

Basic Eye Examination



Patrick Sibony, MD

Goals

- Brief anatomy review
- Essential bedside visual examination
 - Vision, Inspection, Pupil (VIP)
- Localization in the visual afferent system
- Case examples.

Eye Examination : components

- Visual acuity
- Color
- Inspection (in order)
 - adnexae, anterior segment.
 - alignment and eye movements
- Pupils: light reflex and APD .
- Fundus
- Visual fields.
- Tonometry when indicated.

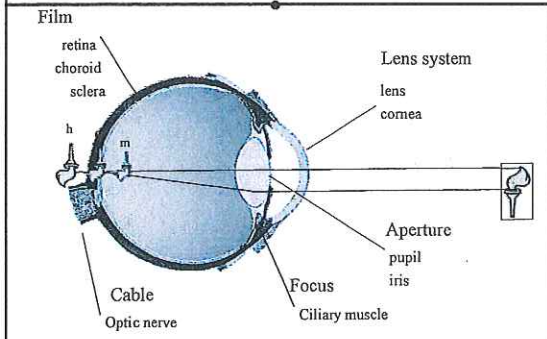
Bedside Eye Examination

- **Vision**
- **Inspection**

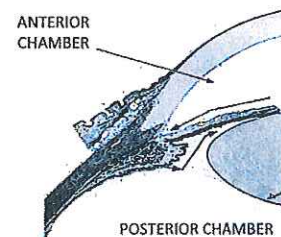
(*Adnexae, Anterior segment, Alignment*)
- **Pupillary Defect (APD)**

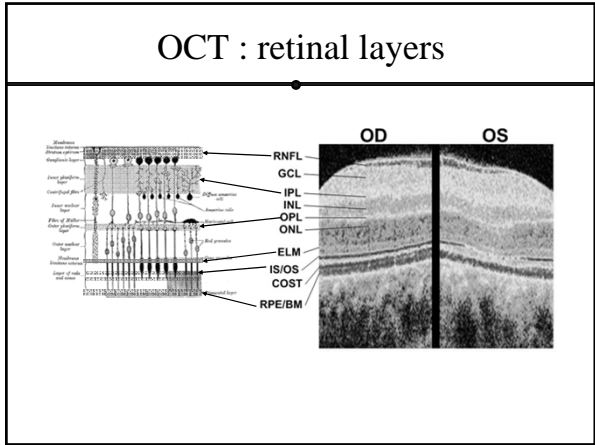
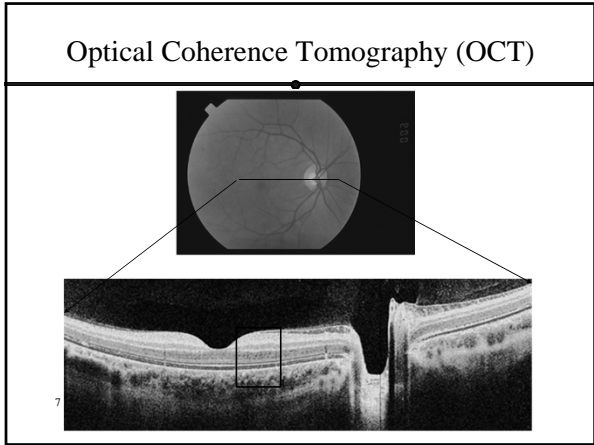


Structures



Aqueous Flow





Central vs Peripheral vision

Peripheral Vision:
Rods (95 million)
30% Ganglion cells

Low resolution
Scotopic
P:G ratio 1000:1
visual fields

Central Vision:
Cones (5 million)
70% Ganglion cells

High resolution
Photopic / color
1:1
Visual acuity, color

Extraocular muscles

Horizontal

- Medial and lateral recti

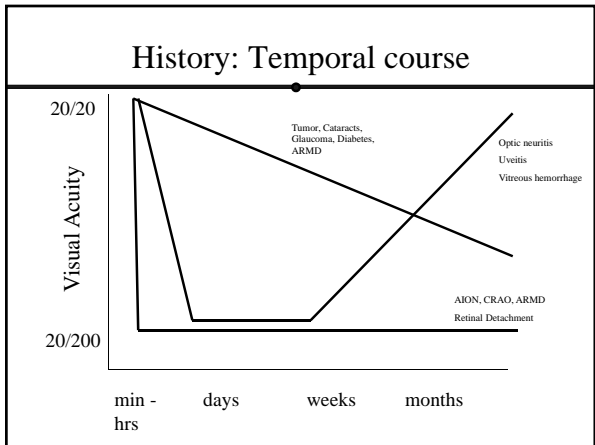
Vertical

- Superior and inferior recti
- Superior and inferior obliques

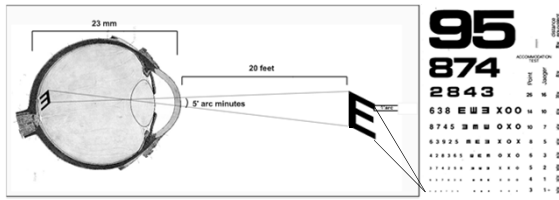
History

- How the eye feels, sees, or looks
- e.g. Pain, Blur, Redness
- Location, quality, severity, chronology, timing, duration, association, modifies
- Common symptoms:

Vision loss	photophobia
visual distortion	night blindness
eye pain	color loss
diplopia	tearing
transient vision loss	redness
irritation	floaters
photopsia	discharge



Visual Acuity



$\frac{20}{20}$ = distance to chart $\frac{10}{20} = \frac{20}{40}$
 $\frac{20}{20}$ = letter size
(5' arc at 20 feet)

Visual Acuity

- IMPORTANT
- Best corrected vision (with glasses or pinhole)
- Test at distance (20 ft) if possible
- At near, consider presbyopia (>45)
- Coax the patient !
 - Guessing is permitted and should be encouraged.

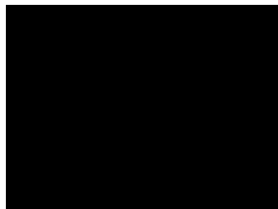
Pupil

Pupil Examination

- Light Reflex
 - Subject must fixate at distance
 - Symmetry, latency and velocity of constriction
- Near Response
 - Convergence, accommodation and miosis
- Consensual Response

Afferent Pupillary Defect

(=APD, Marcus Gunn Pupil, Swinging Flashlight Sign)

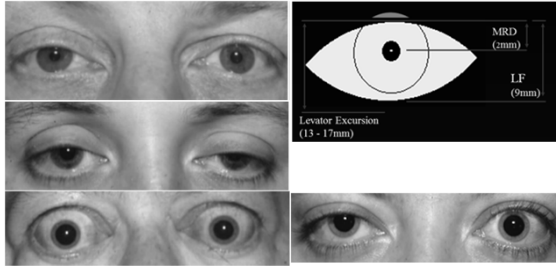


- IMPORTANT !!
- Paradoxical mydriasis to swinging flashlight
- Sign of asymmetric optic nerve or retinal dysfunction
- Reliable and objective evidence of organic disease.

Inspection

Adnexa
Anterior Segment
Alignment

Eyelid

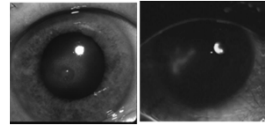


Anterior Segment

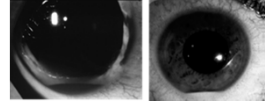
Conjunctiva



Cornea

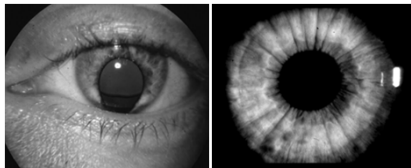


Anterior chamber

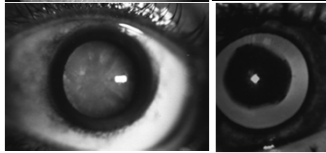


Anterior Segment

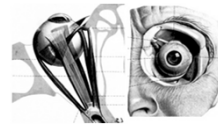
Iris



Lens

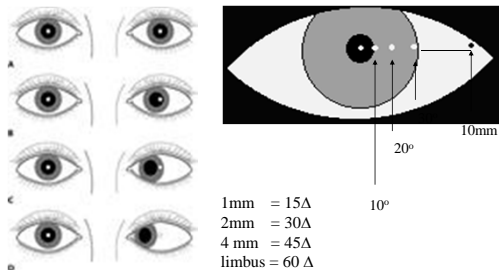


Motility

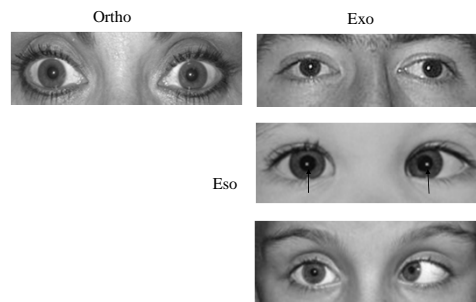


- Ductions vs Versions (gaze)
- Alignment of both eyes in primary position
- Alignment in eccentric gaze

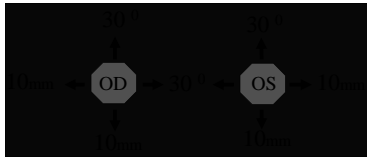
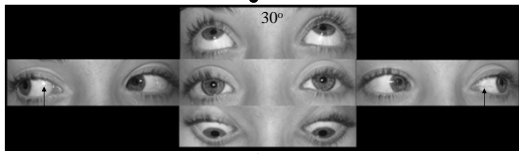
Corneal reflex can be used to assess both Alignment and Ductions



Assesment of Alignment (Hirschberg)



Assessment of Ductions and Versions



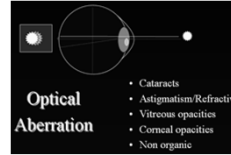
DIPLOPIA

Monocular

- Diplopia that persists with monocular occlusion

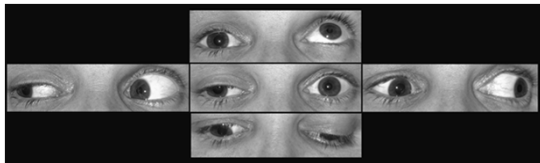
Binocular

- Diplopia is only present with binocular vision
- Resolves when either eye occluded.

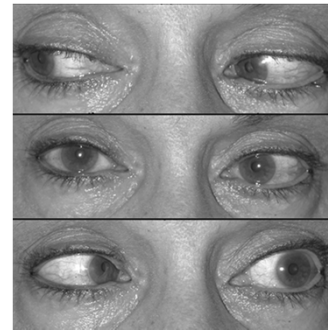


- Non paralytic strabismus
- CNS
- Cranial nerve: III, IV, VI
- Neuromuscular junction
- Extraocular muscle

Oculomotor nerve palsy

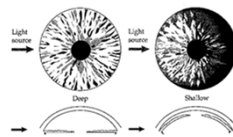


Abducens nerve palsy



Pupillary Dilation

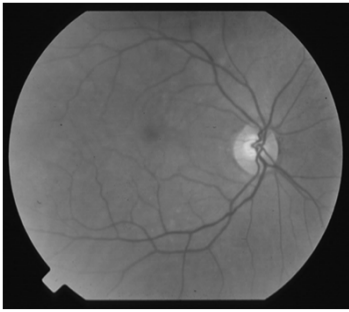
- Document best corrected acuity
- Document pupil exam
- Obtain consent from the patient
- r/o allergies
- r/o impending neurological catastrophe (herniation)
- Check for shallow chamber
- 2.5% neosynephrine



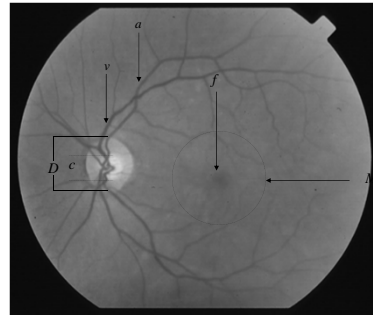
29

Fundus

Normal Fundus

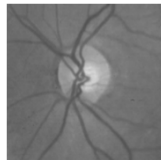
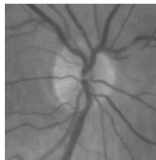


Normal Fundus



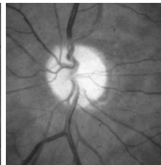
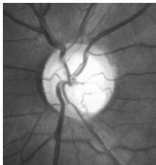
Optic disc

C/D = < .1
Normal



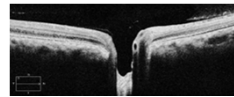
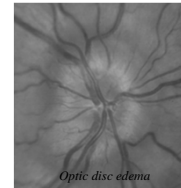
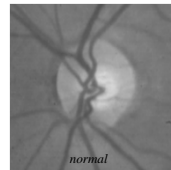
C/D = .3
Normal

C/D = .8
Glaucomatous
optic atrophy

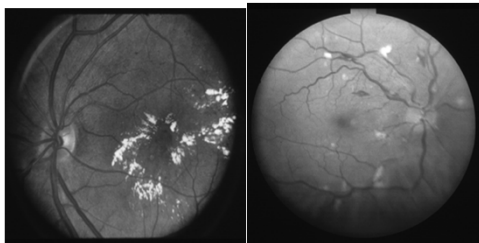


Optic
atrophy

Optic disc edema v papilledema



Hard and Soft Exudates



Basic Eye Examination: Part B



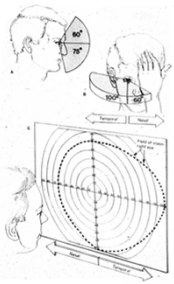
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Updated October 17, 2011, Mar 15, 2013

Eye Examination : components

- **V**isual acuity
- Color
- **I**nspection (in order)
 - adnexae, anterior segment.
 - **a**lignment and eye movements
- **P**upils: light reflex and **APD** .
- Fundus
- Visual fields.
- Tonometry when indicated.

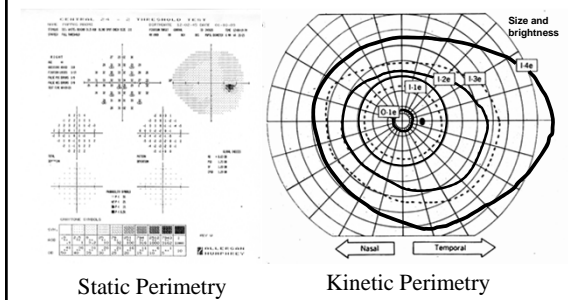
Visual Fields

Visual Field Basics

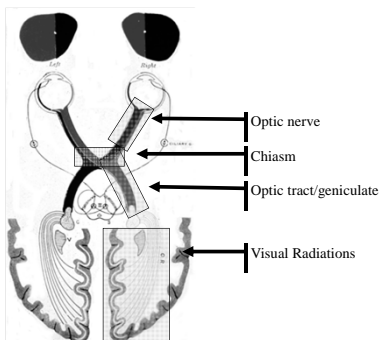


- Monocular testing
- Monitored fixation on central target.
- Subjective response to stimulus that varies in size, brightness and location
- Static Perimetry
- Kinetic Perimetry
- Confrontation visual fields

Visual Field Techniques



Localization of the Visual Field

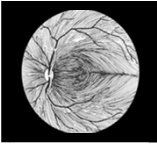


Visual Field Conventions

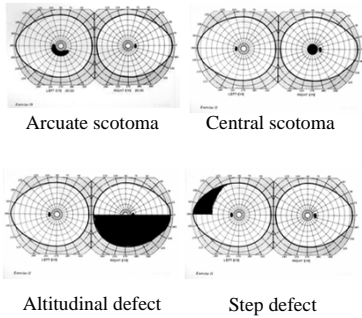
- **V**isual Fields test central and peripheral vision
- **A**natomic vs **V**isual Field (as the patient sees)
- **U**pper VF projects onto **inferior hemiretina**;
lower VF projects onto **upper hemiretina**
- **N**asal VF projects onto **temporal hemiretina**;
Temporal VF projects onto **nasal hemiretina**

Prechiasmal NFBL* Visual Field Defects

- Monocular
- Horizontal
- Papillomacular
- (abnl VA, Color)
- (abnl APD)
- (± disc)



* Nerve fiber bundle layers

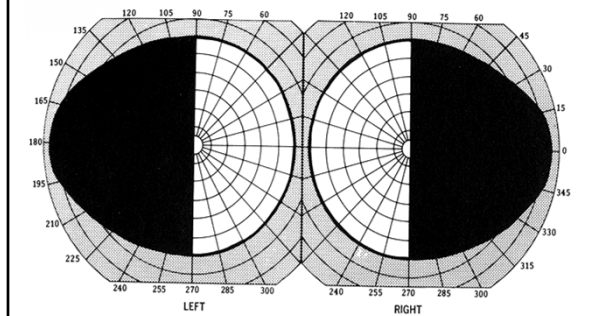


Chiasmal Visual Fields



- **Binocular**
- **Assymmetric**
- **Respects the vertical**
- **Bitemporal defect**

Bitemporal Hemianopsia

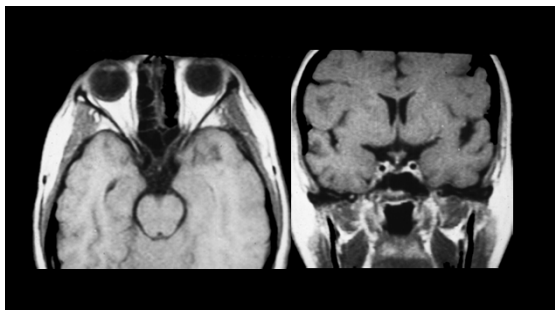


Chiasmal Visual Fields

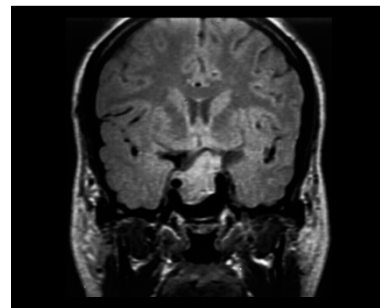
80 % of chiasmal optic neuropathies are due to tumors

- **Pituitary adenoma**
- **Meningioma**
- **Craniopharyngioma**
- Glioma, aneurysms, inflammatory

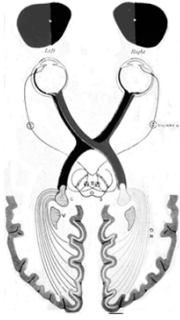
Chiasmal Visual Fields



Chiasmal Visual Fields

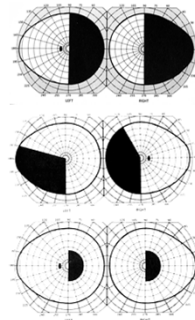


Retrochiasmal Visual Fields



- **Binocular**
- **Homonymous**
- **Respect for vertical meridian**
- **Optic tract; temporal, parietal or occipital lobes.**

Homonymous Hemianopsias

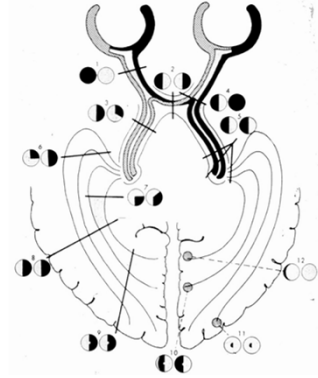
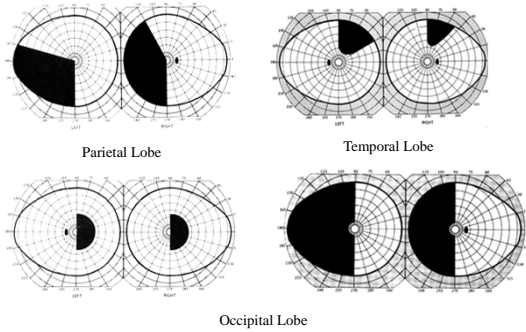


Complete

Incongruent

Congruent

Localization along the Visual Radiations



	Prechiasmal	Chiasmal	Optic Tract	Visual Radiations
Visual Acuity	Decreased			Normal
Color vision	Abnormal			Normal
Pupils	Afferent Pupillary Defect (APD)			Normal
Fundus	Normal, Disc edema or Optic atrophy	Normal or Optic atrophy		Normal
Visual Fields	Monocular NFB	Bitemporal hemianopsia	Homonymous hemianopsia	
Common Causes	Optic Neuritis AION	Pituitary Adenoma Craniopharyngioma Meningioma	Tumor Stroke	Stroke Tumor

CASES

Case EB.27yoWF

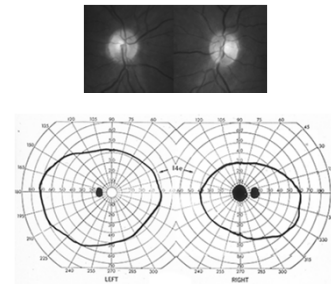
History

- Woke up with a “smudge” in her vision OD
 - Over the last 3 days, smudge has become more opaque; located dead center.
 - Colors seem washed out, vision seems darker in that eye
 - Painful , especially when she moves her eyes.
- PMH:
 - none
 - last year : numbness and paresthesias, right thigh 3 weeks and then resolved. Evaluation by PMD was unrevealing.
 - Meds: none
 - Allergies: none

Case EB.27yoWF

- Examination.
 - Visual acuity: 20/60 OD; 20/20+ OS
 - Color: 2/8 OD, 8/8 OS
 - Pupils: APD OD
 - Anterior segment : normal
 - Eye movements: normal
 - Fundus: photo
 - Visual fields: photo.

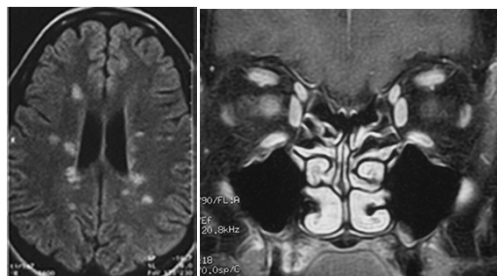
Case EB.27yoWF



Case EB.27yoWF

- Where is the lesion ?
 - Acuity, APD, color, the absence of any retinal disturbance and the VF defect
- What is the lesion ?
 - Consider age, mode of onset, associated symptoms and medical problems,
- Diagnosis ?

MRI



Case JK.32yoWF

History

- 6 m history of progressive decline in vision OD>OS.
- Headaches
- Recent onset of lactation (galactorrhea)

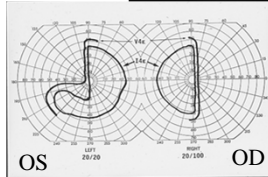
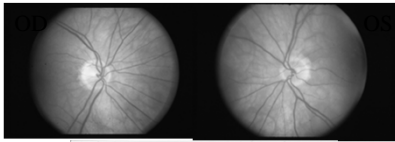
- PMH:
 - none
 - Amenorrhea x 1yr
- ROS: negative
- Meds: none
- Allergies: none

Case JK.32yoWF

• Examination.

- Visual acuity: 20/100 OD; 20/40 OS
- Color: 4/8 OD, 6/8 OS
- Pupils: Light reflex normal; APD OD
- Anterior segment : normal
- Eye movements: normal
- Fundus: photo
- Visual fields: photo.

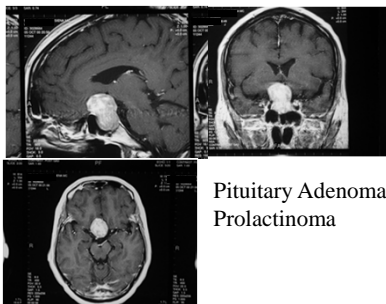
Case JK.32yoWF



Case JK.32yoWF

- Where is the lesion ?
 - Acuity, APD, color, binocularity , the absence of any retinal disturbance and the VF defect
- What is the lesion ?
 - Consider age, mode of onset and progression, associated symptoms and medical problems,
- Diagnosis ?

Case JK.32yoWF

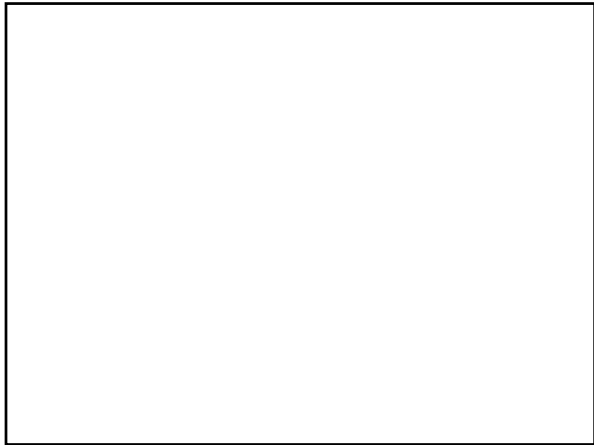


Pituitary Adenoma:
Prolactinoma

Summary Slide

- **Vision**
- **Inspection**
 - (*Adnexae, Anterior segment, Alignment*)
- **Pupillary Defect (APD)**
- [Extra: Versions, Fundus, VF]





More Pupil

- ## Anisocoria
- Physiologic anisocoria
 - 20 – 40% of normals, < 2mm assymetry
 - Both pupils react normally, no ptosis or diplopia
 - Efferent lesion:
 - Parasympathetic (constrictor):
 - worse in light
 - Sympathetic (dilator):
 - worse in dark
 - Afferent lesions do not cause anisocoria

