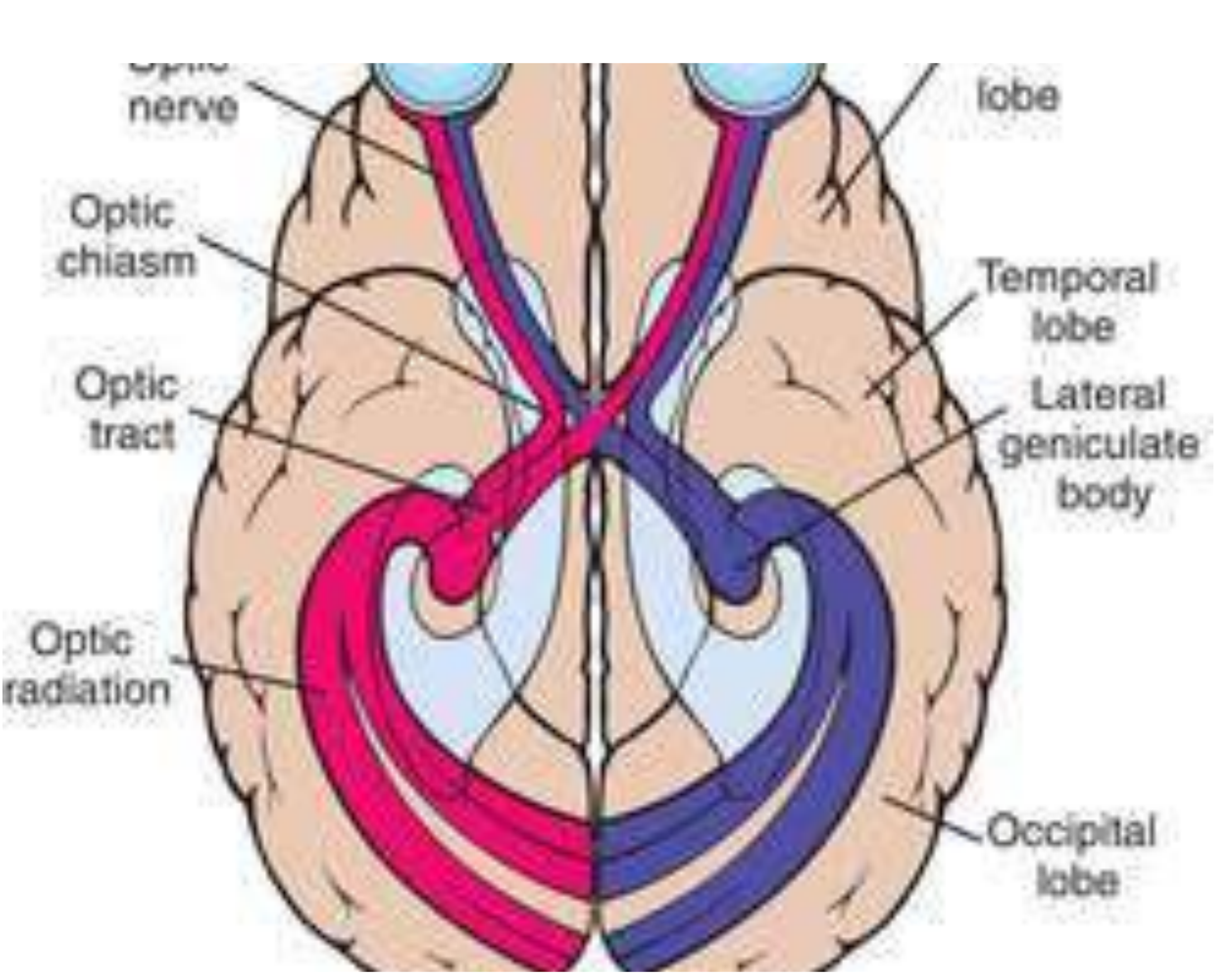
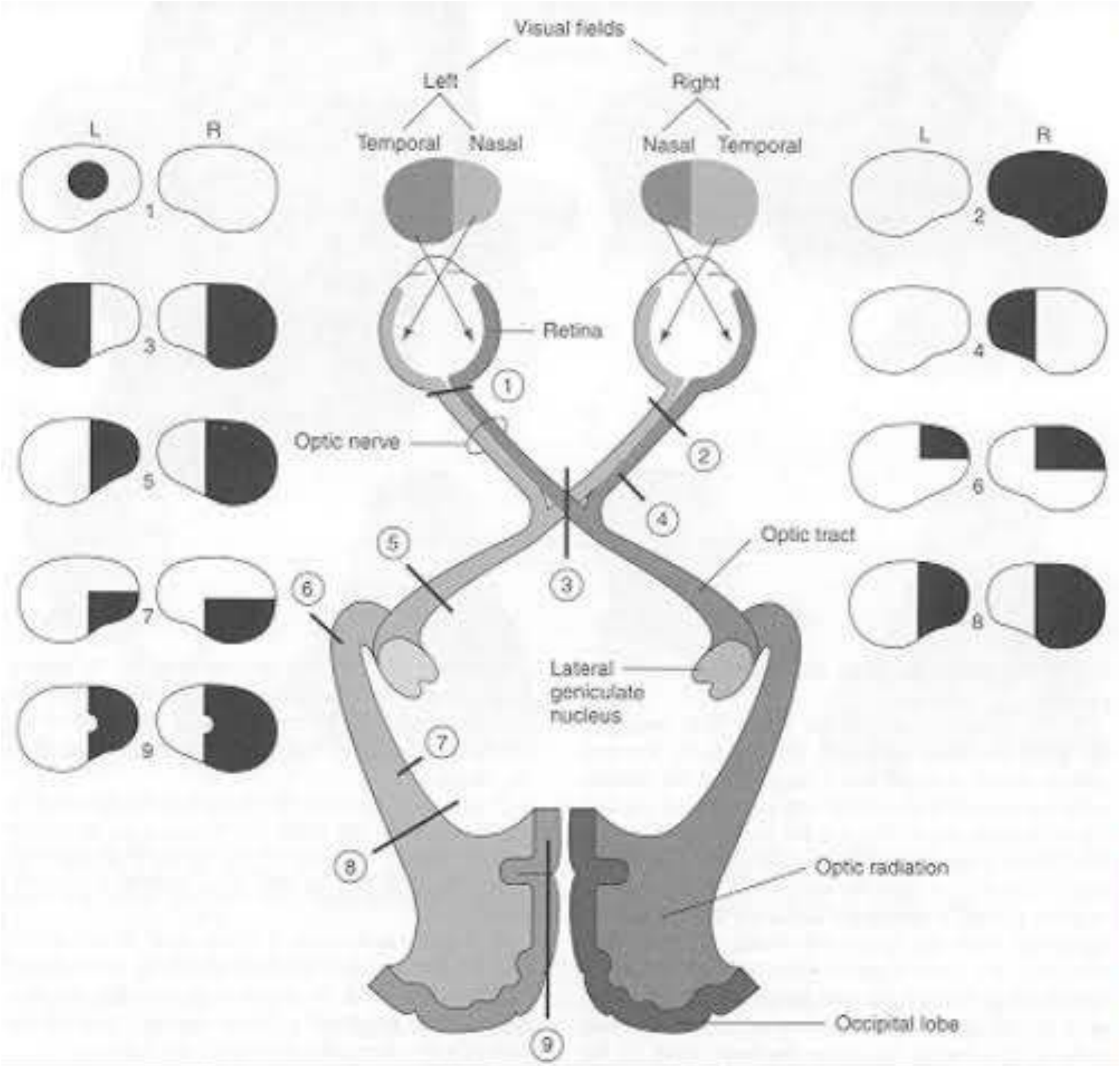
Electrophysiology


nerve
lobe
Optic
chiasm
Temporal
lobe
Optic
tract
Lateral
geniculate
body
Optic
radiation
Occipital
lobe


Visual fields
Left
Right
Temporal
Nasal
Nasal
Temporal
L
R
Retina
Optic nerve
Optic tract
Lateral geniculate nucleus
Optic radiation
Occipital lobe
1
2
3
4
5
6
7
8
9

HISTORY TAKING

- Main questions to ask:
- * Unilateral or Bilateral
- * Painless or Painful
- * Sudden or Gradual
- * Red or White Eye

History taking

- General Medical History
  - Diabetes
  - Hypertension
  - Cholesterol
  - Smoking

- Systems Review
  - CNS
  - Cardiovascular
  - Autoimmune disorders

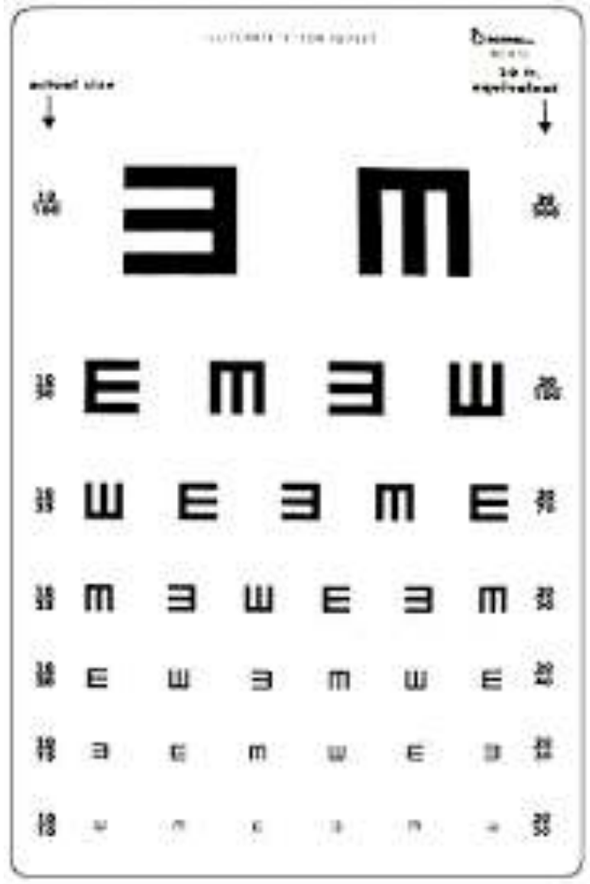
Examination

- Visual Acuity
- Fields: is loss of field vertical or altitudinal
- Relative afferent pupillary defect (RAPD)
- Brightness perception
- Color perception-Red Target
- Check for proptosis
- Look at Red Reflex

Examination

- Visual Acuity
  - Is the eye comfortable.
  - Check with glasses
  - Age and language appropriate

F
B C
P T E O
B Z F E D
O F C L T B
T E P O L F D Z
L P C T Z D B F E O



2
3
4
5

20/400 1

F P

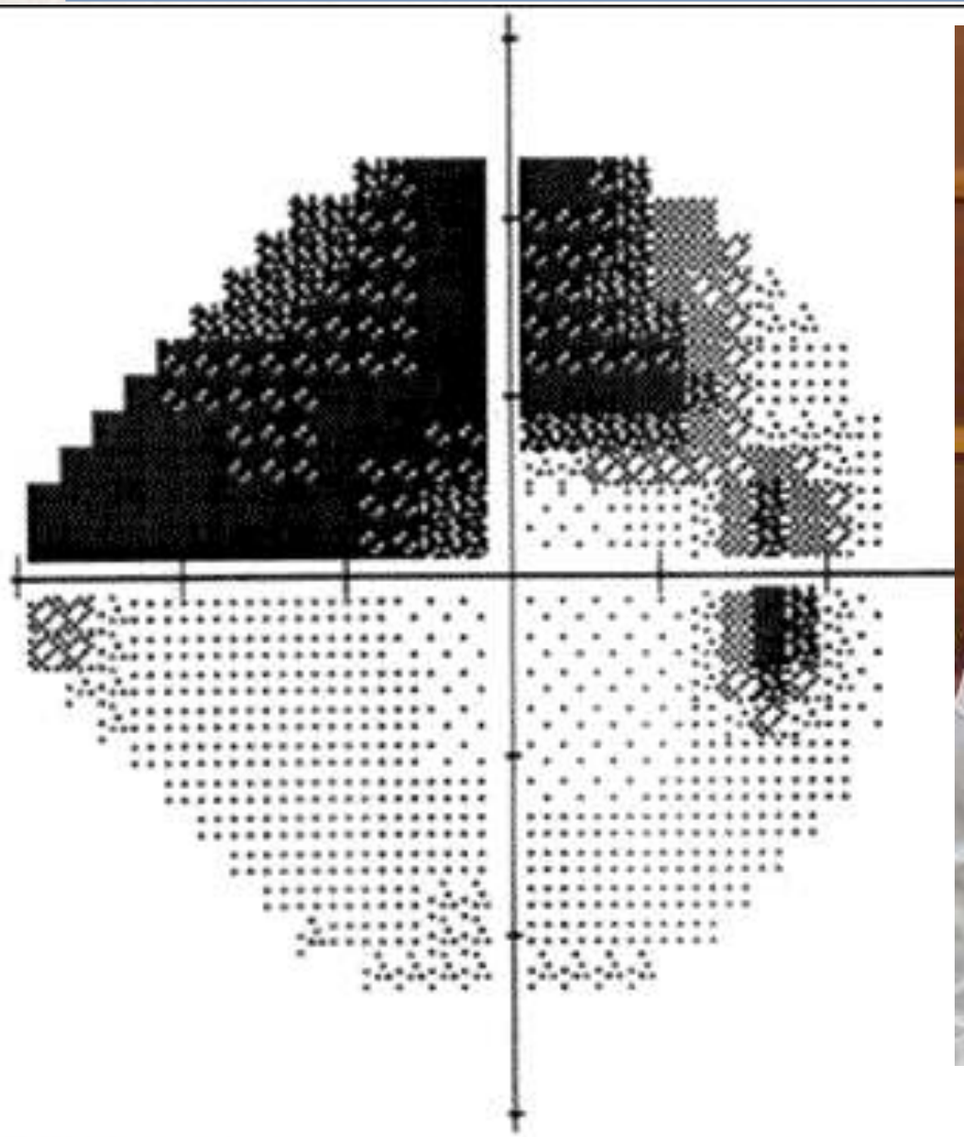
L P E D

P E C F B

Examination

- Visual Field loss
  - unilateral or bilateral
  - vertical or horizontal
  - symmetrical or asymmetrical

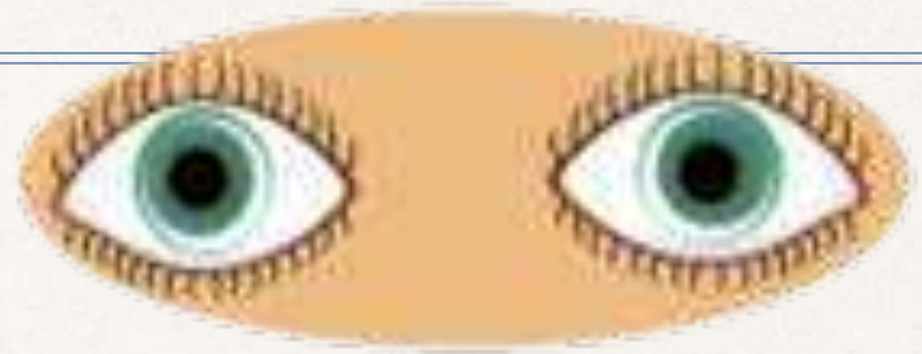
Visual Fields



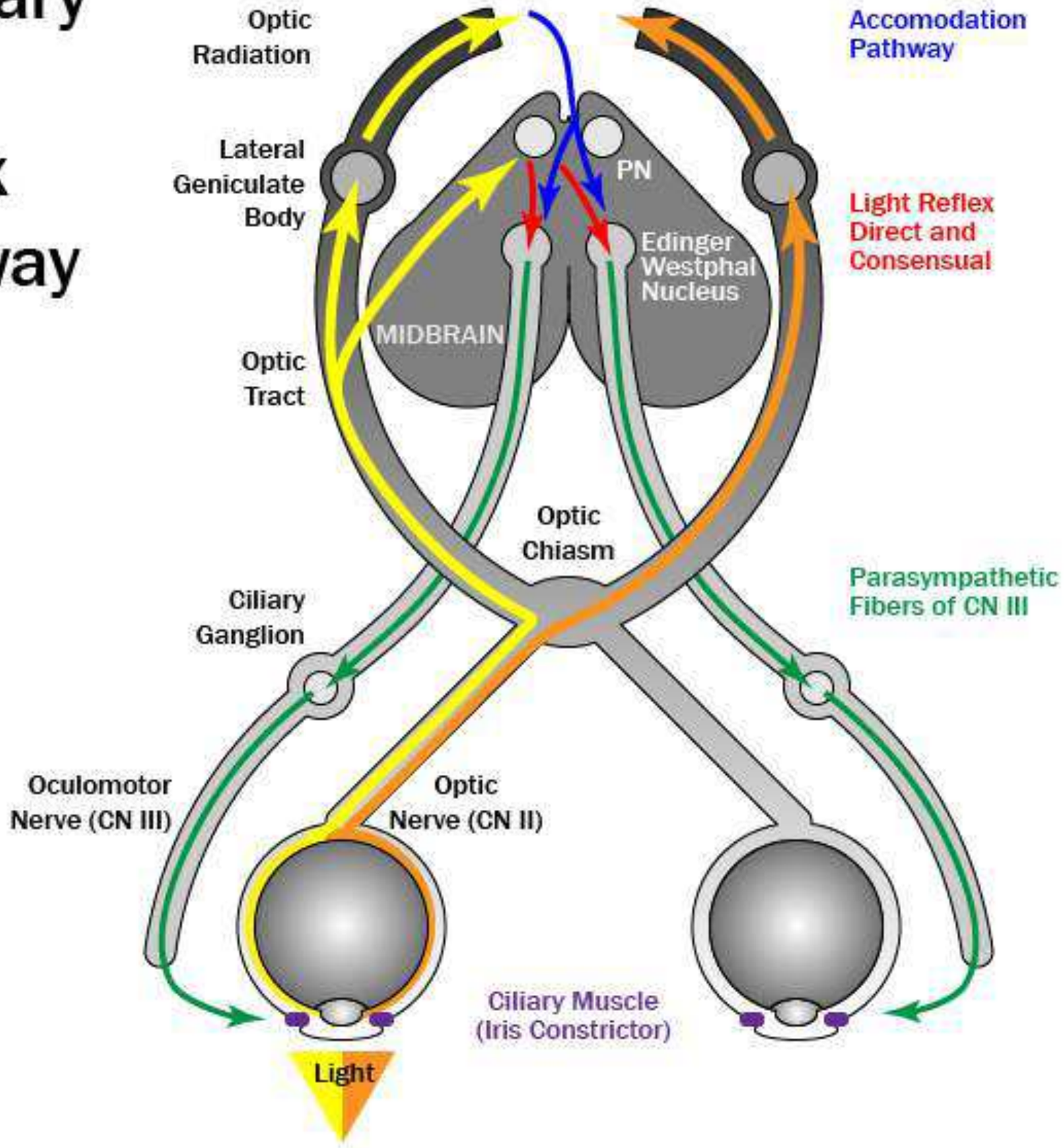
Examination

- Relative Afferent Pupillary Defect
- Brightness Perception
- Color perception- Red Target
- Accommodation Reflex

Relative Afferent Pupillary Defect



Pupillary Light Reflex Pathway



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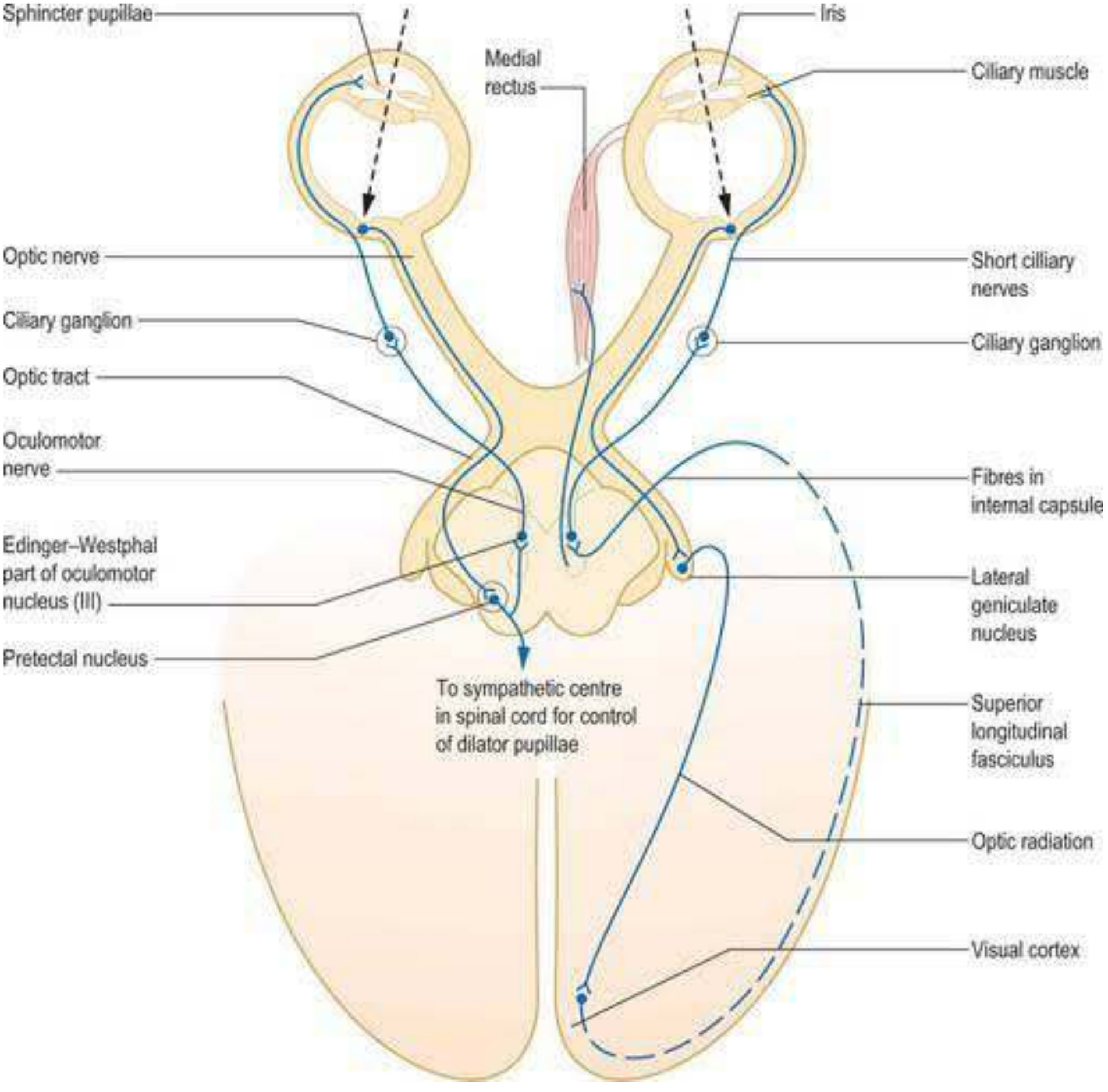
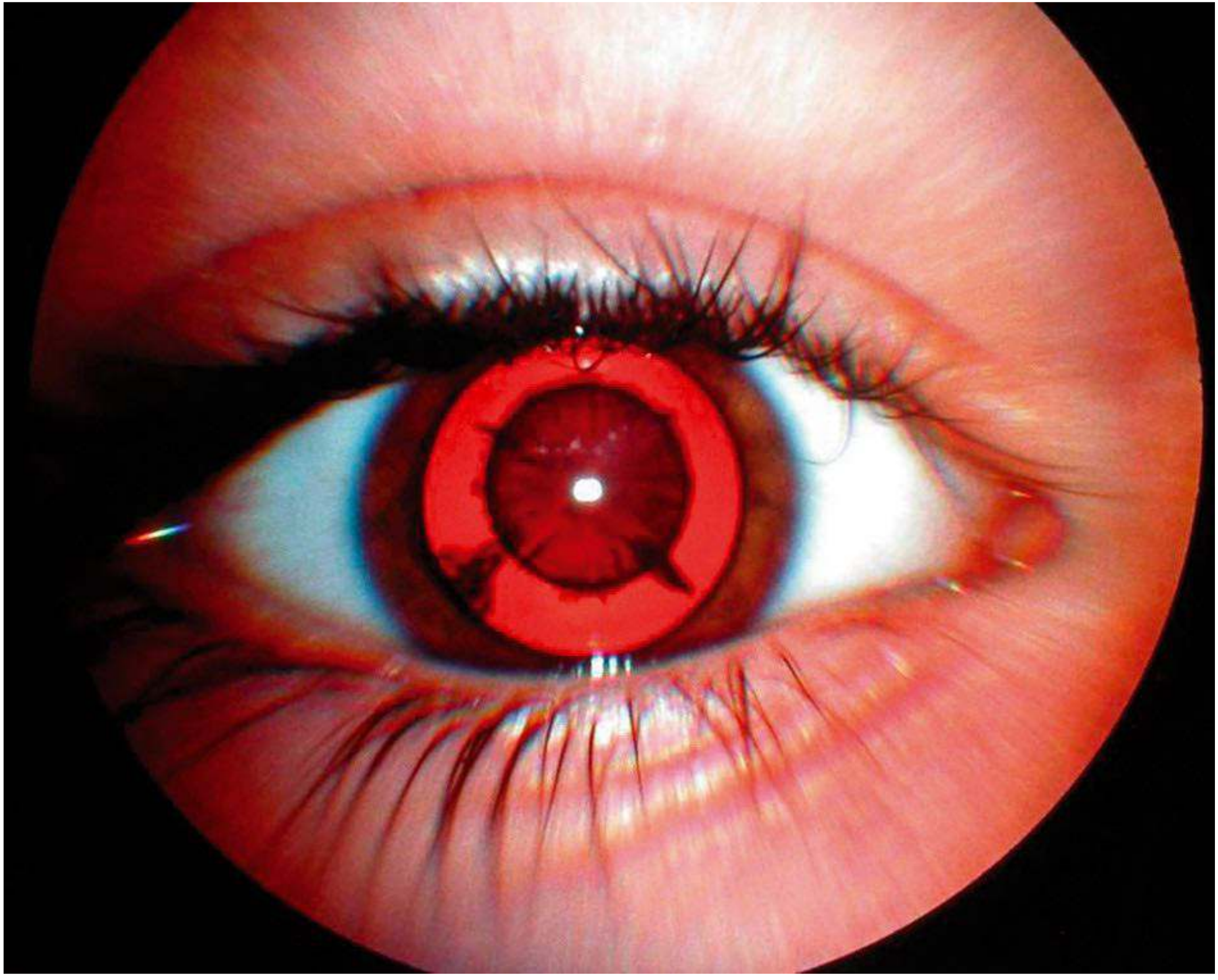

Sphincter pupillae
Iris
Medial rectus
Ciliary muscle
Optic nerve
Short ciliary nerves
Ciliary ganglion
Ciliary ganglion
Optic tract
Oculomotor nerve
Fibres in internal capsule
Edinger–Westphal part of oculomotor nucleus (III)
Lateral geniculate nucleus
Pretectal nucleus
To sympathetic centre in spinal cord for control of dilator pupillae
Superior longitudinal fasciculus
Optic radiation
Visual cortex

Examination

- Ophthalmoscope
  - Red Reflex
- Slit lamp
  - Anterior
  - Posterior



Investigations

- Blood Test

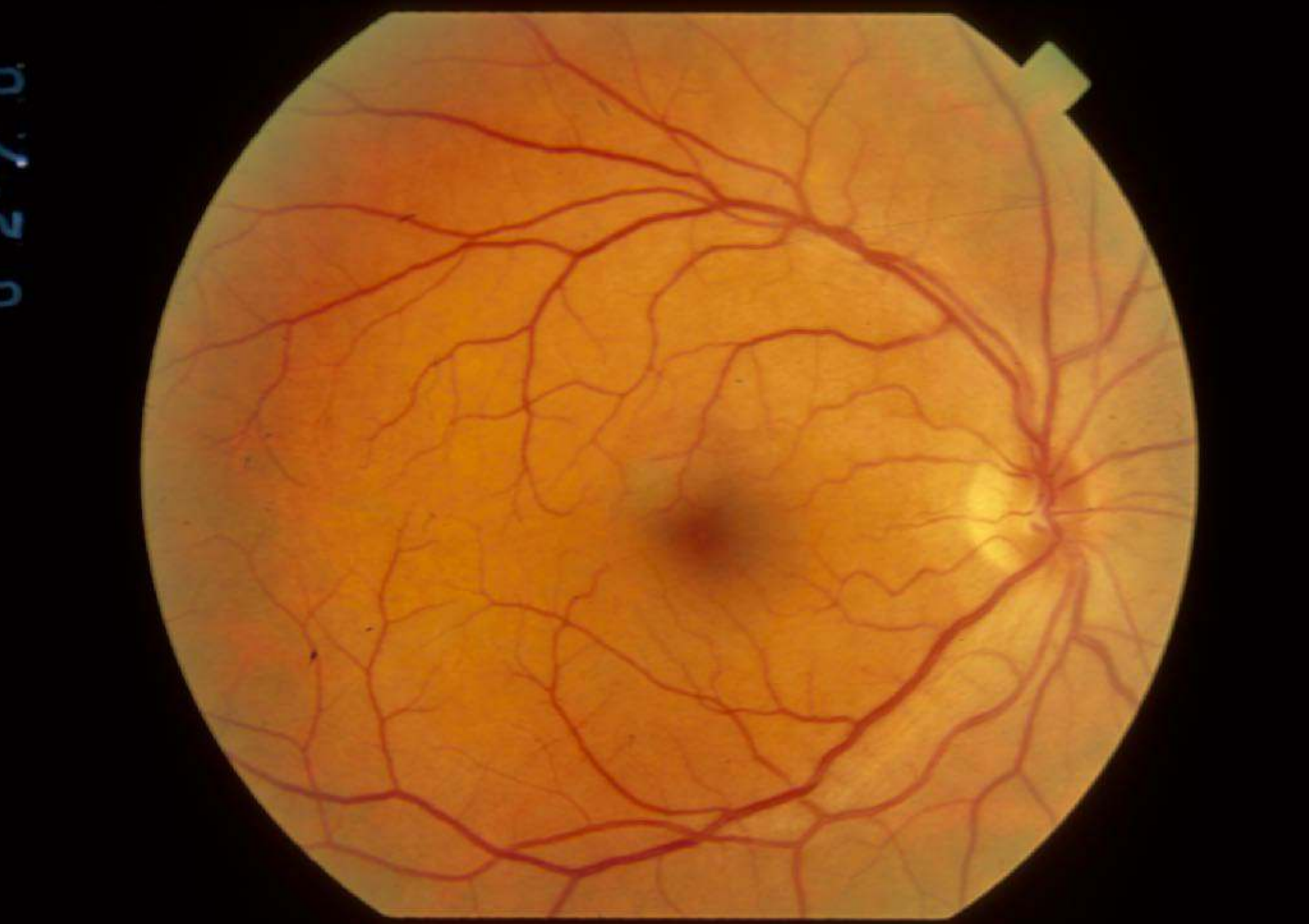
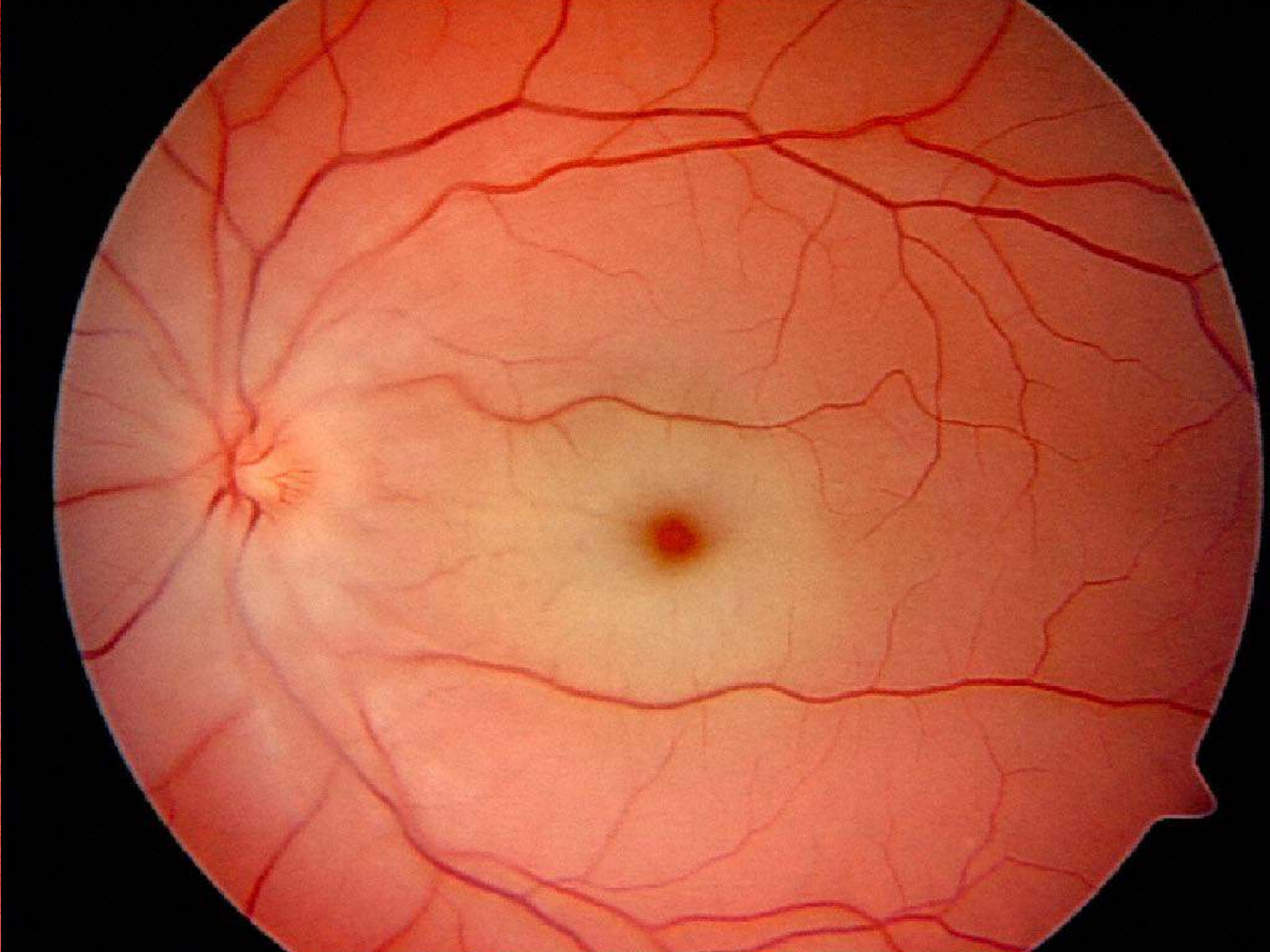
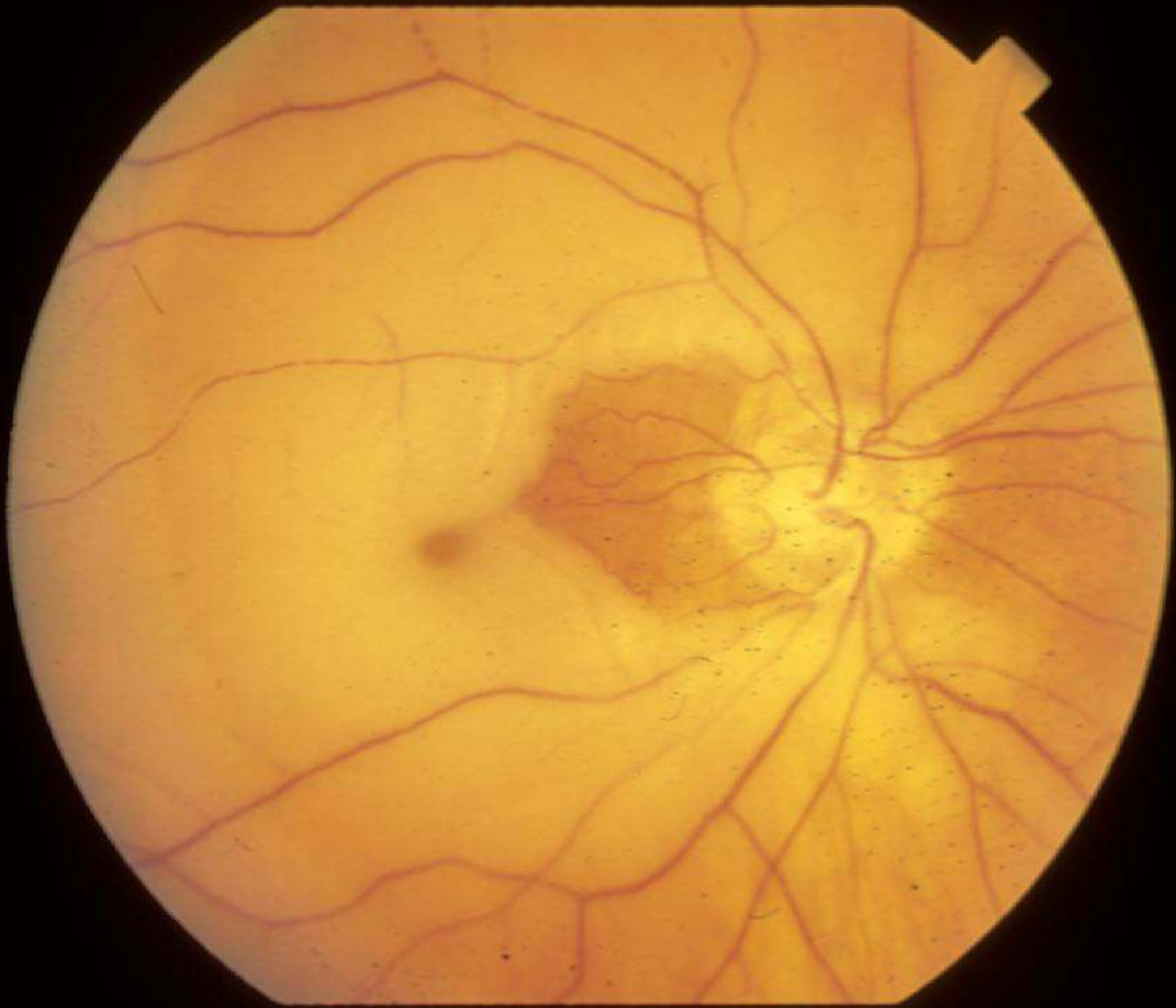
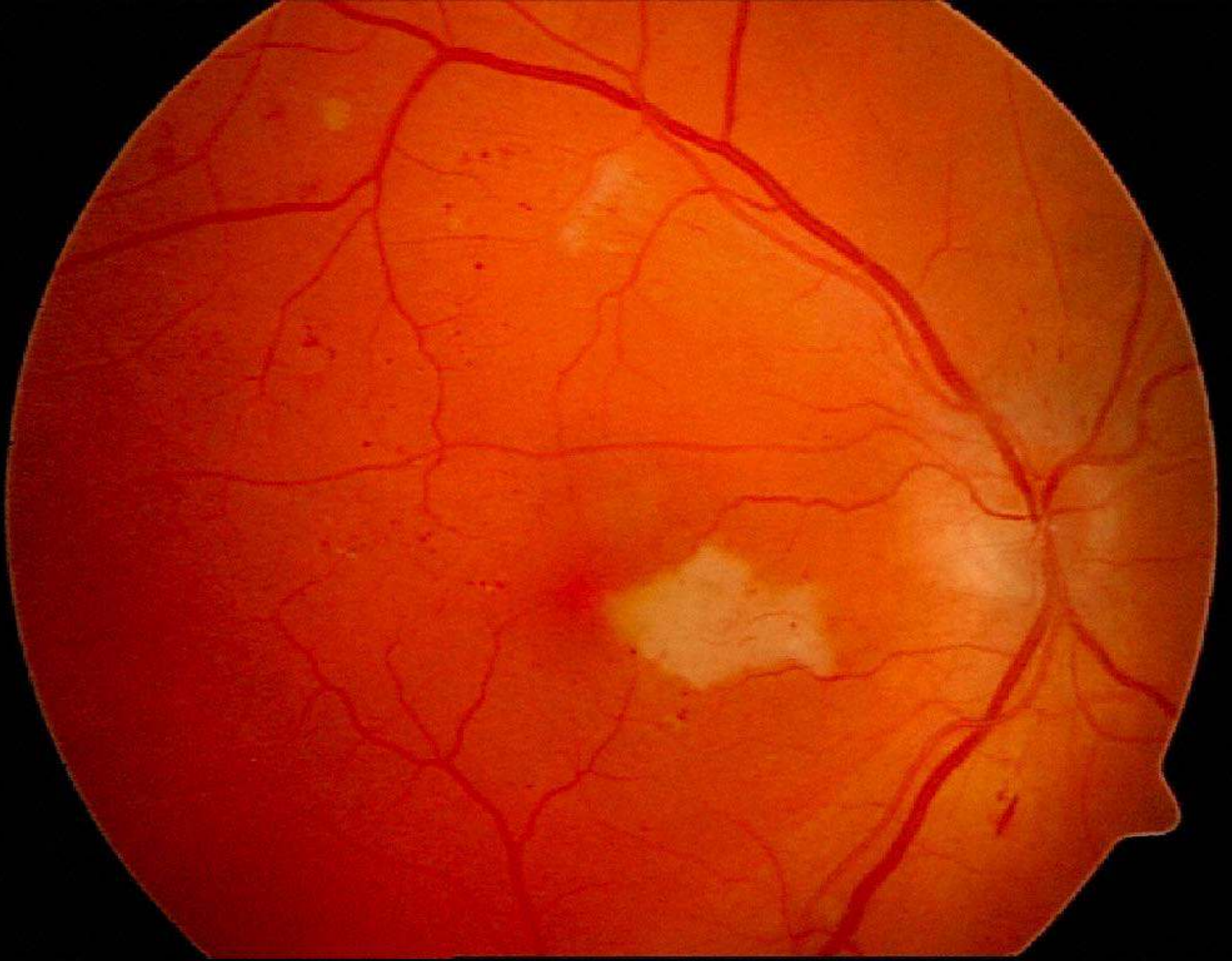
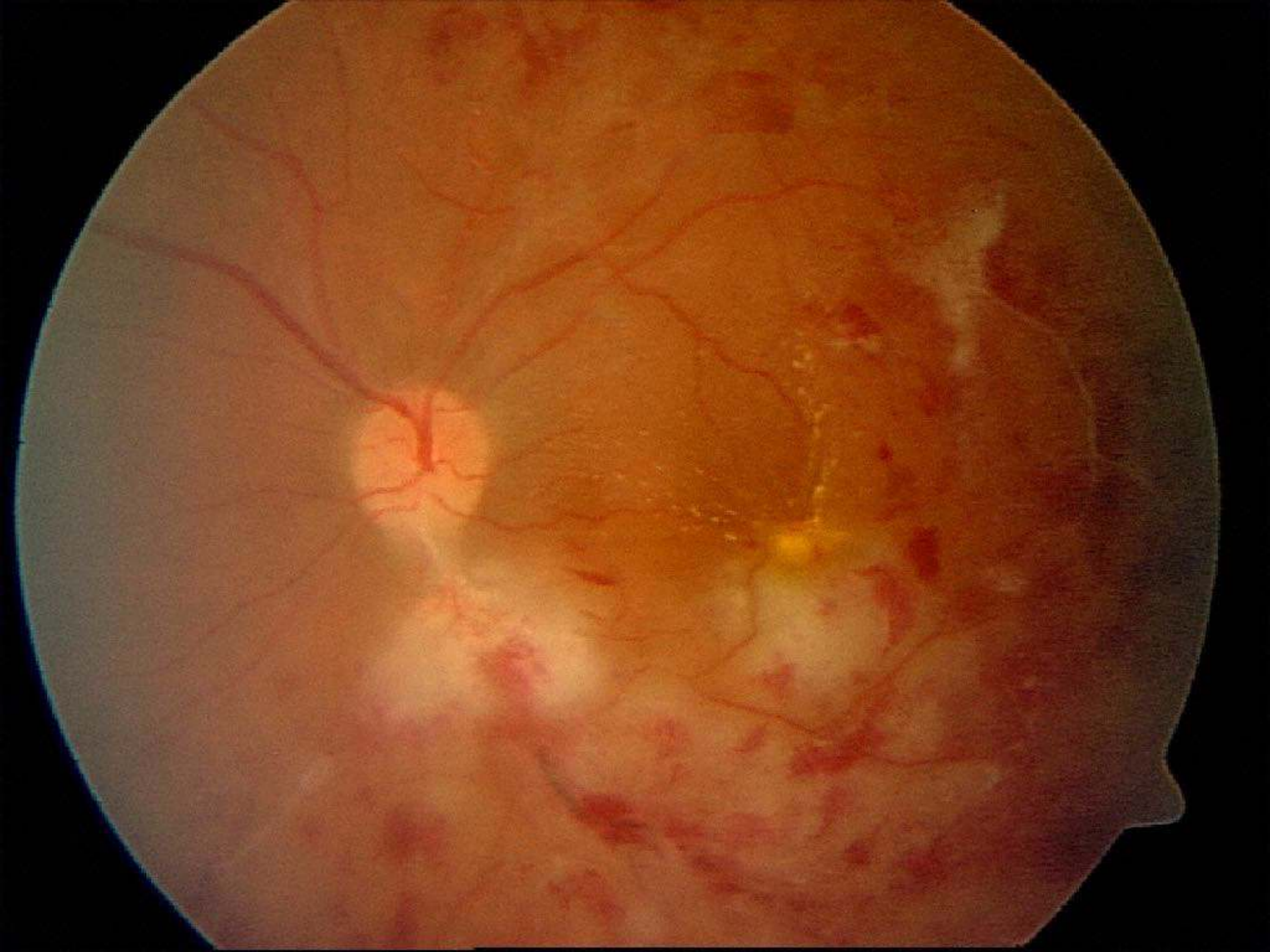
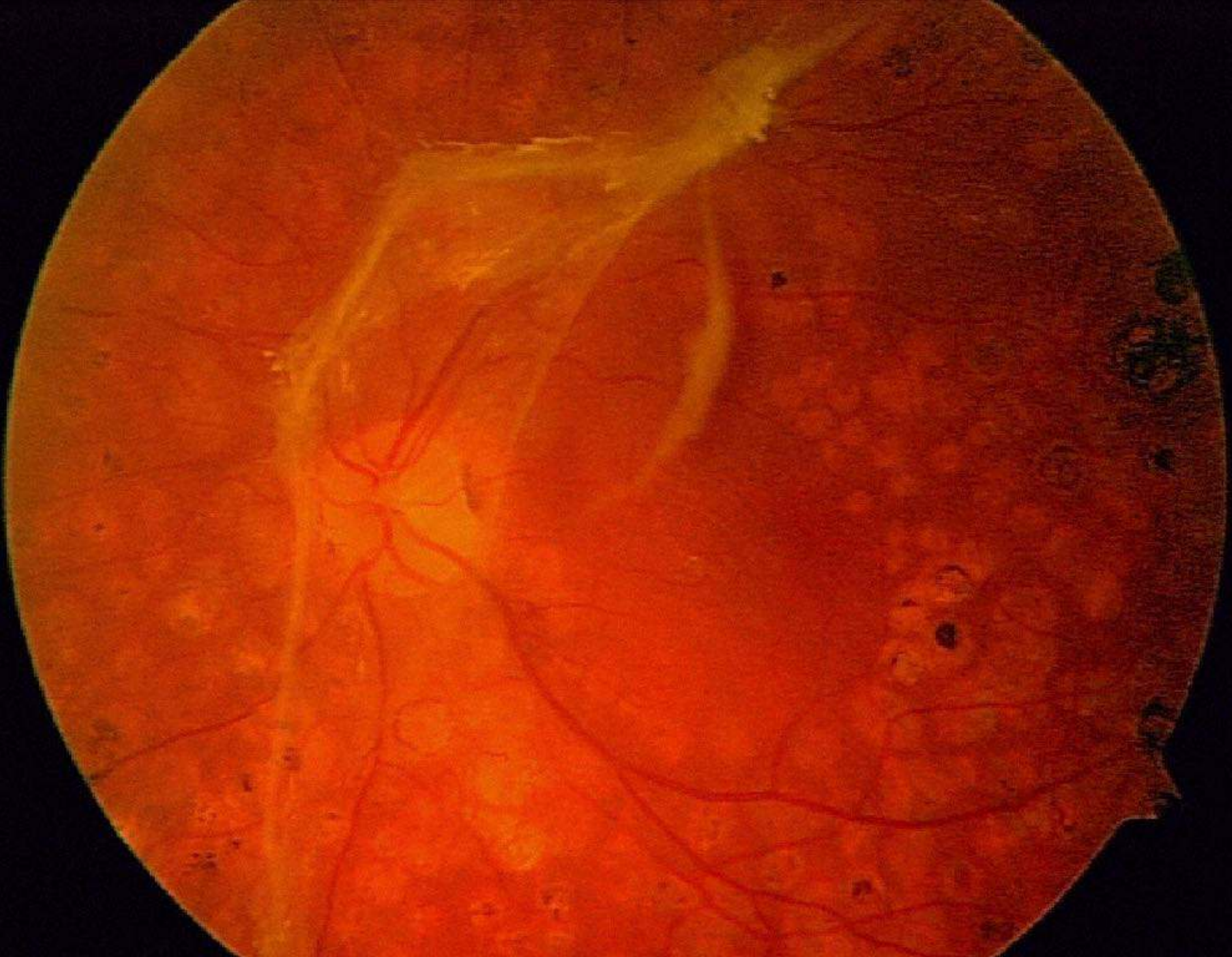
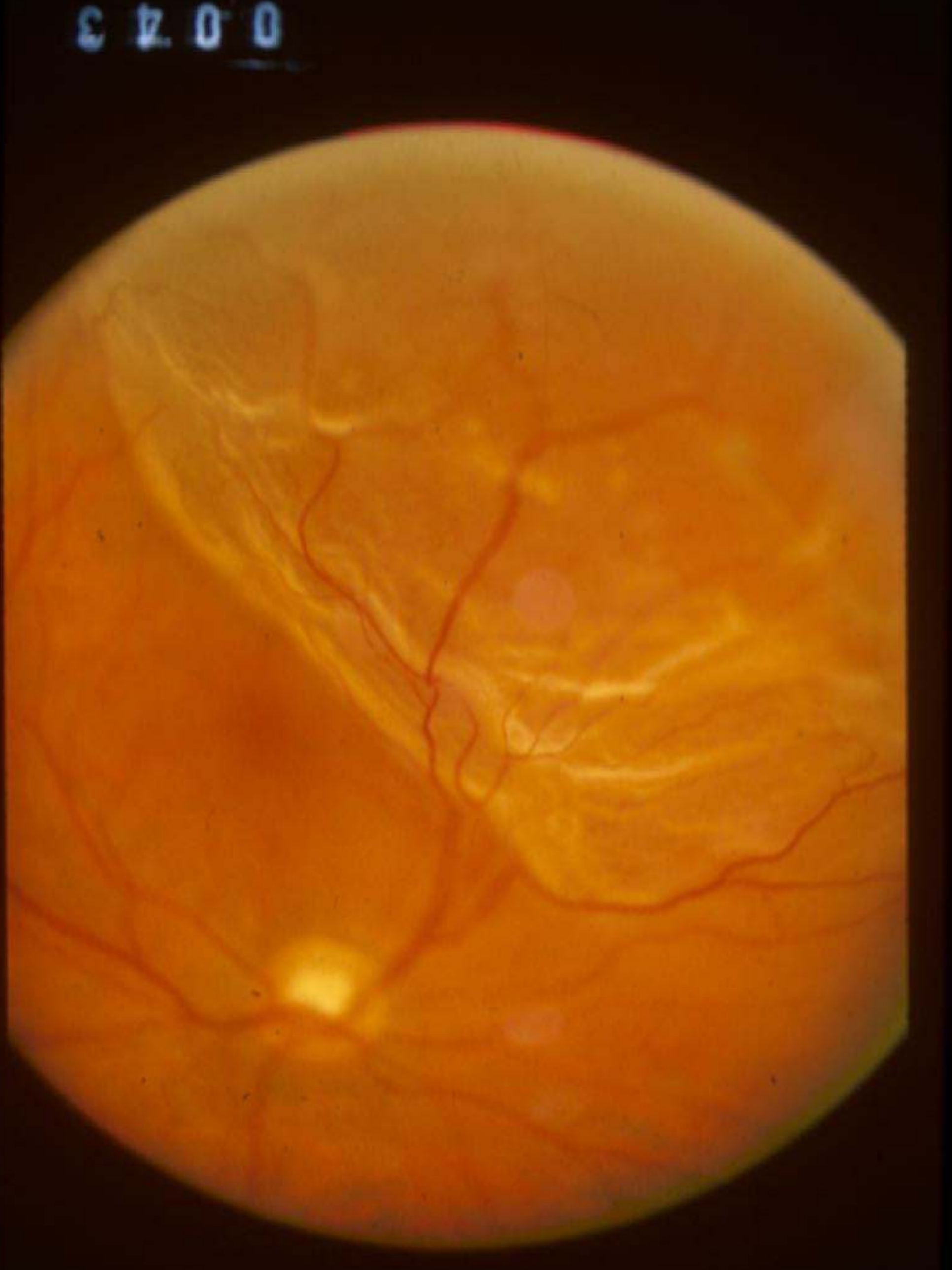
  FBE, ESR, CRP

- Imaging

  MRI, US, Echocardiogram

What are the qualities of an effective Doctor?

- Knowledge
- Dexterity
- Bedside manner
- Humility

Humility; what would it look like if;

- You have a paediatric patient and his family?
- You make a mistake or there is a surgical complication?
- You disagree with your senior colleague?
- Your junior colleague or nurse makes a mistake?
- You don’t know something and need to ask your colleagues?
- Someone asks for your help or advice?