

Neuro-Ophthalmic Grand Rounds

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**On behalf of Vision Expo, we sincerely
thank you for being with us this year.**

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Neuro-Ophthalmic Grand Rounds

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Disclosure Statement:

Dr. Carlo J. Pelino - Nothing to disclose

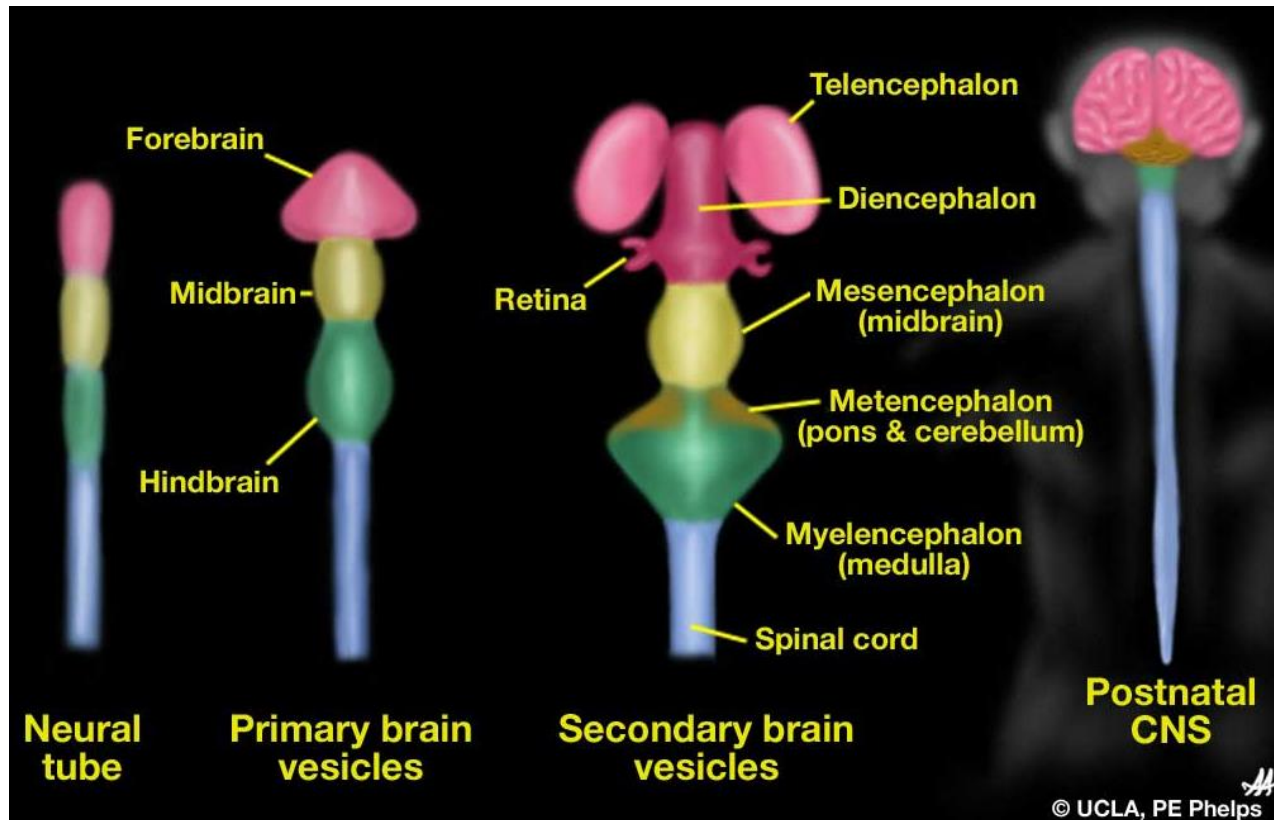
Neuro-ophthalmic Grand Rounds

Emergencies vs. Urgencies

Some of these are neuro related

- Differentiate “Emergency” vs. “Urgency”
- Proper Triage necessary (Front desk, Doctor away, After hours)
- Understand the “ 10 A Club ”
 - Papillaedema
 - Giant Cell Arteritis
 - Aneurysm
 - Pituitary Apoplexy
 - Carotid Artery Dissection
 - Central Retinal Artery Occlusion
 - Perforated Globe
 - Acute Angle Closure Glaucoma
 - Acid / Alkaline Chemical Burn
 - Hyphema

The 5 vesicle brain – at five weeks gestation



Telencephalon – cerebral hemispheres

Diencephalon – thalamus, epithalamus, subthalamus, hypothalamus

Mesencephalon – midbrain

Metencephalon – pons and cerebellum

Myelencephalon = medulla oblongata

The visual pathway

Retina has 10 layers:

- Optic nerve- intraocular, intraorbital, intracranial
- Optic Chiasm – nasal fibers cross, temporal fibers do not
- Optic tract - contains retinal fibers from both eyes
- Optic Radiations - travel through the temporal, parietal and occipital

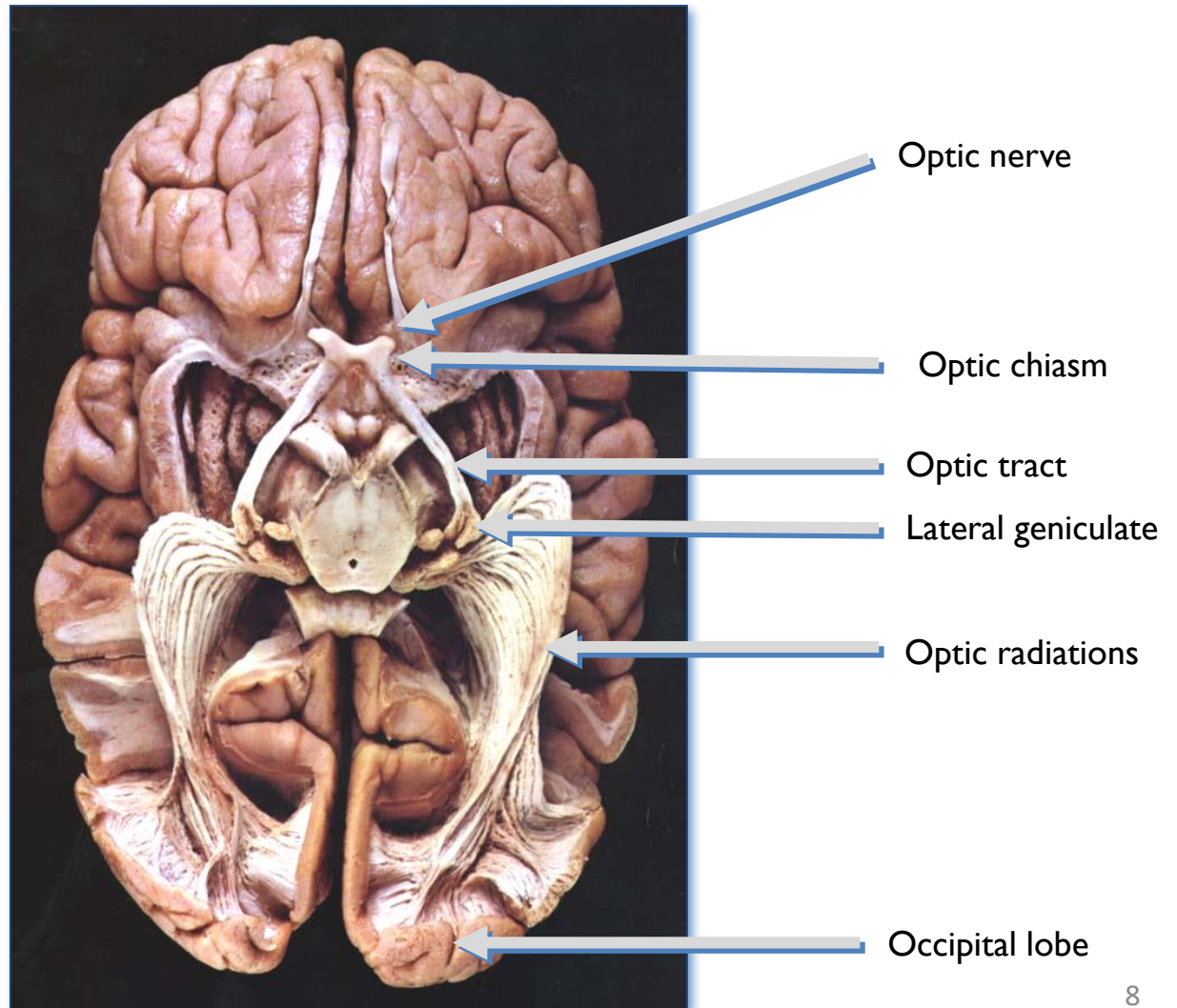
Visual Cortex - termination of all of the nerve fibers and found in the occipital lobe

Visual field loss secondary to retina and optic nerve disease = usually occur monocular

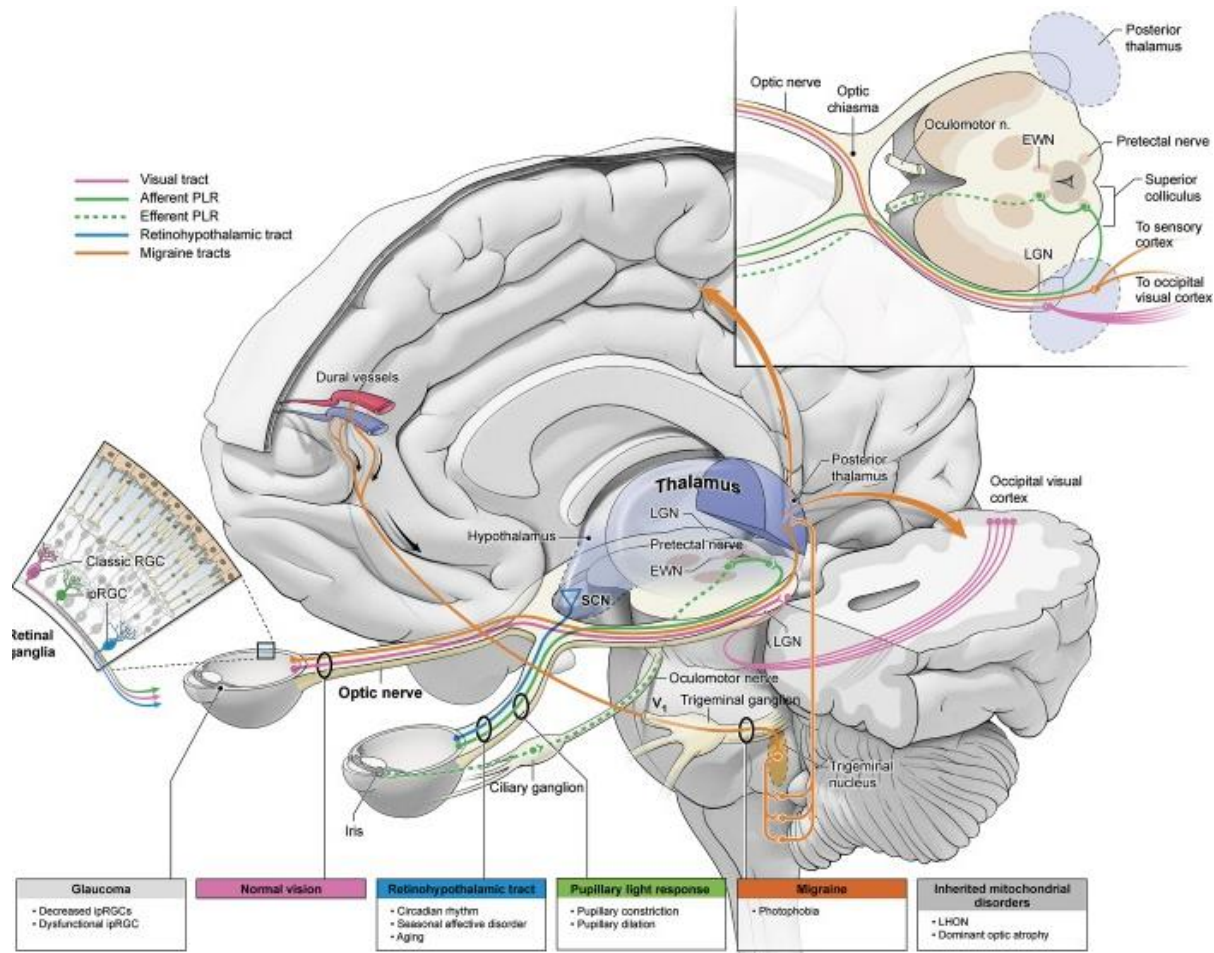
Examples: ARMD, glaucoma, optic neuritis or tumors



Anatomy of the visual pathway



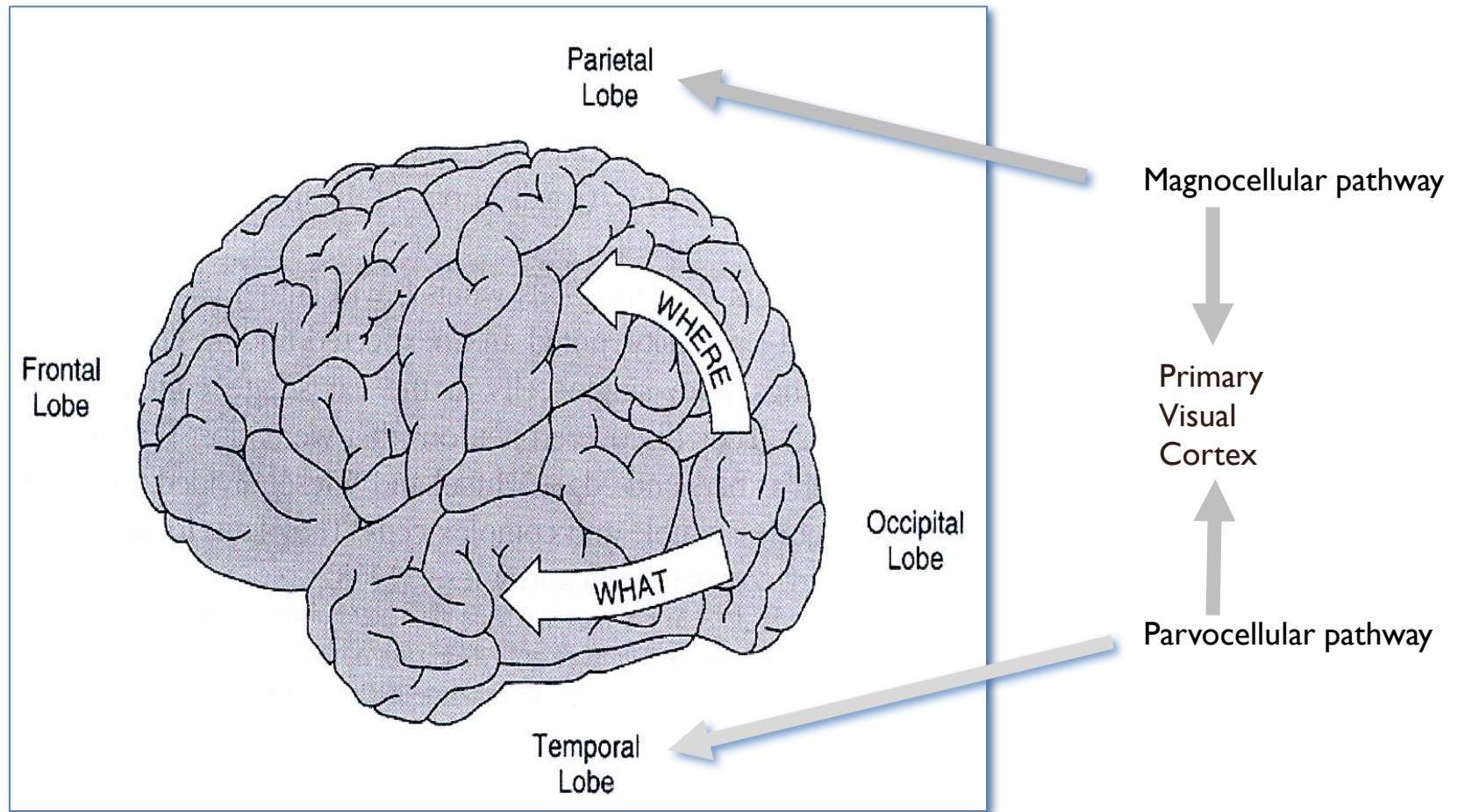
Important visual system pathways



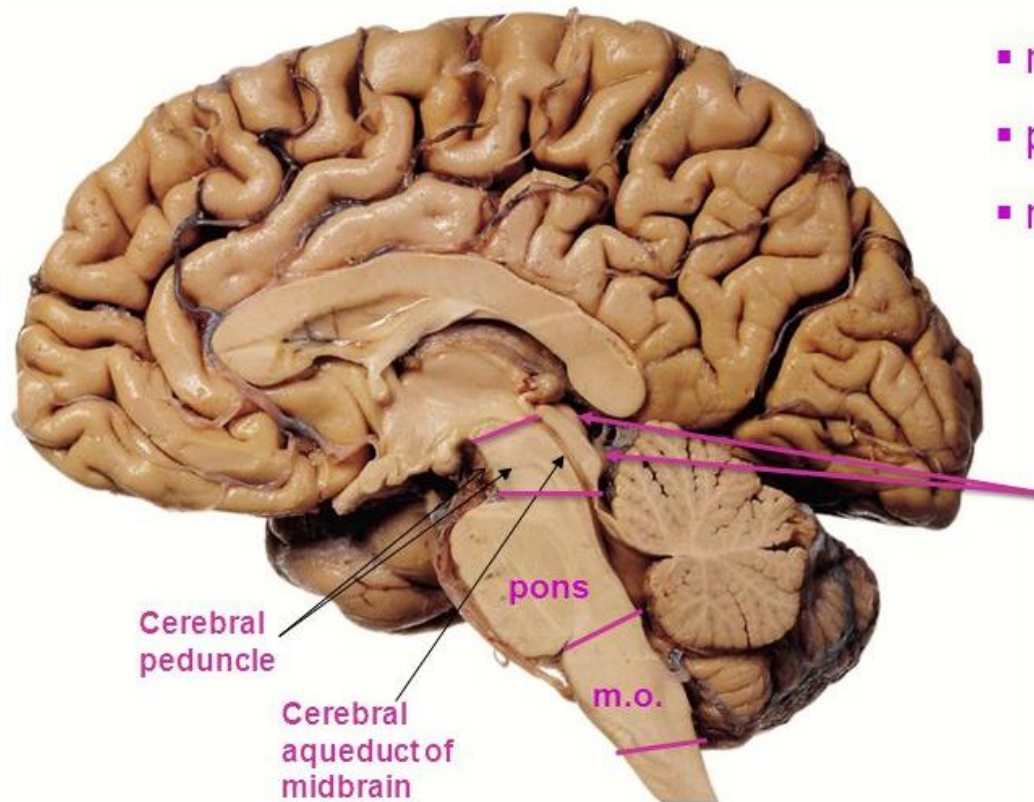
Important pathways

- #1. Visual pathway
- #2. Pupillary light pathway
- #3. Accommodative pathway
- #4. Retino-hypothalamic pathway

Ventral and dorsal streaming



Anatomy of the brain



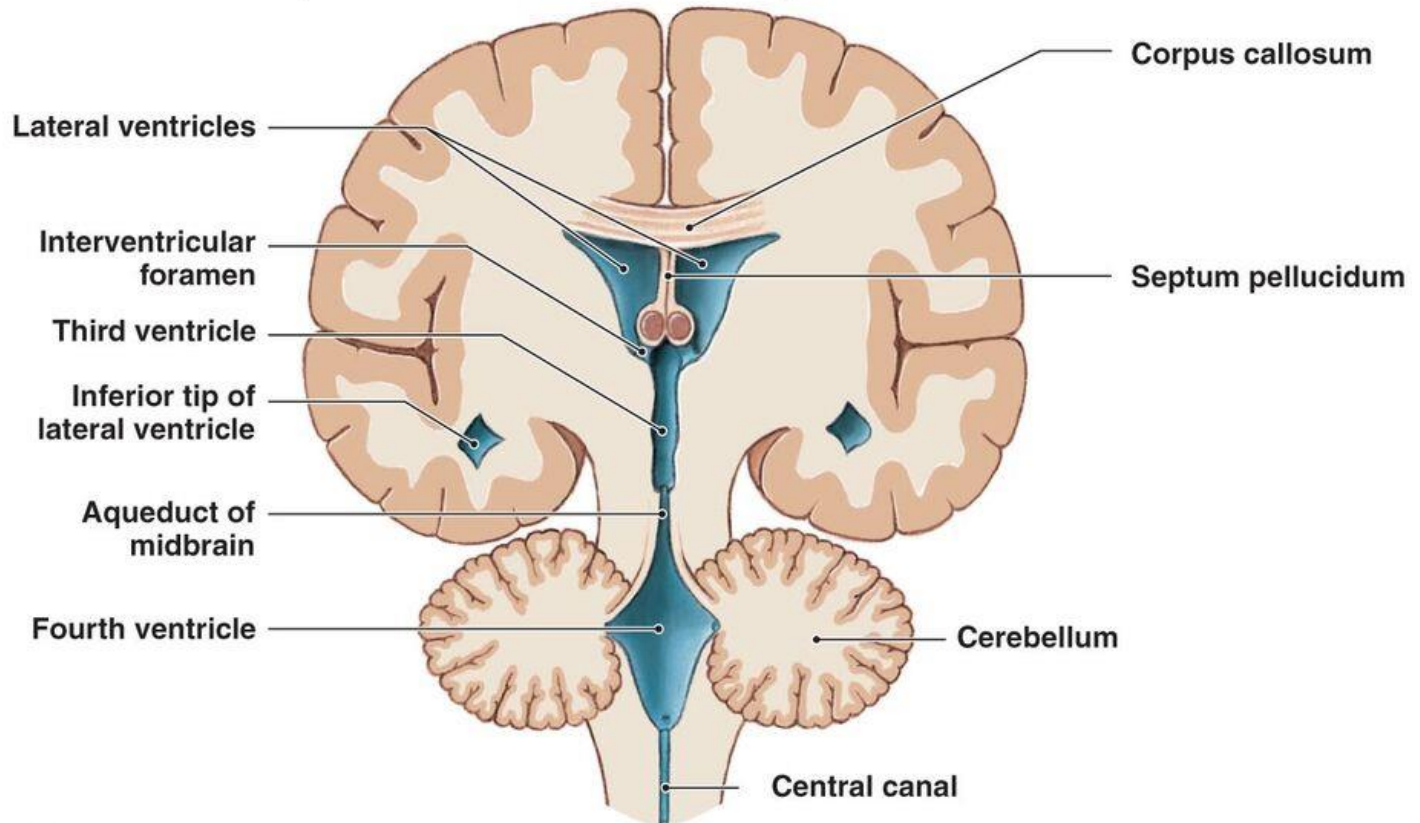
- medulla oblongata (M.O.)
- pons
- midbrain –
 - cerebral peduncle
 - cerebral aqueduct of midbrain
 - corpora quadrigemina
 - superior colliculi
 - inferior colliculi

(c)

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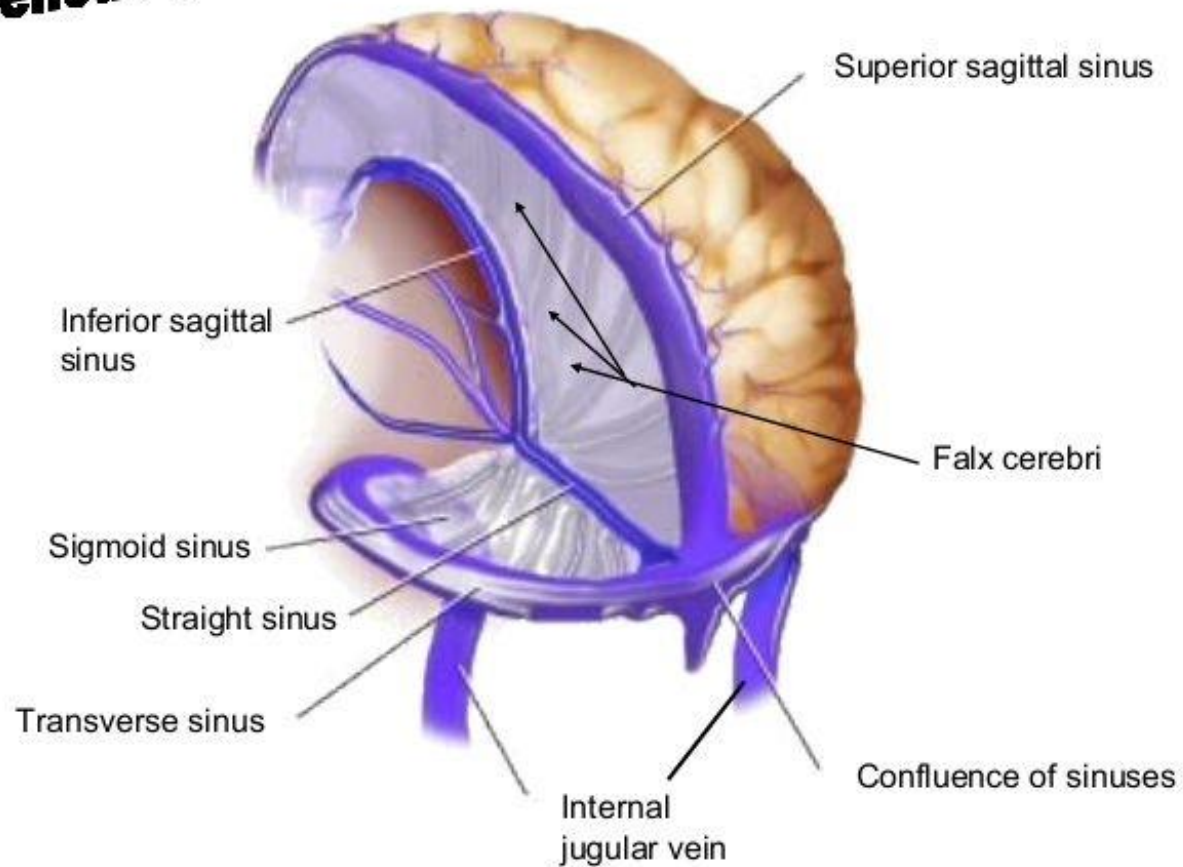
Ventricular system

Two views of the ventricles, which are filled with cerebrospinal fluid



Venous sinuses

venous sinuses



Case: 77 year old man

Reports 3 week history of blurred vision right eye

Notices especially when reading
Right-sided weakness

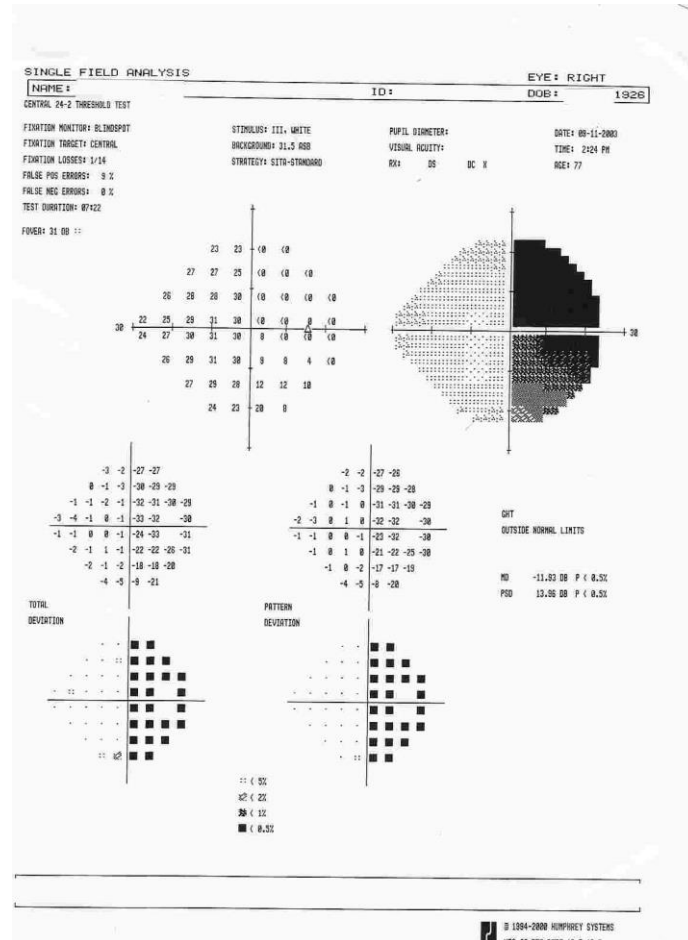
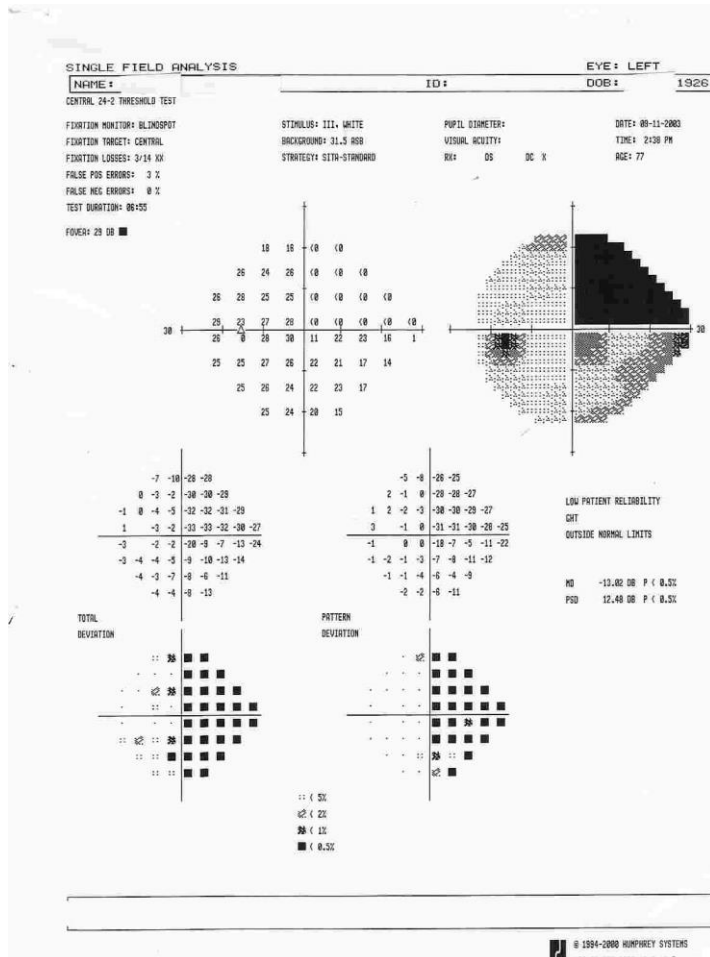
Visual acuities 20/20 (Right) 20/20 (Left)

PERRL (trace +) RAPD right eye

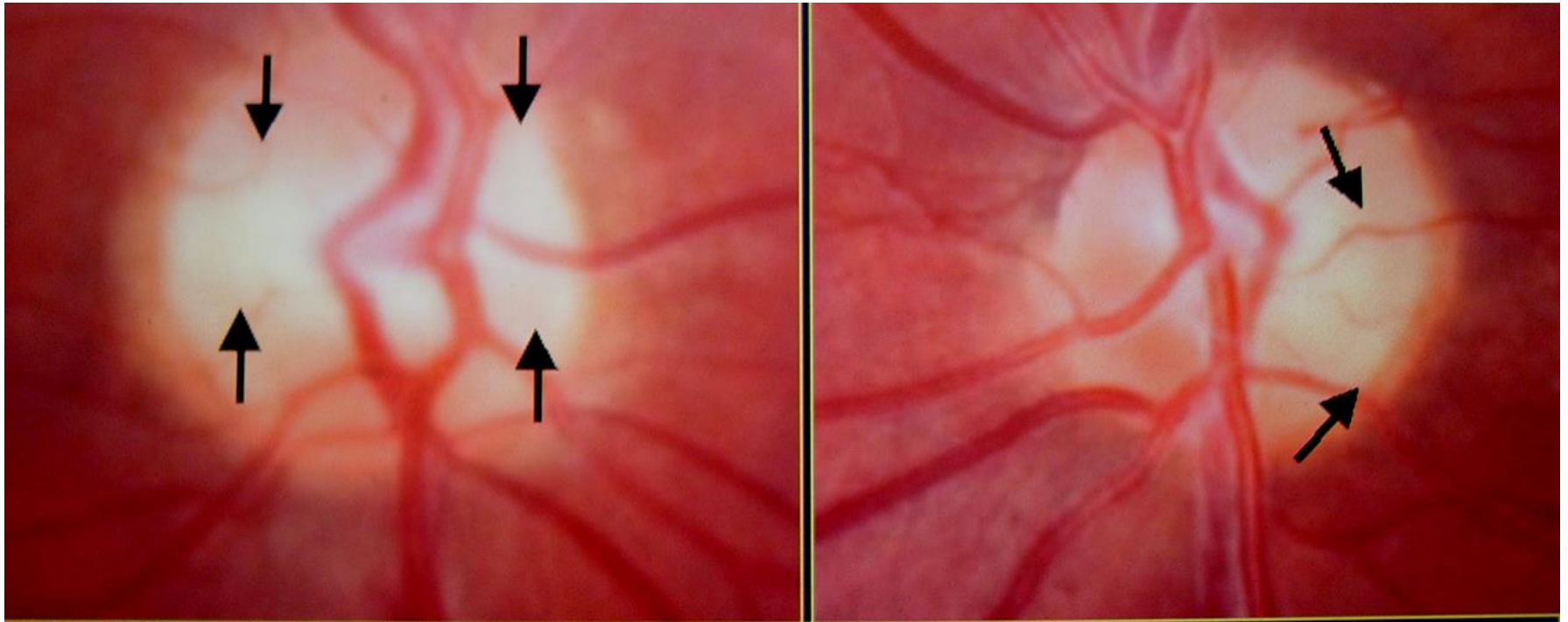
Confrontation fields: right homonymous hemianopia denser superiorly

Medical history: Hypertension / **pipe smoker**

Visual Field Results



Note the specific type of pallor in each optic nerve !!!!



Bowtie Optic atrophy
Right Eye

Temporal optic Atrophy
Left Eye

Bow-tie (band) optic atrophy

Nasal and papillomacular fibers cross in the chiasm

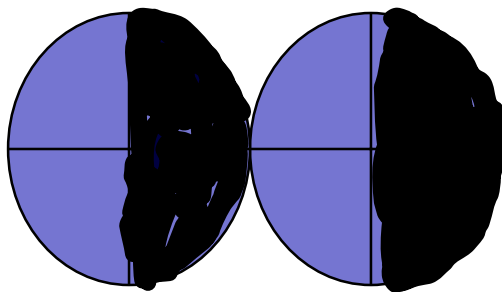
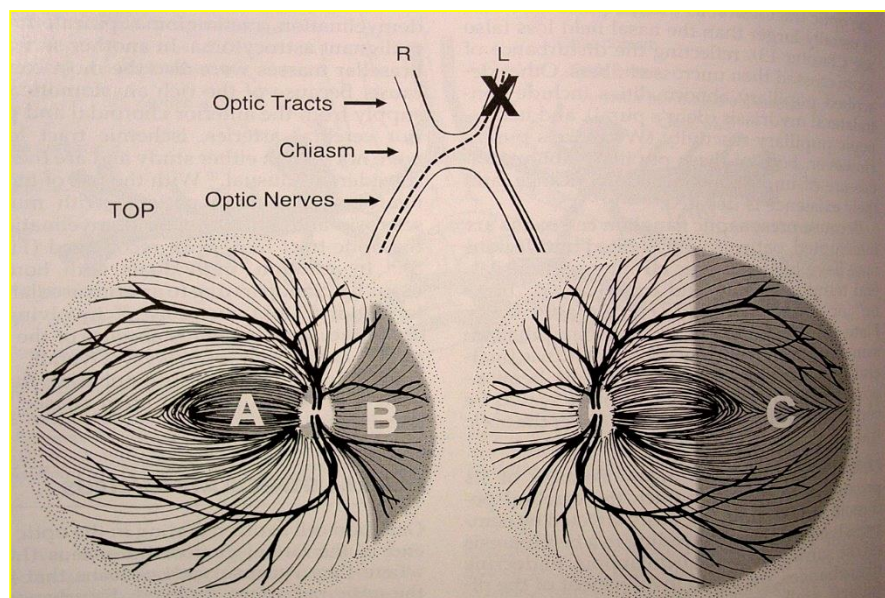
Optic tract lesion

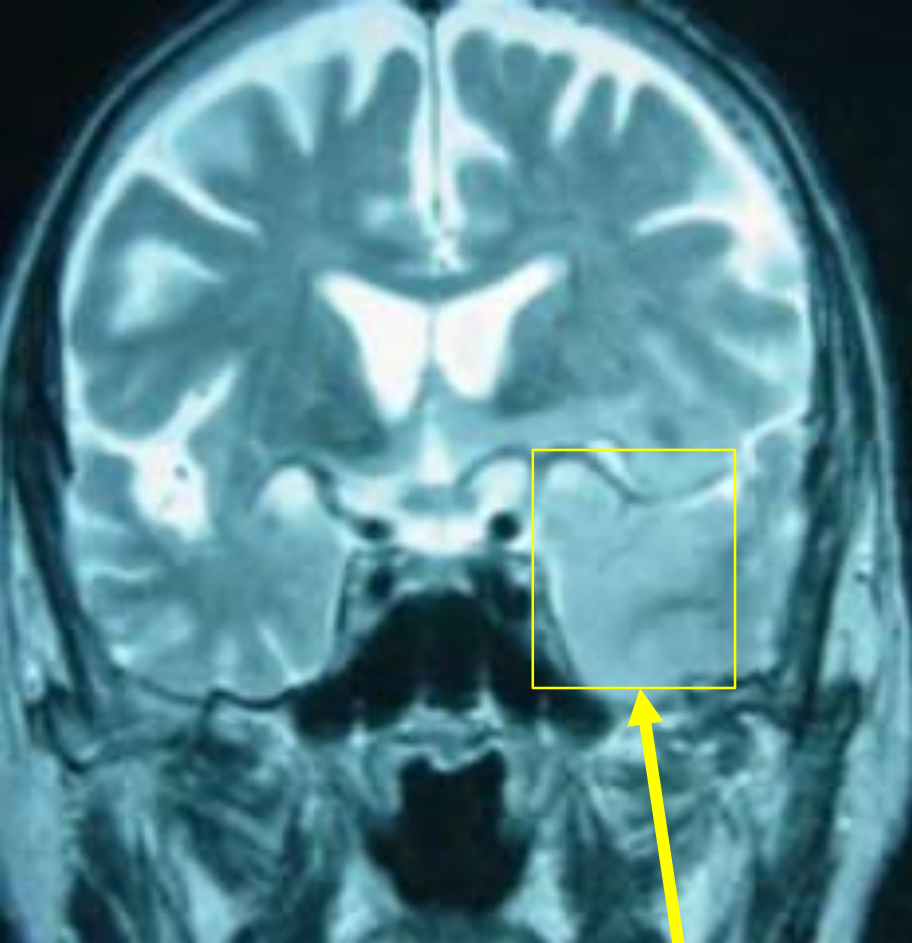
Ipsilateral ST/IT pallor

Contralateral band pallor (temporal VF defect)
From nasal macular fibers (papillomacular bundle)

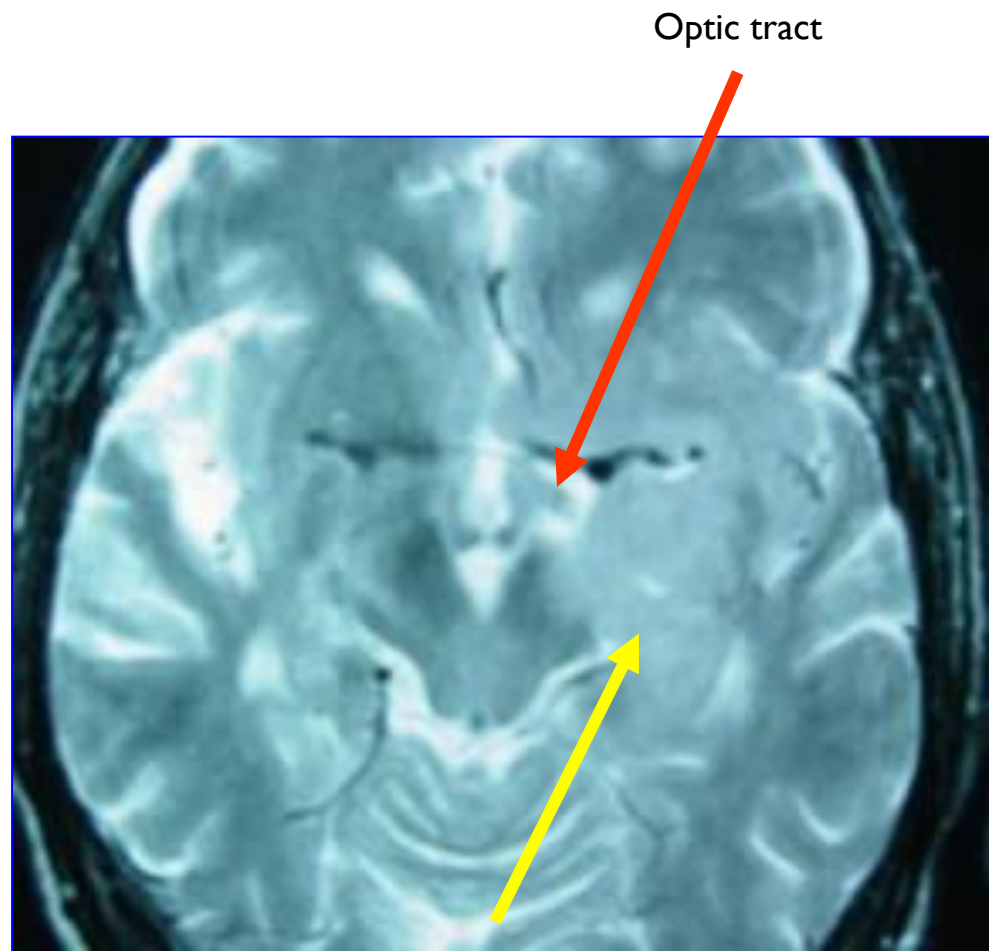
May have small RAPD in contralateral eye

Incongruous homonymous hemianopia



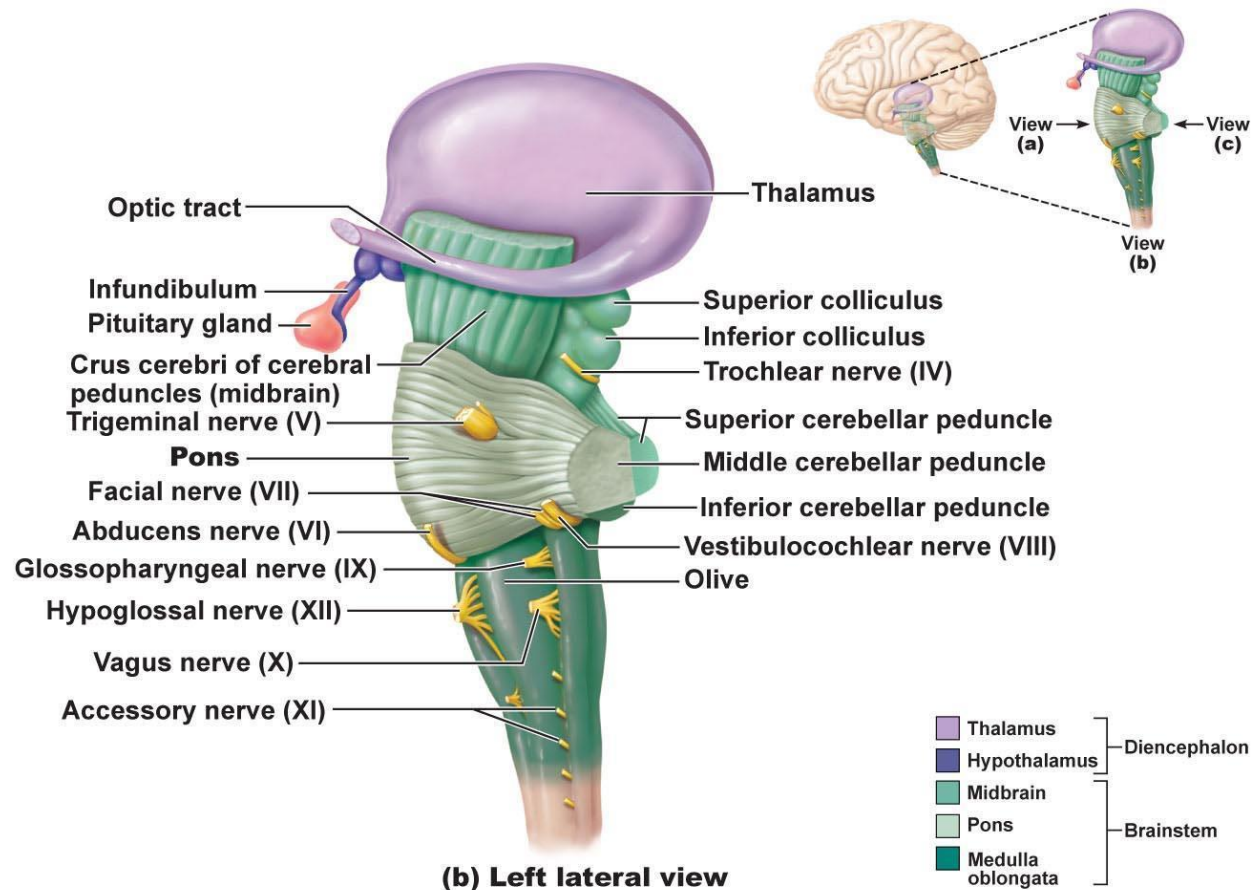


Glioblastoma
Multiforme



Optic tract

Visual pathway – sagittal view



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Treatment

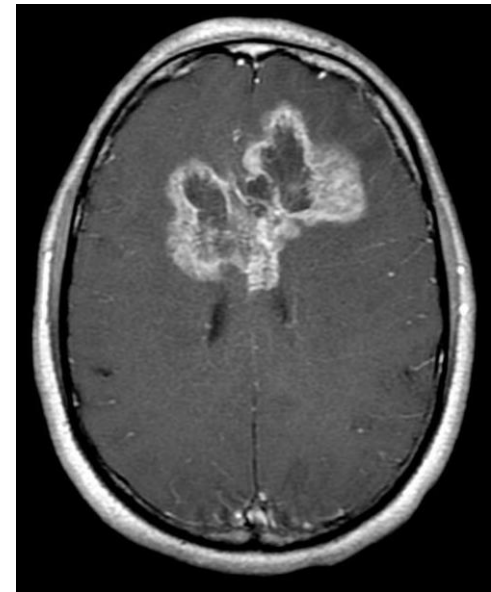
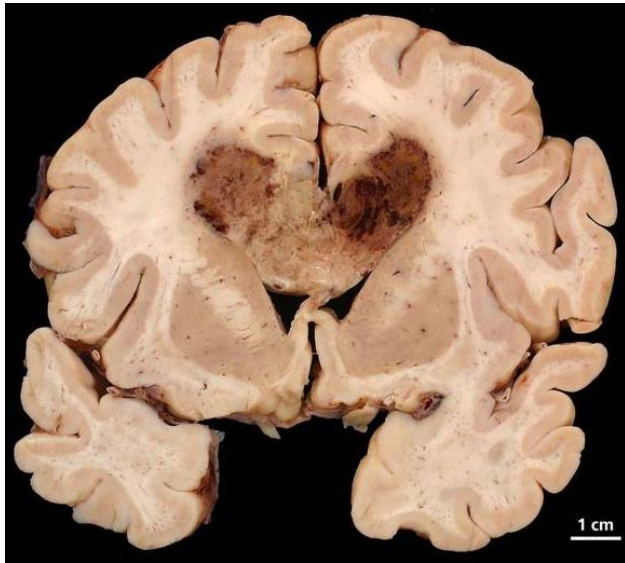
The standard of treatment for a GBM is surgery, followed by daily radiation and oral chemotherapy for six and a half weeks, then a six-month regimen of oral chemotherapy given five days a month.

The neurosurgeon will remove as much of the tumor as possible and may implant medicated wafers right into the brain. These wafers dissolve naturally and gradually release chemotherapy drugs into the tumor area over time.

Another chemotherapy drug called **temozolomide** was approved by the FDA in 2013 and is commonly used to treat GBMs and other advanced brain cancers. The drug is taken in pill form and works by slowing tumor growth.

Radiation may be used to destroy additional tumor cells and treat tumors in patients who are not well enough for surgery.

GBM = butterfly glioma



Bilateral optic nerve swelling

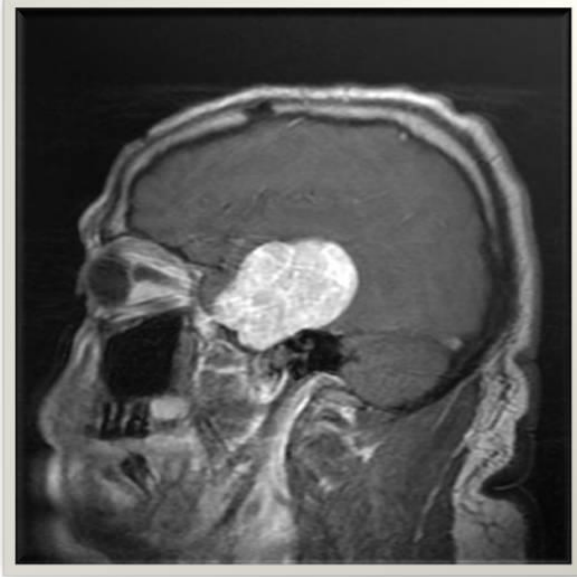
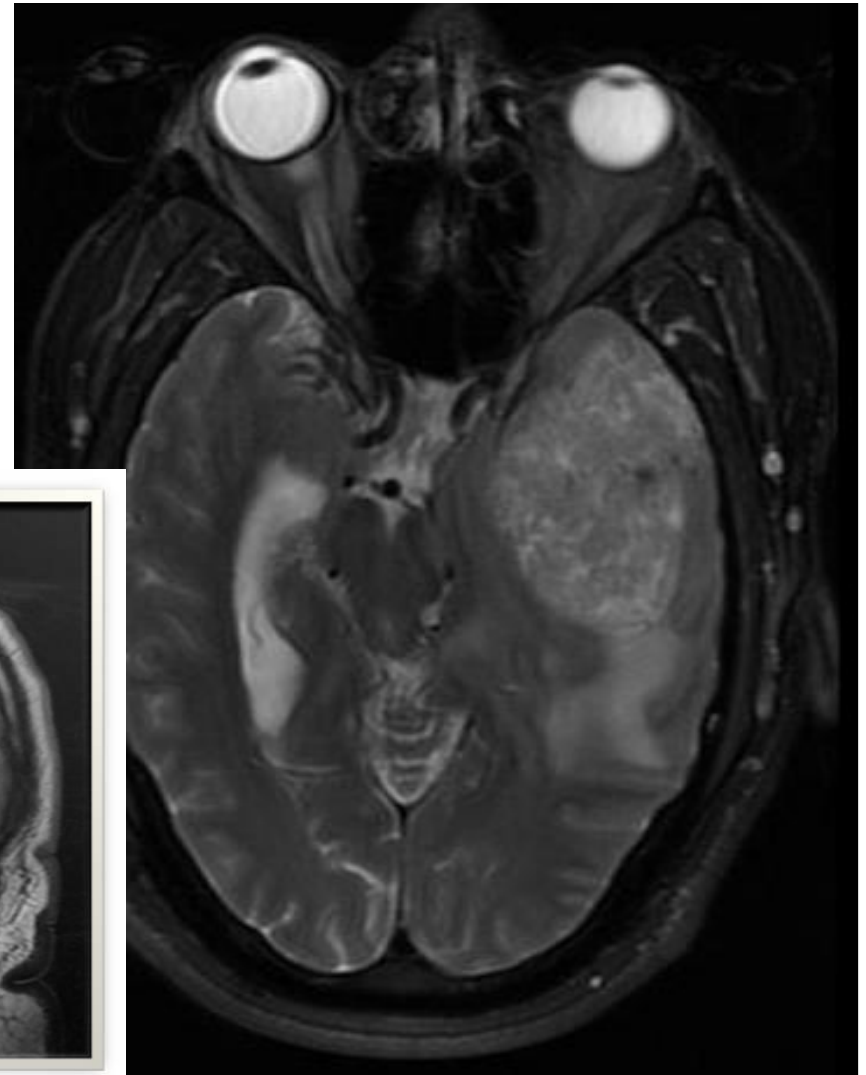
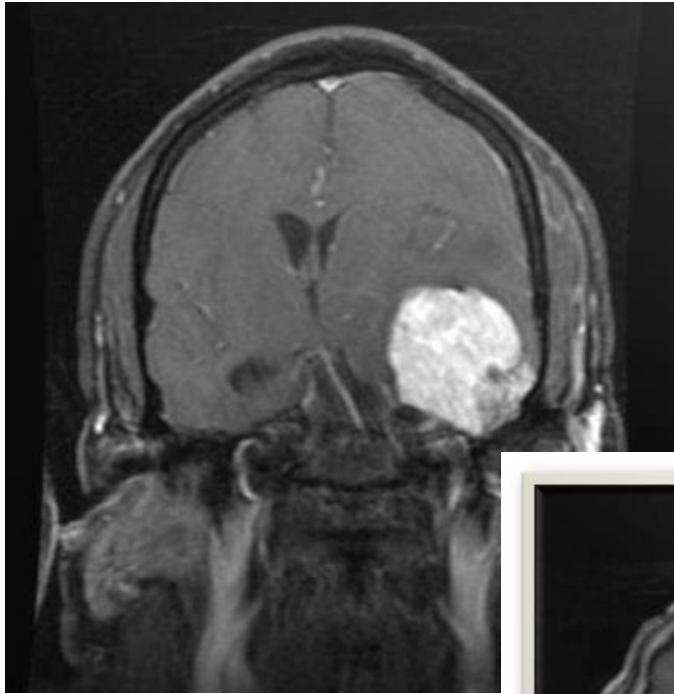
16 year old male

Left Temporal Lobe

Astrocytoma



Swelling of the optic nerves



Adult and childhood brain tumors

The most common primary central nervous system neoplasm in adults:

Astrocytomas = comprise 80% of all CNS tumors

1. Pilocytic Astrocytomas – childhood / cerebellar
2. Fibrillary Astrocytomas – (25 years old)
3. Anaplastic Astrocytoma
4. Glioblastoma Multiforme – most aggressive



Brain tumor suspicion

The greatest concern for most chronic headache patients is that they have a brain tumor

Patients with primary or metastatic brain tumors have a headache at the time of diagnosis (~30%)

Brain tumor headache have pain worse in the morning, nausea and vomiting = seen in **20%** of patients

Most often the headaches are intermittent, dull ache, unilateral and mild initially but usually occur daily

Headache occurs in **70%** of brain tumor patients

Tumors of the central nervous system

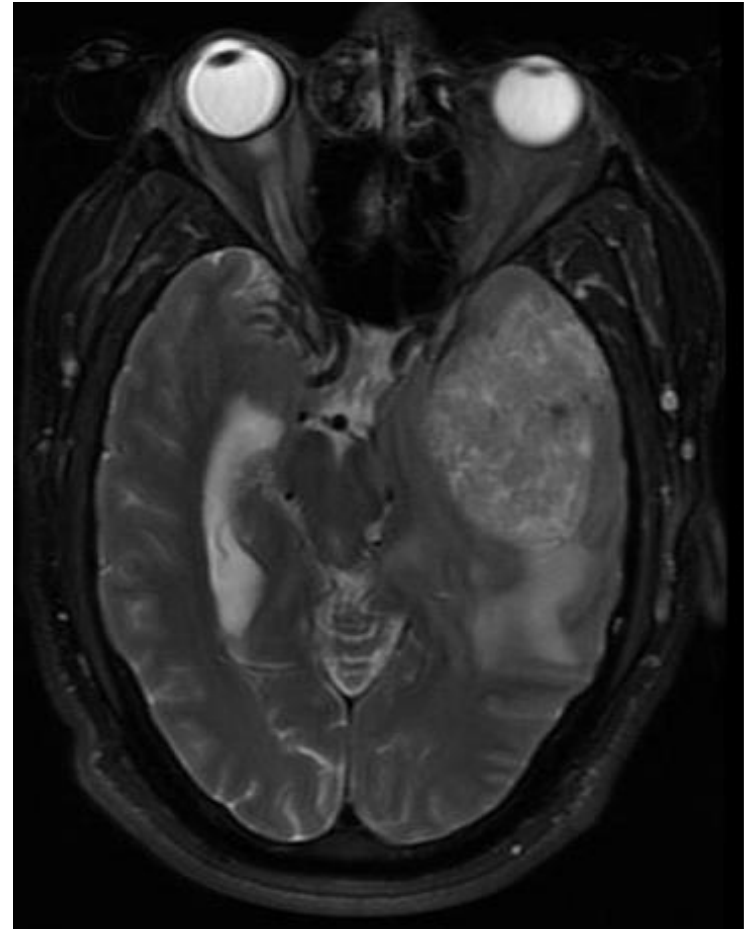
Incidence is 15 per 100,000 for intracranial tumors

In Adults 50% are primary brain tumors

In Adults 50% are metastatic brain tumors

- Breast cancer
- Lung cancer

In children, nearly all brain tumors are primary



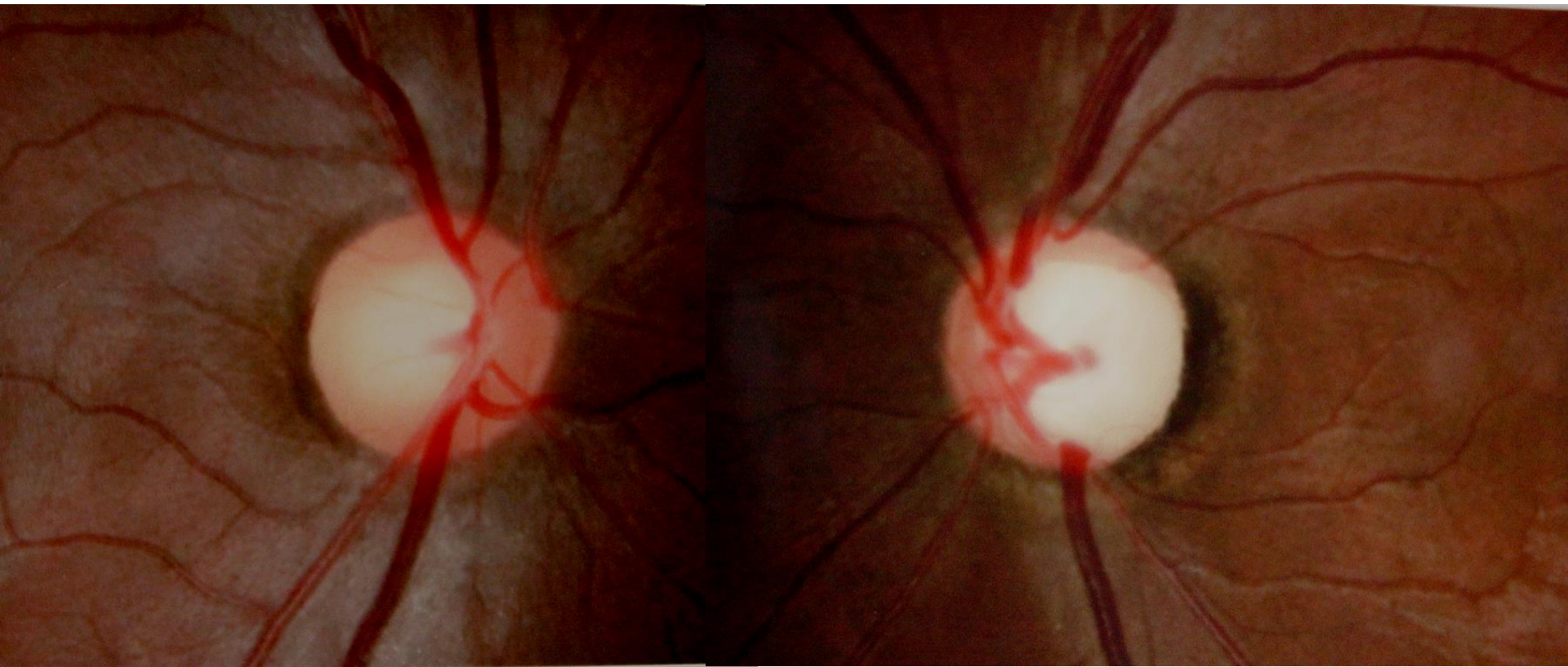
Case - 25 year old woman

5 yrs ago, C/D was 0.3 x 0.3 both eyes with no pallor in either eye

3 years ago C/D ratio increased with normal IOP

Due to findings, optometrist spoke with PCP, and PCP ordered MRI of brain and orbits with and without contrast

MRI reported to be normal

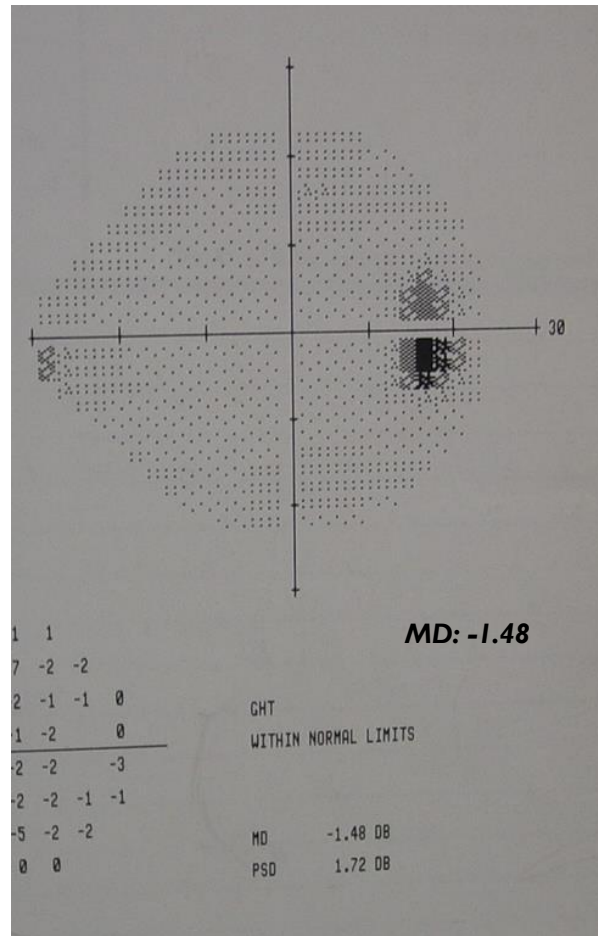
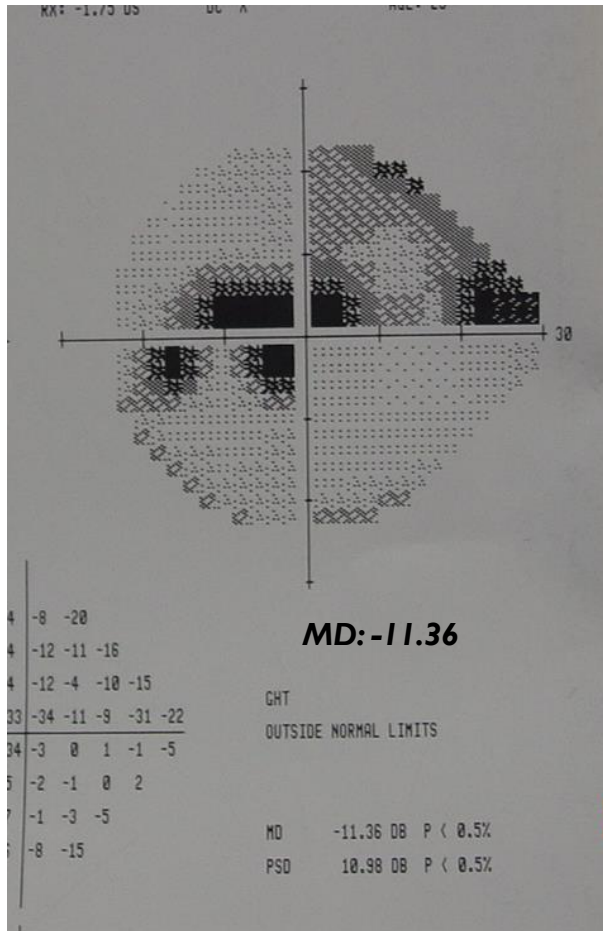


Present Exam :

Note Optic Nerve Structure and C/D

Right and left eye 25 mm Hg

Visual Fields



Subtract the MD

$11.36 \text{ right eye} - 1.48 \text{ left eye} = 10$

Then divide that # always by 10

In our case $10 / 10 = 1.0$

APD found when > 0.3

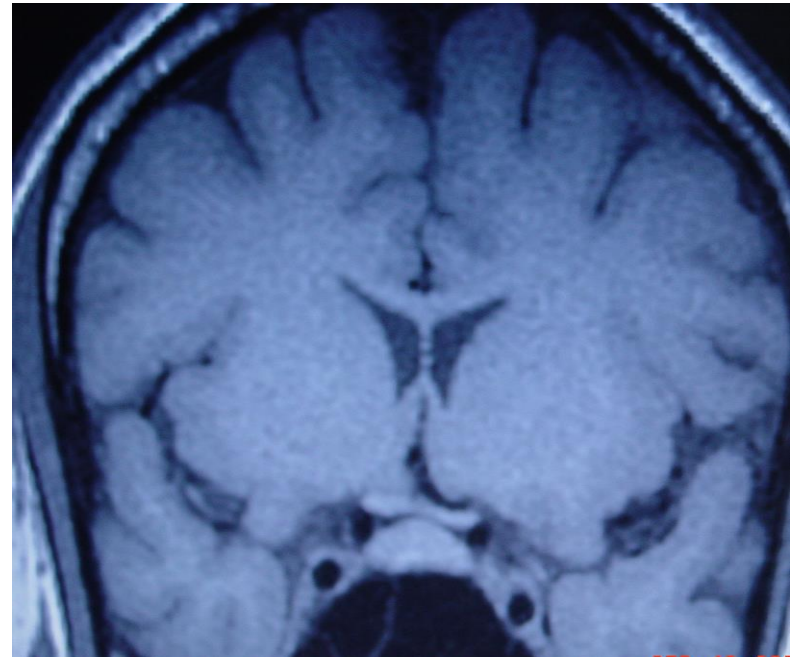
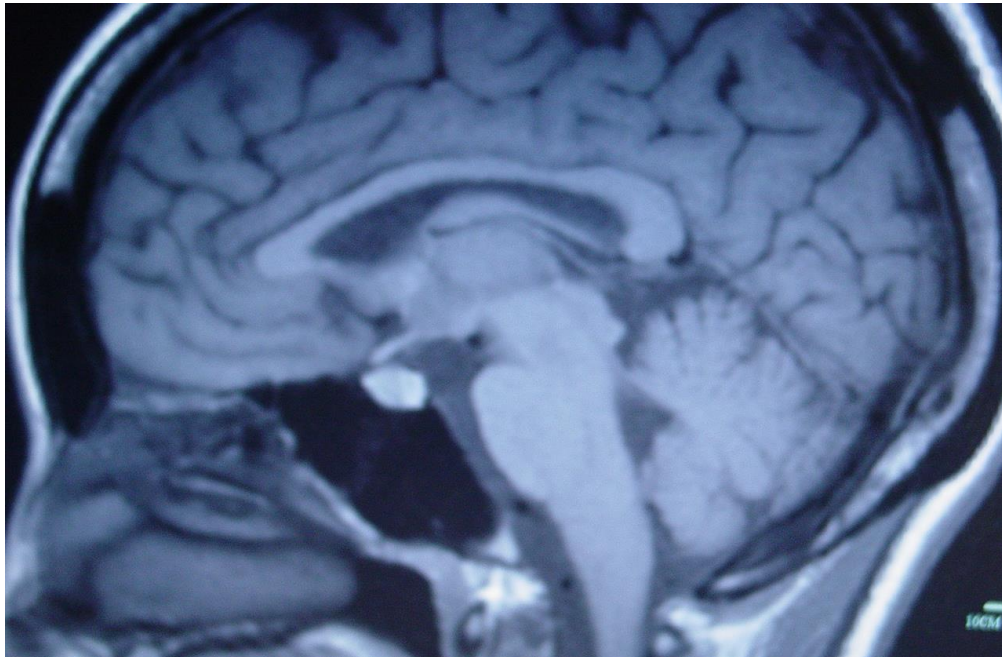
Grade 1 RAPD .3

Grade 2 RAPD .6

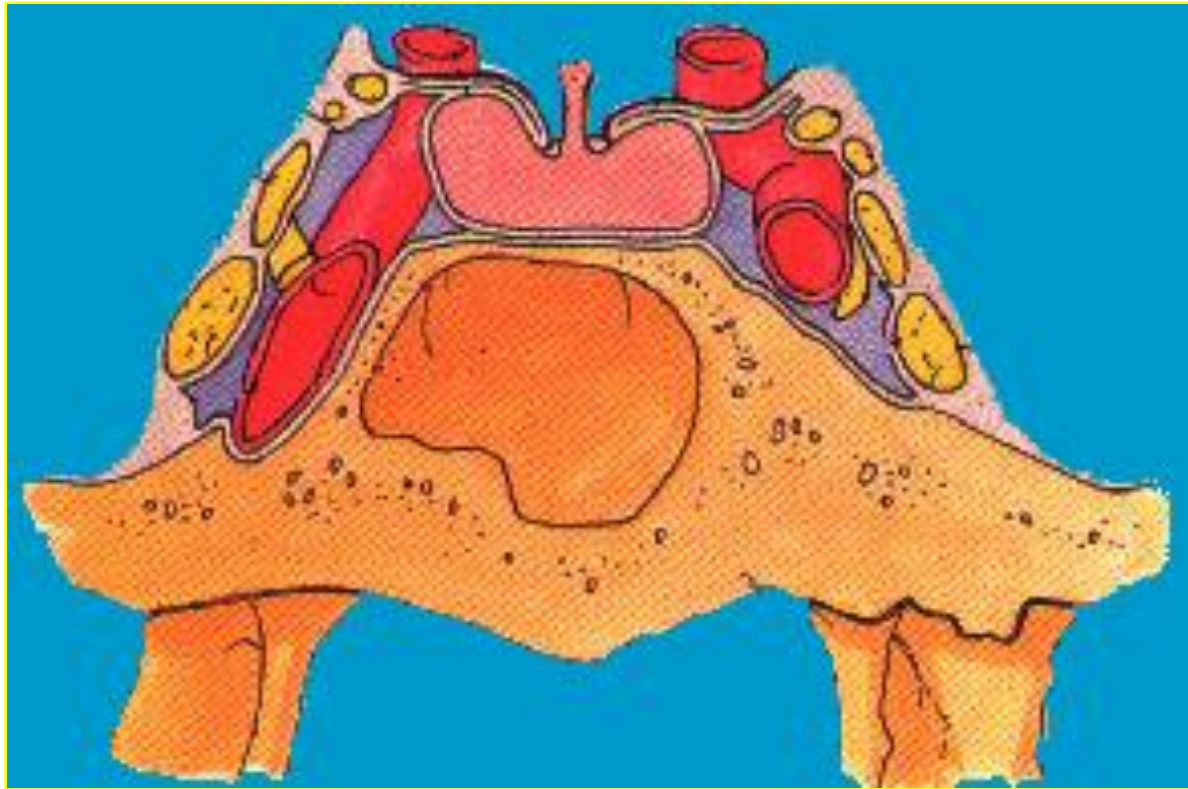
Grade 3 RAPD .9

Grade 4 RAPD 1.2

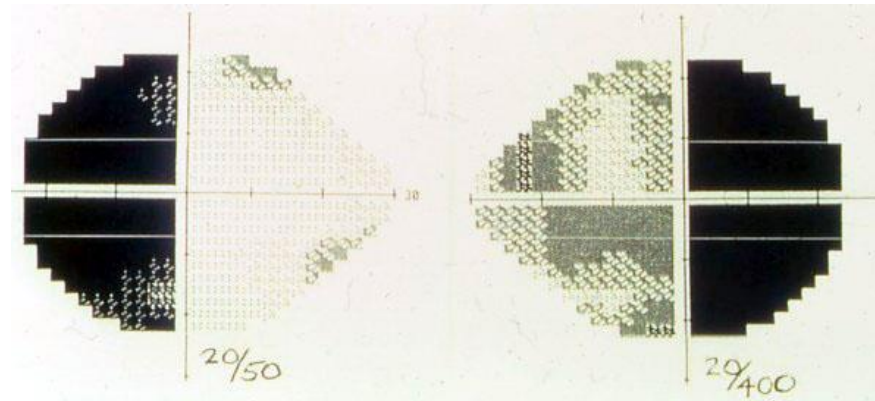
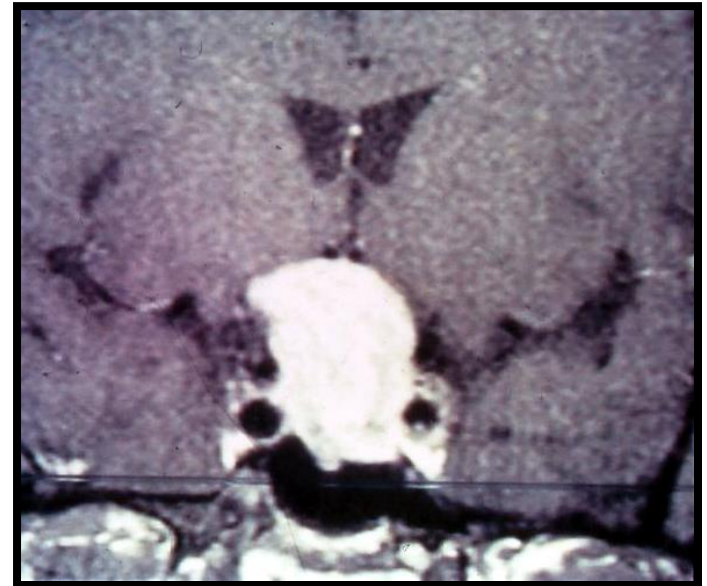
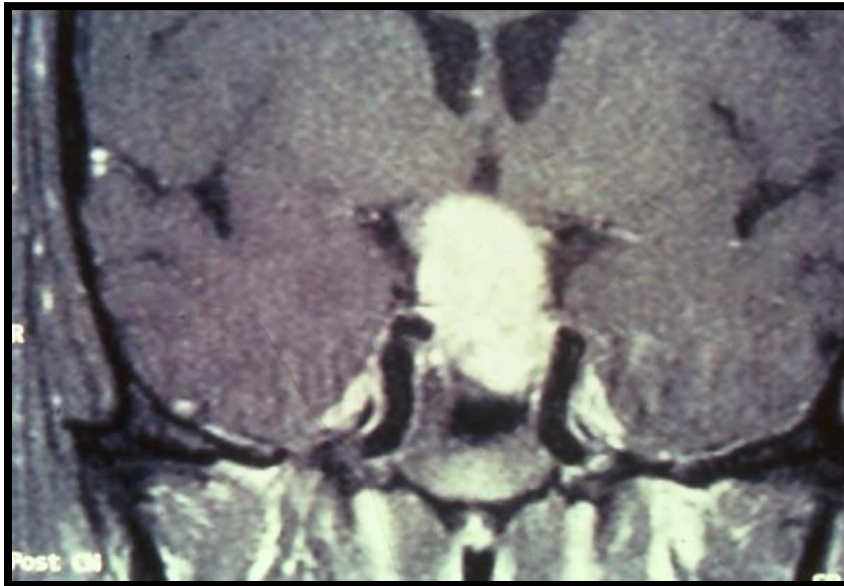
Important Notes: MRI



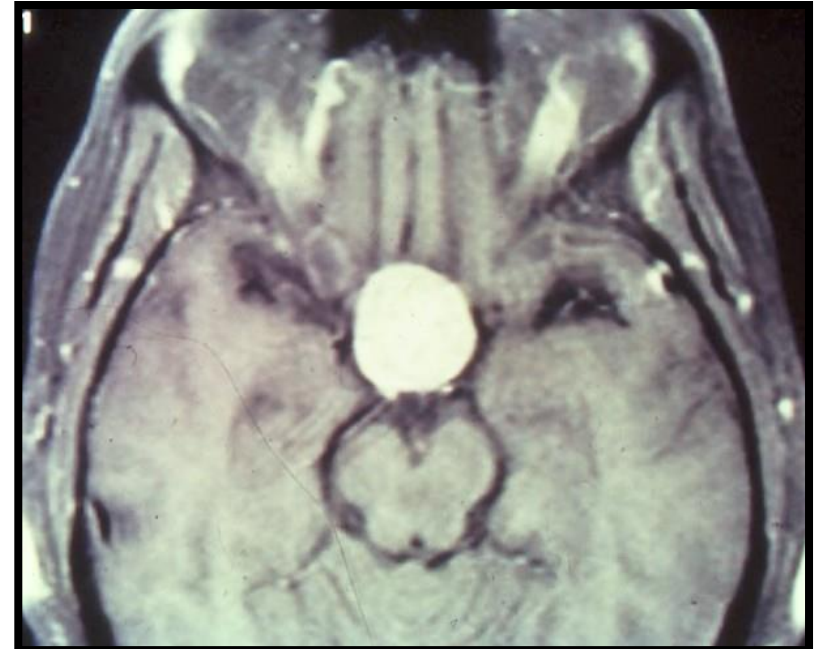
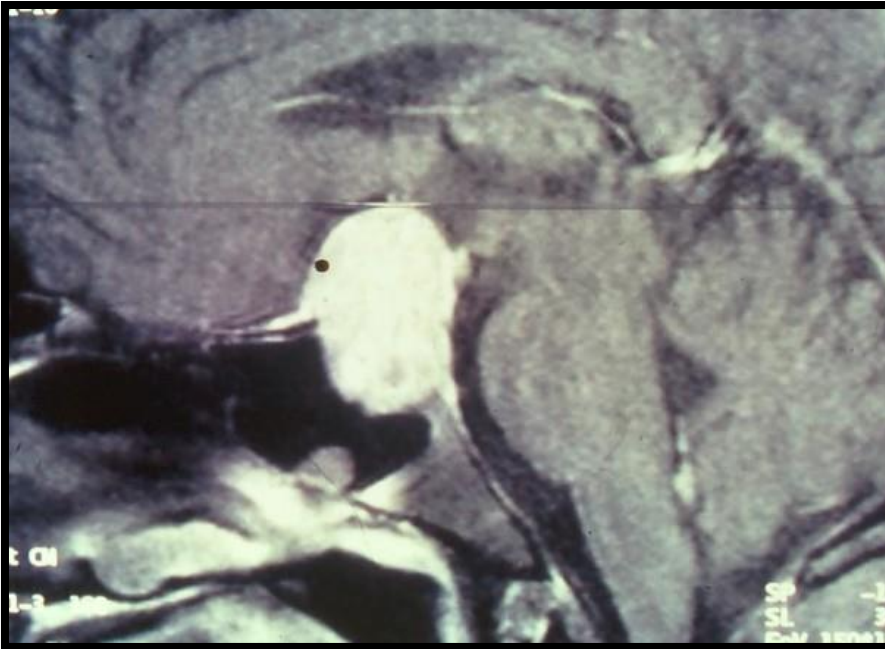
Cavernous sinus and pituitary gland



Pituitary gland adenoma



Types of pituitary adenomas



Growth hormone: Acromegaly - This condition often requires surgery as the first line of treatment.

Cushing's syndrome/ACTH (Adrenocorticotrophic hormone): Surgery is most commonly the first line of treatment.

Prolactinoma: is the most common secretory pituitary tumor. It can be treated with a medication bromocriptine.

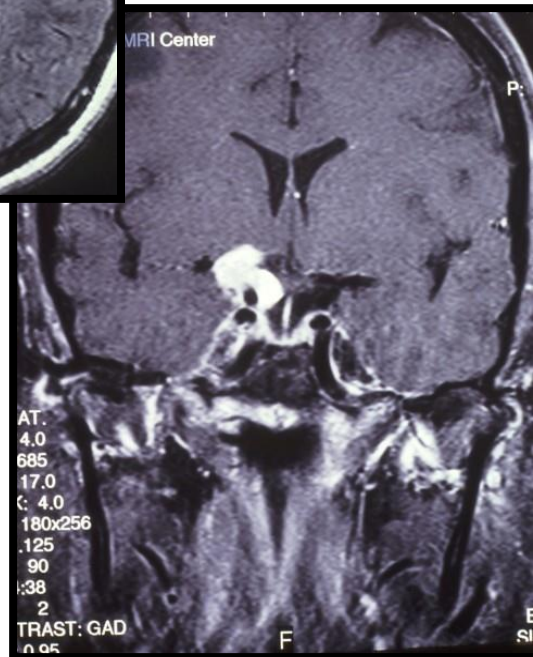
Non-secreting tumors: do not secrete hormones but can cause health problems because of their size and location. Treated surgically.

Etiology of bitemporal VF loss

Pituitary Adenoma	55%
Craniopharyngioma	25%
Meningioma	10%
Glioma	7%
Arachnoid Cyst	



Case - Meningioma



Pale right optic nerve

Meningioma

Meningioma

Tumor comprised from the cell of the arachnoid layer of the meninges

These neoplastic proliferations grow slowly in the subarachnoid

Epidemiology

Females are affected by a 3:1 ratio

Most commonly present in patients from 30-50 years of age

Meningiomas are rare in patients less than 20 years old

Meningioma

Facts

- Meningiomas compress the optic nerve by extrinsic factors
- Most meningiomas are unilateral

Diagnosis

- MRI (Magnetic Resonance Imaging)
- CT scan

Treatment

- Observation
- Surgical removal
- Radiation







Central 24-2 Threshold Test

Fixation Monitor: Gaze/Blind Spot

Fixation Target: Central

Fixation Losses: 7/19 xx

False POS Errors: 26 % xx

False NEG Errors: 26 %

Test Duration: 11.07

Fovea: OFF

Stimulus: III, White

Background: 31.5 ASB

Strategy: SITA-Standard

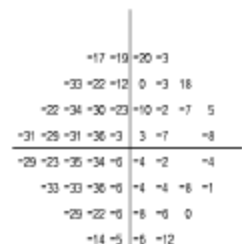
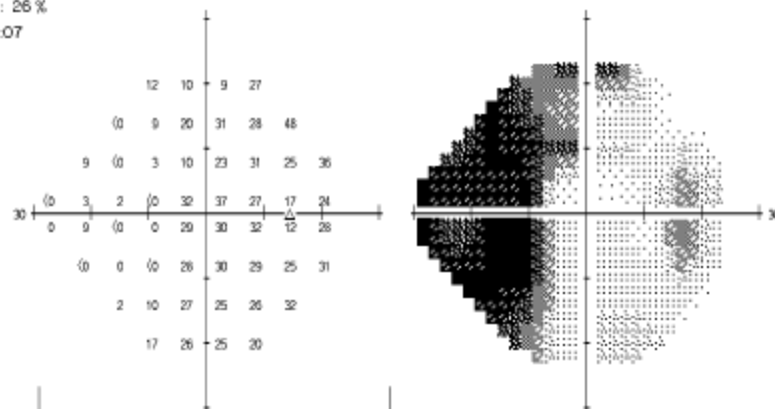
Pupil Diameter: 8.8 mm

Visual Acuity:

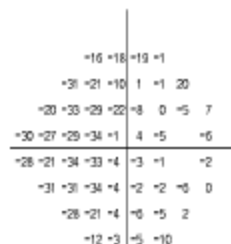
RX: +3.00 DS DC X

Time: 2:43 PM

Age: 23



Total Deviation



Pattern Deviation

*** Excessive High False Positives ***

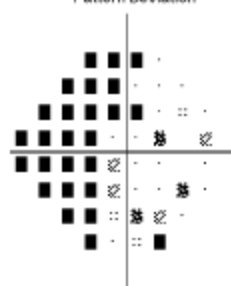
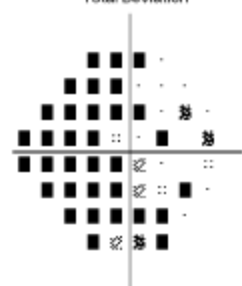
GHT

Outside Normal Limits

VFI 65%

MD -14.90 dB P < 0.5%

PSD 14.53 dB P < 0.5%



:: < 5%
 :: < 2%
 :: < 1%
 ■ < 0.5%

The Eye Institute
 7630 Germantown Ave
 Philadelphia, PA 19118

Central 24-2 Threshold Test

Fixation Monitor: Blind Spot

Fixation Target: Central

Fixation Losses: 12/17 xx

False POS Errors: 14 %

False NEG Errors: 13 %

Test Duration: 10:06

Fovea: OFF

Stimulus: III, White

Background: 31.5 ASB

Strategy: SITA-Standard

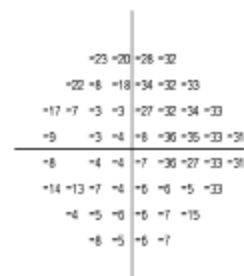
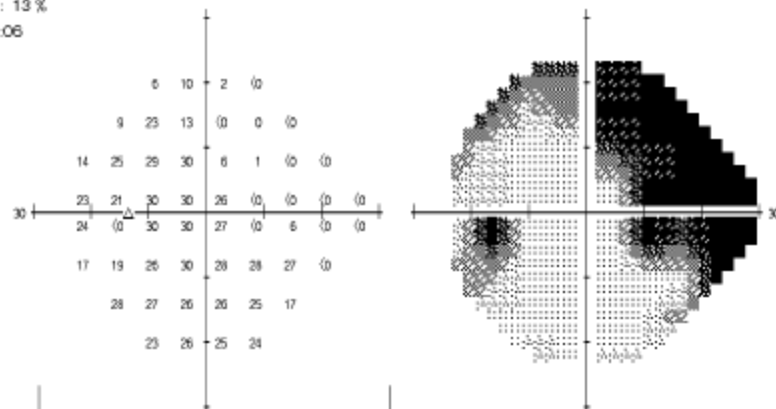
Pupil Diameter:

Visual Acuity:

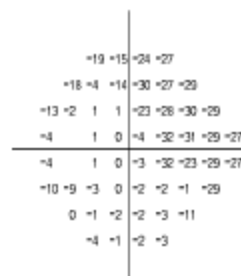
RX: DS DC X

Time: 2:56 PM

Age: 23



Total Deviation



Pattern Deviation

*** Low Test Reliability ***

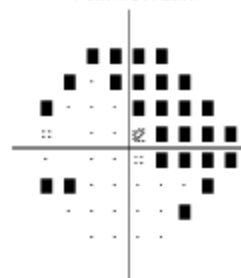
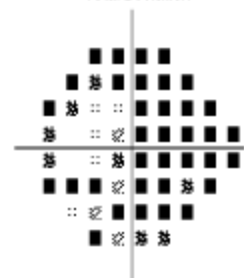
GH

Outside Normal Limits

VFI 65%

MD -15.80 dB P < 0.5%

PSD 13.51 dB P < 0.5%

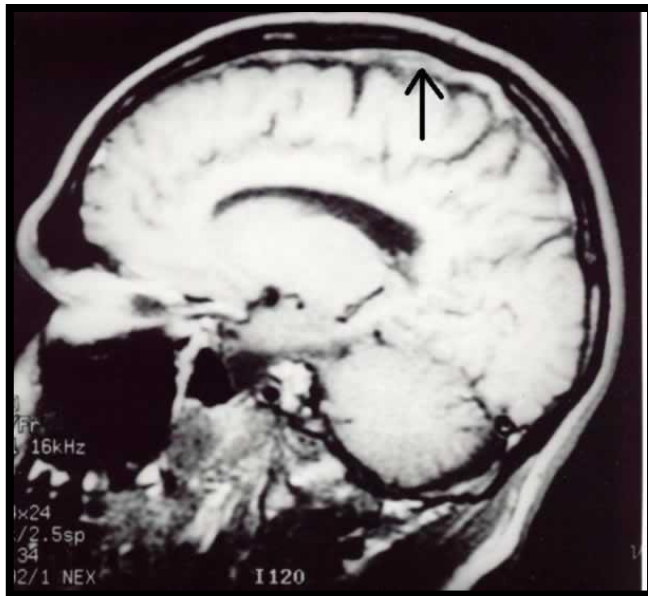


:: < 5%
 :: < 2%
 :: < 1%
 ■ < 0.5%

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 Philadelphia, PA 19118

Venous sinus thrombosis

MRV – performed to image dural venous sinuses



Blood clot in veins = headache, stroke symptoms

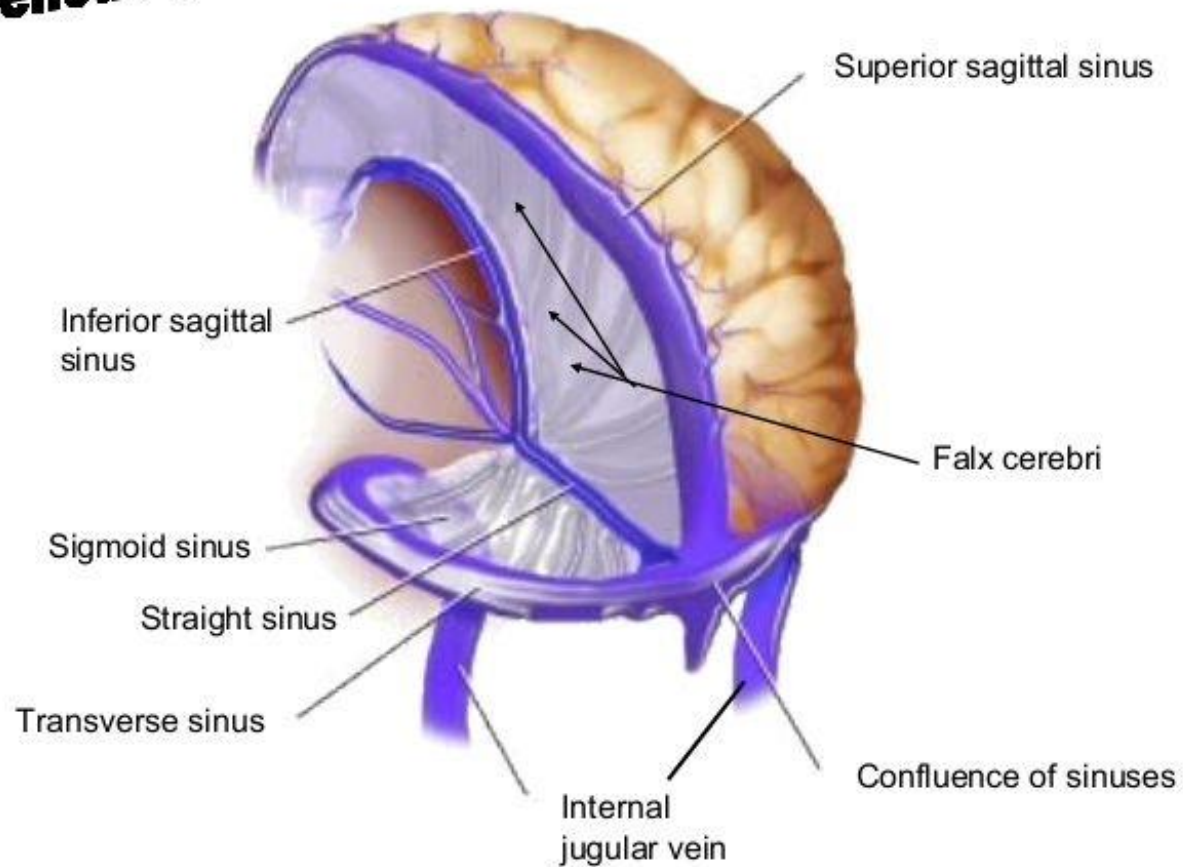
Prevalence 5 per million / year

Inherited blood disorders (factor V leiden), lupus, cancers, medications (chemo drugs), infections (staph)

Intravenous heparin, subcutaneous heparin then coumadin for extended period of time

Venous sinuses

venous sinuses



Things that must be considered with ONH swelling

- Immediately order a **CT** or **MRI** – to rule out mass lesion
- If no lesion is found – **lumbar puncture** will be performed to rule out infection and to measure ICP
- **MRV** to rule out “venous sinus thrombosis”
- Get **visual fields** to make sure no progressive field loss
- Always, Always, Always check **blood pressure**



Resting Miosis



Acknowledgement: Kelly Malloy, OD



No light response, brisk near



Argyll-Robertson Pupil

- Resting Miosis (2.5 mm) in darkness
- No direct pupil response
- Brisk near response (LND)
- Preserved vision ?
- Dilates poorly

Causes:

- Syphilis, Multiple Sclerosis, Lyme, Sarcoidosis

Stages: Ocular Syphilis

Primary – Chancre on eyelid or conjunctiva

Secondary – Uveitis, optic neuritis, retinitis, episcleritis, scleritis, conjunctivitis, dacryoadenitis, dacryocystitis

- Ocular findings found in 10% with secondary syphilis

Latent stage – may remain so for months or even a lifetime

Tertiary – Interstitial keratitis, optic atrophy, Argyll Robertson

Syphilis Work-up and Management

- FTA-ABS, RPR
- Lyme titer
- Neuroimaging (r/o MS)
- Rule out Sarcoid: Chest X-ray, ACE, serum lysozyme

Treatments

- IV or IM Penicillin G
- Oral Tetracycline/Doxycycline or Azithromycin

Thank you for your attention



The End

Any Questions?

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thank you for being with us this year.**

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